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ESG as M&A Catalysts: Unravelling the Complex Dynamics of Deal Completion

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Abstract

Numerous studies have identified the relationship between ESG rating and M&A performance, but little have discussed the implication of ESG during the pre-deal phase. This paper investigates the relationship between ESG and deal status. Particularly, how ESG disclosure and performance impact the probability of a deal being completed or withdrawn. This paper chose M&As from regions with widespread ESG regulations and applications, namely M&A samples from 2010 - 2022 in North America and Western Europe. After conducting probit analyses, we found that target firms' decision to disclose ESG information negatively influences deal completion probability, while acquirers' decisions have no significant relationship. Furthermore, an increase in target firms' ESG and environmental scores also negatively affects deal completion probability. Our study finds no relationship between deal status and the differences in ESG scores between target and acquiring firms.

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1. Introduction

1.1. Introduction

Mergers and acquisitions (M&A) refers to the process by which companies combine to create a single entity through purchasing, merging, or consolidation (Risberg, 2013). Objectives of M&A vary depending on the specific case, which can be generalized as financial or strategic incentives–either generating shareholder values or enhancing competitive stance (Risberg, 2013). Although the current fear of recession and rising interest rates has led to fewer recent M&A activities, deal volumes remained 9% higher than pre-pandemic levels, with two-thirds of CEOs planning to carry on M&A deals in the following years (PricewaterhouseCoopers, 2023). EY's reported that value creation in an M&A setting can also be driven by ESG (environmental, social, and governance) activities, with CEOs selecting target firms with ESG in mind (Makrygiannis, 2022). Additionally, companies face high pressure to transition to a more sustainable and low-carbon future; the security exchange commission (SEC) mandated sustainability disclosure, and EU Taxonomy Regulation was enacted recently in 2020. Many guidelines relating to operational transparency also took place prior, like the Paris Agreement in 2015. However, engaging in M&A is a substantial and intricate task; as of 2022, 933 M&A deals did not materialize globally (Zephyr Database, 2022). With rising relevance and further public pressure, exploring the relationship between ESG and M&A, especially during the pre-deal phase, will provide an interesting insight into corporate finance and value creation.

There are varying reasons why deals fail, and some fail due to coinciding factors. Target firms that are larger than the acquiring firms and target firms that are less profitable are more likely to get withdrawn (Attah-Boakye et al., 2021). Sometimes, deals fail due to intricacies relating to legal problems arising from cross-border mergers. Of all factors influencing deal completion, most literature noted the primary factors relating to deal completion are deal hostility, the number of competing acquirers, lengthy takeovers, investor protection, and (in some cross-country M&As) GDP proximity (Caiazza & Pozzolo, 2016; Rossi & Volpin, 2004). There are relationships between ESG scores and M&A in various contexts related to this research. For instance, selecting target firms with high ESG scores generates ex-post stock market value for the acquirers (Teti et al., 2022). Engaging in M&A activities with target firms that have high scores can potentially elevate the score of the acquiring firm (Ung et al., 2021). In theory, firms should favor high-scoring targets. However, if the acquiring firms are not as sustainable (they have lower ESG scores), Cardillo & Harasheh (2023) noted that it may negatively impact the time to complete a deal. When acquiring a potential target, acquiring firms should also consider the synergy differences between the two companies.

This study aims to close the gap in finding determinants of M&A success, where the objective is to uncover the completion of M&A deals considering ESG disclosure and each ESG performance. The stakeholder theory proposed that businesses' effectiveness revolves around the stakeholders, including the society as a whole, and whether businesses can balance the needs of their stakeholders (Freeman, 1994). Drawing upon stakeholder theory, targeting ESG-focused firms is a rational move for many acquiring firms today. Target firms with high

scores not only enhance the market value of the acquiring firms post-merger, but they also contribute to an increase in the acquirers' ESG score (Tampakoudis & Anagnostopoulou, 2020). Niemczyk et al. (2022) also emphasized how M&A is a vehicle for diversifying environmental risks, a surface-level indicator of ESG as another driver for M&A. Therefore, it is progressively riveting to identify how sustainability factors interplay in mergers and acquisitions–whether ESG plays a part in the completion stage of M&A; whether ESG improves or hinders the deal-making process of M&A. In short, this thesis aims to answer the question: "How do ESG disclosures and scores within target and acquiring firms influence the likelihood of M&A deal completion?"

Based on the question above, this quantitative research builds upon Caiazza and Pozzollo's (2016) methodology, where a probit analysis is employed to appraise the probability of M&A success. We follow the methodology used in Caiazza and Pozzollo's research, replacing the independent variables with ESG metrics. Th sample of our paper consists of companies from all industries excluding banks and insurance companies. Furthermore, this paper aims to highlight the effect of recent regulations in M&A deals by including samples after 2020, when ESG applications are becoming more ubiquitous and relevant. In doing so, there are two key data sources for this study: Refinitv (Eikon) for ESG scores and Zephyr regarding M&A information. Refinitiv (Eikon) provides a comprehensive report and weighting methodology to report ESG scores so that scores are comparable for firms across industries. The independent variables, therefore, are raw ESG scores taken from the Refinitiv database, consisting of the generalized ESG scores and pillar scores representing environmental, social, and governance. We retrieve our dependent variable from Zephyr's database as deal status, with a value of '0' if withdrawn and '1' if completed. This paper adopts prior identified metrics that factor into deal succession as control variables: deal characteristics, firm characteristics, and country characteristics (Andrade et al., 2001; Martynova & Renneboog, 2008). Firm and deal-specific data are directly retrievable from Zephyr. However, it is important to note that many firms do not report ESG data or firm characteristics, which limits the sample size for this research.

We hypothesized that M&A completion is partially determined by business sustainability. By examining the impact of ESG disclosure and performance on deal completion, this paper provides valuable insights into the role of sustainability reporting. In a favorable context, finding a positive relationship would mean businesses appreciate sustainable efforts and seek to create value by expecting target firms to improve sustainability. However, as we progress through this research, we found contradicting results; ESG transparency (disclosure) and ESG scores correlate negatively with deal completion probability. In other words, acquiring companies with transparency and higher scores might pose additional challenges. Thus, our findings disrupt the conventional narrative, painting a more intricate picture of how sustainable practices interplay with M&A completions.

Following this introduction, the thesis is structured as follows: Chapter 2 presents an extensive literature review, offering an overview of Mergers and Acquisitions, determinants of deal withdrawal, and the role of Environmental, Social, and Governance (ESG) factors. In

Chapter 3, we lay out the methodology we employed, including details on sample and data collection methods, variables of interest, and our specific research method and model specification. Chapter 4 offers a thorough presentation of our results, which includes descriptive statistics, a test of assumptions, and the results from our probit and marginal analysis. Chapter 5, where we synthesize our findings and their implications. Lastly, we present several limitations and suggestions for further research in this domain.

1.2. Research Contribution

Mergers and acquisitions remain a popular method of value creation. However, many M&As are withdrawn due to conflicts between acquiring and target firms. This paper examines the potential role of ESG factors in facilitating or obstructing M&A processes. Drawing inspiration from Caiazza and Pozzolo (2014), we employed probit analysis, positioning ESG ratings as the variables of interest in place of deal and firm characteristics. Prior literature, such as Zhao (2009) and Kumar and Sengupta (2020), has established partial relationships between specific ESG metrics and deal completion, for instance, environmental patents and CSR spending.

Meanwhile, other research, like that of Leucht and Rydell (2020), is predominantly qualitative, based on executive and expert responses. This study, therefore, fills the literature gap by quantitatively assessing the comprehensive impact of ESG on facilitating deal completion. The results of this research hold significance for economic considerations and policy development. Demonstrating ESG's influence on M&A success might inspire new regulations, align with global sustainability initiatives, and foster a more responsible, resilient economy. Hence, the implications of this research extend beyond corporate considerations, reaching into the domains of public policy and sustainable economic development.

2. Literature Review

2.1. Mergers and Acquisitions

Although similar in concept, only the stronger company subsists in acquisitions, whereas mergers result in the absolvement of both companies into a single entity. In 2022, 33,821 deals were announced worldwide, with more than 99% being acquisitions (Zephyr Database, 2022). Compared to two decades prior, mergers are slightly more common at around 2% of total deals. Factors such as antitrust scrutinization and lack of organizational fit may hinder companies from merging and opting for acquisition. A survey among CFO in 1991-2000 shows that maintaining operational synergy and risk diversification is the primary motivation for M&A (Mukherjee et al., 2005). Macroeconomic factors can also drive M&A activities, such as changes in the regulatory environment that can halt or boost international takeovers (Zámborský et al., 2021).

As we explore the M&A process further, it is crucial to emphasize the significance of its phases in this thesis. There are debates over the logistics and stages of an M&A. However, for this thesis, we will divide the process into four following Fery et al. (1969): the ‘courtship phase,’ the ‘marriage ceremony,’ the ‘honeymoon phase,’ and ‘after the honeymoon’ phase. At

the heart of this thesis, we emphasize the 'courtship' and 'marriage ceremony' stages of M&A. These phases are crucial in our discussion and significantly influence whether a deal is completed. Courtship is a highly confidential phase where companies familiarize themselves with their counterpart's management, culture, business goals, and philosophy (Welch et al., 2020). In identifying a target, acquirers build a list of potential firms that align with their motives. For example, acquirers often select companies with satisfactory financial performance, extensive R&D technologies, or environmental capabilities (Hitt et al., 2013; Mahoney & Pandian, 1992). Acquirers might opt for similar target companies or companies with similar ownership, such as deals between family-owned firms (Bettinazzi et al., 2018). Afterward, acquirers submit a letter of intent to bid, where firms can proceed with the takeover or negotiate further.

After the private takeover, the marriage ceremony involves communicating with key management to declare the merger and its reasons, simultaneously informing employees and the public (Welch et al., 2020). In this stage, acquirers continue the due diligence process: verify assets and liabilities, ensure both parties settle the negotiation, comply with the antitrust regulations, identify synergy benefits, and unearth risks related to the deal (Howson, 2003, Chapter 1). The process is lengthy and takes up to years after the announcement, in which parties can complete or abandon the deal if conditions are unmet. Companies also manage public impression, where nonoptimal impression could also lead to withdrawals. Withdrawing from an M&A deal is devastating since arranging an M&A is an extensive process that requires external expertise. Some deals might result in a termination fee, bearing costs to the acquiring firms.

As a caveat, M&A is not one-way, and deal initiation can come from both sides. Previously, we reviewed acquirers as the move-maker, although target companies can arrange with investment bankers to find potential bidders that complete their motive. Firms undergoing financial distress might seek potential bidders (Hotchkiss & Mooradian, 1998). Another research shows that CEOs with a higher ownership share and those with a golden parachute or stock options are likelier to initiate an M&A deal (Fidrmuc & Xia, 2019). Hence, the likelihood of a deal succession could be determined by the characteristics of the target firm or the acquiring firms.

2.2. Determinants of Deal Withdrawal

Many M&A deals have yet to materialize; about ten percent of large agreements are withdrawn yearly (McKinsey & Company, 2019). Prior literature has identified justifications for M&A withdrawals, in which the reasons for failed takeovers vary and can sometimes be influenced by subjective factors. For instance, a study of American M&As found that the probability of a deal withdrawal is 20% among bidder companies with young male CEOs (Levi et al., 2010). In light of the data available, we categorize the determinants of failed takeovers into deal and firm characteristics. The characteristics outlined in this section are drivers behind M&A completion. Furthermore, several of these factors interplay with companies' ESG metrics.

Therefore, this thesis must control for these factors, which will be elaborated upon in the subsequent section.

2.2.1. Deal Characteristics

The likelihood of a deal completion might be affected if it is a merger or acquisition. As an illustration, 4% of acquisitions between 2000-2019 were abandoned, while 11% of mergers failed (Zephyr Database, 2022). Furthermore, the nature of the acquisition, whether a deal is friendly or hostile, also plays a part in deal completion. Deal hostility refers to resistance from the target company's management or board when facing a proposed merger or acquisition, often leading to a decreased chance of the deal's completion (Ngo & Susnjara, 2016). Deal resistance can manifest when a takeover is unsolicited by the target's management. For example, potential acquirers make a tender offer to purchase a significant share of the target firm (Betton et al., 2008). Trust (distrust) is also an integral part of deal friendliness (hostility), where without it, the target can bluff as a strategy due to information asymmetry and decrease the value of an M&A, possibly causing withdrawal (Ahmad et al., 2022; Maung, 2022). Consequently, due diligence could be hindered without good trust between parties, impacting the outcome of the takeover.

Another influencing characteristic is whether deals are conducted within or across borders, where domestic M&As are naturally less complicated. For example, deals between countries with strikingly different institutional environments are less likely to manifest, especially with higher distance in expropriation risks between targets and acquirers (Dikova et al., 2010). Additional threats also emerge from international takeovers, such as arbitrage risks; after all, the post-announcement performance of target firms impacts takeover success (Brown & Raymond, 1986). Interestingly, Dikova et al. (2010) found no impact of cultural distance on deal completion, even if many presumed that it hampers the negotiation process since trust differs across cultures.

The payment method of a deal also influences deal completion. Cash payment is more prominent in the field, where almost 50% of deals are paid by cash (Zephyr Database, 2022). Based on a preliminary review of Zephyr's data, deals involving equity payments appear to be canceled more frequently than those using cash or debt methods. Furthermore, the acquirer's choice can signal hidden information and that stock payment is more likely if the managers believe their stocks are overvalued (Betton et al., 2008, p. 328). The choice of financing follows the pecking-order theory, and information asymmetry increases as companies stray further from internal financing (Betton et al., 2008; Myers & Majluf, 1984).

The next factors, deal valuation and bidder competition, are interlinked. While synergy theory suggests acquirers should assign appropriate premia and value, the hubris hypothesis argues that bidders might overpay (Roll, 1986). Fidrmuc and Moeller (2014) found in their study of 1000 US publicly traded targets from 2005-2011 that increased competition results in lower valuations and M&A premiums. Smaller deal sizes, relative to an acquirer's financial capacity, can expedite the takeover process (Luypaert & De Maeseneire, 2015). Cheaper deals,

needing less financing and simpler due diligence, reduce the risk of deal failure. Essentially, overvaluation can hinder deal completion.

2.2.2. Firm Characteristics

Deal characteristics primarily influence M&A completion, but firm attributes, like resources, are also crucial (Tanna et al., 2020). A relatively larger target also poses a challenge for the acquiring firm, which may lead to a longer deal negotiation (Attah-Boakye et al., 2021). Firm size is also pivotal for this thesis because there is a positive correlation between total assets and ESG ratings from Thomson's Reuter ESG rating (Drempetic et al., 2020). Drempetic et al. (2020) suggest that larger firms tend to be more sustainable due to more resources and a pursuit of legitimacy-seeking behavior. To pinpoint ESG scores' effect on deal completion, we control for firm size, ensuring size doesn't skew our findings.

Resources encompass more than just financial aspects; they also cover a company's intangible traits. Intangible assets often drive M&A decisions when external growth isn't the focus, reflecting M&A motives (Luypaert & De Maeseneire, 2015). Within this spectrum, we found that corporate culture, as an intangible asset, plays a pivotal role. M&A deals between companies with similar governance practices are faster than those with significant discrepancies (Cardillo & Harasheh, 2023). The study by Cardillo & Harasheh (2023) is congruent to prior literature, which shows that the completion of M&A is supported when the strategies of the two companies complement each other, and they share similar corporate cultures (Bauer & Matzler, 2014; Schraeder & Self, 2003). We also believe ESG metrics reflect a company's culture. As highlighted by by Lu & Wang (2021), more diverse and collectivist firms are inclined towards greater CSR reporting, though their insights didn't encompass all tangible firm aspects.

2.3. Environmental, Social, and Governance (ESG)

Instead of solely focusing on capitalizing on profit, businesses now pay attention to giving back and minimizing their impact on society. Beginning in the early 2000s, environmental, social, and governance or ESG emerged as a framework to quantify companies' performance in respective aspects. Countless studies emphasized the holistic effects of ESG activities, not only on society but also on companies. A study of American IPOs showed how ESG disclosure reduces downside tail risks (VaR) of newly listed companies (Reber et al., 2022). Reber et al. (2022) emphasized reduced information asymmetry to affect the idiosyncratic risks of those companies. Besides risk factors, institutional investors prefer responsible companies and usually avoid "sin stocks" due to social norms (Hong & Kacperczyk, 2009). In other words, reputation becomes a crucial determinant in investment decisions. Institutional investors react positively toward strong ESG practices because it signals companies' good reputations, and higher preference leads to a lower cost of capital (Maaloul et al., 2023; Nirino et al., 2021). Banke et al. (2022) found a more observable result: share prices are higher among DAX 40 companies that disclosed ESG ratings.

A survey by Bain & Company among 281 M&A executives presented that companies often neglect ESG during target identification, although they believe ESG will be more involved (Branden et al., 2022). The consideration of ESG in M&A should not be underestimated. In reality, ESG disclosure can reduce the information asymmetry between firms and investors, leading to a smoother due diligence process and assisting deal completion (Cornell, 2021; Huang, 2022). CEOs and M&A experts also stated how they initially sift through publicly available information when conducting due diligence (Welch et al., 2020) (Welch et al., 2020). Therefore, the availability of ESG ratings must be influential for deal completion. ESG ratings can also convey a firm's market position and technological capabilities. For instance, an automotive company with a low emission score (environmental metric) signifies that it invests in fuel-efficient vehicles (Lee et al., 2022). The resource-based view proposes that companies attain a competitive advantage when they possess a unique and inimitable resource, which makes ESG disclosure seemingly an integral part of target identification (Mahoney & Pandian, 1992). With all things considered, we formulate the first hypothesis as follows:

H1a: *ESG disclosure of acquiring firms positively influences deal completion likelihood*
H1b: *ESG disclosure of target firms positively influences deal completion likelihood*

One study found that target firms with good ESG ratings improve acquirers' sustainability post-deal, especially if the target has a higher score than the acquirer (Tampakoudis & Anagnostopoulou, 2020). Tampakoudis & Anagnostopoulou (2020) suggest that the stakeholder theory can elucidate their findings on the positive impact of target firms' ESG ratings on acquirers' post-deal sustainability. Based on the previous study, highly rated firms are logically attractive targets. However, the direct role of ESG ratings during the courtship and marriage ceremony phase remains unclear as to whether the stakeholder theory applies to target selection and deal completion. Negative associations between ESG ratings and deal completion are found in Zhao (2009) and Maung et al. (2020). Meanwhile, Kumar & Sengupta (2020) and Gao et al. (2022) showed significant positive associations.

Acquirers with higher corporate social responsibility (CSR) spending and employee friendliness lead to smoother negotiation and assist deal completion (Kumar & Sengupta, 2020). The previous factors are related to social and governance scores associated with company reputation. Target reputation also influences the deal process, where ESG-related controversies potentially reduce acquisition premiums (Maung et al., 2020). Maung et 2020) employed global M&A data, which showed consistent results among reputation risks and lower cost of capital. As reflected in ESG scores, environmental commitment indicates a firm's dedication to green practices and potentially influences M&A behaviors and outcomes. Studies in Europe and East Asia show that higher environmental scores correspond to more green patents and R&D investments (Dicuonzo et al., 2022; Xu et al., 2020). For acquirers with such capabilities, Zhao (2009) noted that they are more likely to withdraw because they have less pressure to complete the deal. However, embarking on green investments can help MNEs from developing nations gain legitimacy and assist cross-border M&A with developed countries (Gao et al., 2022). All in all, we formulate the second hypothesis as follows:

H2a: *ESG scores of acquiring firms influence deal completion probability*
H2b: *ESG scores of target firms influence deal completion probability*

Companies with similar CSR and governance practices (similar ESG scores) complete deals faster than firms with significant discrepancies (Cardillo & Harasheh, 2023). Consequently, a longer negotiation process has a higher likelihood of withdrawing (Caiazza & Pozzolo, 2016). We can deduce that higher ESG differences may lead to failure. Furthermore, previous related literature proposed how cultural, strategic, and operational alignment can assist the integration process between the two companies. Another research noted that M&As between similar companies resulted in a greater post-deal performance, which indicates how cultural fit provides more synergy benefits (Bereskin et al., 2018). Specifically, there is evidence that cultural proximity, measured by CSR, positively influences post-merger returns (Swiatkowski & Frey, 2021). Consequently, our last hypothesis is as follows:

H3: *ESG scores distance between the target and acquiring firms reduces the likelihood of M&A completion.*

3. Methodology

3.1. Sample and Data Collection Method

A large sample of merger and acquisition deals are taken from the Zephyr database from 1 January 2010 until 31 December 2022. Zephyr also provides the ISIN numbers, country of headquarters, announced date, deal characteristics, and firm characteristics for each target(s) and acquirer(s). Afterward, we match the ISIN numbers of acquirer and target firms with their Refinitiv ESG scores within the announcement year, available from Thomson Reuters (EIKON) database. Table 3.1 describes the search strategy to obtain the sample. The initial sample returns 21,570 different deals. However, depending on the model, our sample size is greatly reduced to 205 - 1,864 after including independent and control variables (refer to Appendix A for details on observation sizes). The availability of ESG scores, especially for target firms, is the biggest cause of the reduction in observation.

Table 3.1
Sample selection method in the Zephyr Database

Category	Search Strategy
Deal Type	Acquisition, Merger
Period	Announced on and after 01/01/2010 and up to and including 31/12/2022
World Region	North America and Western Europe (Acquirer or Target)
Deal value	≥1m USD (including estimates)
Deal status	Completed–confirmed, Withdrawn
Percentage of stake	Acquired stake ≥ 50%

Major sectors	All sectors, excluding Banks and Insurance

We obtain deals after 2010 to consider the financial turmoil two years prior, resulting in a postponed or canceled M&A volume due to hurdles in obtaining financing. We only retrieve deals involving companies from North America and Western Europe because these regions have the strongest ESG regulations. However, acquirers or targets from outside the regions are eligible (as long as the deal involves a North American or Western European company). We also exclude deals involving financial institutions because the financial industry is imposed with different regulations and a higher degree of information asymmetry. We ignore non-majority acquisitions or those with an acquired stake of less than fifty percent. The minimum deal value required for the research is US$1 million to reduce minority deals within the sample.

3.2. Variables of Interest

3.2.1. Dependent Variable

Our approach follows the study by Caiazza & Palazzo (2016), in which we have a dependent variable called *Deal Status* that takes a value of '0' if the deal was withdrawn and '1' for completed deals. The deal status is taken from the Zephyr database, where we transform the string into a workable binary variable. Otherwise, there is no additional data modification or cleaning because the sample does not contain rumored or assumed deals.

3.2.2. Independent Variable(s)

Our independent variables are ESG scores of targets and acquiring firms from Refinitiv (Eikon). Refinitiv's ESG scoring system measures a company's performance from a subset of 186 metrics, which are then categorized into governance, environmental, and social scores. Refinitiv compiled data from information available from annual reports, company websites, CSR reports, and news sources. Through Refinitiv's methodology, the ESG scores are calibrated to consider unique qualities and challenges experienced by businesses within various industries. The ESG scores are made comparable and meaningful across different organizations thanks to this industry-specific standardization.

For the initial hypotheses (H1a and H1b), we define a binary variable called ESG disclosure. It is set to '1' if the target or acquirer disclosed ESG data in the year of the M&A announcement and '0' if they did not. Furthermore, prior studies identified the effect of ESG disclosure using a disclosure variable with mixed results. ESG disclosure either reduces information asymmetry or has no relationship with information asymmetry, depending on the context (Hassani & Bahini, 2022; Siew et al., 2016). For the second hypothesis (H2a and H2b), we take the ESG scores conforming to Refinitiv's methodology, which consists of the overall and three pillar scores, to measure how an increase in each score contributes to the probability of deal completion. We take firms' ESG scores in the year their M&A deal was announced, and we did not make any transformation to the score. For the final hypothesis (H3), we examine the direct (raw) differences in ESG scores between targets and acquirers. These differences can

yield negative values, indicating whether the acquirer's scores are higher or lower within the model.

3.2.3. Control Variables

All control variables are available from the Zephyr database, and we included these variables in the regression models: deal value, deal payment method, deal competition, deal hostility, international/domestic deal, target size, acquirer size, and cross-industry deal. We also add the announcement year as fixed effect. Most continuous variables in this research are positively skewed (Refer to Appendix B). Therefore, we conduct a natural logarithmic transformation for deal value, target size, and acquirer size to account for skewness. Conclusively, Table 3.2 presents all the variables used in this research.

Table 3.2
Description of Variables

Variable	Variable Type	Form	Measurement
Deal Status	Dependent	Binary	=0 if the deal is withdrawn =1 if the deal is completed
Acquierer/Target Disclosure	Independent	Binary	= 0 if the target/acquirer disclosed ESG information at the announcement year =1 if the target/acquirer disclosed ESG information at the announcement year
ESG	Independent	Continuous	Target or acquirer's unaltered general ESG rating assigned to a company by Refinitiv Eikon
ENV	Independent	Continuous	Target or acquirer's unaltered environmental rating assigned to a company by Refinitiv Eikon
SOC	Independent	Continuous	Target or acquirer's unaltered social rating assigned to a company by Refinitiv Eikon
GOV	Independent	Continuous	Target or acquirer's unaltered governance rating assigned to a company by Refinitiv Eikon
ESG/ENV/SOC/GOV Difference	Independent	Continuous	Score differences between target and acquirer for the general, environmental, social, and governance score
Deal Size (ln)	Control	Continuous	Natural logarithmic form of deal value divided by acquirers' market capitalization
Deal Hostility	Control	Binary	=0 if deal was conducted in a friendly manner =1 if deal was hostile
Deal Competition	Control	Binary	=0 if there was only a single bidder =1 if there were more than one bidder
Cross Border	Control	Binary	=0 if the acquirer and target were from the same country =1 if firms operate in different countries

Cross Industry	Control	Binary	=0 if target/acquirer operates in the same industry code (NAICS 2017 Primary Code) =1 if target/acquirer operates in different industry codes (NAICS 2017 Primary Code)
Payment Method	Control	Categorical	=1 if deal was financed by cash =2 if deal was financed by equity =3 otherwise
Acquirer Size (ln)	Control	Continuous	Natural logarithmic form of acquirers' total assets
Target Size (ln)	Control	Continuous	Natural logarithmic form of targets' total assets

3.3. Descriptive Statistics

Table 3.3 presents 920 withdrawn deals within the dataset, which accounts for 4.27% of all deals. Deal withdrawals usually fall within the range of 3-4%, except in 2016, 2020, and 2021 where they reached higher than 5%. Additionally, the table shows the percentage of acquirers and targets disclosing ESG information in withdrawn deals. For instance, 21% of withdrawn deals involve acquirers with ESG information. We believe that during those years, exogenous shocks caused slightly higher-than-average withdrawals, such as the Covid-19 pandemic, leading companies to employ more conservative investment decisions. We assume the existence of time-varying factors may lead to a more favorable M&A condition which foresaw fewer withdrawals in some years. Furthermore, the number of companies disclosing ESG information increases in the past five years compared to 2010-2015. With these variations, we will include announcement years as fixed effects to account for the yearly variations. To regress hypothesis 2 and 3, we will group the announcement year as 2010-2015, 2016 - 2019, and 2020 – 2022 due to limited observation sizes. In addition to yearly variations, we delve deeper into the variations of ESG considering firm factors, detailed in Appendix C.

Table 3.3
Yearly Distribution of Withdrawn Deals by ESG Disclosure Status

Year	Withdrawn Deals					
	Freq.	Percent	Acq. Disclosed		Target Disclosed	
2010	72	4.05	17	24%	2	2.8%
2011	64	3.31	18	28%	4	6.3%
2012	81	4.26	12	15%	2	2.5%
2013	59	3.37	7	12%	8	13.6%
2014	82	3.96	18	22%	7	8.5%
2015	75	3.95	19	25%	16	21.3%
2016	92	5.14	16	17%	12	13.0%
2017	65	4.14	12	18%	13	20.0%
2018	61	4.12	21	34%	22	36.1%
2019	63	4.55	11	17%	21	33.3%
2020	61	5.88	14	23%	20	32.8%

2021	91	5.29	17	19%	33	36.3%
2022	54	4.31	8	15%	13	24.1%
Total	920	4.27	190	21%	173	19%

Note: This table showcases the yearly count and percentage of withdrawn deals from the sample. On the right side, we detail the number and percentage of ESG disclosures within these withdrawn deals, offering insight into the relationship between ESG and deal completion.

Table 3.4 details the descriptive statistics of our variables for both withdrawn and completed deals. The table features the number of observations, mean (for continuous variable) or percentage (for categorical variables), standard deviation, range, skewness, and kurtosis. For example, acquirers in the withdrawn subset have an average ESG score of 52.04, compared to 47.03 in the completed subset, suggesting that withdrawn deals typically involve acquirers with higher ESG scores. The frequency of ESG disclosure by target firms is higher in withdrawn deals. Specifically, the mean of target disclosure is 19% for the withdrawn subset, compared to 2% for the completed subset. Lastly, almost all completed deals are friendly (deal hostility has a mean of 0.01), while only 65% of withdrawn deals are, mirroring findings by Caiazza & Pozzolo (2016).

Table 3.4
Descriptive statistics for withdrawn and completed sub-datasets

Variable	Obs		**Mean/%**		Std. dev.		Min		Max		Skew-ness	Kurt-osis
	W	C	**W**	**C**	W	C	W	C	W	C		
Acq Disclosure	920	20,650	**0.21**	**0.24**	0.41	0.42	0.00	0.00	1.00	1.00	1.25	2.57
Acquirer ESG	190	4,873	**52.04**	**47.03**	22.00	20.85	10.66	0.88	90.89	95.06	0.12	2.09
Acquirer ENV	190	4,873	**45.70**	**37.61**	30.17	28.85	0.00	0.00	92.35	98.94	0.20	1.76
Acquirer SOC	190	4,873	**54.01**	**48.71**	24.23	23.41	6.48	0.49	96.75	97.74	0.15	2.03
Acquirer GOV	190	4,873	**54.99**	**52.21**	22.38	22.56	7.98	0.73	93.42	99.41	-0.13	2.10
Tgt Disclosure	920	20,650	**0.19**	**0.02**	0.39	0.14	0.00	0.00	1.00	1.00	5.91	35.94
Target ESG	173	396	**45.95**	**38.53**	19.64	17.99	10.30	2.98	83.96	87.74	0.34	2.26
Target ENV	173	396	**35.81**	**25.88**	27.73	24.48	0.00	0.00	88.26	94.23	0.60	2.24
Target SOC	173	396	**47.28**	**41.03**	22.31	20.13	0.00	0.00	95.71	91.30	0.28	2.31
Target GOV	173	396	**54.61**	**46.85**	20.87	22.45	12.87	4.07	96.00	97.97	0.00	2.10
Deal Size (ln)	277	7569	**-1.02**	**-2.66**	1.95	1.96	-7.45	-10.31	4.46	10.27	0.33	2.63
Deal Hostility	785	10452	**0.35**	**0.01**	0.48	0.10	0.00	0.00	1.00	1.00	5.23	28.32
Cross Border	899	20,136	**0.41**	**0.38**	0.49	0.48	0.00	0.00	1.00	1.00	0.50	1.25
Cross Industry	920	20,650	**0.49**	**0.51**	0.50	0.50	0.00	0.00	1.00	1.00	-0.02	1.00
Deal Comp.	920	20,650	**0.03**	**0.03**	0.17	0.17	0.00	0.00	1.00	1.00	5.62	32.60
Acq Size (ln)	555	14,221	**12.39**	**12.23**	3.55	3.34	-6.76	-6.91	19.24	20.50	-1.41	7.80
Tgt Size (ln)	607	8,861	**11.92**	**9.91**	2.82	2.89	-6.79	-6.82	19.54	18.40	-0.86	7.28
Pmt Method												

Cash	479	8046	**56.62**	**54.20**
Equity	230	3010	**27.19**	**20.28**
Otherwise	137	3788	**16.19**	**25.52**

Note: Descriptive statistics are differentiated by 'withdrawn' (W) and 'completed' (C) subsets. Each column displays the count, mean (for continuous variables), percentage (for categorical variables), standard deviation, range, skewness, and kurtosis. Abbreviations: acq = acquirer; tgt = target; comp = competition; pmt = payment. For a comprehensive definition and more details on the variables, refer to Table 3.2.

3.4. Research Method

3.4.1. Method and Model Specification

Since the dependent variable takes a value of 1 or 0, we employed a probit analysis following a prior study by Caiazza & Pozzolo (2020). Caiazza & Pozzolo's (2020) study focuses on several characteristics that affect the probability of deal withdrawal, and employing their methods in this study is appropriate since we are predicting the same outcome with different predictors. After running the probit regressions, marginal analyses on the betas are necessary to interpret results properly since we employ the cumulative normal distribution to transform the models (Brooks, 2019, p. 664). It is worth mentioning that there are other methods to account for binary dependent: the linear probability model (LPM) and logit. The logit and probit models typically yield similar results and exhibit close relationships between explanatory variables and the probability of an event, and either method is preferred over LPM (Brooks, 2019, p. 664). Additionally, this study conducts a robustness test with a logit model.

For the first hypothesis, we regress ESG disclosure of the acquirer *i* and the target *j* with deal status. "ESG disclosure" denotes whether a company disclosed its ESG scores at the time of the M&A announcement, which takes a value of either 1 (disclosed) or 0 (undisclosed). The probit regression equation for this relationship is given by:

$$Pr(Y_{ij} = k) = \Phi(\beta_1 ESG\ Disclosure_{i,j} + \beta_d DD_{ij} + \beta_f FF_{i,j} + \varepsilon) |\ k \in \{0, 1\}. \qquad (1)$$

The specification for this model and the following models–*Pr(Yij = k)* denotes the probability that the outcome variable deal status between acquirer *i* and target *j (Y)* takes on the value $k \in \{0, 1\}$ (k can be 0 or 1 in a binary probit model). Phi *(ϕ)* is an indicator function of a cumulative normal distribution. Beta *(βx)* are the coefficients or parameters to be estimated for the independent variables, whereas βd and βf are the parameters for deal-specific and firm-specific controls. *DDij* stands for deal-specific control variables, such as deal hostility and deal value, whereas *FFi,j* stands for firm-specific controls. Lastly, we have epsilon *(ε)* which is the error term, capturing unobserved factors.

For the second hypothesis, we regress ESG, ENV, SOC, and GOV scores of the acquirer *i* and the target *j* with deal status. We separated the general score with the pillar scores into two distinct models due to multicollinearity issues. Subsequently, we observe the scores of the target and acquirer individually before we observe the interaction between scores. The relationship is given by the following equations:

$$Pr\ (Y_{ij} = k) = \Phi(\beta_1 ESG_{i,j} + \beta_d DD_{ij} + \beta_f FF_{i,j} + \varepsilon) |\ k \in \{0,1\} \text{ and} \quad (2.1)$$

$$Pr\ \left(Y_{ij} = k\right) = \Phi\big(\beta_1 ENV_{i,j} + \beta_2 SOC_{i,j} + \beta_3 GOV_{i,j} + \beta_d DD_{ij} + \beta_f FF_{i,j} + \varepsilon\big) |\ k \in \{0,1\}. \quad (2.2)$$

For the last hypothesis, we regress the difference between targets and acquirers ESG scores and three of the pillar scores with deal status. The following equations denote the relationship:

$$Pr\ \left(Y_{ij} = k\right) = \Phi\big(\beta_1 ESGdif_{i,j} + \beta_d DD_{ij} + \beta_f FF_{i,j} + \varepsilon\big) \mid k \in \{0,1\} \text{ and} \quad (3.1)$$

$$Pr\ \left(Y_{ij} = k\right) = \Phi(\beta_1 ENVdif_{i,j} + \beta_2 SOCdif_{i,j} + \beta_3 GOVdif_{i,j} + \beta_d DD_{ij} + \beta_f FF_{i,j} + \varepsilon) \mid k \in \{0,1\}. \quad (3.2)$$

3.4.2. Model Assumptions and Diagnosis

The number of observations in this study is limited due to the nature of the data. ESG reporting, particularly among smaller target firms, is less common, possibly due to limited resources and less regulatory pressure. Consequently, a smaller sample size is more sensitive to outliers, where several deals could overtly predict deal completion. According to George & Mallery (2010) a valid proof for normal univariate distribution requires values for skewness and kurtosis to fall within the range of -2 and +2. Meanwhile, Hair et al. (2010) and Bryne (2016) propose that data can be deemed as normally distributed if the skewness lies between -2 to +2 and kurtosis is within -7 to +7. The descriptive statistics (Table 3.4) shows the level of skewness and kurtosis, in which we observe extreme kurtosis in deal status and ESG disclosure and a slight skewness in ESG scores. However, the skewness is the nature of the data, and we do not make further transformations.

Other probit assumptions–in a probit analysis, we assume that the observations are independent from one another. Since our dataset consists of M&A deals from 2010 to 2022, we assume no repeated observation exists. Nonetheless, we found 178 deals conducted by the same target and acquirer. Since our study accounts for unique factors corresponding to each deal, repeated deals are treated as different deals. Also, firm characteristics are not constant, and we retrieve different ESG scores depending on the deal's timing. Another concern is perfect separation. Previously, we identified an almost perfect separation in deal hostility, where all completed deals are friendly deals. After running the models in STATA, we did not receive warnings for separability, concluding that our models fulfill the assumption. Lastly, we run our analyses with a built-in STATA command “robust” to account for potential heteroskedasticity in the models.

Additionally, we must address perfect multicollinearity. Generally, multicollinearity does not lead to a biased or inconsistent estimation, but research avoids multicollinearity to obtain the most precise estimates. For a probit analysis, carefully examining the pairwise matrix between variables of interest can convey whether there are extreme correlations. Appendix D displays the correlation matrix for each hypothesis, consisting of all the variables within each model. We do not observe extreme collinearity between the independent, dependent, and

control variables. However, as briefly discussed, ESG pillar scores are highly correlated with the general score, ranging from 0.7 to 0.9. Therefore, separation of the general score is necessary to ensure the stability of the analysis and avoid inflated standard errors. Although environmental and social scores are highly correlated, separating them eliminate the possible interaction between each pillar. The effect of an ESG metric, for instance environmental score, might enhance, diminish, or cancel out the other (Alareeni & Hamdan, 2020).

4. Results

4.1. ESG Disclosure and Deal Withdrawal

We conducted a probit analysis to test hypotheses 1a and 1b. The regression table for probit analysis is available in Appendix E. Since probit is not directly interpretable, Table 4.1 presents the marginal analysis, where column (1) examines the impact of the acquiring firm, column (2) focuses on the target firm, and column (3) assesses the combined effect of both entities. All models have a consistent percentage of withdrawn deals because they share the same observations. In Column (1), we found no significant result between acquirer's ESG disclosure and deal status. Without including acquirers' disclosure (Column (2)), a one-unit increase (i.e., change from 0 to 1) of target disclosure decreases the probability of a deal being completed by approximately 8.95%, holding other variables constant. This result is statistically significant at the 1% level. In other words, the probability of deal completion reduces by 8.90%. Including acquirers in the picture, as in column (3), does not change the magnitude and significance.

Our analysis offers insightful conclusions on the role of ESG disclosure in deal completion likelihood. Our data did not provide supporting evidence for H1a; the ESG disclosure of acquiring firms did not exhibit a statistically significant impact on the likelihood of deal completion. We suggest that target firms' ESG disclosures play a more pivotal role in influencing M&A outcomes than that of acquirers. Contrary to our initial hypothesis H1b, we found that the ESG disclosure by target firms reduces the probability of deal completion by approximately 8.95%, ceteris paribus. This negative relationship remains pronounced and significant when we account for the ESG disclosure of acquiring firms.

For the control variables, we observe a significant relationship between deal size and deal hostility, which matches the study result of Attah-Boakye & Guney (2020) and Schwert (1999). Column (3) results suggest that a 1% increase in deal size is associated with a decrease in the probability of a deal being withdrawn by approximately 1.6 percentage points, holding all other variables constant. Furthermore, deal hostility has the strongest influence on deal completion, where the probability of the deal being completed decreases by 25.3 percentage points for hostile deals (Column 3). We could not obtain a significant result for deal competition or deal with multiple bidders, which is different from the result found by Caiazza & Pozzolo (2016), where multiple bidders have a negative association with deal completion probability.

Table 4.1
Marginal analysis for ESG disclosure and deal completion (hypothesis 1a and 1b)

	(1)	(2)	(3)
	dy/dx	dy/dx	dy/dx
Acquirer Disclosure	-0.018		-0.013
	(0.015)		(0.015)
Target Disclosure		-0.089***	-0.089***
		(0.018)	(0.018)
Deal Size	-0.019***	-0.016***	-0.016***
	(0.005)	(0.005)	(0.005)
Deal Hostility	-0.266***	-0.252***	-0.253***
	(0.019)	(0.019)	(0.019)
Cross Border	-0.002	-0.003	-0.003
	(0.013)	(0.012)	(0.012)
Cross Industry	0.017	0.014	0.014
	(0.012)	(0.012)	(0.012)
Deal Competition	-0.004	-0.003	-0.004
	(0.067)	(0.067)	(0.067)
Acq. Size (ln)	-0.001	-0.001	0.000
	(0.003)	(0.003)	(0.003)
Target Size (ln)	-0.005	0.000	0.000
	(0.003)	(0.003)	(0.003)
Cash	*Reference*	*Reference*	*Reference*
	(.)	(.)	(.)
Equity	0.010	0.014	0.013
	(0.014)	(0.014)	(0.014)
Otherwise	0.021	0.017	0.018
	(0.015)	(0.015)	(0.015)
Year Fixed-Effect	Yes	Yes	Yes
N	1,864	1,864	1,864
% of Withdrawn	9.39	9.39	9.39

Note: This table displays the marginal analysis (dy/dx) of probit analysis to elucidate the magnitude of the relationship between ESG disclosure and the probability of M&A completion. Column (1) examines the impact of the acquiring firm, column (2) focuses on the target firm, and column (3) assesses the combined effect of both entities. Robust standard errors are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

4.2. ESG Scores and Deal Withdrawal

In this section, we obtain the analysis results between ESG scores of both acquirers and targets and their association with deal completion. We present the probit analysis in Appendix F and instead focus on the marginal analysis under Table 4.2. Column (1) evaluates the relationship between the ESG score of the acquiring firm and deal completion, column (2) investigates the influence of the target firm's ESG score, and column (3) explores the combined ESG scores of both entities. Column (4) delves into the acquirer's environmental, social, and governance scores of the acquirer, while column (5) examines the same scores for the target firm. It is important to highlight that the count of observations and the proportion of withdrawn deals vary across models. Specifically, models involving target firms present a higher incidence of withdrawn deals (26.6% compared to 10.3%). Additionally, our analysis indicates a decreased likelihood of deal completion by including target firms' variables.

From Column (1), Column (3), and Column (4) in Table 4.2, we found that acquirers' scores have no significant effect on deal completion. Conversely, Column (2) and (3) implies that a one-point increase in ESG score decreases the probability of deal completion by 0.3%. The results are significantly below the 0.05 level. While the coefficient of the target's ESG score may seem small, considering that score ranges from 0 to 100, incremental differences significantly affect deal completion likelihood. For instance, a 30-point ESG score difference could shift deal completion probability by around 9.55%. The result would suggest that acquiring firms perceive higher ESG scores as presenting particular challenges in the M&A process. Focusing on the pillars, an increase in environmental score for target firms decreases the probability of deal completion by 0.2%, and the result is significant at 10%. Similarly, the environmental score of target firms could indicate an obstacle for M&A.

Our results did not provide evidence to support hypothesis 2a due to the lack of statistical significance. Conclusively, while we found statistical support for hypothesis 2b, the p-value of our independent variable(s) falls below the 10% significance threshold. In other words, evidence suggests that targets' general ESG and environmental scores negatively affect deal completion by a slight magnitude. However, the results should be interpreted cautiously; this more lenient threshold indicates a greater probability of type I error or falsely identifying an effect where none exists. Further research with larger samples or different contexts may be beneficial in obtaining more definitive results.

Table 4.2
Marginal analysis for ESG scores and deal completion (hypothesis 2a and 2b)

	(1)	(2)	(3)	(4)	(5)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Acquirer ESG	0.000		0.001		
	(0.000)		(0.002)		
Target ESG		-0.003**	-0.003**		

		(0.001)	(0.001)		
Acq. ENV				0.000	
				(0.000)	
Acq. SOC				0.000	
				(0.001)	
Acq. GOV				0.000	
				(0.000)	
Tgt. ENV					-0.002*
					(0.001)
Tgt. SOC					0.000
					(0.002)
Tgt. GOV					-0.001
					(0.001)
Deal Size	-0.010	-0.023	0.019	-0.009	-0.025
	(0.007)	(0.025)	(0.027)	(0.007)	(0.026)
Deal Hostility	-0.298***	-0.417***	-0.442***	-0.291***	-0.415***
	(0.025)	(0.060)	(0.061)	(0.024)	(0.059)
Cross Border	0.011	-0.022	-0.053	0.010	-0.016
	(0.017)	(0.055)	(0.056)	(0.017)	(0.055)
Cross Industry	0.027*	0.036	0.030	0.025*	0.037
	(0.015)	(0.050)	(0.049)	(0.015)	(0.050)
Deal Competition	-0.054	0.020	0.042	-0.045	0.024
	(0.075)	(0.239)	(0.223)	(0.078)	(0.243)
Acq. Size (ln)	-0.001	-0.004	0.009	-0.001	-0.006
	(0.004)	(0.014)	(0.017)	(0.004)	(0.015)
Target Size (ln)	-0.007	0.048**	0.015	-0.007	0.054**
	(0.005)	(0.020)	(0.020)	(0.005)	(0.021)
Cash	*Reference*	*Reference*	*Reference*	*Reference*	*Reference*
	(.)	(.)	(.)	(.)	(.)
Equity	0.029	0.057	0.0996*	0.027	0.057
	(0.019)	(0.059)	(0.060)	(0.019)	(0.059)
Otherwise	0.0451**	0.004	0.037	0.0430**	0.010
	(0.018)	(0.075)	(0.070)	(0.018)	(0.074)
Year Fixed-Effect	Yes	Yes^{+}	Yes^{+}	Yes^{+}	Yes^{+}
N	1111	225	205	1111	225
% of Withdrawn	10.26	26.67	24.88	10.26	26.67

Note: This table provides a marginal analysis (dy/dx) of probit analysis to clarify the relationship between ESG, ENV, SOC, and GOF scores and M&A completion likelihood. Column (1) evaluates the influence of the acquirer's ESG score, column (2) pertains to the target firm, and column (3) explores the combined effect of both. Columns (4) and (5) respectively analyze the pillar scores of acquiring and target firms. Robust standard errors are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01
[+]Announcement year is recategorized into three variable groups due to limited subset of observations: 2010 - 2015, 2016 - 2019, and 2020 - 2022.

4.3. Differences in ESG Scores and Deal Withdrawal

This section aims to discover whether affinity in ESG scores among target and acquiring companies affects the likelihood of deal completion, referring to a study by Cardillo and Harasheh (2023). We present the probit regression in Appendix G and present the marginal analyses in Table 4.3. In the marginal analysis table, Column (1) examines the influence of ESG differences, while Column (2) assesses the impact of pillar score differences. However, we could not obtain a significant relationship that conforms to the study. Furthermore, we could not find significant relationships among the control variables like in previous hypotheses, beside for deal hostility. These inconsistencies signify that the model might be misspecified or probit analysis is inappropriate for inferring a meaningful relationship. In conclusion, we found no support for hypothesis 3.

Table 4.3
Marginal analysis for ESG score differences (hypothesis 3)

	(1)	(2)
ESG Difference	0.002	
	(0.001)	
ENV Difference		0.002
		(0.001)
SOC Difference		0.000
		(0.001)
GOV Difference		0.000
		(0.001)
Deal Size	0.020	0.016
	(0.027)	(0.028)
Deal Hostility	-0.454***	-0.458***
	(0.061)	(0.059)
Cross Border	-0.072	-0.079
	(0.055)	(0.054)

Cross Industry	0.026	0.020
	(0.049)	(0.048)
Deal Competition	0.060	0.099
	(0.222)	(0.226)
Acq. Size (ln)	0.004	0.003
	(0.017)	(0.017)
Target Size (ln)	0.008	0.012
	(0.020)	(0.020)
Cash	*Reference*	*Reference*
	(.)	(.)
Equity	0.104*	0.116*
	(0.060)	(0.062)
Otherwise	0.046	0.059
	(0.070)	(0.070)
Year Fixed-Effect	Yes[+]	Yes[+]
N	205	205
% of Withdrawn Deals	26.67	26.67

Note: This table provides a marginal analysis (dy/dx) of probit analysis to clarify the relationship between score differences and M&A completion likelihood. Column (1) evaluates the influence of ESG score difference, column (2) evaluates the influence of pillar score differences. Robust standard errors are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01
[+]Announcement year is recategorized into three variable groups due to a limited subset of observations: 2010 - 2015, 2016 - 2019, and 2020 - 2022

4.4. Robustness Test

Brooks (2019) stated that probit and logit analysis might have non-negligible results when the data is unbalanced. Therefore, we conducted a logit regression for the hypotheses accepted above, available in Appendix H. Table 4.4 shows the marginal analysis of the logit regression, and there is no change in the direction of the relationship between the variables of interest. We still observe negative relationships between the dependent variable with ESG disclosure, ESG score, and environmental score. The logit regressions further support evidence to 2a, where ESG disclosure and target ESG score decrease the likelihood of deal completion. Interestingly, when examining the results from hypotheses 3a and 3b, the logit regressions present evidence that contrasts findings from the probit models. Here, both ESG difference and environmental scores manifested slightly significant positive correlations with deal completion. The result suggests that a greater ESG score discrepancy, particularly when the acquirer's score surpasses the target's, can increase the probability of deal completion. Conversely, deal completion becomes less likely when the target outscores. Our robustness test highlights the nuanced role

of ESG factors in M&A outcomes, with consistent probit and logit results. However, the sensitivity of the environmental score to model specification signals further attention.

	(1)	(2)	(3)	(4)	(5)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Acquirer Disclosure	-0.014				
	(0.016)				
Target Disclosure	-0.087***				
	(0.018)				
Acquirer ESG		0.002			
		(0.002)			
Target ESG		-0.003**			
		(0.001)			
Tgt. ENV			-0.002		
			(0.001)		
Tgt. SOC			0.000		
			(0.002)		
Tgt. GOV			-0.001		
			(0.001)		
ESG Difference				0.003*	
				(0.001)	
ENV Difference					0.002*
					(0.001)
SOC Difference					0.000
					(0.002)
GOV Difference					0.000
					(0.001)
Deal Size	-0.016***	0.022	-0.025	0.024	0.019
	(0.005)	(0.028)	(0.027)	(0.028)	(0.028)
Deal Hostility	-0.226***	-0.425***	-0.394***	-0.435***	-0.437***
	(0.017)	(0.065)	(0.058)	(0.064)	(0.063)
Cross Border	-0.003	-0.060	-0.021	-0.075	-0.084
	(0.013)	(0.059)	(0.058)	(0.058)	(0.058)
Cross Industry	0.014	0.028	0.037	0.024	0.024
	(0.012)	(0.050)	(0.052)	(0.051)	(0.050)
Deal Competition	0.006	0.056	0.030	0.070	0.100
	(0.073)	(0.278)	(0.310)	(0.273)	(0.267)
Acq. Size (ln)	0.000	0.012	-0.004	0.008	0.006
	(0.003)	(0.016)	(0.015)	(0.017)	(0.017)
Target Size (ln)	0.001	0.013	0.051**	0.008	0.011
	(0.003)	(0.018)	(0.021)	(0.018)	(0.017)
Cash	*Reference*	*Reference*	*Reference*	*Reference*	*Reference*
	(.)	(.)	(.)	(.)	(.)

Equity	0.014	0.098*	0.059	0.101*	0.115*
	(0.014)	(0.060)	(0.059)	(0.060)	(0.061)
Otherwise	0.017	0.026	0.002	0.034	0.047
	(0.015)	(0.071)	(0.078)	(0.070)	(0.072)
Year Fixed-Effect	Yes	Yes[+]	Yes[+]	Yes[+]	Yes[+]
N	1864	205	225	205	205
% of Withdrawn	10.26	24.88	26.67	26.67	26.67

Note: This table presents a marginal analysis (dy/dx) using logit regression to corroborate the findings from the probit analysis. Column (1) evaluates the consistency of ESG disclosure with probit outcomes. Columns (2) and (3) examine the stability of ESG and pillar scores, while Columns (4) and (5) assess consistency in differences for ESG and pillar scores. Robust standard errors are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

[+]Announcement year is recategorized into three variable groups due to a limited subset of observations: 2010 - 2015, 2016 - 2019, and 2020 - 2022

5. Discussion and Conclusion

The role of Environmental, Social, and Governance (ESG) factors has been recognized within the context of mergers and acquisitions. Despite the extensive literature, most studies focus on the post-deal impact of ESG rather than pre-deal; more is needed to know about the influence of ESG on the pre-deal stage of M&A. Therefore, this study will resolve the main research question: *"How do ESG disclosures and scores, individually and in relation to each other, within target and acquiring firms influence the likelihood of M&A deal completion?"* Consequently, this study aims to close the gap and provide interesting insights, especially for practitioners, in determining potential targets for M&A to avoid unnecessary losses related to withdrawn deals. The findings within this paper aim to expand the current knowledge regarding ESG as a consideration in value creation for businesses and how the outcome translates to M&A decisions. To summarize, Table 5.1 reports our findings.

Table 5.1
Summary of Results

Hypothesis	Result	Explanation
H1a: Acquirer's ESG disclosure positively influence deal completion	Unsupported	The p-value of the independent variables is greater than the accepted threshold of 0.1.
H1b: Target's ESG disclosure positively influence deal completion	Unsupported	The magnitude shows negative relationship, although p-value is smaller than 0.005.
H2a: ESG and pillar scores of acquiring firms affect deal completion	Unsupported	The p-values of the independent variables are greater than the accepted threshold of 0.1.
H2b: ESG and pillar scores of target firms affect deal completion	Supported	The p-values of the independent variables are smaller than the threshold 0.1.
H3: ESG and pillar score differences between target and acquiring firm positively influence deal completion	Unsupported	The p-values of the independent variables are greater than the accepted threshold of 0.1.

Our first finding concerns ESG disclosure–whether public information regarding a company's ESG policies exists, specifically within the Refinitiv database. We delved into the theoretical exploration of how ESG disclosure reduces information asymmetry. In screening potential investments, ESG disclosure serves as a signal for transparency, reducing information asymmetry and potentially improving investment efficiency (Ellili, 2022). Prior literature suggested that acquiring companies prefer targets with low information asymmetry (Borochin et al., 2019). Interestingly, a reduction in the probability of deal completion decreases when target companies reveal ESG information by 8.9%. While ESG disclosure might lessen information asymmetry, it may unintentionally add new factors that influence the acquirer's decision-making, decreasing the likelihood of a successful transaction. Coincidentally, Borochin et al. (2019) found a negative relationship between information asymmetry and completion duration; opaque targets are associated with a longer time to completion. Research on pre-deal activities already established that time to completion correlates with deal withdrawal–this may explain why M&A among target firms with ESG ratings leads to prolonged negotiation and potentially withdrawn deals.

In theory, transparency should smoothen the due diligence process, allowing a more productive negotiation between the parties. Nonetheless, a qualitative study conducted by Leucht & Rydell (2020) proposed that integrating ESG in the due diligence process incurs additional costs and further complexities, requiring external specialists to assess the risks and legal criteria relating to ESG. One caveat is that ESG disclosure must have been visible during the target selection process, enough time for acquirers to assess the complexities before the deal announcement and avoid unnecessary sunk costs. In brief, while ESG disclosure promotes transparency and facilitates negotiations, its integration into the due diligence process can introduce unforeseen challenges and expenses. This intricate balance between transparency and complexity underscores the need for further research and refinement in assessing and integrating ESG factors in the M&A process.

This paper also analyzed how each score correlates with deal completion probability. Our sample was restricted to companies that disclosed their ESG scores, with the sample size further diminishing when target companies were included in the analysis. Overall, we observed a reduction in the probability of deal completion among targets with higher general ESG and environmental scores. This finding raises some concern. A meta-analysis of more than 2000 empirical studies concluded that 63% of the findings show a positive relationship between ESG and equity performance, while only 8% showed a negative association (Friede et al., 2015). Furthermore, evidence suggests higher-than-average post-merger performances among targets with better ESG scores (Tampakoudis & Anagnostopoulou, 2020). In other words, a lower probability of deal completion seems counterintuitive, knowing the wide array of literature stating the merit of ESG activities with firm performance. Referring to Leucht & Rydell (2020), investment professionals value companies with strong environmental practices due to the portfolio benefits they can bring. Professionals also believe that environmentally conscious companies comply better with the regulations, reducing related post-deal risks. The mismatch of results led us to assume either that high-scoring firms are more challenging to acquire or that there is a trade-off when acquiring high-scoring firms.

For example, agency problems could arise from acquiring high-scoring ESG targets; the acquirer might view the high ESG score as a potential issue, fearing that it will lead to disagreements or additional costs post-acquisition and thus be less likely to complete the deal. Although it is not always a direct correlation, many environmentally-conscious companies have higher capital expenditures (Karim et al., 2021). Companies that have yet to align their interest to sustain the investments required for ESG might be hesitant to acquire. In addition, high-scoring targets are usually acquired by high-scoring parties as well. Conclusively, further research with a larger sample size or different methodology is needed to validate and solidify these arguments. The results from this study show a relatively weak relationship, exacerbated by the limited sample size. Moreover, considering other potentially influential factors or conducting more granular analyses might help achieve more robust significance levels and provide more definite conclusions.

Our last result deals with ESG as a measurement for firm proximity, whether firms with similar ESG practices have a higher probability of deal completion. We subtract acquirers' scores from the target scores and observe their influence on the probability. We only have samples from deals with parties with ESG scores, which returned 205 observations. Unfortunately, we could not obtain a meaningful result from the analysis; we cannot accept that there is an association between score differences and the probability of deal withdrawal. As previously mentioned, there is evidence between score differences and time to completion, especially for governance scores (Cardillo & Harasheh, 2023). The preceding theories posited by Cardillo and Harasheh (2023) regarding cultural and organizational fit will still hold to nurture acquisition. However, our study suggests that score proximities are not a definite answer to whether a deal would be completed. It is crucial to acknowledge the limitations inherent in our study. The number of observations at hand is modest, which may affect the robustness of the results. This also restricts our ability to generalize these findings to a broader population or context.

In conclusion, our study identified a negative association between target ESG disclosure, or target firm's ESG transparency, and the probability of deal completion. We also found that increasing targets' ESG and environmental scores reduces the deal completion probability. The potential reasons vary, but complexity and misalignment during due diligence between acquirer and target firms could be the most challenging obstacle for deals to complete. This study, however, did not study the target selection process; we could not validate if ESG were a part of the screening process and if ESG factors are merely proxies for implicit firm characteristics. Furthermore, the number of target firms disclosing ESG information is considerably smaller than those who did not, which arises further concern for future research.

6. Limitations and Future Studies

In considering the limitations of this study, it is important to note that our analysis relied solely on ESG ratings provided by Refinitiv. There is a multitude of rating agencies in existence, each with its distinct standards and criteria for assessing ESG performance. Therefore, our findings may only partially represent the broader perspective on ESG performance since different rating

agencies might yield different results. Moreover, there are sub-categories within Refinitiv scoring system, such as 'Emission Score' for the environmental pillar. It is possible that the broader score has no effect but when broken down into these sub-categories, specific aspects might prove to be significant. The sample size employed in our study was also limited. The lack of ESG reporting from smaller companies particularly influenced the scope of our analysis. As we move towards a future where ESG reporting is normalized and adopted more widely, particularly by smaller firms, we anticipate being able to conduct a more robust and meaningful analysis. This evolution in reporting standards could yield more comprehensive insights and perhaps paint a more nuanced picture of the relationship between ESG performance and M&A activity.

This study only includes deals that involve companies in North America and Western Europe. In other words, we disregard deals from less developed parts of the world, which may limit the generalizability of our findings. In other words, there are concerns relating to external validity. The M&A landscape could vary significantly between developed and less-developed markets due to differences in regulatory environments, business practices, cultural norms, and economic conditions. Therefore, we could not ensure that the relationships found in this research hold for such economic conditions. Moreover, our results may be influenced by the characteristics and dynamics of North American and Western European markets, which are often characterized by higher levels of transparency, more robust regulatory frameworks, and more mature financial systems.

Lastly, we require greater attention to the negative relationships established in this study. Although our analysis indicates that higher ESG scores are associated with lower deal completion probability, it does not establish a causal link between these two variables. Furthermore, there might be confounding or interaction variables that this study should have explored, such as deal premium or company reputation. For reference, in the future, experimenting with the dataset with a more advanced method (such as the Cox proportional hazards model, like the study by Cardillo and Harasheh in 2023) can yield a more nuanced result. Such statistical methods allow the inclusion of a time-to-event study and the relationship with deal completion.

7. References

Ahmad, M. F., Aktas, N., & Aziz, S. (2022). Does Bilateral Trust Matter During Mergers and Acquisitions Negotiations? *British Journal of Management*, *n/a*(n/a). https://doi.org/10.1111/1467-8551.12692

Alareeni, B. A., & Hamdan, A. (2020). ESG impact on performance of US S&P 500-listed firms. *Corporate Governance: The International Journal of Business in Society*, *20*(7), 1409–1428. https://doi.org/10.1108/CG-06-2020-0258

Andrade, G., Mitchell, M., & Stafford, E. (2001). New Evidence and Perspectives on Mergers. *Journal of Economic Perspectives*, *15*(2), 103–120. https://doi.org/10.1257/jep.15.2.103

Attah-Boakye, R., Guney, Y., Hernandez-Perdomo, E., & Mun, J. (2021). Why do some merger and acquisitions deals fail? A global perspective. *International Journal of Finance & Economics*, *26*(3), 4734–4776. https://doi.org/10.1002/ijfe.2039

Banke, M., Lenger, S., & Pott, C. (2022). ESG Ratings in the Corporate Reporting of DAX40 Companies in Germany: Effects on Market Participants. *Sustainability (Switzerland)*, *14*(15), Article 15. https://doi.org/10.3390/su14159742

Bauer, F., & Matzler, K. (2014). Antecedents of M&A success: The role of strategic complementarity, cultural fit, and degree and speed of integration. *Strategic Management Journal*, *35*(2), 269–291. https://doi.org/10.1002/smj.2091

Bereskin, F., Byun, S. K., Officer, M. S., & Oh, J.-M. (2018). The effect of cultural similarity on mergers and acquisitions: Evidence from corporate social responsibility. *Journal of Financial and Quantitative Analysis*, *53*(5), 1995–2039.

Bettinazzi, E., Miller, D., Amore, M. D., & Corbetta, G. (2018). *Ownership Similarity in M&A Target Selection* (SSRN Scholarly Paper 3329162). https://doi.org/10.2139/ssrn.3329162

Betton, S., Eckbo, B. E., & Thorburn, K. S. (2008). Corporate Takeovers. In *Handbook of Empirical Corporate Finance* (pp. 291–429). Elsevier. https://doi.org/10.1016/B978-0-444-53265-7.50007-X

Borochin, P., Ghosh, C., & Huang, D. (2019). Target information asymmetry and takeover strategy: Insights from a new perspective. *European Financial Management*, *25*(1), 38–79. https://doi.org/10.1111/eufm.12199

Branden, J.-C. van den, Seemann, A., & Lino, M. (2022, February 8). *The ESG Imperative in M&A*. Bain. https://www.bain.com/insights/esg-imperative-m-and-a-report-2022/

Brooks, C. (2019). *Introductory Econometrics for Finance*. Cambridge University Press.

Brown, K. C., & Raymond, M. V. (1986). Risk Arbitrage and the Prediction of Successful Corporate Takeovers. *Financial Management*, *15*(3), 54–63. https://doi.org/10.2307/3664844

Byrne, B. M. (2016). *Structural Equation Modeling With AMOS: Basic Concepts, Applications, and Programming, Third Edition* (3rd ed.). Routledge. https://doi.org/10.4324/9781315757421

Caiazza, S., & Pozzolo, A. F. (2016). The determinants of failed takeovers in the banking sector: Deal or country characteristics? *Journal of Banking & Finance*, *72*, S92–S103. https://doi.org/10.1016/j.jbankfin.2016.04.011

Cardillo, G., & Harasheh, M. (2023). Stay close to me: What do ESG scores tell about the deal timing in M&A transactions? *Finance Research Letters*, *51*, 103498. https://doi.org/10.1016/j.frl.2022.103498

Cornell, B. (2021). ESG preferences, risk and return. *European Financial Management*, *27*(1), 12–19. https://doi.org/10.1111/eufm.12295

Dicuonzo, G., Donofrio, F., Ranaldo, S., & Dell'Atti, V. (2022). The effect of innovation on environmental, social and governance (ESG) practices. *Meditari Accountancy Research*, *30*(4), 1191–1209. https://doi.org/10.1108/MEDAR-12-2020-1120

Dikova, D., Sahib, P. R., & van Witteloostuijn, A. (2010). Cross-border acquisition abandonment and completion: The effect of institutional differences and organizational learning in the international business service industry, 1981–2001. *Journal of International Business Studies*, *41*(2), 223–245. https://doi.org/10.1057/jibs.2009.10

Drempetic, S., Klein, C., & Zwergel, B. (2020). The Influence of Firm Size on the ESG Score: Corporate Sustainability Ratings Under Review. *Journal of Business Ethics*, *167*(2), 333–360. https://doi.org/10.1007/s10551-019-04164-1

Ellili, N. O. D. (2022). Impact of ESG disclosure and financial reporting quality on investment efficiency. *Corporate Governance: The International Journal of Business in Society*, *22*(5), 1094–1111. https://doi.org/10.1108/CG-06-2021-0209

Fery, J. B., Loomba, N. P., Marks, L., Odell, I. G., & Vance, S. (1969). The Impact of Mergers on Management Theory. *The Academy of Management Journal*, *12*(2), 153–167. https://doi.org/10.2307/254812

Fidrmuc, J. P., & Moeller, S. (2014). *Bidding competition and premiums in M&As*. Working Paper, Warwick Business School.

Fidrmuc, J. P., & Xia, C. (2019). M&A deal initiation and managerial motivation. *Journal of Corporate Finance*, *59*, 320–343. https://doi.org/10.1016/j.jcorpfin.2017.01.010

Freeman, R. E. (1994). The Politics of Stakeholder Theory: Some Future Directions. *Business Ethics Quarterly*, *4*(4), 409–421. https://doi.org/10.2307/3857340

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

Gao, Q., Zhang, Z., Li, Z., Li, Y., & Shao, X. (2022). Strategic green marketing and cross-border merger and acquisition completion: The role of corporate social responsibility

and green patent development. *Journal of Cleaner Production*, *343*, 130961. https://doi.org/10.1016/j.jclepro.2022.130961

George, D., & Mallery, P. (2010). *SPSS for Windows Step by Step: A Simple Guide and Reference, 17.0 Update*. Allyn & Bacon.

Hair, J. F. (Ed.). (2010). *Multivariate data analysis: A global perspective* (7. ed., global ed). Pearson.

Hassani, B. K., & Bahini, Y. (2022). Relationships between ESG Disclosure and Economic Growth: A Critical Review. *Journal of Risk and Financial Management*, *15*(11), Article 11. https://doi.org/10.3390/jrfm15110538

Hitt, M. A., King, D. R., Krishnan, H., Makri, M., Schijven, M., Shimizu, K., & Zhu, H. (2013). *Creating Value Through Mergers and Acquisitions: Challenges and Opportunities*.

Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics*, *93*(1), 15–36. https://doi.org/10.1016/j.jfineco.2008.09.001

Hotchkiss, E. S., & Mooradian, R. M. (1998). *Acquisitions as a Means of Restructuring Firms in Chapter 11* (SSRN Scholarly Paper 111296). https://papers.ssrn.com/abstract=111296

Howson, P. (2003). *Due Diligence: The Critical Stage in Mergers and Acquisitions*. Gower Publishing, Ltd.

Huang, D. Z.-X. (2022). Environmental, social and governance factors and assessing firm value: Valuation, signalling and stakeholder perspectives. *Accounting & Finance*, *62*(S1), 1983–2010. https://doi.org/10.1111/acfi.12849

Karim, A. E., Albitar, K., & Elmarzouky, M. (2021). A novel measure of corporate carbon emission disclosure, the effect of capital expenditures and corporate governance. *Journal of Environmental Management*, *290*, 112581. https://doi.org/10.1016/j.jenvman.2021.112581

Kumar, D., & Sengupta, K. (2020). Abandonment of mergers and acquisitions: A review and research agenda. *International Journal of Emerging Markets*, *16*(7), 1373–1403. https://doi.org/10.1108/IJOEM-12-2019-1056

Lee, M. T., Raschke, R. L., & Krishen, A. S. (2022). Signaling green! Firm ESG signals in an interconnected environment that promote brand valuation. *Journal of Business Research*, *138*, 1–11. https://doi.org/10.1016/j.jbusres.2021.08.061

Levi, M., Li, K., & Zhang, F. (2010). Deal or No Deal: Hormones and the Mergers and Acquisitions Game. *Management Science*, *56*(9), 1462–1483. https://doi.org/10.1287/mnsc.1100.1206

Lu, J., & Wang, J. (2021). Corporate governance, law, culture, environmental performance and CSR disclosure: A global perspective. *Journal of International Financial Markets, Institutions and Money*, *70*, 101264. https://doi.org/10.1016/j.intfin.2020.101264

Luypaert, M., & De Maeseneire, W. (2015). Antecedents of time to completion in mergers and acquisitions. *Applied Economics Letters*, *22*(4), 299–304. https://doi.org/10.1080/13504851.2014.939370

Maaloul, A., Zéghal, D., Ben Amar, W., & Mansour, S. (2023). The Effect of Environmental, Social, and Governance (ESG) Performance and Disclosure on Cost of Debt: The Mediating Effect of Corporate Reputation. *Corporate Reputation Review*, *26*(1), 1–18. https://doi.org/10.1057/s41299-021-00130-8

Mahoney, J. T., & Pandian, J. R. (1992). The resource-based view within the conversation of strategic management. *Strategic Management Journal*, *13*(5), 363–380. https://doi.org/10.1002/smj.4250130505

Makrygiannis, K. (2022, January 10). *Over half of CEOs to step-up 2022 investment and M&A, but headwinds remain*. EY. https://www.ey.com/en_gl/news/2022/01/over-half-of-ceos-to-step-up-investment-and-m-a-in-2022-but-headwinds-remain

Martynova, M., & Renneboog, L. (2008). A century of corporate takeovers: What have we learned and where do we stand? *Journal of Banking & Finance*, *32*(10), 2148–2177.

Maung, M. (2022). Trust and cross-border mergers and acquisitions. *International Review of Financial Analysis*, *83*, 102262. https://doi.org/10.1016/j.irfa.2022.102262

Maung, M., Wilson, C., & Yu, W. (2020). Does reputation risk matter? Evidence from cross-border mergers and acquisitions. *Journal of International Financial Markets, Institutions and Money*, *66*, 101204. https://doi.org/10.1016/j.intfin.2020.101204

McKinsey & Company. (2019, August 5). *Why large M&A deals fail*. https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/done-deal-why-many-large-transactions-fail-to-cross-the-finish-line

Mukherjee, T., Kiymaz, H., & Baker, H. (2005). Merger Motives and Target Valuation: A Survey of Evidence from Cfos. *Empirical Studies EJournal*. https://www.semanticscholar.org/paper/Merger-Motives-and-Target-Valuation%3A-A-Survey-of-Mukherjee-Kiymaz/e9255d4b4dcc17a3732c2ff2d5670b1dc3c3522c

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), 187–221. https://doi.org/10.1016/0304-405X(84)90023-0

Ngo, T., & Susnjara, J. (2016). Hostility and deal completion likelihood in international acquisitions: The moderating effect of information leakage. *Global Finance Journal*, *31*, 42–56. https://doi.org/10.1016/j.gfj.2016.04.002

Niemczyk, J., Sus, A., Borowski, K., Jasiński, B., & Jasińska, K. (2022). The Dominant Motives of Mergers and Acquisitions in the Energy Sector in Western Europe from the Perspective of Green Economy. *Energies*, *15*(3), 1065.

Nirino, N., Santoro, G., Miglietta, N., & Quaglia, R. (2021). Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices.

Technological Forecasting and Social Change, *162*, 120341. https://doi.org/10.1016/j.techfore.2020.120341

PricewaterhouseCoopers. (2023). *Global M&A Industry Trends: 2023 Outlook*. PwC. https://www.pwc.com/gx/en/services/deals/trends.html

Reber, B., Gold, A., & Gold, S. (2022). ESG Disclosure and Idiosyncratic Risk in Initial Public Offerings. *Journal of Business Ethics*, *179*(3), 867–886. https://doi.org/10.1007/s10551-021-04847-8

Risberg, A. (2013). *Mergers & Acquisitions: A Critical Reader*. Routledge.

Roll, R. (1986). The Hubris Hypothesis of Corporate Takeovers. *The Journal of Business*, *59*(2), 197–216.

Rossi, S., & Volpin, P. F. (2004). Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics*, *74*(2), 277–304. https://doi.org/10.1016/j.jfineco.2003.10.001

Rydell, A., & Leucht, A. (2020). *Looking behind the curtain: Exploring the role and content of ESG in M&A Due Diligence*. https://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-416065

Schraeder, M., & Self, D. R. (2003). Enhancing the success of mergers and acquisitions: An organizational culture perspective. *Management Decision*, *41*(5), 511–522. https://doi.org/10.1108/00251740310479359

Schwert, G. W. (1999). *Hostility in Takeovers: In the Eyes of the Beholder?* (SSRN Scholarly Paper 227425). https://papers.ssrn.com/abstract=227425

Siew, R. Y. J., Balatbat, M. C. A., & Carmichael, D. G. (2016). The impact of ESG disclosures and institutional ownership on market information asymmetry. *Asia-Pacific Journal of Accounting & Economics*, *23*(4), 432–448. https://doi.org/10.1080/16081625.2016.1170100

Swiatkowski, J., & Frey, F. (2021). *Short-term Wealth Effects of Corporate Social Responsibility? - Empirical Evidence from ESG Ratings of Firms Involved in M&A Transactions* (SSRN Scholarly Paper 3935832). https://doi.org/10.2139/ssrn.3935832

Tampakoudis, I., & Anagnostopoulou, E. (2020). The effect of mergers and acquisitions on environmental, social and governance performance and market value: Evidence from EU acquirers. *Business Strategy and the Environment*, *29*(5), 1865–1875. https://doi.org/10.1002/bse.2475

Tanna, S., Yousef, I., & Nnadi, M. (2020). Probability of mergers and acquisitions deal failure. *Journal of Financial Economic Policy*, *13*(1), 1–30. https://doi.org/10.1108/JFEP-09-2019-0182

Teti, E., Dell'Acqua, A., & Bonsi, P. (2022). Detangling the role of environmental, social, and governance factors on M&A performance. *Corporate Social Responsibility and Environmental Management*, *29*(5), 1768–1781. https://doi.org/10.1002/csr.2325

Ung, T. A., Urfe, M. N., & de Sousa, J. A. (2021). *ESG - Does it Pay in M&A?* Norwegian School of Economics.

Welch, X., Pavićević, S., Keil, T., & Laamanen, T. (2020). The Pre-Deal Phase of Mergers and Acquisitions: A Review and Research Agenda. *Journal of Management*, *46*(6), 843–878. https://doi.org/10.1177/0149206319886908

Xu, J., Liu, F., & Shang, Y. (2020). R&D investment, ESG performance and green innovation performance: Evidence from China. *Kybernetes*, *50*(3), 737–756. https://doi.org/10.1108/K-12-2019-0793

Zámborský, P., Yan, Z. J., Sbaï, E., & Larsen, M. (2021). Cross-Border M&A Motives and Home Country Institutions: Role of Regulatory Quality and Dynamics in the Asia-Pacific Region. *Journal of Risk and Financial Management*, *14*(10), 468. https://doi.org/10.3390/jrfm14100468

Zhao, X. (2009). Technological Innovation and Acquisitions. *Management Science*, *55*(7), 1170–1183. https://doi.org/10.1287/mnsc.1090.1018

8. Appendix

Appendix A: Variations in Observation Sizes

The following table presents the variation of observation sizes according to the variables used for each model. The asterisks (*) represent whether the model employs the variable. The last row shows the number of observations.

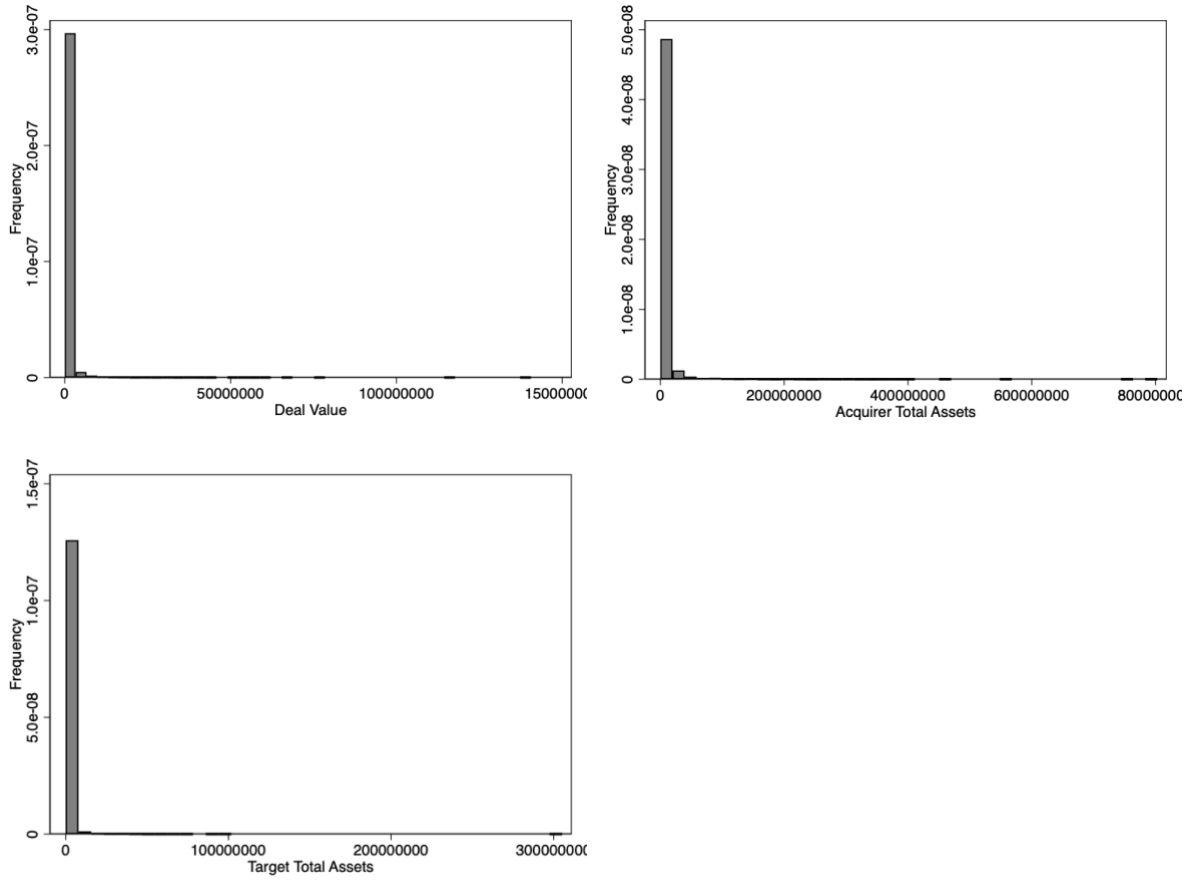
Table 8.1
Variations in Observation Sizes For Models

Deal Status	**1.1**	**1.2**	**1.3**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**3.1**	**3.2**
Acquirer ESG Disclosure	*		*							
Target ESG Disclosure		*	*							
Acquirer ESG Score				*		*				
Target ESG Score					*	*				
Acquirer ENV Score							*			
Acquirer SOC Score							*			
Acquirer GOV Score							*			
Target ENV Score								*		
Target SOC Score								*		
Target GOV Score								*		
ESG Difference									*	
ENV Difference										*
SOC Difference										*
GOV Difference										*
Deal Size (ln)	*	*	*	*	*	*	*	*	*	*
Deal Hostility	*	*	*	*	*	*	*	*	*	*
Deal Competition	*	*	*	*	*	*	*	*	*	*
Cross Border	*	*	*	*	*	*	*	*	*	*
Cross Industry	*	*	*	*	*	*	*	*	*	*
Payment Method	*	*	*	*	*	*	*	*	*	*
Acquirer Size (ln)	*	*	*	*	*	*	*	*	*	*
Target Size (ln)	*	*	*	*	*	*	*	*	*	*
# of Observations	**1864**	**1864**	**1864**	**1111**	**215**	**205**	**1111**	**215**	**205**	**205**

Appendix B: Data Skewness

The following figures are histograms of the continuous variables: deal size, acquirer size, and target size. We observe positive skewness, meaning smaller observations dominate the dataset, which call for an outlier treatment.

Figure 8.1.
Data skewness

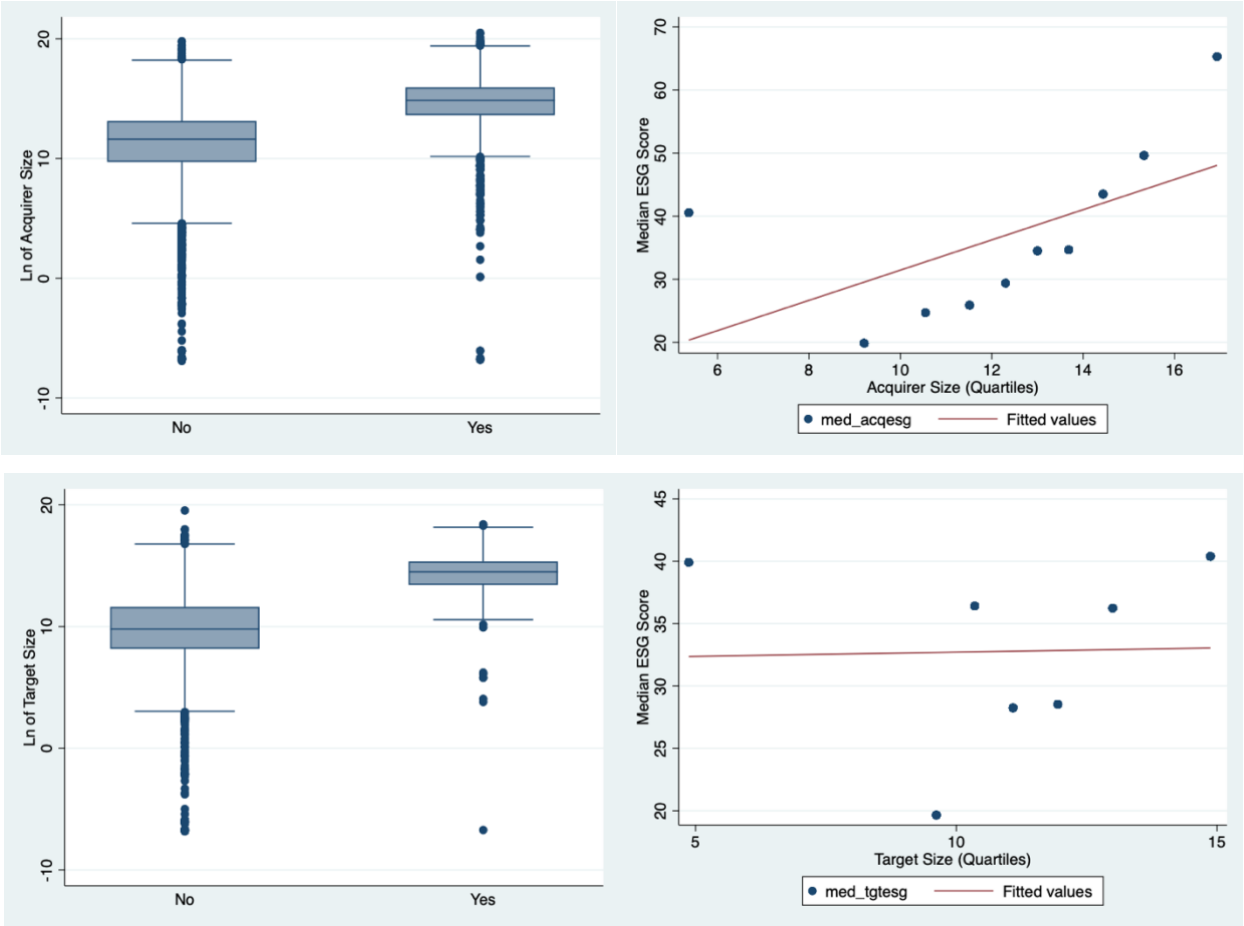


Note: These histograms illustrate the distribution of the continuous control variables. Top (left-to-right): deal size and acquirer size. Bottom: target size.

Appendix C: Relationships Between ESG with Firm and Industry Characteristics.

We observe strong association between firm characteristics and ESG. Most importantly, firm size has positive relationships with the ESG variables. Figure 8.2 shows ESG disclosure concentrates more on larger firms. The figure also infers a positive correlation between ESG scores and acquirer size; as we ascend the deciles of acquirers' size, we correspondingly observe higher ESG medians. However, we could not say that target size is correlated with its ESG score.

Figure 8.2
Boxplot and scatter plot between ESG and firm size.



Note: The left figures depict the relationship between ESG disclosure (x-axis) and firm size (y-axis). The right figure contrasts firm size in a decile form (x-axis) and ESG scores (y-axis). Notably, larger firms tend to have higher ESG disclosures.

We initially assume that industry factors do not explain in constituting total assets, where it causes some small acquirers to have higher ESG score. Table 8.2 shows the industry of firms within the first decile, and we found no dominating industries. Therefore, we conclude that nonlinearity persists, and some "small" acquirers coincidentally have higher ESG scores.

Table 8.2
Identifying potential outlier in acquirers' ESG score based on industry

Sectors in the first decile of acquirer size	N	Freq	%
Chemicals, rubber, plastics, non-meta..	1,343	3	0.22%
Education, Health	435	1	0.23%
Food, beverages, tobacco	715	3	0.42%
Gas, Water, Electricity	642	1	0.16%
Hotels & restaurants	448	1	0.22%
Machinery, equipment, furniture, recy..	2,959	6	0.20%
Metals & metal products	1,062	1	0.09%
Other services	9,610	39	0.41%
Post and telecommunications	309	1	0.32%
Primary Sector (agriculture, mining, ..	1,241	5	0.40%
Publishing, printing	437	6	1.37%
Wholesale & retail trade	1,158	4	0.35%
Wood, cork, paper	209	1	0.48%

Appendix D: Pairwise Correlation Matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1)	Deal Status	1.00																		
(2)	Acq. Disc.	0.01	1.00																	
(3)	Tgt. Disc.	-0.21	0.09	1.00																
(4)	Acq. ESG	-0.05	.	0.12	1.00															
(5)	Acq. ENV	-0.05	.	0.12	**0.87**	1.00														
(6)	Acq. Soc	-0.04	.	0.12	**0.90**	**0.75**	1.00													
(7)	Acq. Gov	-0.02	.	0.08	**0.72**	0.46	0.45	1.00												
(8)	Tgt. ESG	-0.18	0.01	.	0.36	0.40	0.35	0.15	1.00											
(9)	Tgt. ENV	-0.18	0.02	.	0.35	0.42	0.29	0.18	**0.84**	1.00										
(10)	Tgt. Soc	-0.14	-0.02	.	0.29	0.34	0.30	0.06	**0.89**	0.69	1.00									
(11)	Tgt. Gov	-0.16	0.05	.	0.26	0.27	0.24	0.16	**0.70**	0.40	0.43	1.00								
(12)	Deal Size	-0.15	-0.33	0.15	-0.18	-0.16	-0.18	-0.10	0.08	0.10	0.07	0.06	1.00							
(13)	Hostility	-0.48	-0.01	0.15	0.04	0.04	0.04	0.02	0.06	0.07	0.05	0.04	0.07	1.00						
(14)	Cross Border	-0.01	0.12	-0.01	0.16	0.17	0.13	0.09	0.11	0.15	0.08	0.04	-0.13	0.01	1.00					
(15)	Cross Industry	0.01	0.05	-0.03	0.07	0.07	0.05	0.05	-0.01	-0.01	-0.03	0.02	-0.06	0.01	0.05	1.00				
(16)	Competition	0.00	-0.04	0.00	0.05	0.05	0.06	0.02	0.02	0.03	0.01	-0.04	0.01	0.00	0.03	0.10	1.00			
(17)	Acq. Size	-0.01	0.49	0.13	0.42	0.41	0.39	0.27	0.07	0.06	0.07	0.04	-0.34	0.01	0.11	0.04	0.02	1.00		
(18)	Tgt. Size	-0.17	0.22	0.34	0.22	0.22	0.21	0.15	0.20	0.25	0.16	0.08	0.31	0.10	0.02	-0.06	0.03	0.47	1.00	
(19)	Pmt. Method	0.03	-0.06	-0.03	0.02	0.01	0.03	0.00	-0.09	-0.04	-0.09	-0.05	0.12	-0.08	0.03	0.00	0.01	-0.11	-0.06	1.00

Appendix E: Probit Analaysis Testing Hypothesis 1a and 1b

Table 8.3 displays the probit analysis, consisting of three models, with announcement years as the fixed effect. All models return with 1,864 observations, with 9.39% of the observations being withdrawn deals. Column (1) estimated the impact of acquirers' ESG disclosure on deal completion after controlling for other variables. The result shows that the decision of acquirers to disclose ESG information does not significantly impact deal completion. The second model in Column (2) shows a significant negative association between targets' ESG disclosure and deal withdrawal, meaning that disclosure reduces the likelihood of M&A completion. After including the decision of the acquirer and target within the same model in Column (3), we observe that target disclosure remains negatively significant at 0.01 interval.

Table 8.3
Probit analysis for ESG disclosure and deal completion (hypothesis 1a and 1b)

Deal Status	**(1)**	**(2)**	**(3)**
Acquirer Disclosure	-0.139		-0.104
	(0.122)		(0.123)
Target Disclosure		-0.726***	-0.718***
		(0.146)	(0.146)
Deal Size	-0.146***	-0.127***	-0.132***
	(0.037)	(0.036)	(0.036)
Deal Hostility	-2.095***	-2.045***	-2.050***
	(0.157)	(0.161)	(0.161)
Cross Border	-0.0167	-0.0231	-0.0264
	(0.098)	(0.099)	(0.099)
Cross Industry	0.13	0.116	0.116
	(0.092)	(0.093)	(0.093)
Deal Competition	-0.0304	-0.0243	-0.0325
	(0.526)	(0.544)	(0.544)
Acq. Size (ln)	-0.006	-0.006	0.002
	(0.025)	(0.022)	(0.023)
Target Size (ln)	-0.0373	-0.00291	-0.000491
	(0.026)	(0.024)	(0.023)
Cash	*Reference*	*Reference*	*Reference*
	(.)	(.)	(.)
Equity	0.077	0.11	0.106
	(0.110)	(0.113)	(0.113)
Otherwise	0.169	0.14	0.143

	(0.124)	(0.124)	(0.124)
Constant	1.417***	0.984***	0.907***
	(0.337)	(0.326)	(0.336)
Year Fixed-Effect	Yes	Yes	Yes
N	1864	1864	1864
% of Withdrawn	9.39	9.39	9.39
Pseudo R2	0.234	0.255	0.256
Prob > chi2	0	0	0

Note: This table displays the probit analysis to elucidate the magnitude of the relationship between ESG disclosure and the probability of M&A completion. Column (1) examines the impact of the acquiring firm, column (2) focuses on the target firm, and column (3) assesses the combined effect of both entities. Robust standard errors are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

Appendix F: Probit Analysis Testing Hypothesis 2a and 2b

Columns (1), (3), and (4) in Table 8.4 can infer that acquirers' general and pillar ESG scores do not have significant associations with deal completion. From Column (2), holding all other factors constant, an increase in ESG score could contribute to a higher probability of deal withdrawal. The result is significant at the 5% level. Involving the acquirers' ESG score (Column 3), we observe the same relationship with a slightly different magnitude. However, as given in the previous hypothesis, the acquirer's score does not have sufficient explanatory power. Furthermore, the constant for model 3 has no statistical significance, implying a misspecification in the model. This means that interpretation for model 3 requires additional caution.

Continuing onto Columns (4) and (5), we can assess the implication of each pillar score from either target or acquiring companies. Similarly, Column (4) shows no significant relationships between acquirers' scores and the dependent variable. However, Column (5) provides a somewhat counterintuitive finding, suggesting that higher environmental scores in target firms correspond to a higher likelihood of deal withdrawal. Our finding is significant at the 10% level. Aside from the targets' environmental score, no significant relationship is found between deal completion and social or governance scores.

Table 8.4
Probit analysis for ESG scores and deal completion (hypothesis 2a and 2b)

	(1)	(2)	(3)	(4)	(5)
Acquirer ESG	0.000		0.005		
	(0.003)		(0.008)		

Target ESG		-0.013**	-0.015**		
		(0.006)	(0.007)		
Acq. ENV				0.002	
				(0.003)	
Acq. SOC				-0.002	
				(0.004)	
Acq. GOV				0.000	
				(0.003)	
Tgt. ENV					-0.010*
					(0.006)
Tgt. SOC					0.002
					(0.007)
Tgt. GOV					-0.003
					(0.005)
Deal Size	-0.077	-0.092	0.085	-0.071	-0.103
	(0.053)	(0.103)	(0.124)	(0.053)	(0.106)
Deal Hostility	-2.320***	-1.686***	-2.008***	-2.236***	-1.693***
	(0.202)	(0.307)	(0.365)	(0.195)	(0.304)
Cross Border	0.087	-0.089	-0.242	0.076	-0.064
	(0.129)	(0.225)	(0.254)	(0.130)	(0.224)
Cross Industry	0.208*	0.146	0.138	0.194*	0.150
	(0.117)	(0.201)	(0.223)	(0.115)	(0.203)
Deal Competition	-0.417	0.079	0.193	-0.342	0.097
	(0.580)	(0.966)	(1.013)	(0.595)	(0.991)
Acq. Size (ln)	-0.007	-0.015	0.039	-0.007	-0.023
	(0.035)	(0.058)	(0.077)	(0.034)	(0.061)
Target Size (ln)	-0.051	0.195**	0.066	-0.055	0.221**
	(0.040)	(0.080)	(0.089)	(0.041)	(0.087)
Cash	*Reference*	*Reference*	*Reference*	*Reference*	*Reference*
	(.)	(.)	(.)	(.)	(.)
Equity	0.223	0.235	0.462	0.205	0.233
	(0.153)	(0.243)	(0.284)	(0.149)	(0.243)
Otherwise	0.373**	0.014	0.157	0.351**	0.040
	(0.159)	(0.288)	(0.297)	(0.158)	(0.289)
Constant	1.350**	-1.980*	-1.079	1.818***	-2.461**

	(0.563)	(1.165)	(1.236)	(0.537)	(1.202)
Year Fixed-Effect	Yes	Yes[+]	Yes[+]	Yes[+]	Yes[+]
N	1111	225	205	1111	225
% of Withdrawn	10.26	26.67	24.88	10.26	26.67
Pseudo R2	0.27	0.234	0.294	0.261	0.238
Prob > chi2	0	0	0	0	0

This table provides thr probit analysis to clarify the relationship between ESG, ENV, SOC, and GOF scores and M&A completion likelihood. Column (1) evaluates the influence of the acquirer's ESG score, column (2) pertains to the target firm, and column (3) explores the combined effect of both. Columns (4) and (5) respectively analyze the pillar scores of acquiring and target firms. Robust standard errors are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

[+]Announcement year is recategorized into three variable groups due to limited subset of observations: 2010 - 2015, 2016 - 2019, and 2020 - 2022.

Appendix G: Probit Regression for Hypothesis 3

The following table shows the probit analysis for hypothesis 3, where Column (1) portrays the influence of ESG difference and Column (2) specifies the influence of pillar scores. Again the separation is required to address potential multicollinearity. We found no statistical significance for the independent variables, akin to the marginal analysis.

Table 8.5
Probit analysis for ESG score differences (hypothesis 3)

	(1)	(2)
ESG Difference	0.010	
	(0.006)	
ENV Difference		0.010
		(0.006)
SOC Difference		0.000
		(0.007)
GOV Difference		0.000
		(0.004)
Deal Size	0.091	0.071
	(0.124)	(0.128)
Deal Hostility	-2.048***	-2.089***
	(0.364)	(0.353)
Cross Border	-0.327	-0.362
	(0.248)	(0.250)

Cross Industry	0.117	0.093
	(0.222)	(0.217)
Deal Competition	0.272	0.451
	(1.005)	(1.031)
Acq. Size (ln)	0.019	0.012
	(0.078)	(0.079)
Target Size (ln)	0.038	0.053
	(0.089)	(0.089)
Cash	*Reference*	*Reference*
	(.)	(.)
Equity	0.478*	0.533*
	(0.280)	(0.293)
Otherwise	0.191	0.245
	(0.295)	(0.300)
Constant	-0.764	-1.048
	(1.234)	(1.235)
Year Fixed-Effect	Yes[+]	Yes[+]
N	205	205
% of Withdrawn Deals	26.67	26.67
Pseudo R2	0.29	0.298
Prob > chi2	0	0

Note: This table provides the probit analysis to clarify the relationship between score differences and M&A completion likelihood. Column (1) evaluates the influence of ESG score difference, column (2) evaluates the influence of pillar score differences. Robust standard errors are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

[+]Announcement year is recategorized into three variable groups due to limited subset of observations: 2010 - 2015, 2016 - 2019, and 2020 - 2022

Appendix H: Logit Regression for Robustness Test

Table 8.6 showcases the logit regression results corresponding to the hypotheses discussed in the main text. Column (1) addresses the first hypothesis, while Columns (2) and (3) delve into the second hypothesis, and Columns (4) and (5) pertain to the third. Although the direction of the relationships remains consistent with the marginal analysis, the logit regression does highlight notable differences in the log odds.

Table 8.6

	(1)	(2)	(3)	(4)	(5)
Acquirer Disclosure	-0.222				
	(0.254)				
Target Disclosure	-1.389***				
	(0.291)				
Acquirer ESG		0.014			
		(0.014)			
Target ESG		-0.0279**			
		(0.013)			
Tgt. ENV			-0.017		
			(0.011)		
Tgt. SOC			0.003		
			(0.014)		
Tgt. GOV			-0.005		
			(0.008)		
ESG Difference				0.0208*	
				(0.012)	
ENV Difference					0.019
					(0.012)
SOC Difference					0.001
					(0.013)
GOV Difference					0.000
					(0.007)
Deal Size	-0.259***	0.179	-0.176	0.193	0.155
	(0.077)	(0.232)	(0.197)	(0.229)	(0.237)
Deal Hostility	-3.621***	-3.499***	-2.839***	-3.569***	-3.625***
	(0.294)	(0.735)	(0.548)	(0.733)	(0.717)
Cross Border	-0.043	-0.491	-0.152	-0.613	-0.700
	(0.204)	(0.490)	(0.421)	(0.482)	(0.487)
Cross Industry	0.218	0.229	0.264	0.198	0.196
	(0.191)	(0.414)	(0.374)	(0.414)	(0.415)
Deal Competition	0.099	0.458	0.218	0.576	0.832
	(1.172)	(2.297)	(2.235)	(2.246)	(2.225)
Acq. Size (ln)	0.000	0.096	-0.029	0.067	0.047
	(0.047)	(0.135)	(0.104)	(0.137)	(0.142)
Target Size (ln)	0.009	0.106	0.368**	0.062	0.092
	(0.046)	(0.144)	(0.152)	(0.144)	(0.145)
Cash	*Reference*	*Reference*	*Reference*	*Reference*	*Reference*
	(.)	(.)	(.)	(.)	(.)
Equity	0.218	0.842	0.428	0.858	0.984*
	(0.227)	(0.530)	(0.433)	(0.522)	(0.544)
Otherwise	0.281	0.196	0.015	0.254	0.354

	(0.256)	(0.540)	(0.523)	(0.532)	(0.547)
Constant	1.457**	-2.377	-4.243**	-1.920	-2.365
	(0.652)	(2.156)	(2.151)	(2.182)	(2.143)
Year Fixed-Effect	Yes	Yes+	Yes+	Yes+	Yes+
N	1864.000	205.000	225.000	205.000	205.000
% of Withdrawn	10.26	24.88	26.67	26.67	26.67
Pseudo R2	0.253	0.297	0.237	0.294	0.302
Prob > chi2	0.000	0.000	0.000	0.000	0.000

Note: This table presents the logit regression to corroborate the findings from the probit analysis. Column (1) evaluates the consistency of ESG disclosure with probit outcomes. Columns (2) and (3) examine the stability of ESG and pillar scores, while Columns (4) and (5) assess consistency in differences for ESG and pillar scores. Robust standard errors are in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

+Announcement year is recategorized into three variable groups due to a limited subset of observations: 2010 - 2015, 2016 - 2019, and 2020 - 2022