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Master's Thesis of International Studies

ESG and market performance of firms
Analysis based on announcements of mergers and acquisitions

ESG 및 기업 시장 성과
인수 합병 발표를 기반으로

August 2022

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Abstract

This paper¹ looks at the effect ESG score has on an organization's stock price during and following an announcement of M&A activity. Adapted version of the event study methodology is used to analyze M&A announcements by firms that comprised the S&P 500 Index between 2015 and 2020. This study finds positive and significant correlation between ESG metrics and a firm's equity performance in regular conditions and no correlation during and following an M&A event. Lack of association can be due to absence of consideration about ESG practices by the market during assessments of M&A activities, potential M&A information leakage, and the general dynamic of the stock market during M&A announcements. Nevertheless, this research is believed to be important since it can provide empirical support and motivation for firms to adopt sustainable practices that are critical in addressing increasing social and environmental problems.

Keywords: ESG; mergers and acquisitions; stock performance; event study

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국문초록

제도적 발전, 기후 위기 및 계산적 능력은 지속 가능한 투자 채택을 발전하고 있다. 모든 투자자는 책임 있는 가치창출을 향한 변화를 인정하고 있다. SRI 과 ESG 투자에 대한 관심은 기업이 지속 가능하고 책임 있는 가치 창출과 연계하여 시장 성과에 중요한 역할을 할 수 있음을 의미한다. 업계 전문가들의 수많은 보고서는 지속 가능한 비즈니스 관행과 기업의 재무 성과 사이에 긍정적인 관계가 존재한 것을 지적하고 있다.

본고는² 업계 분석가들의 긍정적인 전망이 SRI 와 ESG 투자에 대한 실증적 연구결과와 엇갈린 부분을 발견했다. 기업이 재무적 성공에 대한 ESG 분석은 크게 향상되었음에도 불구하고, 지속 가능성이 경쟁 우위를 창출할 수 있는 정도에 대해서 여전히 논의할 여지가 남아있는 것으로 보인다.

본고는 기존의 연구와 토론에 기여하여, 인수합병 발표를 기반으로 기업의 ESG 점수를 통해 대표되는 기업의 ESG 와 해당 주식 성과 간의 관계를 분석하는 데에 중점을 두고, 2015 년 초부터 2020 년 말까지 가진 S&P 500 지수로 구성된 기업을 중점적으로 다루었다. 평가 대상 이벤트가 기업의 M&A 활동 발표인 이벤트 연구 방법론 ESM(Event Study Methodology)을 사용하여 ESM 와 주식 성과 간의 관계를 추정한다. 위에서 언급한 변수와 관리 대상이 되는 다른 회사별 및 날짜별 변수 간의 유의한 관계가 있는지 알아보기 위해 단순 OLS(일반 최소 자승)을 수행한다.

² 본 논문작성자는 한국정부초청장학금(Global Korea Scholarship)을 지원받은 장학생임

회귀 결과는 기업의 ESG 점수와 일반적인 조건(M&A 발표 없음)에서의 주가 성과 간에 1% 수준에서 양의 통계적으로 유의한 상관 관계가 있음을 보여준다. 그러나 M&A 발표 중 및 발표 이후에 ESG 지표가 주가에 미치는 영향을 살펴보면 통계적으로나 실질적으로 유의미한 결과를 찾을 수 없다. 즉, 상대적으로 더 나은 ESG 지표를 가진 조직이 M&A 발표 이후에 반드시 주가가 개선되는 것을 누리지 못하는 것이다.

인수합병(M&A) 발표를 기반으로 ESG 와 재무 성과 간의 상관 관계가 없는 데에는 여러 가지 이유가 있을 수 있다. 첫째, 투자자들은 단순히 기업의 재무, 합병 및/또는 인수의 타당성, 시너지의 존재 등과 같은 다른 성과 지표에 더 많은 관심을 기울일 수 있다. 둘째, 잠재적 인수합병(M&A)에 대한 정보가 발표 전에 유출될 수 있으므로 M&A 의 예상치 못한 특성이 무효화되고 결과적으로 비정상적 수익과 ESG 의 영향을 감소시킬 수 있다. 마지막으로, 인수합병에 관여한다는 사실 자체가 자금조달과 투자심리로 인해 단기적으로 취득자의 주가가 하락시키는 경향이 있다.

본 연구는 논문과 관련된 불가피한 한계가 존재한 것을 인정한다.

첫째, 본 연구는 S&P 500 지수를 가진 미국 기업을 대상으로 정했다. 그러나 이러한 기업들은 유럽, 중동 또는 아시아에서 성장 및 운영되는 다른 기업들을 대표하지 않을 수 있다. 둘째, 대기업에만 초점을 두는 경우, ESG 실적과 주식 수익의 역학 관계가 다를 수 있는 중소기업은 제외한다. 또한 본고는 기업의 주가와 ESG 실적 간의 역학 관계에 대해서도 설명할 것이다. MNE는 ESG에 투자할 수 있는 자본을 더 많이 확보하여 지속 가능한 사회적 성과를 더 잘 보여준다.

셋째, 본고는 ESG 점수를 액면을 수용하고, 지속 가능한 비즈니스 관행을 선도하려는 조직의 시도를 실제로 보여준다.

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Abbreviations

ESG	Environmental, social and governance
CSR	Corporate social responsibility
SRI	Socially responsible investing
M&A	Merger and acquisition
S&P 500	Standard and Poor's 500
ESM	Event study methodology

Chapter 1. Introduction

Responsible investing has come a long way since its inception. Institutional developments, climate crises, and the rise of computational capabilities are further driving the adoption of sustainable investing. Both big and small investors are acknowledging this shift toward responsible value creation. “Reflecting the importance of CSR in US firms' operation, socially responsible investing (SRI) has also become an increasingly important investment vehicle in the US” (Deng, Kang and Low 2013: 87). For example, according to a report published by The Forum for Sustainable and Responsible Investment (2020), in the beginning of 2020 US-based assets under management (AUM) that adhere to environmental, social and governance (ESG) practices passed the \$17 trillion mark, an increase of 42 percent from 2018’s \$12 trillion. Globally, sustainable investing assets surpassed \$35 trillion at the start of 2020, a 15 percent increase compared to 2018, and a rise of 55 percent in four years (“Global Sustainable Investment Review 2020” 2021). This is almost 36 percent of all worldwide assets under management, and compared to previous years of 2016 and 2018, shows an increase of 8 and 2.5 percent, respectively. ESG integration is a major sustainable investment strategy with a combined \$25.2 trillion in AUM (“Global Sustainable Investment Review 2020” 2021). According to Broadridge Financial Solutions, until the year 2030 assets in dedicated ESG funds may account for as much as \$30 trillion (2021). Moreover, it is believed that net flows into ESG related funds and ETFs could rise from anywhere between 6 trillion to \$9 trillion until the end of this decade (Alexeyev 2021).

Such interest in SRI and ESG investing implies that firms’ alignment with sustainable, responsible value creation may play a significant role in their market performance. In its report about environmental sustainability and decarbonization in the defense industry, Boston Consulting Group states that “ESG-compliant companies and funds tend to outperform their peers across

industrial sectors on most metrics – including stronger financial performance, higher stock prices, and lower capital costs” (Dimitrova et al. 2021: 5). A report from Institutional Shareholder Services also supports this point by stating that high ESG performance is positively related to firm valuation and profitability and can be an indicator of company’s good capital allocation (Spellman and Nicholas 2019). Not only that, in Jiang et al. (2020), experts from Marsh & McLennan Advantage – a professional services firm – report that “as a workforce strategy, ESG performance has become a competitive advantage – both in engaging today’s employees and attracting tomorrow’s talent” (2), which may be a cornerstone of successful company performance. Despite such positive outlook on this topic, empirical studies of SRI and ESG investing result in mixed outcomes. For example, Borovkova and Wu (2020) find that large cap firms in United States and Asia experience negative correlation between their stock returns and sustainability records (represented through Refinitiv ESG metrics). Von Wallis and Klein (2015), find in their extensive meta-analysis that among analyzed firms, 15 show equal performance among SRI and conventional investment; 14 illustrate that SRI has better performance than traditional investing; and 6 come to the opposite conclusion, emphasizing the negative relationship between sustainable investment and performance. Another meta-analysis conducted by Friede, Busch and Bassen (2015) also illustrates the ambiguous nature of the relationship between sustainable investing and corporate financial performance (CFP). An analysis of 2000 studies on ESG-CFP relation reveals that 48.2 percent show clear positive associations with remaining research having neutral, negative or mixed conclusions (23.0%, 10.7%, and 18.0% respectively). The inconclusiveness of research seems to decline over the years since 2021. A report by Whelan, Atz and Clark finds that 58 percent of 1000 plus studies show a positive relationship between ESG and financial performance based on operational metrics such as return on equity, return on assets, or stock price, while 42 percent

still have neutral results at best. Despite substantial leaps in analysis of ESG's role in corporate financial success, there seems to exist room for debate over the extent to which sustainability can create competitive advantage.

The aim of this paper is to contribute to existing literature and debate. It focuses on analyzing the relationship between the ESG of firms represented through ESG scores and their stock performance in the context of announcements of mergers and acquisitions. There are two reasons to study the effect of M&As specifically. First, as one of the most important decisions and ways of expanding the business, M&As can have significant effects on a firm's value. Such type of crucial event can be a fertile ground in analyzing ESG's role in creating additional value on a firm's daily stock performance following M&A announcements. Second, as put by Deng, Kang and Low (2013), the nature of M&As as mostly unanticipated events helps in accounting for a reverse causality problem, whereby, for example, businesses with high sustainability performance invest more in ESG, leading to better accounting performance. Hence, focusing on M&A alleviates this kind of issue.

This paper focuses on firms comprising the S&P 500 Index with an analysis period between the start of 2015 and the end of 2020. It estimates the relationship between ESG and stock performance using a slightly changed and adapted version of the event study methodology (ESM) where the event being evaluated is the announcement of a firm's M&A activity. Simple ordinary least squares (OLS) regression is conducted to learn if there is any significant relationship between the above-mentioned variables with other firm-specific and date-specific variables being controlled for. There are three separate regressions with the first estimating the overall effect of ESG scores on stock returns. In the second model, firms are grouped into high and low ESG performers based on whether the company's ESG score is above or below the average for all firms

in a given year. The third regression divides firms into four groups on a quartile basis depending on their ESG scores. The logic behind the last two models is to learn if there are any performance differences associated with group dynamics whereby, for example, firms in higher groups exhibit higher stock price returns than firms in lower groups. In other words, paper wants to learn if the relationship between the variables is heterogenous and not monotonic, whereby there exists a differential effect.

Regression results show that there is a positive and statistically significant correlation at one percentage level between ESG score of a firm and its stock performance in general conditions (no M&A announcements). To be more precise, the effect of one hundredth increase in overall ESG metric is correlated with about a 10 percent hike on average in equity valuation. When segmented into groups of firms with above-average and below-average ESG, belonging to higher class is associated with approximately a 10.2 percent better stock performance on average. Furthermore, compared to a base group comprising of firms in the lowest quartile, businesses in the second, third and fourth quartile are linked to higher share prices by roughly 3.6, 11.1, and 6.4 percent on average. However, when looking at the effects of the ESG metric on equity prices during and following the announcements of M&As, research does not find any statistically and practically significant results. In other words, organizations with relatively better ESG indicators do not necessarily enjoy improved share prices following M&A announcements. Regardless of event window specification, all of the regression results show positive and somewhat differing coefficients while, as mentioned, failing to exhibit significance at any conventional level.

The rest of the paper is organized as follows: the following section explains the literature regarding SRI and ESG, and their effect on company conduct. Next, this study presents data and methodology that is used to quantitatively analyze this issue. After the quantitative analysis, the

paper demonstrates results, followed by robustness tests. Following that, this research discusses findings, with the final section devoted to concluding remarks.

Chapter 2. ESG Background

2.1. Brief overview of ESG history

The inception of the term ESG, and ESG investing can be traced back to the year of 2004 when former UN Secretary General Kofi Annan's initiative under the UN Global Compact program produced a landmark report entitled "Who Cares Wins: Connecting Financial Markets to a Changing World", authored by Ivo Knoepfel. It was strongly believed that integration of environmental, social, and governance issues into a company's management could ensure its successful competition. Good performance in these three directions could lead to a rise in shareholder value, contributions to sustainable development, and a strong reputation and brand image (Knoepfel 2004). All in all, "...better consideration of environmental, social and governance factors [would] ultimately contribute to stronger and more resilient investment markets, as well as contribute to the sustainable development of societies" (Knoepfel 2004: ii).

At the same time and no less important, the United Nations Environmental Program Finance Initiative (UNEP FI) in collaboration with Freshfields Bruckhaus Deringer – a London-based law firm – developed another report that would address long-lasting intellectual and legal debate over fiduciary duty and the rise of socially responsible investing. In the best tradition of shareholder capitalism that is founded on Milton Friedman's seminal essay which argued that businesses' sole social responsibility is to increase company profits for shareholders, Freshfields Report wished to understand whether this conventional view of fiduciary duty that required managers to focus only on profit maximization was the correct interpretation of law or if there was room to incorporate other objectives, among many, such as environmental protection, and establishment of beneficial social conditions. Following an examination of laws in seven major

markets including the US, UK and Japan, the report concluded that integration of ESG does not run counter to fiduciary duty. In contrary, disregard for these long-term issues may be a violation of fiduciary duty. The report states, “Integrating ESG considerations into an investment analysis... is clearly permissible and is arguably required in all jurisdictions” (Freshfields Bruckhaus Deringer 2005: 6).

These two reports became the backbone for the establishment of Principles for Responsible Investment (PRI) at the New York Stock Exchange in 2006. Aimed at creating sustainable financial systems, it uses the incorporation of ESG into investing practices as its main tool. By understanding investment implications of ESG factors, it helps its ever-growing base of signatories to integrate these factors into their investment and ownership decisions. As of 2021, PRI counts almost 4000 member companies representing more than \$120 trillion AUM (UN PRI 2021). In January of 2016 the PRI and UNEP FI with financial support from The Generation Foundation embarked on a four-year project to study the role of fiduciary duty of investors with respect to integration of ESG once more. Even though there has been considerable progress overall, many investors still fail to fully incorporate the ESG metric in their investment decisions. This is important since the concept of fiduciary duty evolved to include ESG factors over the years. Now, inclusion of ESG is becoming an investment norm with material financial implications and changes in regulatory landscape ("Fiduciary Duty in the 21St Century: Final Report" 2020).

2.2. Academic research on ESG

The foundation for SRI and ESG studies comes from the seemingly distant field of journalism, more precisely, from Milton Moskowitz’s establishment of the “Business & Society” newsletter – a business publication focused on exploration of the role businesses play in the life of their employees, communities, and society – in 1968. Moskowitz was the first to come up with a

list of “responsible” firms and juxtapose their performance against broad market indices. In addition, with new data compiling over the years, he established an “irresponsible” list of firms, too. Moskowitz with the help from Robert Levering and Michael Katz went on to publish an influential book titled “100 Best Companies to Work for in America” in 1984 that generated momentum in evaluating firms by other people and organizations. Moskowitz’s early efforts planted a seed for future academic endeavors to rate firms based on their social, environmental, and internal commitments.

Despite its benevolent intentions, building environmentally and socially conscious investment portfolios runs counter to the fundamental beliefs of a traditional finance mentality. Initiatives, albeit big, were not enough to convince Wall Street players into adopting novel approaches to investing. Pioneers who accepted the mantra of socially responsible investing understood that this new strategy needed to be evaluated against traditional market benchmarks to gain acceptance (Townsend 2020). In his book, Lloyd Kurtz divides SRI and ESG studies into four distinct eras: Pioneering Efforts (1970s and 1980s); Sustained Attention (1990s); Sustainability, Stakeholder, and the Search for Alpha (2000s); and Modern Era (2009–present). Starting from the second era, academics embark upon decades long research to prove that sustainable methods of investing are no less financially profitable than conventional ones. Hamilton, Jo and Statman (1993) find that socially responsible mutual funds perform as well as traditional ones. A 2005 study by Derwall et al. based on the idea of “eco-efficiency” – the value a firm creates relative to the waste it generates – analyzes two equity portfolios that differ in the above-mentioned metric. They conclude that between 1995 and 2003, the high-ranked portfolio produced significantly larger returns than the lower-ranked one. Edmans (2011) looks at the performance of SRI from the intangibles perspective, namely, employee satisfaction and its effect on financial returns. Higher

levels of employee satisfaction translate into higher long-run returns even when accounting for industry, risk, and firm-specific factors. “SRI screen based on employee welfare may improve investment performance, in contrast to existing views that any SRI screen necessarily reduces investor returns” (Edmans 2011: 24).

Modern SRI and ESG research is exemplified by work from Eccles, Ioannou, and Serafeim (2014) where they find that highly sustainable businesses outperform low sustainable firms in stock returns suggesting that environmentally and socially responsible policies do not undermine the shareholder value maximization doctrine. In contrast, due to higher returns, incorporating ESG factors into a company’s strategy may be a source of competitive advantage. Another seminal paper by Khan, Serafeim and Yoon (2016) reaches the same conclusion stating that there is a considerable gap between companies that perform well on material sustainability issues and those that do not based on their stock returns, with the former having better outcomes. Additionally, in the mid to long-term horizon, Dorfleitner, Utz and Wimmer (2018) find that companies exhibiting strong ESG performance have returns as high as 3.8 percent per standard deviation over firms with low ESG scores.

The current era of SRI and ESG research sees the expansion of contexts in which the financial implications of sustainable value creation are manifested. For some, the benefits of ESG investing do not necessarily lie in improved returns, but in reduced risks. ESG investing is found to be beneficial in reducing or sheltering companies from risk during economic downturns. Nofsinger and Varma (2014) find that SRI investments based on ESG metrics outperform conventional mutual funds during crisis periods, while underperforming in non-crisis ones, implying that investors interested in downside protection should pay attention to sustainable funds. Fernández, Abu-Alkheilb and Khartabiel (2019) conclude that during the global financial crisis of

2008 German environmental mutual funds illustrate marginally better adjusted returns than SRI and traditional mutual funds. The same context is used in a study by Wu et al. (2015), where the analysis of FTSE4Good (SRI portfolios) and FTSE 350 (conventional portfolios) from 2004 to 2011, including the financial crisis, reveals that SRI funds tend to not only outperform conventional portfolios, but also recovered faster following the crash. Similarly, examination of Socially Responsible Mutual Funds (SRMF) over 12-year period that encompasses the 2008 crisis depicts that SRMFs with higher ESG scores perform better than SRMFs with lower ESG rating during the downturn, with responsible funds showing no difference in returns to general market in the same period (Das et al. 2018).

Based on such conclusions from previous research, this thesis posits that:

Hypothesis 1: There exists a positive correlation between firms' ESG and their stock prices.

In other words, it is possible that better ESG scores are linked to better stock performance.

With respect to the context of mergers and acquisitions, CSR and ESG itself can become a tool of value creation through indirect means. For example, Tampakoudis and Anagnostopoulou (2020) find that “post-merger ESG performance of the acquirer increases following the acquisition of a target that has higher ESG performance than that of the acquirer in the premerger stage, whereas the post-merger market value of the acquirer increases following an increase in the acquirer's post-merger ESG performance in relation to its premerger ESG performance” (1865). This implies that companies with low ESG can increase their score and market value by acquiring firms with high ESG. Furthermore, Deng, Kang and Low (2013) find that “compared with low CSR acquirers, high CSR acquirers realize higher merger announcement returns, higher announcement returns on the value-weighted portfolio of the acquirer and the target, and larger increases in post-merger long-term operating performance. They also realize positive long-term

stock returns” (87). It is worth mentioning that they use ESG metrics as a representation of businesses’ commitment to corporate social responsibility. Other research by Song (2016) finds that during M&A announcements the acquirer’s ESG strength has a considerable positive influence of associated market returns. Lastly, Krishnamurti et al. (2019) also come to the conclusion that there exists positive and significant abnormal returns in firm stock prices during M&A announcements for acquirers with CSR orientation based on Australian data, meaning that organizations that follow CSR practices have relatively higher stock returns during M&A announcements.

Consequently, this paper believes that:

Hypothesis 2: Businesses with better ESG scores are expected to show better post-M&A announcement stock performance. In other words, the higher an organization’s ESG, the higher is its stock price following the announcement of M&A.

It is worth pointing out that all of the above-mentioned research that focuses on M&As suffers from shortcomings in one way or another. For example, Tampakoudis and Anagnostopoulou’s (2020) research covers only 100 M&A observations. Such a small sample size raises the question of whether study results can be extrapolated to the real world. In addition, Deng, Kang and Low (2013) exclude financial and utilities industries with no explanation. Doing so may distort the overall image by leaving empty spots. Lastly, Krishnamurti et al. (2019) focus only on Australian markets which may not be a good representation of the general financial world. Furthermore, existing research does not conduct robustness tests to check if the results are strong. Ultimately, every one of these research studies use relatively old data that dates to 2016 at the latest. The following research tries to address these issues by including a big sample size (3500+ observations), all industries and data that covers the period between 2015 and 2020.

Chapter 3. Methodology

3.1. Data

The variable of interest – stock performance of S&P 500 firms – is represented by the natural logarithmic form of their daily stock price in dollar terms. The S&P 500 Index is chosen since it is one of the most recognized indices in the financial industry. Only Class A shares are included. This is because not all firms have other types of shares such as Class B and/or C, but all have Class A shares. Hence, focusing on Class A shares ensures that each firm's performance is represented in a comparable manner. Among others, the main difference between Class A and other types of shares is that Class A shares give higher voting power. Class A shares may offer 10 voting rights per share, while Class B may have only one, and Class C – none. The date format is given in trading days, meaning the exclusion of weekends and holidays. The CRSP database is utilized to obtain the necessary information. CRSP, which stands for Center for Research in Security Prices, is a provider of historical stock market data. It manages one of the most extensive historical databases in stock market research. Changes in stock prices and their returns are analyzed starting from 2015 and until the end of 2020. 2015 is the year when the Paris Agreement was signed which marks the symbolic beginning of a new era in the fight towards sustainable and responsible future. 501 unique companies are included in S&P 500 Index at the start of 2015. Their corresponding permanent company numbers are obtained from the CRSP database with daily stock price information between 01/01/2015 and 12/31/2020 for each of them. A permanent company number is assigned to every firm in order to address complications associated, for example, with a ticker name change whereby firms may decide to go with a new ticker symbol which may confuse people when searching for company stock data (Facebook changed its name to Meta as well as announcing its ticker symbol change from FB to MVRB, but its permanent company number is

still the same - 54084). Following the clean-up where firms with insufficient daily stock price data between 01/01/2015 and 12/31/2020 are excluded, there are 414 companies remaining. In other words, only firms with stock price information for the whole period between 01/01/2015 and 12/31/2020 are kept for final analysis. This is because the S&P 500 Index is known for its occasional change in constituents where some firms tend to stay there for a considerable amount of time, while others last for only a few years.

Information on announcement dates of Mergers and Acquisitions is acquired from the SDC Platinum database. The deal announcements are represented in calendar date format with specified date, month, and year. The dataset expands from the year 2015 to the end of 2020. Announcements of both cross-border and same-country deals are included in the analysis. Unfortunately, SDC Platinum does not have an option of knowing who announces the deals, therefore, this research leaves that aspect open to discussion. Types of M&A deals represented in SDC Platinum, and the ones research includes are leveraged buyouts, tender offers, spinoffs, recapitalizations, self-tenders, exchange offers, repurchases, minority stake purchases, acquisitions on remaining interest, and privatizations. As for the amount of capital involved and its disclosure, this paper considers all the possible ranges without limitations on lowest and highest threshold and covers both disclosed and undisclosed deals. The same is true with respect to industry, meaning that all M&A announcements are included regardless of industry type. This paper incorporates not only completed deals, but also ones that are pending, withdrawn, tentative and with unknown statuses. The focus of the research is on the *announcement* of M&A transactions, not necessarily on their status. It is worth mentioning that because of the public nature of firms in the S&P 500 Index, only M&A announcements of public acquirers are included in the analysis. There is information on 389 firms

out of an original 414 companies totaling in 3674 M&A announcements throughout the given years.

ESG scores for firms in S&P 500 are provided by Reuters' Refinitiv Eikon database. The Eikon database covers firms' ESG performance on an annual Fiscal Year (FY) basis. Therefore, ESG scores for each FY are converted to calendar years. ESG scores are reported in percentages ranging from 0 to 100 percent. For this paper, only the combined total ESG scores between 2015 and 2020 are used for 389 firms that have both stock and M&A information. Refinitiv offers one of the most comprehensive ESG databases with coverage of more than 70 percent of global market cap and goes as far back as the fiscal year 2002. Scores are derived from publicly available verifiable data that include annual reports, company websites, NGO websites, stock exchange filings, CSR reports and news sources. Ratings are available for more than 9500 firms including, but not limited to, businesses in S&P 500, NASDAQ, Russell 3000 and more. ESG scores provided by Refinitiv are updated on a continuous basis in alignment with event occurrences such as inclusion of a new company into the database, release of annual and/or SCR reports, and firm controversies. Generally, all ESG scores are updated on a weekly basis. Refinitiv analyzes more than 500 company-level ESG metrics, of which 186 most comparable and important are chosen to drive the company assessment. The subset of 186 metrics is grouped into 10 categories that further comprise three pillars – environmental, social and governance – and an overall ESG score. The environmental pillar includes these three categories – resource use, emissions, and innovation. Workforce, human rights, community, and product responsibility categories form the social pillar. Lastly, governance is comprised of management, shareholders, and SCR strategy categories. These three pillars and the final ESG scores reflect business's ESG performance based on objective and quantifiable data.

Methodology used by Refinitiv for calculating ESG scores can be summarized by a five-step process. In the first step, more than 500 metrics are collected and analyzed with particular focus on data relevancy and transparency. Next, out of these data points the most relevant 186 are chosen with 70-170 per industry. For the third stage, percentile rank scoring methodology is used to calculate scores for 10 categories. The formula is as follows:

$$\text{score} = \frac{\# \text{ of firms with worse value} + \frac{\# \text{ of firms with the same value included in the current one}}{2}}{\# \text{ of firms with a value}}$$

At the same time, each category is given weight according to the industry, which are calculated using Refinitiv’s proprietary magnitude matrix. After calculating 10 categories, as a fourth step, they are aggregated to form each pillar (for detailed calculation refer to Appendix 1). ESG pillar scores are the relative sum of the category weights. Finally, overall ESG scores are accumulated based on the 10 category weights that depend on a company’s industry (for further details refer to Appendix 2).

Summary statistics of final data can be seen below:

Table 1. Descriptive statistics

Variables	Mean	Median	SD	Variance	Min	Max	Range
Natural log of stock price	4.422	4.332	1.025	1.05	1.112	12.708	11.596
ESG score ³	0.629	0.668	0.195	0.038	0	0.945	0.945
AR for ESG score	0.629	0.668	0.195	0.038	0	0.945	0.945
Above-average ESG group ⁴	0.633	1	0.482	0.232	0	1	1
AR for above-average ESG score	0.633	1	0.482	0.232	0	1	1
ESG quartiles	2.692	3	1.103	1.217	1	4	3
Second ESG quartile ⁵	0.217	0	0.412	0.17	0	1	1
Third ESG quartile	0.281	0	0.450	0.202	0	1	1

³ ESG score divided by 100

⁴ Base/comparison group is firms in below-average ESG group

⁵ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Fourth ESG quartile	0.304	0	0.460	0.212	0	1	1
AR for second ESG quartile	0.217	0	0.412	0.17	0	1	1
AR for third ESG quartile	0.281	0	0.450	0.202	0	1	1
AR for fourth ESG quartile	0.304	0	0.460	0.212	0	1	1

Table 2. Average of natural logarithms of stock prices of firms by year and industry group

Acquiror Industry Group*	2015	2016	2017	2018	2019	2020	Average by Industry group
Financial	4.46	4.16	4.57	4.62	4.55	4.61	4.50
Manufacturing	4.06	4.08	4.25	4.37	4.42	4.62	4.27
Natural Resources	4.06	3.97	3.99	3.87	3.58	3.39	3.81
Services	4.41	4.35	4.60	4.80	4.74	4.95	4.63
Trade	4.52	4.45	4.57	4.69	5.03	5.91	4.77
Average	4.24	4.18	4.43	4.52	4.54	4.74	4.42

* Industry groups are based on SDC Platinum's proprietary classification method

Table 3. Number of M&As by year and industry group

Acquiror Industry Group*	2015	2016	2017	2018	2019	2020	# M&As by Industry group
Financial	128	109	143	147	116	84	727
Manufacturing	377	324	254	325	247	205	1732
Natural Resources	7	16	26	23	14	16	102
Services	139	141	172	158	116	117	843
Trade	58	51	52	38	41	30	270
Total	709	641	647	691	534	452	3674

* Industry groups are based on SDC Platinum's proprietary classification method

Table 4. Average of ESG by year and industry group

Acquiror Industry Group*	2015	2016	2017	2018	2019	2020	Average by Industry group
Financial	43.86	63.71	67.27	66.19	69.96	68.51	62.97
Manufacturing	56.30	63.67	64.65	67.68	69.36	66.13	64.06
Natural Resources	45.43	58.74	59.29	61.27	69.89	58.81	60.08
Services	43.44	58.74	63.75	64.14	65.09	64.98	59.99
Trade	53.82	61.01	64.00	71.73	75.04	78.75	65.65
Average	51.22	62.26	64.72	66.56	69.01	66.85	62.92

* Industry groups are based on SDC Platinum's proprietary classification method

3.2. Method

The main method that is being utilized is a slightly changed version of the event study methodology (ESM). “An event study is an empirical analysis that examines the impact of a significant catalyst occurrence or contingent event on the value of a security, such as company stock” (Phuong 2021: 524). In the case of this research, the event is the announcement of M&A by a firm. It should be mentioned that event study assumes that markets are always efficient meaning that they reflect all available information on the firm’s stock. ESM calculates the impact of a certain corporate event on stock performance by measuring the abnormal returns (Ullah et al. 2021). Abnormal returns are earnings investors make above the otherwise normal returns in the absence of an event (Boehmer, Musumeci and Poulsen 1991). To put it differently, abnormal returns are actual returns that are observable minus normal returns in the case the event did not happen. However, for this research, instead of calculating abnormal returns, a dummy variable is used with value zero for days before the event, and one at the day of the event and following dates, and further interacted with variable for ESG performance to capture the deviations of the pre- and post-event stock prices. The key here is to compare the performance of the dummy variable interacted with ESG for event and post-event days to ones that account for pre-event days and analyze whether there is a significant difference between the two. If the discrepancy is big and statistically significant, it can be stated that ESG influences a corporation’s market performance during the M&A announcement event.

Another concept in event study is event window. Fama et al. (1969) are considered as the originators of this concept in ESM literature. As the name suggests, to analyze the effect of ESG, this study needs to choose specific dates (windows) to look at surrounding the event and divide them into pre-event, and post-event dates according to the dummy variable (with event and post-

event dates having 1 as dummy variable value). Unfortunately, there is no consensus on the exact number of days that form the event window, but general advice is to keep it relatively short in order to avoid the impact of unintended and unrelated events on post-event returns (Delattre 2007). For this research, several event windows are chosen starting with pre-seven trading days and post-seven trading days (-7; +7), pre-five trading days and post-five trading days (-5; +5), and so forth with an increment of two trading days up until the pre-one and post-one trading days (-1; +1).

The baseline OLS regression model below is used to find the effect of ESG ranking on firm's stock performance following the announcement of M&As.

$$\log (Price_{i,t}) = \alpha + \beta ESG_{i,t} + \gamma ESG_{i,t} \times Event_{i,t} + \theta_i + \eta_t + \varepsilon_{i,t} \quad (1)$$

$\log (Price_{i,t})$ is the natural logarithm of the stock price of a firm i traded in time t . Time t is given by trading date that does not include weekends and holidays. $ESG_{i,t}$ is a variable for ESG scores of a firm i in time t between zero and 100 percent divided by 100. $Event_{i,t}$ is a dummy variable that is zero before the announcement of M&A (depending on event window, observations will range from one to seven), and one during and after announcement of M&As (similar to pre-event value of zero, observations will vary from two to eight). The interaction term $ESG_{i,t} \times Event_{i,t}$ is the variable that shows the deviations of firm's stock prior to and following the M&A announcements. Parameters θ_i is a firm and η_t is a day- month-, and year- fixed effects. Variable $\varepsilon_{i,t}$ captures the unexplained random shock and errors. Our parameters of interest are β and γ that capture the effect of ESG score on the stock price, and ESG's influence on returns of stock price after announcement of M&A, respectively. As mentioned before, it is expected that β and γ will be positive, and if they are statistically significant, then it can be concluded that there is

a (positive) correlation between ESG and stock performance. A full variable list is provided in Appendix 3.

Following the baseline regression, in order to understand if there are any heterogenous effects within ESG ranking, whereby firms with higher ESG scores show better stock returns than companies with low ESG scores, the model divides firms into two groups based on average ESG metric for each year as ones with above average ESG scores and ones with below average ESG. Generally, the regression model is almost the same and is shown below:

$$\log (Price_{i,t}) = \alpha + \beta dummy_ESG_{i,t} + \gamma dummy_ESG_{i,t} \times Event_{i,t} + \theta_i + \eta_t + \varepsilon_{i,t} \quad (2)$$

All else is similar to the previous model, including dependent variable, variable for ESG is changed to *dummy_ESG_{i,t}* to account for grouping. It is given zero if a firm is in the below average group, and one if the firm's ESG score is above average. In other words, coefficient β will be interpreted in relative terms to a base group of below average firms. These two groups are then interacted with *Event_{i,t}* dummy variable to calculate the existence of the differences for each group, represented through coefficient γ .

The third and final model displays a further breakdown of ESG scores by separating them into four groups based on quartiles in each year. Firms are now assigned into first, second, third, and fourth quartiles (groups), depending on their ESG scores with the lowest 25 percent belonging to the first group, next 25 percent to the second group and so forth. As previously, the model does not undergo considerable changes and is illustrated below:

$$\log (Price_{i,t}) = \alpha + \beta quartile_ESG_{i,t} + \gamma quartile_ESG_{i,t} \times Event_{i,t} + \theta_i + \eta_t + \varepsilon_{i,t} \quad (3)$$

quartile_ESG_{i,t} is a categorical variable that includes all four groups with the first one (lowest 25 percent) being the base group, meaning that similar to the previous regression, results

are interpreted in relative terms. $quartile_ESG_{i,t} \times Event_{i,t}$ represents an interaction term with four groups, and firms belonging to the lowest quartile are also used as a base comparison group. Similar to previous models, coefficients of interest are β and γ with the only difference being that now they are in matrix form and incorporate four groups. All the other variables are the same as in baseline and the second models.

Chapter 4. Results

Despite differences in event window periods, all regressions show almost identical results. ESG scores tend to have a positive and statistically significant association at one percent level with the stock performance of a firm. More specifically, an increase of one hundredth in ESG score results in 10.0 percent rise in share price (0.1 percent for one point increase in ESG score) illustrated by Model 1.1 and Model 1.2 for event window (-7; +7) in [Table 5](#). A decrease in event window from 15 trading days to 11 days results in identical outcomes (Model 1.1 and 1.2 in [Table 6](#)). Further shortening of the event window to seven trading days results in a coefficient of 0.101 in Model 1.1 and 0.1 in Model 1.2 seen in [Table 7](#). This means that, as previously, one hundredth increase in ESG score is correlated with 10.1 and 10.0 percent improvement in stock prices (0.101 and 0.1 percent increase correlated with one-point ESG rise), respectively. Lastly, an event window of three days shows slightly higher results with 10.3 and 10.2 percentage growth in equity prices for firms with better ESG (Model 1.1 and 1.2 in [Table 8](#)).

In order to see if there are any heterogenous effects within ESG scores, firms are divided into two groups. One is assigned into ‘below-average group’ if its ESG is ranked below total average for a given year, and ‘above-average group’ if it is above total average. Results show that if a firm is in an ‘above-average group’, then its stock price will be approximately 10.3 and 10.2 percent higher than that of a company in the comparison group – ‘below-average group’ – as shown by Models 2.1 and 2.2 in [Table 5](#). [Table 6](#) depicts that with an event window of 11 days, there is a positive correlation whereby being in ‘above-average group’ is linked to 10.2 and 10.1 percent hike in share valuation (Model 2.1 and Model 2.2). Regression results based on an event window of seven days depicted in [Table 7](#) show that in contrast to base group ‘above-average’ firms tend to have equity prices that are higher by 10.1 percent in Model 2.1 and 10 percent in Model 2.2.

The shortest event window of three days ([Table 8](#)) demonstrates similar dynamics with 10.2 percent and 10.1 percent better stock performance for companies belonging to ‘above-average ESG group’ in Models 2.1 and 2.2, respectively.

The situation does not change drastically when the ESG metric is further divided into four groups based on quartiles of ESG score. All the groups exhibit positive and statistically significant coefficients compared to the baseline – firms with lowest ESG scores that belong to the first quartile – meaning that being in the second, third or fourth ESG quartiles is positively correlated with better equity performance. For an event window of 15 days in [Table 5](#), Model 3.1 displays the results where firms in the second, third and fourth quartiles have stock prices higher by 3.9, 11.3 and 6.6 percent, respectively. Model 3.2 has coefficients of 3.7 percent for firms in the second ESG quartile, 11.1 for companies occupying the third quartile, and 6.4 for businesses with ESG scores above 75th percentile. The rest of the event window regressions show nearly the same results among each other with a minimum of 3.7 percent and maximum of 3.8 percent for the second quartile, 11.3 – 11.5 percent better performance for firms in the third quartile, and 6.6 – 6.9 percentage increase for the fourth quartile compared to first ESG quartile (Model 3.1). Outcomes in Model 3.2 range from 3.4 percent to 3.7 percent for businesses in the second quartile, from 11 to 11.3 percent in the third quartile, and from 6.3 to 6.8 percent in the last quartile in all event window regressions.

While the above results establish positive and statistically significant associations between ESG scores and share prices, there seems to be no correlation between ESG’s effect on stock performance during M&A announcements specifically. In other words, having high ESG does not necessarily lead to better returns following M&A announcements. All regressions with differing event windows show identical positive directions while marginally differing in coefficients, albeit

not being statistically and practically significant. For instance, Model 1.2 in [Tables 5 through 8](#) has positive coefficients, meaning that there is a possibility of positive difference for firms with better ESG, with coefficients in (-7; +7) equal to 0.1, in (-5; +5) to 0.1, (-3; +3) to 0.2, and (-1; +1) to 0.2 percent. However, as stated previously, these results are not significant. The same goes for Model 2.2 in all event window regressions where the variable of interest has positive results of 0.1 percent higher than ‘below-average group’, but which are statistically insignificant. Interaction terms between ESG group quartiles and dummies signifying M&A events introduced to capture the deviation in Model 3.2. illustrate the same dynamics. Despite positive direction, all the variables in this model do not exhibit statistical significance in any conventional level. For event windows of 15 and 11 days ([Tables 5](#) and [6](#)), coefficients are 0.5 percent higher for firms in the second quartile compared to the base level, and 0.4 percent better in both the third and fourth ESG quartiles. Results based on a 7-day event window in [Table 7](#) depict that companies have 0.4 percent better stock performance regardless of their ESG quartile in comparison to baseline group. Lastly, Model 3.2 in [Table 8](#) illustrates that firms belonging to the second, third and fourth ESG quartiles are associated with 0.2, 0.2 and 0.1 percent higher share prices than firms in first quartile. Ultimately, despite their mostly positive direction as expected at the beginning of the paper, interaction terms that represent the differences of stock prices between pre-, event and post-event days are not statistically significant in all models throughout all event window regressions.

Chapter 5. Robustness Tests

5.1. Industry specification

To conduct robustness tests based on industry specification, observations are divided into manufacturing and non-manufacturing following SDC Platinum's proprietary classification with about 47 percent of data belonging to the first group and 53 percent to the other. [Tables 9 to 12](#) show results for the manufacturing industry group and [Tables 13 to 16](#) illustrate outcomes for observations covering non-manufacturing group. Firms in manufacturing tend to have coefficients with significance levels and direction similar to results in the previous section. For example, Models 1.1 and 1.2 presented in [Tables 9 to 12](#) depict that overall ESG scores have a positive correlation of 8.2 and roughly 8.1 percent, respectively, meaning that one hundredth rise in ESG may lead to above-mentioned gains, regardless of event window duration. Distribution into 'above- and below-average' performing groups shows that along all event windows firms in the better half tend to have stock prices that are higher by about 7.8 percent in Model 2.1 and approximately 7.7 percent in Model 2.2 compared to 'below-averages'. Distribution of firms into quartiles reveals that the higher quartile a company is in, the better the company's share performance. Based on all event windows, organizations in the second quartile have roughly 6.4 percent better results, while firms in the third and fourth quartile exhibit coefficients of 9.0 and 7.9 percent.

When it comes to the difference between pre- and post-M&A stock prices, throughout all models and event windows, none of the coefficients are significant in any conventional level despite positive signs, reinforcing the conclusion that ESG does not influence stock performance following M&A announcements based on manufacturing industry observations. For example,

Model 1.2 shows a coefficient of around 0.2 percent while Model 2.2 depicts 0.2 percent on average in all event windows. Firm distribution according to ESG quartiles results in insignificant outcomes that range from 0.2 to 0.5 percent increase for the second quartile, 0.3 to 0.8 for the third quartile and from -0.1 to 0.5 percent rise for the last group.

Results for non-manufacturing industry firms are provided starting from [Table 13](#) until [Table 16](#). Models 1.1. and 1.2 in each table establish that there is a positive correlation between ESG and stock prices – one hundredth growth in the former is associated with 14.7 – 15.8 percent rise in the first model and 14.7 – 15.6 percent rise in the second model depending on event window specification. In addition, belonging to the ‘above-average group’ is linked with a minimum of 13.1 percent and maximum of 13.4 percent higher equity prices than the baseline in Models 2.1 and 2.2. With respect to quartiles, in the non-manufacturing industry group, coefficients before the second quartile variable lose significance in all levels while retaining it at the range of around 12.6 and 13.0 percent for the third quartile and 5.7 – 6.7 percent for fourth quartile that can be seen in Models 3.1 and 3.2.

Once again, coefficients in front of interaction terms are not significant at any level in all tables and models. However, some models result in negative percentage coefficients as in the case of Model 1.2 (-0.0) and Model 2.2 (-0.1) in [Table 13](#) (event window of 15 days) and Model 2.2 in [Table 14](#) with -0.0 percent – both practically and statistically insignificant. All the other regressions show expected positive signs and similar coefficients as in previous regressions.

5.2. M&A form specification

The second robustness test is based on the form of M&As. There are two groups – M&As in the form of acquisition of assets, and a ‘non-asset’ group which contains buybacks, exchange

offers, acquisition of interest etc. ‘Acquisition of assets’ accounts for almost 56 percent of observations with the remaining belonging to the second category. Results for M&As in the form of asset acquisition are given in [Table 17 through 20](#), and for ‘non-asset’ M&As in [Tables 21 to 24](#). For event windows with 15- and 11-days Models 1.1 and 1.2 show that overall ESG has a positive correlation of around 7.0 percent, while a 7-day event window has coefficients of 0.073 and 0.072 in Models 1.1 and 1.2, respectively (7.3 and 7.2 percent). As for event window (-1; +1) in [Table 20](#), Models 1.1 and 1.2 illustrate a percentage of 7.8 for both Models 1.1 and 1.2, meaning that one hundredth hike in ESG tends to correlate with 7.8 percent increase in share prices. As for the ‘above- and below-average group’, the former is illustrated to have higher stock prices by about 8.8 and 8.7 percent in Models 2.1 and 2.2, respectively, for 15-day window, 8.7 and 8.6 percent higher stock price for 11- and 7-day windows, and around 9 percent for a 3-day window as illustrated in [Table 20](#). Lastly, with respect to quartiles, coefficients range from a minimum of 0.039 to maximum of 0.048 in Models 3.1 and 3.2 for the second quartile, from 0.129 to 0.135 in the third quartile, and from 0.037 to 0.042 in the fourth quartile for all event windows, again depicting a significant and positive association between ESG and financial performance.

As for the coefficients in front of interaction terms, regardless of whether regression models are in overall terms, in groups or quartiles, all the coefficients are insignificant. Models 1.2 and 2.2 in all event window regressions show 0.1 percent better performance (insignificant), and in Model 3.2 0.5 for second, 0.4 for third and around 0.3 percent for fourth quartile regardless of window specification (again insignificant).

Outcomes for non-asset M&A forms are presented in [Tables 21 through 24](#). Generally, the direction and significance level of most of the variables of interest are unchanged in comparison to the group with ‘assets acquisition’ as an M&A form, including the lack of significance in front

of coefficients for variables that account for the differences between pre- and post-event equity prices. There are several notable differences in coefficient before interaction terms for overall ESG being negative (-0.0) in Model 1.2, and insignificant percentage coefficients for firms in the second ESG quartile with 1.1 and 0.9 for Models 3.1 and 3.2 for a 15-day event window. In other event window regressions, the negative coefficient changes to positive. However, the insignificance of coefficients in a variable for the second ESG quartile does not change and remains at around 0.9 percent for both Models 3.1 and 3.2 in all event window regressions.

5.3. Year specification

For the year specification, data are divided into two periods with the first one covering years 2020, 2019 and 2018, and the remaining observations being assigned to a second group. Years are grouped in this manner to ensure equal distribution of observations. Detailed results are provided in [Tables 25 to 32](#). The distribution is around 45 percent to 55 percent in favor of a group with information between years 2015 and 2017. A robustness test of the first group (2018-2020) reveals that starting from a 15-day event window and up to a 7-day one, overall ESG is negatively and statistically significantly correlated with equity prices with coefficients at a minimum of -0.077 and at a maximum of -0.074 in Model 1.1, and -0.077 to -0.075 for Model 1.2. The same negative sign is observed in [Table 28](#) with event windows (-1; +1) where, however, coefficients for overall ESG score lose their significance at any conventional level. With respect to ‘above- and below-average’ distribution of firms, results are significant at 1 and 10 percent levels in event windows (-7; +7), (-5; +5) and (-3; +3) with percentages at around 2.0 in Model 2.1 and 1.9 in Model 2.2 ([Tables 25 – 27](#)). In a 3-day event window regression, both Model 2.1 and Model 2.2 results are not significant while still being at around 2.0 percent. Another interesting change is connected to negative coefficients in front of variables for firms in the fourth ESG quartile. While

remaining significant, they show that belonging to the fourth quartile is connected with a decrease in stock prices of 3.4 percent in Model 3.1 and 3.7 percent in Model 3.2 on average for all event windows, except the 3-day one. The 3-day event window analysis reveals that while still being negative, coefficients are no longer significant at any level for both Models 3.1 and 3.2.

As for the coefficients in front of interaction terms, none of them is statistically significant despite different event window dates, which is expected. Their directions are all positive and concentrate around 0.1 – 0.2 percent in Models 1.2 and 2.2 ([Tables 25 - 28](#)). Results for different quartiles also do not change significantly with respect to changes in window dates with an average of about 0.4, 0.2, and 0.4 percent for the second, third, fourth quartiles, respectively.

Results for the remaining years of 2015, 2016 and 2017 are given in [Tables 29 through 32](#). Models 1.1 and 1.2 in all event window specifications depict statistically insignificant yet positive performance whereby firms' ESG score increase by one hundredth is associated with about 0.7 percent rise in stock prices on average, except (-1; +1). The coefficient is different with respect to the 3-day event window in [Table 32](#) where variables show a 1.2 and 1.0 percent hike in Models 1.1 and 1.2, respectively, for the same ESG score growth. Organizations with above-average ESG score tend to have 4.2 percent higher equity prices in both Models 2.1 and 2.2 in 15-day and 11-day event window periods, while a 7-day window results in 4.2 percent higher performance in both models. [Table 32](#) illustrates results of a 3-day event window regression which shows that the 'above-average group' has higher share prices by about 4.4 and 4.3 percent. All the coefficients before the 'above-average group' variable are statistically significant at 1 percent. Similar to the first group with 2018 – 2020 as years, coefficients in front of the 'fourth ESG quartile' variable become insignificant at any traditional level with roughly 0.8 percent on average as an outcome in all event window regressions and models. Apart from this variable, other coefficients for quartiles

are statistically significant at 1 percent. Firms in the second quartile in Model 3.1 are associated with higher stock prices that are better by about 2.5 (15- and 11-day event window), 2.6 (7-day) and 2.8 percent (3-day). Numbers are slightly lower in Model 3.2 with 2.2 percent in event windows (-7; +7) and (-5; +5). It increases to 2.5 percent in the 7-day window period, and up to 2.8 in the 3-day event window regression. As for businesses in the third quartile, Model 3.1 depicts that on average they tend to have prices higher by 3.4 percent regardless of event window, and approximately 3.3 percent in Model 3.2.

With respect to interaction terms, once again none of the event window specifications and models have statistically significant coefficients, solidifying the point that ESG is not correlated with better stock performance following M&A announcements. Percentages are all positive except for the second ESG quartile variable in Model 3.2 in the 3-day event window. Coefficients depict numbers in the range of 0.000 and 0.002 in Models 1.2 and 2.2 in all event windows (meaning 0.0 and 0.2 percent). Model 3.2 for a 15-day event window shows that firms in the second, third and fourth quartiles are associated with 0.5, 0.3 and 0.2 percent better results, while they fall by 0.1 percentage point in a 11-day event window specification for all quartiles. In (-3; +3) event window regression coefficients decrease once more reaching 0.002, 0.002 and 0.001 for the second, third and fourth quartiles. Lastly, a 3-day event window specification shows -0.001, 0.002 and 0.000 as coefficients for the respective quartiles and firms associated with them.

Chapter 6. Discussion

6.1. Interpretation of results

This paper shows that, in general, higher ESG of a firm is associated with higher stock price. This result is persistent when companies are divided into groups with high and low ESG scores. In other words, in order to fully leverage the benefits of ESG, having higher than average environmental, social and governance metric helps. This notion is further supported when corporations are divided into four quartiles. Players in the third quartile tend to reap the most gain out of their ESG performance compared to the baseline group. This conclusion advances the point of aiming for higher ESG rankings since it is correlated with higher share performance. This is in alignment with existing research, some of which is mentioned in previous sections. One of the main implications of these results is to show that ESG, and sustainability and accountability in general, should be seen *not* as a burden, but as an opportunity to engage in and take advantage of improving business's financial performance. Nevertheless, it is critical to acknowledge the possibility that there is a reverse relationship, whereby firms with higher stock prices tend to have higher ESG scores. Firms like Apple, Microsoft, ExxonMobil, Berkshire Hathaway, Walmart etc., with equities that usually outperform the market, may simply devote more resources to tackle ESG related issues, hence improving their ranking.

Focusing on M&A announcements is believed to address this issue as mentioned in the first chapter. Consequently, regardless of firm size, value and “image”, stock prices following the M&A announcements seem not to be associated with organizations' ESG scores. Despite positive coefficients in a majority of regression results, their insignificance leads to a conclusion that ESG performance does not have an effect on returns after the particular event. Galvez and Kuiper (2020)

come to the same outcome stating that “no correlation is found when comparing [ESG] tools with stock prices” (48).

Majority of results from robustness tests show outcomes similar to those found in the main regressions. Industry specification depicts not only that the manufacturing sector is the main driver of M&As during 2015 and 2020, but that regressions based on such specification reap similar results as the baseline model does. M&As by non-manufacturing firms have comparable numbers with only one exception – coefficients in front of the second ESG quartile lose significance. Implications of such findings are twofold – first, there is no correlation between relatively better ESG score in non-manufacturing industries; second, the main findings of this paper may be driven mostly by firms in the manufacturing industry.

M&As in the form of asset acquisition tend to have results analogous to those depicted in general findings. For non-asset acquisitions, results are similar to the main findings except in this case coefficients for firms in the second ESG quartile turn insignificant. As with the manufacturing sector, acquisition of assets represents the single biggest M&A form and accounts for approximately half of results, meaning that overall outcomes may be driven primarily by this form of M&A. Furthermore, one of the explanations for both specifications to have identical behavior may be the fact that firms engaging in asset acquisition are firms in the manufacturing industry, in other words, there is a possibility of overlap in firms occupying a specific industry and the forms of M&A they engage in.

Dividing observations into two time periods produces interesting result in the form of a negative correlation between overall ESG and stock performance for the period of 2018 – 2020. This may be partly due to the COVID-19 pandemic that put enormous pressure on businesses. According to Tampakoudis et al. (2021) research that looks at US firms’ M&A activities between

2018 and July of 2020, there is a significant negative value effect of ESG performance on acquirers' shareholders' equity valuation. The influence becomes stronger at the onset of the current pandemic, suggesting that during economic hardships costs associated with sustainable value creation are higher than potential benefits. Apart from this, other coefficients from the same period behave in an expected way, supporting this paper's first hypothesis. Outcomes from observations between 2015 and 2017 illustrate results consistent with this study's main findings. The only difference is the loss of significance for overall ESG variable, and the variable representing firms in the fourth ESG quartile. In other words, these two variables are not correlated with business's stock performance.

6.2. Explanation for the lack of correlation

There may be several reasons for the absence of correlation between ESG and financial performance in the context of M&A announcements. Firstly, investors may be simply giving more attention to other performance indicators such as a firm's financials, plausibility of merger and/or acquisition, existence of synergies and so forth. Secondly, as Jacobs (2010) notes, information about potential M&As may be leaked before their announcement, hence nullifying the unexpected nature of M&As (Deng, Kang and Low 2013) and, consequently, diminishing the deviation in returns of pre- and post-event stock prices and ESG's effect on them. Finally, the very fact of engagement in merger and/or acquisition may drive acquirers' share prices down in the short-term due to financing and investor sentiment.

Current evaluation of M&A's success is greatly engrained in the idea of existence of "fit" between two actors. Ensuring the cultural fit between a bidder and a target is possibly the most critical aspect in delivering successful M&A transformation (Bond 2021). As a result, there is little place for consideration about acquirer's ESG metrics for investors trying to maximize their

investment outlook during mergers and/or takeovers. Additionally, according to Bain & Company report, only 11 percent of surveyed M&A executives consider ESG metrics during deal-making processes on a regular basis. ESG is reported to be the least recognized element out of a given 10 that are related to corporate M&A procedure. It is acknowledged that assessing the ESG implications is a task that is hard to practically embed into the mechanics of acquisition in M&A strategy (van den Branden, Seemann and Lino 2022). Hence, it is not surprising that ESG does not bring material advantages during M&As since even executives are slow to implement ESG considerations, let alone industrial and retail investors and shareholders. Furthermore, the foundation of the M&A environment is built on traditional frameworks of assessment that ignore ESG metrics. Insights from numerous studies hint at 4 primary characteristics connected to successful M&A undertakings that further translate into stock price increases for the acquiring firm's shareholders (Weston and Weaver 2001). They are, first, above industry average growth of acquirer's earnings and share price for the last 3 years before acquisition, second, relatively low suggested premium in comparison to similar deals, third, small number of bidders, and fourth, positive initial reaction from the market (Weston and Weaver 2001). It is easy to see that the most important areas of analysis lay in financial aspects, not sustainability. ESG, as mentioned several times before, is already penetrating, but, likely not to a meaningful degree as to become one of the cornerstones of investing. This study's aim is not to say that investors should ignore financials and solely focus on sustainability, but to consider ESG as one data point which points to a beneficial outcome.

With respect to leakage, numerous studies find positive abnormal returns characterized by both target and acquirer stock price run-ups before the announcement of M&As and attribute them to possible information leakages, and, as an extension, to insider trading (Bris 2005). Such effects

are persistent for different periods and markets. Gopalaswamy, Archarya and Malik (2008) look at Indian markets from 2000 to 2007 and find that both acquirer and target firm enjoy increased stock prices before M&A announcement, indicating a leakage of information. Another support comes from a study by Sehgal, Banerjee and Deisting (2012) of BRICKS economies between 2005 and 2009 with the conclusion that 5 out of 6 countries illustrate significant pre-event return which is indicative of information leakage, partly due to the emerging nature of these economies. Indeed, after analyzing ten emerging Asian markets, Ma, Pagan and Chu (2009) come to the similar conclusion. They write that “many emerging economies... suffer from a poor legal environment as well as weak enforcement of existing laws” (239) that may lead to insider trading fueled by information leakage. Interestingly, information leakage is present in developed markets to an even greater extent. According to SS&C Intralink and M&A Research Centre report, in 2019 Germany and United Kingdom were among countries with the most M&A leakages with 17.6 percent each, second only to South Korea with 19.6 percent (“A study by SS&C Intralinks and the M&A Research Centre at The Business School (formerly Cass), City, University of London” 2020). The notion of pre-M&A leakages is empirically supported by Dilshad (2013) who studies European banks’ stock returns prior to M&A announcements and observes that they rise one day before for targets and fourteen days before for acquirers. US markets exhibit comparable dynamics. Following the analysis of US prosecuted insider trading cases, Patel and Putnins (2020) estimate that insider trading occurs in 20 percent of M&A events and in 1 in 20 earnings announcements. Abernathy MacGregor, a leading strategic communication advising firm, goes as far as to state that 42 percent of M&A deals with announcement value of 5 billion dollars or greater in enterprise value get publicly reported prior to announcement (Ruggiero and Yanulis 2019). Lastly, Adnan and Hossain (2016) find that stock prices of firms listed in New York, American and NASDAQ

stock exchanges tend to experience a run-up during the pre-announcement period which is indicative of the leakage of information. Ultimately, all the examples above point to the direction of leakage prevalence in markets all around the world. Consequently, such leakages may neutralize any effects from high ESG ranking on stock prices since the market is already reacting ahead of any announcement.

Finally, there is an established tendency whereby the acquirer firm's stock price falls temporarily when it takes over another company. The bidder's share price dips because, first, it must pay a premium in majority of cases to acquire the target organization, and second, it incurs debt to finance the takeover. In the first scenario, the bidder almost inevitably pays considerably more than the market value of a target firm to acquire it (Stout 1990). Premiums may be as small as 10 percent of the seller's pre-announcement market value and go as high as 35 percent (Christofferson, McNish and Sias 2004). In such case, concerns over overpayment due to competitive bidding by potential acquirers drive the market to categorize undergoing merger and/or acquisition as value destroying (Sehgal, Banerjee and Deisting 2012). There is fear that money spent on a transaction is not commensurate with the value created by the potential M&A. Additionally, "there is a case of asymmetric information between the management of the companies and the external market participants. Hence, the acquirer firm stockholders may fear less value left for them from the merger, with most value accruing to the acquired firm shareholders" (Sehgal, Banerjee and Deisting 2012: 84). The market fears the overestimation of synergies by the buyer firm's management and/or overpayment to the seller due to competitive bidding amongst potential acquirers. This excessive spending on M&A creates less than favorable reactions from the stock market and investors and, potentially, drives the acquirer stock prices downward.

In the second case, financing of cash M&As is associated with incurring of a debt. However, it is not advised to rely on cash flows to service debt payments because this decreases the volume of discretionary cash flows necessary for future business operations (Sehgal, Banerjee and Deisting 2012). Cash is part of business's assets and when the asset part of their balance sheet shrinks, this sends a negative message to current investors that drives the company's equity prices down. On the other hand, when a takeover is financed through the acquirer's stock offerings, the "information content" hypothesis by Myers and Majluf (1984), states that such offerings will be interpreted by the market as an indication of the acquirer firm's stock price being overvalued. In the same light, "equity market timing" – a practice whereby firms issue new shares at high prices and repurchase them at low ones – suggests that businesses use fluctuations in the cost/price of equity to decrease the cost of capital (Baker and Wurgler 2002). Such practices can be exploited during the financing of M&As as well. Ultimately, both information content and market timing hypotheses imply the overvaluation of an acquiring company as a motivation to issue equity and pay for M&A transactions with shares. In either case, market participants are usually aware of this behavior and adjust the stock price downwards upon the announcement of new issues thereby driving share prices down during and following M&A announcements financed through stock offerings.

Chapter 7. Conclusion

More and more people, governments and organizations are acknowledging the role businesses play in ensuring humanity's just, responsible, and green future. COVID-19, rising concern over climate change and human rights violations are galvanizing the long-lasting effort to increase firms' accountability toward communities, employees, environment, and all stakeholders in general. Polman and Winston (2021) write for HBR that "both practically and morally, corporate leaders can no longer sit on the sidelines of major societal shifts or treat human and planetary issues as 'someone else's problem.'" Not surprisingly, big and small players who hold stakes in big businesses are turning their attention to options with more responsible investment possibilities as a sign of this push. The rise of SRI and, consequently, ESG have given such people an excellent instrument of valuation and decision making. Even monks, who are seen as people with little earthly interests, are getting into ESG investing in Japan (Tomisawa 2021). Now, more than ever, firms are realizing the importance of aligning their vision, aims and processes with the demands of sustainable and responsible development. An increasing body of research by academics, NGOs, and other organizations is finding support for adopting value propositions that benefit not only firms themselves, but also society, environment and even separate individuals, because such measures have advantageous effects on firms' financial performance, their image and on many other aspects.

This paper supports such claims by providing outcomes that show a positive and statistically significant correlation between a firm's ESG performance and its equity price. Therefore, it is important for firms to follow sustainable and responsible business practices if they want to improve their financial indicators. However, this positive relationship is not found during a more specific event – M&A announcement. This can be due to ESG's infancy in M&A practices,

leakage during deal-making, and financial implications of funding of potential merger and/or takeover.

The research acknowledges that there are inevitable limitations associated with the paper. First, this study focuses solely on firms in the S&P 500 Index which is comprised of US-based companies. These firms may not be representative of other enterprises listed and operating in Europe, Middle East, or Asia. This is especially true for big businesses such as Alibaba, Tencent, and Huawei in China, Samsung in South Korea, and Saudi Aramco in Middle East, which are some of the biggest enterprises in the world. Second, analyzing only the largest firms leaves out middle and small companies where the dynamics of ESG performance and stock returns may be different. Corporate pledges to ensure proper ESG practices require considerable investment, and SMEs may not be able to fully follow such activities because of the need to prioritize certain tasks (product development; R&D etc.) over others (ESG). In the same light, this paper also acknowledges the backward relationship between a firm's stock price and ESG performance. MNEs may have greater capital to invest in ESG, making their sustainable and social performance look better. Lastly, this study is taking ESG scores at their face value and as a true representation of organizations' attempts at leading sustainable business practices. It acknowledges the possibility that firms have an incentive and ability to manipulate ESG metrics, for example, through "greenwashing", whereby organizations mislead consumers about their environmental practices or environmental benefits of their products or services (Delmas and Burbano 2011).

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Results (Tables)

Table 5. Event window (-7; +7)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.100*** (0.010)	0.100*** (0.010)				
Deviation for ESG score		0.001 (0.003)				
Above-average ESG group ³			0.103*** (0.005)	0.102*** (0.005)		
Deviation for above-average ESG group				0.001 (0.002)		
Second ESG quartile ⁴					0.039*** (0.005)	0.037*** (0.006)
Third ESG quartile					0.113*** (0.006)	0.111*** (0.007)
Fourth ESG quartile					0.066*** (0.007)	0.064*** (0.007)
Deviation for second ESG quartile						0.005 (0.006)
Deviation for third ESG quartile						0.004 (0.006)
Deviation for fourth ESG quartile						0.004 (0.006)
Observations	55,110	55,110	55,110	55,110	55,110	55,110
R-squared	0.952	0.952	0.953	0.953	0.952	0.952
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of seven days prior to and seven days after the M&A announcement, making a total of 15 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 6. Event window (-5; +5)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.100*** (0.0116)	0.100*** (0.012)				
Deviation for ESG score		0.001 (0.003)				
Above-average ESG group ³			0.102*** (0.005)	0.101*** (0.006)		
Deviation for above-average ESG group				0.001 (0.003)		
Second ESG quartile ⁴					0.038*** (0.006)	0.035*** (0.007)
Third ESG quartile					0.113*** (0.007)	0.111*** (0.008)
Fourth ESG quartile					0.066*** (0.008)	0.063*** (0.008)
Deviation for second ESG quartile						0.005 (0.007)
Deviation for third ESG quartile						0.004 (0.007)
Deviation for fourth ESG quartile						0.004 (0.007)
Observations	40,414	40,414	40,414	40,414	40,414	40,414
R-squared	0.952	0.952	0.952	0.952	0.952	0.952
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of five days prior to and five days after the M&A announcement, making a total of 11 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 7. Event window (-3; +3)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.101*** (0.015)	0.100*** (0.015)				
Deviation for ESG score		0.002 (0.004)				
Above-average ESG group ³			0.101*** (0.007)	0.100*** (0.007)		
Deviation for above-average ESG score				0.001 (0.003)		
Second ESG quartile ⁴					0.037*** (0.008)	0.034*** (0.010)
Third ESG quartile					0.113*** (0.009)	0.110*** (0.010)
Fourth ESG quartile					0.066*** (0.010)	0.063*** (0.011)
Deviation for second ESG quartile						0.004 (0.009)
Deviation for third ESG quartile						0.004 (0.008)
Deviation for fourth ESG quartile						0.004 (0.008)
Observations	25,718	25,718	25,718	25,718	25,718	25,718
R-squared	0.952	0.952	0.953	0.953	0.952	0.952
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of three days prior to and three days after the M&A announcement, making a total of seven trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 8. Event window (-1; +1)¹

Independent variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.103*** (0.023)	0.102*** (0.023)				
Deviation for ESG score		0.002 (0.007)				
Above-average ESG group ³			0.102*** (0.010)	0.101*** (0.011)		
Deviation for above-average ESG group				0.001 (0.006)		
Second ESG quartile ⁴					0.037*** (0.012)	0.036** (0.016)
Third ESG quartile					0.115*** (0.013)	0.113*** (0.016)
Fourth ESG quartile					0.069*** (0.015)	0.068*** (0.017)
Deviation for second ESG quartile						0.002 (0.015)
Deviation for third ESG quartile						0.002 (0.013)
Deviation for fourth ESG quartile						0.001 (0.013)
Observations	11,022	11,022	11,022	11,022	11,022	11,022
R-squared	0.952	0.952	0.953	0.953	0.953	0.953
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of one day prior to and one day after the M&A announcement, making a total of three trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Robustness Tests (Tables)

Table 9. Industry – Manufacturing; Event Window (-7; +7)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.082*** (0.017)	0.080*** (0.017)				
Deviation for ESG score		0.003 (0.004)				
Above-average ESG group ³			0.079*** (0.006)	0.077*** (0.007)		
Deviation for above-average ESG score				0.003 (0.003)		
Second ESG quartile ⁴					0.068*** (0.006)	0.065*** (0.008)
Third ESG quartile					0.094*** (0.009)	0.089*** (0.010)
Fourth ESG quartile					0.082*** (0.010)	0.079*** (0.010)
Deviation for second ESG quartile						0.005 (0.008)
Deviation for third ESG quartile						0.008 (0.008)
Deviation for fourth ESG quartile						0.005 (0.007)
Observations	25,980	25,980	25,980	25,980	25,980	25,980
R-squared	0.902	0.902	0.902	0.902	0.902	0.902
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Acquiror Industry Group	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of seven days prior to and seven days after the M&A announcement, making a total of 15 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 10. Industry – Manufacturing; Event Window (-5; +5)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.1
ESG score ²	0.082*** (0.019)	0.081*** (0.020)				
Deviation for ESG score		0.002 (0.005)				
Above-average ESG group ³			0.078*** (0.007)	0.077*** (0.008)		
Deviation for above-average ESG group				0.002 (0.004)		
Second ESG quartile ⁴					0.067*** (0.008)	0.064*** (0.009)
Third ESG quartile					0.093*** (0.010)	0.090*** (0.012)
Fourth ESG quartile					0.081*** (0.011)	0.079*** (0.012)
Deviation for second ESG quartile						0.005 (0.010)
Deviation for third ESG quartile						0.007 (0.009)
Deviation for fourth ESG quartile						0.004 (0.009)
Observations	19,052	19,052	19,052	19,052	19,052	19,052
R-squared	0.902	0.902	0.903	0.903	0.902	0.902
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Acquiror Industry Group	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of five days prior to and five days after the M&A announcement, making a total of 11 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 11. Industry – Manufacturing; Event Window (-3; +3)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.082*** (0.024)	0.082*** (0.025)				
Deviation for ESG score		0.001 (0.006)				
Above-average ESG group ³			0.078*** (0.009)	0.077*** (0.010)		
Deviation for above-average ESG group				0.001 (0.005)		
Second ESG quartile ⁴					0.065*** (0.010)	0.063*** (0.012)
Third ESG quartile					0.092*** (0.013)	0.089*** (0.015)
Fourth ESG quartile					0.079*** (0.014)	0.078*** (0.015)
Deviation for second ESG quartile						0.004 (0.013)
Deviation for third ESG quartile						0.005 (0.011)
Deviation for fourth ESG quartile						0.002 (0.011)
Observations	12,124	12,124	12,124	12,124	12,124	12,124
R-squared	0.902	0.902	0.903	0.903	0.903	0.903
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Acquiror Industry Group	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of three days prior to and three days after the M&A announcement, making a total of seven trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 12. Industry – Manufacturing; Event Window (-1; +1)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.082** (0.038)	0.080** (0.038)				
Deviation for ESG score		0.002 (0.010)				
Above-average ESG group ³			0.077*** (0.014)	0.076*** (0.015)		
Deviation for above-average ESG group				0.002 (0.008)		
Second ESG quartile ⁴					0.066*** (0.015)	0.065*** (0.020)
Third ESG quartile					0.092*** (0.020)	0.090*** (0.024)
Fourth ESG quartile					0.079*** (0.022)	0.080*** (0.025)
Deviation for second ESG quartile						0.002 (0.020)
Deviation for third ESG quartile						0.003 (0.019)
Deviation for fourth ESG quartile						-0.001 (0.017)
Observations	5,196	5,196	5,196	5,196	5,196	5,196
R-squared	0.903	0.903	0.903	0.903	0.903	0.903
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Acquiror Industry Group	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of one day prior to and one day after the M&A announcement, making a total of three trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 13. Industry – Non-manufacturing; Event Window (-7; +7)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.147*** (0.013)	0.147*** (0.013)				
Deviation for ESG score		-0.000 (0.004)				
Above-average ESG group ³			0.132*** (0.007)	0.133*** (0.007)		
Deviation for above-average ESG group				-0.001 (0.003)		
Second ESG quartile ⁴					0.011 (0.008)	0.008 (0.010)
Third ESG quartile					0.128*** (0.008)	0.127*** (0.009)
Fourth ESG quartile					0.060*** (0.009)	0.057*** (0.010)
Deviation for second ESG quartile						0.005 (0.009)
Deviation for third ESG quartile						0.002 (0.008)
Deviation for fourth ESG quartile						0.005 (0.008)
Observations	29,130	29,130	29,130	29,130	29,130	29,130
R-squared	0.966	0.966	0.966	0.966	0.966	0.966
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Acquiror Industry Group	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of seven days prior to and seven days after the M&A announcement, making a total of 15 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 14. Industry – Non-manufacturing; Event Window (-5; +5)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.149*** (0.015)	0.148*** (0.015)				
Deviation for ESG score		0.000 (0.005)				
Above-average ESG group ³			0.132*** (0.008)	0.132*** (0.008)		
Deviation for above-average ESG group				-0.000 (0.004)		
Second ESG quartile ⁴					0.009 (0.010)	0.006 (0.011)
Third ESG quartile					0.128*** (0.009)	0.126*** (0.011)
Fourth ESG quartile					0.061*** (0.010)	0.058*** (0.012)
Deviation for second ESG quartile						0.006 (0.011)
Deviation for third ESG quartile						0.003 (0.009)
Deviation for fourth ESG quartile						0.006 (0.009)
Observations	21,362	21,362	21,362	21,362	21,362	21,362
R-squared	0.965	0.965	0.966	0.966	0.966	0.966
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Acquiror Industry Group	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of five days prior to and five days after the M&A announcement, making a total of 11 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 15. Industry – Non-manufacturing; Event Window (-3; +3)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.154*** (0.019)	0.153*** (0.019)				
Deviation for ESG score		0.002 (0.006)				
Above-average ESG group ³			0.132*** (0.010)	0.131*** (0.010)		
Deviation for above-average ESG group				0.001 (0.005)		
Second ESG quartile ⁴					0.008 (0.012)	0.005 (0.015)
Third ESG quartile					0.128*** (0.012)	0.126*** (0.014)
Fourth ESG quartile					0.063*** (0.013)	0.059*** (0.015)
Deviation for second ESG quartile						0.005 (0.013)
Deviation for third ESG quartile						0.003 (0.012)
Deviation for fourth ESG quartile						0.005 (0.012)
Observations	13,594	13,594	13,594	13,594	13,594	13,594
R-squared	0.966	0.966	0.966	0.966	0.966	0.966
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Acquiror Industry Group	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of three days prior to and three days after the M&A announcement, making a total of seven trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 16. Industry – Non-manufacturing; Event Window (-1; +1)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.158*** (0.029)	0.156*** (0.030)				
Deviation for ESG score		0.003 (0.010)				
Above-average ESG group ³			0.134*** (0.015)	0.132*** (0.016)		
Deviation for above-average ESG group				0.002 (0.008)		
Second ESG quartile ⁴					0.007 (0.019)	0.006 (0.024)
Third ESG quartile					0.130*** (0.018)	0.128*** (0.022)
Fourth ESG quartile					0.067*** (0.020)	0.064*** (0.024)
Deviation for second ESG quartile						0.003 (0.022)
Deviation for third ESG quartile						0.004 (0.019)
Deviation for fourth ESG quartile						0.004 (0.019)
Observations	5,826	5,826	5,826	5,826	5,826	5,826
R-squared	0.966	0.966	0.966	0.966	0.966	0.966
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Acquiror Industry Group	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing	Non- manufacturing

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of one day prior to and one day after the M&A announcement, making a total of three trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 17. M&A Form – Acquisition of Assets; Event Window (-7; +7)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.070*** (0.013)	0.069*** (0.013)				
Deviation for ESG score		0.001 (0.004)				
Above-average ESG score ³			0.088*** (0.006)	0.087*** (0.007)		
Deviation for above-average ESG score				0.001 (0.003)		
Second ESG quartile ⁴					0.048*** (0.007)	0.046*** (0.008)
Third ESG quartile					0.135*** (0.008)	0.133*** (0.009)
Fourth ESG quartile					0.041*** (0.009)	0.040*** (0.010)
Deviation for second ESG quartile						0.004 (0.007)
Deviation for third ESG quartile						0.004 (0.007)
Deviation for fourth ESG quartile						0.003 (0.006)
Observations	30,675	30,675	30,675	30,675	30,675	30,675
R-squared	0.954	0.954	0.955	0.955	0.955	0.955
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
M&A Form	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of seven days prior to and seven days after the M&A announcement, making a total of 15 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 18. M&A Form – Acquisition of Assets; Event Window (-5; +5)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.070*** (0.015)	0.070*** (0.016)				
Deviation for ESG score		0.001 (0.004)				
Above-average ESG group ³			0.087*** (0.007)	0.086*** (0.008)		
Deviation for above-average ESG group				0.001 (0.003)		
Second ESG quartile ⁴					0.046*** (0.008)	0.043*** (0.009)
Third ESG quartile					0.134*** (0.010)	0.131*** (0.010)
Fourth ESG quartile					0.040*** (0.011)	0.038*** (0.012)
Deviation for second ESG quartile						0.005 (0.009)
Deviation for third ESG quartile						0.004 (0.008)
Deviation for fourth ESG quartile						0.003 (0.008)
Observations	22,495	22,495	22,495	22,495	22,495	22,495
R-squared	0.954	0.954	0.955	0.955	0.955	0.955
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
M&A Form	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of five days prior to and five days after the M&A announcement, making a total of 11 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 19. M&A Form – Acquisition of Assets; Event Window (-3; +3)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.073*** (0.019)	0.072*** (0.020)				
Deviation for ESG score		0.002 (0.005)				
Above-average ESG group ³			0.087*** (0.009)	0.086*** (0.010)		
Deviation for above-average ESG group				0.001 (0.004)		
Second ESG quartile ⁴					0.043*** (0.010)	0.040*** (0.012)
Third ESG quartile					0.132*** (0.012)	0.129*** (0.013)
Fourth ESG quartile					0.039*** (0.013)	0.037** (0.015)
Deviation for second ESG quartile						0.007 (0.011)
Deviation for third ESG quartile						0.005 (0.010)
Deviation for fourth ESG quartile						0.004 (0.010)
Observations	14,315	14,315	14,315	14,315	14,315	14,315
R-squared	0.954	0.954	0.955	0.955	0.955	0.955
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
M&A Form	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of three days prior to and three days after the M&A announcement, making a total of seven trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 20. M&A Form – Acquisition of Assets; Event Window (-1; +1)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.078*** (0.030)	0.078** (0.031)				
Deviation for ESG score		0.001 (0.009)				
Above-average ESG group ³			0.090*** (0.015)	0.089*** (0.015)		
Deviation for above-average ESG group				0.001 (0.007)		
Second ESG quartile ⁴					0.042*** (0.016)	0.039* (0.020)
Third ESG quartile					0.134*** (0.019)	0.132*** (0.021)
Fourth ESG quartile					0.042** (0.021)	0.041* (0.023)
Deviation for second ESG quartile						0.005 (0.018)
Deviation for third ESG quartile						0.003 (0.016)
Deviation for fourth ESG quartile						0.001 (0.016)
Observations	6,135	6,135	6,135	6,135	6,135	6,135
R-squared	0.955	0.955	0.955	0.955	0.956	0.956
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
M&A Form	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets	Acquisition of Assets

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of one day prior to and one day after the M&A announcement, making a total of three trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 21. M&A Form – Non-asset; Event Window (-7; +7)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.103*** (0.014)	0.103*** (0.015)				
Deviation for ESG score		-0.000 (0.004)				
Above-average ESG group ³			0.107*** (0.007)	0.107*** (0.007)		
Deviation for above-average ESG group				0.000 (0.003)		
Second ESG quartile ⁴					0.011 (0.007)	0.009 (0.009)
Third ESG quartile					0.067*** (0.008)	0.065*** (0.009)
Fourth ESG quartile					0.075*** (0.009)	0.073*** (0.010)
Deviation for second ESG quartile						0.004 (0.009)
Deviation for third ESG quartile						0.004 (0.008)
Deviation for fourth ESG quartile						0.005 (0.008)
Observations	24,435	24,435	24,435	24,435	24,435	24,435
R-squared	0.964	0.964	0.964	0.964	0.964	0.964
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
M&A Form	Non-asset	Non-asset	Non-asset	Non-asset	Non-asset	Non-asset

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of seven days prior to and seven days after the M&A announcement, making a total of 15 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 22. M&A Form – Non-asset; Event Window (-5; +5)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.102*** (0.017)	0.102*** (0.017)				
Deviation for ESG score		0.000 (0.005)				
Above-average ESG group ³			0.107*** (0.008)	0.106*** (0.008)		
Deviation for above-average ESG group				0.000 (0.004)		
Second ESG quartile ⁴					0.009 (0.008)	0.008 (0.010)
Third ESG quartile					0.067*** (0.010)	0.065*** (0.011)
Fourth ESG quartile					0.076*** (0.010)	0.074*** (0.012)
Deviation for second ESG quartile						0.003 (0.010)
Deviation for third ESG quartile						0.003 (0.010)
Deviation for fourth ESG quartile						0.004 (0.009)
Observations	17,919	17,919	17,919	17,919	17,919	17,919
R-squared	0.964	0.964	0.964	0.964	0.964	0.964
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
M&A Form	Non-asset	Non-asset	Non-asset	Non-asset	Non-asset	Non-asset

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of five days prior to and five days after the M&A announcement, making a total of 11 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 23. M&A Form – Non-asset; Event Window (-3; +3)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.098*** (0.021)	0.097*** (0.022)				
Deviation for ESG score		0.002 (0.006)				
Above-average ESG group ³			0.105*** (0.010)	0.104*** (0.010)		
Deviation for above-average ESG group				0.002 (0.005)		
Second ESG quartile ⁴					0.008 (0.011)	0.008 (0.013)
Third ESG quartile					0.067*** (0.012)	0.066*** (0.014)
Fourth ESG quartile					0.074*** (0.013)	0.072*** (0.015)
Deviation for second ESG quartile						0.000 (0.013)
Deviation for third ESG quartile						0.002 (0.012)
Deviation for fourth ESG quartile						0.003 (0.012)
Observations	11,403	11,403	11,403	11,403	11,403	11,403
R-squared	0.964	0.964	0.965	0.965	0.964	0.964
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
M&A Form	Non-asset	Non-asset	Non-asset	Non-asset	Non-asset	Non-asset

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of three days prior to and three days after the M&A announcement, making a total of seven trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 24. M&A Form – Non-asset; Event Window (-1; +1)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.097*** (0.034)	0.094*** (0.034)				
Deviation for ESG score		0.004 (0.010)				
Above-average ESG group ³			0.105*** (0.015)	0.103*** (0.016)		
Deviation for above-average ESG group				0.003 (0.008)		
Second ESG quartile ⁴					0.007 (0.017)	0.010 (0.022)
Third ESG quartile					0.069*** (0.019)	0.069*** (0.023)
Fourth ESG quartile					0.076*** (0.021)	0.076*** (0.024)
Deviation for second ESG quartile						-0.004 (0.022)
Deviation for third ESG quartile						0.000 (0.020)
Deviation for fourth ESG quartile						-0.000 (0.019)
Observations	4,887	4,887	4,887	4,887	4,887	4,887
R-squared	0.964	0.964	0.965	0.965	0.965	0.965
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
M&A Form	Non-asset	Non-asset	Non-asset	Non-asset	Non-asset	Non-asset

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of one day prior to and one day after the M&A announcement, making a total of three trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 25. Years – 2018 & 2019 & 2020; Event Window (-7; +7)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	-0.075*** (0.020)	-0.075*** (0.020)				
Deviation for ESG score		0.000 (0.003)				
Above-average ESG group ³			0.021*** (0.006)	0.021*** (0.006)		
Deviation for above-average ESG group				0.000 (0.002)		
Second ESG quartile ⁴					0.068*** (0.007)	0.066*** (0.008)
Third ESG quartile					0.063*** (0.008)	0.062*** (0.009)
Fourth ESG quartile					-0.033*** (0.010)	-0.036*** (0.010)
Deviation for second ESG quartile						0.004 (0.006)
Deviation for third ESG quartile						0.002 (0.006)
Deviation for fourth ESG quartile						0.006 (0.005)
Observations	25,100	25,100	25,100	25,100	25,100	25,100
R-squared	0.979	0.979	0.979	0.979	0.980	0.980
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Period	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of seven days prior to and seven days after the M&A announcement, making a total of 15 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 26. Years – 2018 & 2019 & 2020; Event Window (-5; +5)¹

Independent Variable	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	-0.077*** (0.024)	-0.077*** (0.024)				
Deviation for ESG score		0.001 (0.003)				
Above-average ESG group ³			0.020*** (0.006)	0.019*** (0.007)		
Deviation for above-average ESG group				0.001 (0.003)		
Second ESG quartile ⁴					0.066*** (0.008)	0.063*** (0.009)
Third ESG quartile					0.063*** (0.010)	0.061*** (0.010)
Fourth ESG quartile					-0.034*** (0.012)	-0.037*** (0.012)
Deviation for second ESG quartile						0.005 (0.007)
Deviation for third ESG quartile						0.003 (0.007)
Deviation for fourth ESG quartile						0.006 (0.006)
Observations	18,412	18,412	18,412	18,412	18,412	18,412
R-squared	0.980	0.980	0.980	0.980	0.980	0.980
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Period	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of five days prior to and five days after the M&A announcement, making a total of 11 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 27. Years – 2018 & 2019 & 2020; Event Window (-3; +3)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	-0.074** (0.030)	-0.075** (0.030)				
Deviation for ESG score		0.002 (0.004)				
Above-average ESG group ³			0.019** (0.008)	0.019** (0.009)		
Deviation for above-average ESG group				0.001 (0.004)		
Second ESG quartile ⁴					0.064*** (0.011)	0.062*** (0.012)
Third ESG quartile					0.063*** (0.012)	0.062*** (0.013)
Fourth ESG quartile					-0.034** (0.015)	-0.037** (0.016)
Deviation for second ESG quartile						0.005 (0.009)
Deviation for third ESG quartile						0.002 (0.008)
Deviation for fourth ESG quartile						0.005 (0.008)
Observations	11,725	11,725	11,725	11,725	11,725	11,725
R-squared	0.980	0.980	0.980	0.980	0.980	0.980
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Period	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of three days prior to and three days after the M&A announcement, making a total of seven trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 28. Years – 2018 & 2019 & 2020; Event Window (-1; +1)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	-0.069 (0.048)	-0.071 (0.048)				
Deviation for ESG score		0.002 (0.007)				
Above-average ESG group ³			0.020 (0.013)	0.020 (0.014)		
Deviation for above-average ESG group				0.001 (0.006)		
Second ESG quartile ⁴					0.067*** (0.017)	0.065*** (0.019)
Third ESG quartile					0.069*** (0.019)	0.068*** (0.021)
Fourth ESG quartile					-0.029 (0.023)	-0.030 (0.025)
Deviation for second ESG quartile						0.003 (0.015)
Deviation for third ESG quartile						0.001 (0.014)
Deviation for fourth ESG quartile						0.001 (0.013)
Observations	5,027	5,027	5,027	5,027	5,027	5,027
R-squared	0.980	0.980	0.980	0.980	0.980	0.980
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Period	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020	2018 & 2019 & 2020

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of one day prior to and one day after the M&A announcement, making a total of three trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 29. Years – 2015 & 2016 & 2017; Event Window (-7; +7)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.008 (0.007)	0.007 (0.007)				
Deviation for ESG score		0.001 (0.002)				
Above-average ESG group ³			0.043*** (0.004)	0.043*** (0.004)		
Deviation for above-average ESG group				0.000 (0.002)		
Second ESG quartile ⁴					0.025*** (0.005)	0.022*** (0.005)
Third ESG quartile					0.032*** (0.005)	0.031*** (0.005)
Fourth ESG quartile					0.006 (0.006)	0.005 (0.006)
Deviation for second ESG quartile						0.005 (0.005)
Deviation for third ESG quartile						0.003 (0.004)
Deviation for fourth ESG quartile						0.002 (0.004)
Observations	30,010	30,010	30,010	30,010	30,010	30,010
R-squared	0.984	0.984	0.984	0.984	0.984	0.984
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Period	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of seven days prior to and seven days after the M&A announcement, making a total of 15 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 30. Years – 2015 & 2016 & 2017; Event Window (-5; +5)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.007 (0.009)	0.007 (0.009)				
Deviation for ESG score		0.001 (0.003)				
Above-average ESG group ³			0.043*** (0.005)	0.043*** (0.005)		
Deviation for above-average ESG group				0.001 (0.002)		
Second ESG quartile ⁴					0.025*** (0.005)	0.022*** (0.006)
Third ESG quartile					0.033*** (0.006)	0.032*** (0.006)
Fourth ESG quartile					0.006 (0.007)	0.006 (0.007)
Deviation for second ESG quartile						0.004 (0.006)
Deviation for third ESG quartile						0.003 (0.005)
Deviation for fourth ESG quartile						0.001 (0.004)
Observations	22,002	22,002	22,002	22,002	22,002	22,002
R-squared	0.984	0.984	0.984	0.984	0.984	0.984
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Period	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of five days prior to and five days after the M&A announcement, making a total of 11 trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 31. Years – 2015 & 2016 & 2017; Event Window (-3; +3)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.008 (0.011)	0.007 (0.011)				
Deviation for ESG score		0.002 (0.003)				
Above-average ESG group ³			0.042*** (0.006)	0.042*** (0.006)		
Deviation for above-average ESG group				0.001 (0.003)		
Second ESG quartile ⁴					0.026*** (0.007)	0.025*** (0.008)
Third ESG quartile					0.034*** (0.007)	0.033*** (0.008)
Fourth ESG quartile					0.007 (0.008)	0.007 (0.009)
Deviation for second ESG quartile						0.002 (0.007)
Deviation for third ESG quartile						0.002 (0.006)
Deviation for fourth ESG quartile						0.001 (0.006)
Observations	13,993	13,993	13,993	13,993	13,993	13,993
R-squared	0.984	0.984	0.984	0.984	0.984	0.984
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Period	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of three days prior to and three days after the M&A announcement, making a total of seven trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Table 32. Years – 2015 & 2016 & 2017; Event Window (-1; +1)¹

Independent Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2	Model 3.1	Model 3.2
ESG score ²	0.012 (0.017)	0.010 (0.017)				
Deviation for ESG score		0.002 (0.005)				
Above-average ESG group ³			0.044*** (0.009)	0.043*** (0.010)		
Deviation for above-average ESG group				0.002 (0.004)		
Second ESG quartile ⁴					0.028*** (0.011)	0.028** (0.013)
Third ESG quartile					0.036*** (0.011)	0.035*** (0.013)
Fourth ESG quartile					0.010 (0.013)	0.009 (0.014)
Deviation for second ESG quartile						-0.001 (0.011)
Deviation for third ESG quartile						0.002 (0.010)
Deviation for fourth ESG quartile						0.000 (0.009)
Observations	5,995	5,995	5,995	5,995	5,995	5,995
R-squared	0.984	0.984	0.984	0.984	0.984	0.984
Date FE	YES	YES	YES	YES	YES	YES
Company FE	YES	YES	YES	YES	YES	YES
Period	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017	2015 & 2016 & 2017

Robust standard errors in parentheses

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

¹ Results are derived from a regression with event window of three days prior to and three days after the M&A announcement, making a total of seven trading days including the event day itself

² ESG score divided by 100

³ Base/comparison group is firms in below-average ESG group

⁴ Base/comparison group for quartiles is first quartile (in other words, firms in first quartile are base group)

Appendices

Appendix 1. Illustration on calculation of pillar scores

Pillar	Category	Category scores*	Category weights	Sum of category weights	Formula: sum of category weights	New category weights*	Formula: new category weights	Pillar scores	Formula: pillar scores
Environmental	Emissions	0.98	0.15	0.44	(0.15+0.15+0.13)	0.35	(0.15/0.44)	0.94	(0.98*0.35) + (0.97*0.35) + (0.85*0.29)
Environmental	Resource use	0.97	0.15			0.35	(0.15/0.44)		
Environmental	Innovation	0.85	0.13			0.29	(0.13/0.44)		
Social	Community	0.89	0.09	0.31	(0.09+0.05+0.04+0.13)	0.28	(0.09/0.31)	0.94	(0.89*0.28) + (0.95*0.17) + (0.92*0.13) + (0.98*0.43)
Social	Human rights	0.95	0.05			0.17	(0.05/0.31)		
Social	Product responsibility	0.92	0.04			0.13	(0.04/0.31)		
Social	Workforce	0.98	0.13			0.43	(0.13/0.31)		
Corporate governance	Shareholders	0.73	0.05	0.26	(0.05+0.03+0.17)	0.20	(0.05/0.26)	0.32	(0.73*0.20) + (0.34*0.13) + (0.19*0.67)
Corporate governance	CSR strategy	0.34	0.03			0.13	(0.03/0.26)		
Corporate governance	Management	0.19	0.17			0.67	(0.17/0.26)		

*Decimal places to be considered

Appendix 2. Illustration on calculation of overall ESG score

ESG scores are aggregated based on the 10 category weights, which are calculated based on the Refinitiv magnitude matrix.

Industry Group	Environmental			Social				Governance			ESG Scores
	Emission	Innovation	Resource Use	Human Rights	Product Responsibility	Workforce	Community	Management	Shareholders	CSR Strategy	
Water & Related Utilities	0.15	0.13	0.15	0.05	0.04	0.13	0.09	0.17	0.05	0.03	
ABC	0.66	0.00	0.44	0.05	0.58	0.89	0.34	0.99	0.84	0.56	0.571146184
CBD	0.71	0.96	0.38	0.00	0.69	0.66	0.70	0.37	0.01	0.56	0.547913483
DEF	0.03	0.00	0.00	0.00	0.00	0.57	0.11	0.21	0.14	0.54	0.150536652
EFG	0.00	0.31	0.03	0.00	0.00	0.25	0.59	0.89	0.94	0.00	0.327824384
EMJ	0.87	0.31	0.68	0.20	0.86	0.84	0.98	0.33	0.87	0.68	0.639400132
EMQ	0.00	0.00	0.00	0.00	0.00	0.30	0.02	0.88	0.08	0.01	0.194782046
ENR	0.92	0.81	0.85	0.75	0.97	0.93	0.66	0.40	0.49	0.86	0.756319427
GPQ	0.24	0.31	0.00	0.00	0.17	0.02	0.16	0.56	0.56	0.00	0.223443757
HIJ	0.61	0.31	0.50	0.65	0.42	0.80	0.80	0.48	0.27	0.37	0.54145808
IBD	0.00	0.00	0.00	0.00	0.00	0.07	0.30	0.51	0.49	0.00	0.145398367
JKL	0.50	0.73	0.74	0.00	0.78	0.43	0.93	0.62	0.89	0.26	0.611504799
LMN	0.76	0.31	0.56	0.00	0.47	0.48	0.48	0.17	0.24	0.26	0.415151441
MNO	0.82	0.31	0.91	0.40	0.58	0.61	0.07	0.33	0.52	0.63	0.539888776
MSE	0.55	0.00	0.62	0.85	0.17	0.75	0.84	0.77	0.35	0.91	0.581805891
OPQ	0.29	0.00	0.32	0.00	0.17	0.16	0.48	0.15	0.42	0.08	0.212906948
PQR	0.45	0.65	0.79	0.55	0.78	0.52	0.75	0.76	0.76	0.16	0.640379494
PSF	0.97	0.88	0.97	0.95	0.92	0.98	0.89	0.15	0.73	0.34	0.776142465
RST	0.08	0.31	0.00	0.00	0.17	0.20	0.59	0.42	0.42	0.00	0.228111754
UVW	0.34	0.00	0.26	0.20	0.58	0.70	0.39	0.26	0.16	0.31	0.316400123
VPF	0.16	0.31	0.15	0.00	0.17	0.11	0.25	0.88	0.90	0.00	0.325828115
XYZ	0.39	0.00	0.21	0.40	0.17	0.39	0.48	0.95	0.73	0.51	0.429105164
YQM	0.16	0.00	0.09	0.00	0.36	0.34	0.20	0.69	0.34	0.00	0.25005416

Appendix 3. Variable explanation

	Variable	Unit
Dependent	Log of Stock Price	Natural logarithmic form of daily stock prices given in dollars
Independent	ESG Score	0 to 100 in percentage terms divided by 100
	Dummy for firms in above- and below-average ESG groups	0 if firm has lower than average ESG score (calculated as an average of all ESG scores for all firms for each year); 1 if firm's ESG score is above average of all scores
	Quartile 1	Firms with ESG scores in 1st quartile from all ESG scores for each year
	Quartile 2	Firms with ESG scores in 2nd quartile from all ESG scores for each year
	Quartile 3	Firms with ESG scores in 3rd quartile from all ESG scores for each year
	Quartile 4	Firms with ESG scores in 4th quartile from all ESG scores for each year
	Event window dummy	0 for pre-event days, and 1 for event and post-event days
	Interaction term with event window dummy and ESG score	0 if pre-event date, ESG score (divided by 100) if event and post-event window
	Interaction term between event window dummy and dummy for above- and below-average ESG firms	0 if pre-event window or low ESG score, 1 if event and post event window & high ESG
	Interaction term between quartiles and event window dummy	0 if pre-event window, 1 if event and post-event window and quartile is 1 0 if pre-event window, 1 if event and post-event window and quartile is 2 0 if pre-event window, 1 if event and post-event window and quartile is 3 0 if pre-event window, 1 if event and post-event window and quartile is 4
Control	Dummy variables for each year between 2015 and 2020 inclusive	1 if the year is what we look at; and 0 if it is not
	Dummy variables for each month in a year (1-12)	0 and 1 (same as above, but for months)
	Dummy variable for days in a month	0 and 1 (same as above, but for days)
	Dummy variables for all the firms to capture their fixed effect	0 and 1