International Journal of Business and Economic Sciences Applied Research

IJBESAR
ijbesar.af.duth.gr

Green M&A Deals: Do Acquirers Obtain Superior Returns?

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ARTICLE INFO
Article History

Received 10 December 2025
Accepted 27 March 2026

JEL Classifications
G34, G14, G12, Q5

Keywords:
Green M&As,
Event Study,
Asset pricing,
Sustainability,
Horizontal M&A,
Cross-border M&A

ABSTRACT

Purpose:
The paper aims to examine whether investors receive superior returns for participating in green mergers and acquisitions (M&As), or whether they pay a price for doing so.

Design/methodology/approach:
Using the event study research methodology, we assess whether acquirers are rewarded by the stock market in green versus non-green M&A deals, specifically in cross-border and horizontal transactions. The empirical study employs the pair-matching principle. The research is based on US market data on green and non-green acquirers listed in the US, sourced from Bloomberg, from 2010 to 2024.

Findings:
Our study results suggest that the stock market rewards the acquirer for making green M&As and provides positive cumulative abnormal returns during the short-term event window. However, as event window following the announcement of M&A transaction increases, the positive cumulative abnormal returns transition to negative ones. The results of the study suggest overpricing effects, which can be explained by the high takeover premiums when targeting sustainability-oriented deals.

Research limitations/implications:
The study implies mixed market attitudes towards sustainability-oriented M&A transactions. It supports the generally increasing interest in sustainable investments, urged by regulatory developments. However, the limited disclosure of public information on the environmental practices of companies involved in M&As makes it difficult to assess the level of adoption of sustainability practices and the possibility of greenwashing policies.

Originality/value:
This study addresses a research gap by examining green versus non-green M&As over the period from 2010 to 2024, characterized by a growing emphasis on sustainability issues within regulatory and political domains, as well as in the broader public discourse. Our results corroborate previous research indicating that investors often overstate the value of green M&As on the day of the announcement. Investors tend to assign a favourable value to cross-border environmentally oriented deals, also characterised by higher short-term volatility. Although not systematic, these overpricing effects suggest a general market optimism towards sustainability-oriented deals. The results support the notion that markets may overreact to the 'green' label of a transaction, and reinforce the argument that sustainability-oriented acquisitions involve significant information asymmetry.

1. Introduction

Global trends in climate change sparked investment in financial markets, particularly in mergers and acquisitions transactions. Over the past ten years, there has been a dramatic increase in the emphasis placed on corporate social responsibility, socially responsible investments, and investments with specific environmental targets, in response to strong pressure from diverse stakeholder groups. The proportion of public corporations producing sustainability reports rose from 20% to 86% (Gillan et al., 2021). Financial investors targeted investments in socially and environmentally responsible corporations more frequently, though with mixed results. These trends prompted a growing academic interest.

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DOI: 10.25103/ijbesar.182.04

A substantial body of literature has examined the performance effects of socially responsible investment targets, as well as the extent to which investors can select successful stocks and recognise high-performing firms. A more specific research stream focuses on sustainability-oriented M&As. The term green M&As has emerged encompassing target company's CSR practices, socially and environmentally responsible investments. In such transactions, it is assumed that acquirers will pursue investments linked to sustainability, such as technologies or operations that are intended to create long-term sustainable value, with positive social and environmental outcomes. Previous studies show that shareholders of target companies tend to benefit from M&A transactions (Andrade et al., 2001), whereas acquirers often achieve zero or negative abnormal returns (Moeller et al., 2004). Gomes (2019) provides evidence that a firm's CSR is positively associated with its propensity to become a M&A target. Furthermore, studies conducted across multiple markets, regions and industries have not consistently demonstrated that investors in green deals experience positive abnormal returns following the announcement of green M&A transactions. As these studies mainly focus on transactions in the early stages of sustainability-oriented investments, the dramatic increase in green-focused investments calls for a revisit of the research in this field.

This paper aims to examine whether investors receive superior returns for participating in green M&As, or whether they pay a price for doing so. The study looks at the effects of announcements and the short-term performance before and after announcements. Using event-study methodology and the pair-matching principle, we investigate whether acquirers in green M&As are systematically rewarded by the stock market more than those in non-green M&As. Additionally, we examine the results in relation to cross-border deals and horizontal green M&A transactions. The study focuses on the US market given its semi-strong form of market efficiency, well-developed institutional environment, strong corporate governance mechanisms, and robust investor protection framework. It covers green M&A transactions announced between 2010 and 2024, a period characterised by growing regulatory support and investor interest in sustainability-oriented investments.

Our research focuses on the effects for the acquirer in green M&A transactions, and the results show that acquirers in such deals may earn positive cumulative abnormal returns over the short-term event window. The results suggest overpricing, however not systematic, in market reactions towards green M&A announcements. The findings point out that abnormal returns after the announcement are modest, short-lived and sensitive to the event window specification. These outcomes are consistent with previous studies that have suggested that, at the time of the announcement, investors may not fully consider the potential long-term value of sustainability-oriented acquisitions (Deng et al., 2013; Han et al., 2022). Any positive valuation effects for acquirers, if they arise, may therefore emerge gradually as information about sustainability integration and future performance becomes clearer. This pattern is consistent with earlier findings on overpricing effects and may reflect high takeover premiums in sustainability-driven investments.

The study reveals mixed market attitudes towards green M&As. Market investments driven by sustainability have been encouraged by regulatory developments and expanded. However, limited public disclosure of the sustainability practices of companies involved in M&A deals makes it difficult to assess the depth of their sustainability practices and the credibility of their environmental claims. This increases uncertainty for investors and may prevent stock market fair valuations.

We contribute to the research on green versus non-green M&As, a topic that is characterised by growing interest in scholarly literature. Previous studies (Shleifer and Vishny, 2003) proved the existence of M&A waves, with stock market valuations shaping merger activity. Our focus on the timeframe of 2010–2024 covers several M&A waves, as well as the latest significant regulatory, political and societal shifts towards environmental sustainability policies. Our approach enables to assess the influence of rising sustainability awareness on market reactions to acquisition announcements. By applying an explicit green M&A classification and integrating it into an event-study framework, our study provides new evidence on whether acquirer returns differ systematically across green and conventional M&A transactions. Our study builds on previous research indicating that investors often overstate the value of green M&As on the day of the announcement. The results support the notion that markets may overreact to the 'green' label of a transaction, and reinforce the argument that sustainability-oriented acquisitions involve significant information asymmetry.

2. Review of Literature

The backbone of M&A research lies in neoclassical theories, assuming that markets are efficient and investors are rational. Within this stream of research M&A studies focus on motives of efficiency improvement concerns, a reaction to diverse economic and industry shocks, a response to deregulation, development of large conglomerates (Andrade et al., 2001).

The understanding that transactions are driven by fair market valuations is at the core of neoclassical theories. Behavioural theories refine this approach by examining the drivers of market over- and undervaluation. Shleifer and Vishny (2003) suggested that stock markets misvalue potential participants of M&A transactions, either acquirers or target companies or both, and introduced earnings manipulation and insider selling effects into their model. Roll (1986) introduced a hubris hypothesis which attributes acquirer overpayment to managerial overconfidence rather than market inefficiency.

Scholars demonstrated that M&A waves are triggered by multiple factors, including changes in the technological, economic and regulatory environment. Technological innovations and developments are critical shifts (Gaughan,

DOI: 10.25103/ijbesar.182.04

2017) that have a significant impact on industries and redefine them. As market competition grows, companies are motivated to merge or acquire complementary assets, including investments in innovative firms, due to concerns about industry competition. Furthermore, economic shocks drive consolidation through the horizontal and vertical expansion of companies' operations.

A significant body of academic research conducted on the effects of M&A announcements, highlighting the theoretical tension between signalling, resource acquisition, and the exploitation of synergies, particularly in environmentally oriented transactions. From a signalling perspective, M&A announcements reveal managerial expectations about future cash flows. However, empirical evidence shows that markets often respond cautiously. Kellner (2024) indicates that acquirer returns in the European Union are modest and sensitive to transaction characteristics, which is consistent with the notion that announcement signals are incomplete. The empirical evidence from the crisis period supports this. Pandey et al. (2022) show that, in times of uncertainty, investors rely more heavily on signals, resulting in abnormal return patterns that differ from typical M&A reactions. The resource-based view provides a complementary explanation, emphasising that acquisitions are a way of securing strategic assets, whether technological, environmental or operational. Studies on renewable energy and sustainability-oriented transactions (Yoo et al., 2013; Wei and Pujari, 2023) show that companies pursue green targets in order to acquire critical environmental capabilities and innovation potential. Nevertheless, market reactions remain heterogeneous, reflecting uncertainty regarding integration and the company's capacity to utilise acquired resources to gain a competitive advantage. This aligns with the findings of Wei and Pujari (2023) that green acquisitions generate positive but inconsistent stock market returns when investors perceive environmental investments as reliable indicators of long-term strategic intent. A synergy-based interpretation provides further insight into these mixed outcomes. While Salvi et al. (2018) demonstrate that sustainability-oriented deals can improve bidder performance in the post-acquisition period, realising synergies in green transactions often relies on the complex integration of environmental technologies or processes, which increases execution risk. Insights from private equity research reinforce these dynamics. Ljungqvist (2024) identifies evolving value-creation mechanisms in modern investment environments, while Indahl and Jacobsen (2019) argue that sustainability integration reduces operational risk when aligned with credible strategic execution. Jost et al. (2022) suggest that there is no significant relationship between CSR performance and M&A premia, but the interaction of governance quality and CSR negatively impacts transaction premia. Overall, the existing literature indicates that acquirer returns in green and non-green M&As depend on financial performance as well as the interaction between signalling capacity, resource absorption proficiency, and the firm's ability to realise environmental and operational synergies. This emphasises the need for further analysis of how markets interpret sustainability-oriented acquisitions.

The post-acquisition M&A performance in financial markets attracted a great deal of attention from researchers (Bettinazzi and Zolo, 2017). Multiple studies examine the abnormal returns of the target company and its bidder after the acquisition. While both engaged parties pursue the perceived benefits of M&A, studies demonstrate that the effects on each party tend to differ (Campa and Hernando, 2004). Empirical evidence indicates that target company shareholders may experience positive abnormal returns, proving that such transactions could create shareholder value for sellers of target company shares. When examining cross-border acquisitions in US Danadapani et al. (2020) recognize that shareholders exhibit statistically significant short-term abnormal return, however around the announcement of their first international acquisition. These findings indicate that gains from mergers are unevenly distributed among bidders and sellers, and that postive abnormal returns for the acquirer arise under specific conditions.

A body of research, which examines corporate governance and M&A deals, demonstrates that governance structures can impact both the decisions made around acquisitions and the subsequent distribution of merger gains. More specifically, research indicates that board composition, managerial incentives, and ownership structures impact acquirer discipline and deal quality. For example, stronger board independence and the separation of the roles of CEO and chair are associated with more value-preserving acquisitions and higher acquirer announcement returns (Datta et al., 2001; Masulis et al., 2007). Insider trading and information leakage in market transactions are extensively examined in corporate governance literature, however to a limited extent in studies on M&As. Research across different countries shows that the laws and systems in place can influence how markets respond to M&A announcements. In particular, stronger protections for investors can lead to better outcomes for the companies that are bought (Bris and Cabolis, 2008). These findings show that the quality of governance is very important for the strategy used to buy a company, the prices paid, and the market assessment of the transaction. This highlights the need to consider how different governance structures affect the returns on acquisitions.

A substantial body of research looks at the connection between CSR/ESG features and M&A performance. Firms with solid environmental management practices and a stronger commitment to CSR and sustainability tend to experience more favourable announcement returns (Jo and Na, 2012). Empirical evidence also shows that target firms with robust employment-related and social practices generate higher post-acquisition returns (Lin and Wei, 2006). Stakeholder-oriented governance influences the likelihood of acquisition as well as the distribution of merger gains (Bettinazzi and Zollo, 2017). Further research suggests that acquirers benefit from acquiring targets with strong socially reponsible investments (Aktas et al., 2011), whereas review of studies on socially responsible investment funds found mixed or negative performance in relation to benchmarks (Renneboog et al., 2008). Furthermore, stronger CSR was found to increase merger completion rates and realize higher merger announcement returns (Deng

DOI: 10.25103/ijbesar.182.04

et al., 2013). Sector-specific studies reveal variations across industries undergoing technological disruption or regulatory transition. In the oil and gas sector, for example, M&As were found to have predictive power of energy returns and volatility within the industry (Wang et al., 2024). In the renewable energy and cleantech sectors, acquirer characteristics are negatively correlated with returns. However, for acquirers from outside the industry, positive abnormal returns were observed in the context of the financial crisis (Eisenbach et al., 2011).

Despite the extensive literature on the topic, the evidence on acquirer returns following an event announcement remains inconsistent. The variations in findings suggest that acquirer outcomes depend on such factors as environmental orientation, sectoral characteristics and the geographical context of M&As. These sources of heterogeneity of outcomes indicate that certain transaction types may generate different market reactions. It is important to note that the distinction between green and non-green M&As is insufficiently explored. Studies seldom consider environmental strategic motivation as an explanatory factor, and even fewer examine how horizontal versus cross-border green M&As affect acquirer returns following an event announcement. This limits our understanding of whether sustainability oriented transactions create distinct value and abnormal returns relative to conventional deals.

3. Methodology

3.1. Data sample

The main focus of our empirical study on M&A transactions is to test the effects on the green acquirer's stock returns. The green M&A is typically defined (Pernick and Wilder, 2007) as a transaction in which an acquirer, which utilizes renewable resources and maintains a low level of waste, acquires a majority stake in another green firm, or merges with another firm engaged in environmentally sustainable activities. Because such transactions are not separately disclosed in standard M&A reporting, a structured identification procedure is required. For data sample selection purposes, we employed data from the Bloomberg database. We applied a description text filter to the target and the acquiring firms to filter out the specific deals. The filtering words were selected based on the components of renewable and sustainable products, such as solar, hydropower, wind farm, biomass, and many more. The keywords were picked from the monthly report about cleantech M&As, which is presented by Zephyr (2013), known for its M&A database. The data sample for non-green M&As was selected based on the description of deals, where participation companies utilize non-renewable resources and exhibit high levels of waste.

According to Andrade et al. (2001), stock price trends following an M&A announcement are heavily dependent on the size of the transaction. They suggest that larger deals are more likely to attract greater investor attention. Therefore, this research only analyses transactions larger than 10 million USD. While previous studies have included completed deals, this study includes transactions that have been announced and have a sufficiently long post-announcement share price development period, but which are still pending or have been declined.

Two data samples were sourced from the Bloomberg database: green M&As and non-green M&As, covering the period from 2010 to 2024. Deals where the acquirer is listed in the United States were specifically chosen to reflect the depth and liquidity of US financial markets, as well as the extensive evidence of semi-strong market efficiency (Fama, 1991; Fama et al., 1969). The US market also exhibits high M&A activity, supported by robust disclosure standards and investor protection mechanisms (Rossi and Volpin, 2004). Acquirers in cross-border transactions often originate from jurisdictions with stronger governance frameworks than the targets, making cross-border M&A deals relevant for examining governance spillover effects.

The control sample of non-green M&A transactions was constructed using a matched-pair sampling design intended to improve comparability between treatment (green M&A) and control observations in a non-randomized empirical setting. Each green M&A announcement was matched one-to-one with a non-green transaction based on predefined observable characteristics. Non-green M&A transactions were required to occur within the same fiscal year as the corresponding green transaction (based on announcement year), thereby limiting exposure to macroeconomic and market-wide shocks. To further account for residual time-specific heterogeneity not fully eliminated through exact year matching, year fixed effects were incorporated in the subsequent regression analysis. Matching was performed within the same 3-digit NACE industry classification to reduce structural differences in operating environment and risk profiles between bidders and targets. Economic comparability of transaction size was addressed by matching deals with similar materiality relative to bidder scale, operationalized through the ratio of total deal value to the acquirer's total assets. This scaling approach enabled comparison of transactions with comparable financial significance across firms and industries.

Following the implementation of the matching criteria, the final balanced sample comprised 160 M&A announcement observations, including 80 green and 80 matched non-green transactions. The acquiring firms represented a diversified cross-section of industries, such as real estate, materials, financials, industrials, utilities, technology, consumer discretionary, and energy, with green transactions occurring most frequently among acquirers in the energy, technology, and utilities sectors. The matched design enhanced the internal comparability of the treatment and control groups and provided a structured empirical setting for estimating abnormal stock-market reactions associated with green M&A announcements, while acknowledging that unobservable firm-level heterogeneity may still influence the results.

DOI: 10.25103/ijbesar.182.04

3.2 Research design

In order to perform the event-study, three components were defined: the event day, the event window and the estimation window. The event day is the trading day on which the green M&A announcement was made public. Accurate identification of this date was crucial as it established the basis for measuring market reactions. The event window represented the period during which the effects of the announcement were expected to be visible in stock-price movements.

Most studies examining M&A announcement returns rely on short event windows rather than long ones. Dann et al. (1977) demonstrated that security prices can adjust within minutes of an announcement, whereas McWilliams and Siegel (1997) suggested that shorter windows mitigate the impact of unrelated events. In the present study, short-term windows are employed and days prior to the announcement are also incorporated to capture potential information leakage or insider trading. Previous empirical research showed that confidential information may leak prior to public disclosure, resulting in abnormal trading activity. Accordingly, the event windows selected for analysis are [-1, 1], [-2, 2] and [-2, 5].

The estimation window is used to model each firm's normal return in the absence of an event. Prior studies commonly apply estimation windows ranging from 100 to 300 trading days. Following MacKinlay (1997), this study employs a 250-trading-day estimation window. Trading days between the end of the estimation window and the beginning of the event window are excluded to avoid contamination. Cumulative average abnormal returns (CAARs) are then calculated for each event window across the full sample of companies.

The empirical analysis follows MacKinlay (1997) and estimates the following cross-sectional OLS regression:

$$CAR_i = \alpha + \beta_1 X_{1,i} + \beta_2 X_{2,i} + \cdots + \beta_n X_{n,i} + \varepsilon_i \quad (1)$$

where CAR_i denotes the cumulative abnormal return for acquirer i; α is the intercept; β_n represents the coefficients on the independent variables $X_{n,i}$; and ε_i is the error term.

The model incorporates several independent variables and controls based on prior research. The relative size ratio, defined as total deal value scaled by the acquirer's total assets, captures the transaction's economic significance; larger transactions impose stronger effects on acquirer returns (Eisenbach et al., 2011; Alexandridis et al., 2013). The market-to-book ratio measures potential undervaluation, overvaluation, and growth expectations, all of which influence M&A motivations and outcomes (Goergen and Renneboog, 2004; Eisenbach et al., 2011). Market capitalization controls for firm size, recognizing that larger firms generally exhibit more stable price movements. The deal value–to–market capitalization ratio further controls for deal size and reduces pair-matching-related distortions.

Four dummy variables are included: year, green M&A, cross-border, and cross-industry. Year fixed effects account for variation in stock returns across merger cycles (waves). The green M&A dummy isolates differences in announcement returns between green and non-green transactions. The cross-border dummy controls for differences between domestic and international M&A transactions, which often reflect disparate regulatory regimes, political risks, currency exposure, and cultural frictions (Cao et al., 2015). The cross-industry dummy distinguishes horizontal, vertical, and conglomerate acquisitions. This distinction is essential because each type of transaction generates different synergies and implementation challenges, as documented by Gaughan (2017).

The Table 1 below provides descriptive statistics for variables of the data sample.

Table 1: Descriptive statistics

Statistics	N	Mean	Median	St. Dev	Pctl(25)	Pctl(75)	Min	Max
CAR [-1;+1]	160	-0,002	-0,004	0,059	-0,028	0,026	-0,248	0,328
CAR [-2;+2]	160	-0,002	-0,004	0,063	-0,031	0,028	-0,233	0,323
CAR [-2;+5]	160	-0,001	-0,002	0,136	-0,039	0,035	-0,676	1,194
Log(TV/TA)	160	0,183	0,178	0,776	-0,274	0,718	-2,120	2,236
Log(Market-to-Book)	160	0,726	0,703	0,841	0,358	1,117	-2,996	3,197
Log(MarketCap)	160	8,812	8,959	1,664	7,762	9,824	2,303	12,664
TV/mCAP	160	0,330	0,105	0,521	0,028	0,346	0,001	2,803
Log(TotalValue)	160	6,489	6,629	2,099	5,010	8,366	2,401	11,793

Source: (Authors' own, based on RStudio results)

The descriptive statistics describes the whole sample of companies, employed for studying of the effect of green M&A transaction announcement for acquiring companies, based on selected event study methodology.

DOI: 10.25103/ijbesar.182.04

4. Results

The empirical study focused on testing if specific green M&As related events, the public announcement of a green M&A transactions, created an immediate positive impact on the acquirer's abnormal returns.

Firstly, following MacKinlay (1997) suggestions for the event study methodology, two types of significance tests – parametric and non-parametric – were performed. The study applied three parametric tests: a two-tailed cross-sectional t-test, a Patell z-test (Patell, 1976), Bharath and Wu, 2005), and a standardized cross-sectional (BMP) test (based on Boehmer et al. (1991). One non-parametric test, the generalized sign test (Cowan, 1992), was performed. Also, a two-tailed cross-sectional t-test was applied rather than a one-sided t-test.

Cumulative average abnormal returns of green and non-green M&A announcements were computed for all selected event windows (see Table 2 and Table 3).

Table 2: Green M&A announcements - results

Average Abnormal Returns					
Event Day	**AAR**	**T-test**	**Patell Z**	**BMP**	**Gen. Sign Test**
T-2	-0,19%	-0,993	-1,631	-0,923	-0,472
T-1	0,09%	0,482	-0,424	0,563	-0,919
T	-0,15%	-0,268	-1,872*	-0,089	0,422
T+1	0,43%	1,578	2,325**	1,166	0,869
T+2	-0,10%	-0,525	-0,92	-0,571	-1,367
T+3	0,28%	0,982	0,415	0,701	1,540
T+4	0,26%	1,400	1,677*	1,348	1,540
T+5	-0,82%	-1,156	-3,100***	-0,541	-0,919
Cumulative Average Abnormal Returns					
Event Window	**CAAR**	**Patell Z**	**BMP**	**Gen. Sign Test**	**Pos:Neg**
[T-1;T+1]	0,36%	0,896	0,002	0,199	41:39
[T-2;T+2]	0,08%	0,148	-0,723	-0,919	36:44
[T-2;T+5]	-0,20%	-0,303	-0,824	0,422	42:38

Note: *p<0,10, **p<0,05, ***p<0,01

The empirical findings do not reveal statistically robust evidence of an average stock-market reaction to M&A announcements within the examined sample. Daily average abnormal returns (AARs) fluctuate around zero throughout the event period, and although a modest positive abnormal return is observed on the first trading day following the announcement (T+1), this effect lacks persistence and is not consistently supported across alternative test statistics. Cumulative average abnormal returns (CAARs) calculated over the short-term event windows [T-1, T+1], [T-2, T+2], and [T-2, T+5] remain economically small and statistically insignificant, indicating the absence of a sustained valuation impact at the aggregate level. In addition, the nearly balanced distribution of positive and negative abnormal returns across firms suggests that the observed variation in abnormal returns reflects firm-specific heterogeneity rather than reflecting a systematic market sentiment. Overall, the results are consistent with heterogeneous transaction-specific valuation effects.

Table 3 illustrates the average abnormal returns and cumulative average abnormal returns for the selected event windows for non-green M&A announcements.

Table 3: Non-green M&A announcements - results

Average Abnormal Returns					
Event Day	**AAR**	**T-test**	**Patell Z**	**BMP**	**Gen. Sign Test**
T-2	0,460%	1,493	1,534	1,163	-0,462
T-1	-0,478%	-2,522**	-2,774***	-2,503**	-2,698***
T	0,041%	0,076	-0,245	0,023	-0,014
T+1	-0,389%	-0,980	-0,756	-0,451	-0,909
T+2	-0,035%	-0,154	-0,817	-0,124	-0,238
T+3	1,078%	0,670	-0,707	0,281	0,433
T+4	-0,095%	-0,451	0,230	-0,325	-0,685
T+5	-0,523%	-1,872*	-1,673*	-1,296	-1,356

DOI: 10.25103/ijbesar.182.04

Cumulative Average Abnormal Returns					
Event Window	**CAAR**	**Patell Z**	**BMP**	**Gen. Sign Test**	**Pos:Neg**
[T-1;T+1]	-0,826%	-2,100**	-1,023	-1,580	33:47
[T-2;T+2]	-0,402%	-0,791	-0,774	-0,462	38:42
[T-2;T+5]	0,059%	0,061	-0,886	-1,132	35:45

Note: *p<0,10, **p<0,05, ***p<0,01

As Table 3 documents, the pattern of average abnormal returns indicates generally limited and non-systematic stock-market reactions surrounding M&A announcement dates. The only statistically significant effect is observed on the trading day immediately preceding the announcement (T-1), when the AAR equals –0.478%. This negative abnormal performance is consistently supported across multiple parametric and non-parametric test statistics, including the standard t-test, Patell Z statistic, BMP test, and the generalized sign test. In contrast, cumulative average abnormal returns computed over standard short-term event windows remain small and statistically insignificant, indicating the absence of a persistent aggregate valuation effect. The concentration of negative abnormal returns prior to the announcement may tentatively suggest the presence of anticipatory trading; however, such an interpretation should be treated with caution, as alternatively it might be related to market noise.

Table 4 presents average abnormal returns and cumulative average abnormal returns for selected event windows for horizontal green M&A announcements.

Table 4: Horizontal green M&A announcements - results

A: Average Abnormal Returns					
Event Day	**AAR**	**T-test**	**Patell Z**	**BMP**	**Gen. Sign Test**
T-2	-0,410%	-1,768*	-2,416**	-1,491	-1,358
T-1	0,221%	1,273	0,383	1,688*	-0,308
T	-0,184%	-0,247	-1,779*	-0,075	0,217
T+1	0,659%	2,058**	2,960***	1,476	1,268
T+2	-0,006%	-0,026	-0,005	-0,028	-0,570
T+3	0,515%	1,468	1,733*	0,958	3,106***
T+4	0,427%	1,836*	2,021**	1,824*	1,268
T+5	-0,930%	-0,958	-2,961***	-0,385	-0,833
B: Cumulative Average Abnormal Returns					
Event Window	**CAAR**	**Patell Z**	**BMP**	**Gen. Sign Test**	**Pos:Neg**
[T-1;T+1]	0,70%	1,537	0,406	0,743	32:26
[T-2;T+2]	0,28%	0,479	-0,237	-0,308	28:30
[T-2;T+5]	0,29%	0,395	-0,262	1,531	35:23

Note: *p<0,10, **p<0,05, ***p<0,01

The results indicate that acquirers engaged in horizontal green M&A transactions experience, on average, positive short-term abnormal stock-market reactions in selected event windows. Statistically significant positive average abnormal returns are observed primarily in the post-announcement period, particularly on trading days T+1, T+3, and T+4, indicating a delayed but favourable investor response. Although isolated negative abnormal returns emerge prior to the announcement (T−2) and toward the end of the event window (T+5), these effects are limited in magnitude and do not materially alter the overall short-term return pattern. Cumulative average abnormal returns remain modest and statistically insignificant, implying that the positive daily reactions do not translate into a persistent aggregate valuation effect. The distribution of positive versus negative abnormal returns provides tentative evidence of a mildly favourable market assessment of horizontal green M&A announcements, while also reflecting potential constraints related to sample size or event clustering.

Table 5 below provides results of average abnormal returns and cumulative average abnormal returns for the selected event windows associated with cross-border green M&A announcements.

DOI: 10.25103/ijbesar.182.04

Table 5: Cross-border green M&A announcements - results

Green Cross-Border M&As					
A: Average Abnormal Returns					
Event Day	**AAR**	**T-test**	**Patell Z**	**BMP**	**Gen. Sign Test**
T-2	0,011%	0,046	0,041	0,049	1,171
T-1	-0,088%	-0,371	-0,973	-0,438	-1,131
T	0,725%	1,292	2,825***	0,499	1,499
T+1	0,141%	0,436	0,639	0,391	0,513
T+2	-0,342%	-1,532	-1,580	-1,747*	-2,117**
T+3	0,128%	0,519	0,061	0,556	0,184
T+4	0,296%	1,724*	1,775*	2,273**	1,828*
T+5	-0,358%	-1,625	-1,079	-2,030**	-0,473
B: Cumulative Average Abnormal Returns					
Event Window	**CAAR**	**Patell Z**	**BMP**	**Gen. Sign Test**	**Pos:Neg**
[T-1;T+1]	0,78%	1,511	0,801	0,842	21:16
[T-2;T+2]	0,45%	0,672	0,264	-0,473	17:20
[T-2;T+5]	0,51%	0,611	0,470	0,842	21:16

Note: *p<0,10, **p<0,05, ***p<0,01

The results show that the most significant positive abnormal return is on the day of the announcement (T_0), suggesting that the market responds immediately to the disclosure of cross-border green M&A transactions. Following the announcement, there are additional positive abnormal returns on selected days, although these are followed by short-lived negative adjustments. The latter may reflect uncertainty related to the strategic, regulatory, or integration challenges typically associated with international acquisitions. Despite the presence of statistically significant daily effects, cumulative average abnormal returns remain statistically insignificant, albeit consistently positive. The evidence suggests that investors tend to assign a moderately favourable value to cross-border environmentally oriented acquisitions, but the adjustment process is gradual and characterised by higher short-term variability. The findings should be interpreted with caution, as transaction-specific heterogeneity and potential constraints related to sample size may influence the observed return dynamics.

Below is provided Table 6, which presents the results of the cross-sectional analysis on cumulative abnormal returns of the observed bidders.

Table 6: Cross-sectional results of cumulative average returns for short-term window

	Dependent variable: CAR [-1; +1]								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Green	0.012	0.012	0.012	0.012	0.011	0.011	0.012	0.009	0.009
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.010)
log(Total Value/Total Assets		-0.0005						-0.001	
		(0.006)						(0.006)	
Total Value/ Market Cap			0.006						0.006
			(0.014)						(0.015)
Cross-Industry				-0.012				-0.014	-0.013
				(0.008)				(0.008)	(0.008)
Cross-Border					0.007			0.009	0.010
					(0.011)			(0.011)	(0.012)
log(Market-to-Book)						-0.001		-0.0003	-0.0005

DOI: 10.25103/ijbesar.182.04

						(0.006)		(0.006)	(0.006)
log(Market Cap)							-0.001		
							(0.003)		
Fixed Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	160	160	160	160	160	160	160	160	160
R2	0.097	0.097	0.100	0.104	0.100	0.093	0.098	0.105	0.108
Adjusted R2	0.003	-0.004	-0.001	0.003	-0.001	-0.009	-0.003	-0.017	-0.014
Res. Std. Error	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
F Statistic	1.029	0.958	0.988	1.034	0.991	0.911	0.970	0.862	0.882

Source: (Author's construct)

The reliability of the regression estimates was evaluated through a series of diagnostic procedures addressing key Gauss–Markov conditions. Heteroskedasticity-robust (White) standard errors were applied to ensure consistent statistical inference in the presence of potential variance heterogeneity. Additional assumption checks, conducted in RStudio, examined issues related to multicollinearity, functional specification and residual properties. The Shapiro-Wilk tests indicated that all nine regression model did not meet the requirement of normality in the residuals. Therefore, skewed variables were log-transformed. Distributional adjustments were implemented to enhance the robustness of inference in a relatively limited sample setting.

The results in Table 6 indicate variation in short-term investor responses to green M&A announcements by acquiring firms. Overall, the estimated coefficients do not provide statistically significant support for generally discussed by scholars effects of pricing of green M&As and the return generation for acquiring companies.

To summarize, the consistently low explanatory power across all models suggests that short-term market reactions and variation in announcement returns is not driven by observable characteristics at deal or firm level. Instead, the evidence points to the tentative impact of unobserved factors, including information asymmetry, varied investor expectations, and strategic narratives specific to each transaction. The findings imply that sustainability-related M&As may generate value for acquirers in delayed or multi-stage adjustments. Variables traditionally emphasized in M&A literature - deal size, diversification, cross-border status, bidder valuation metrics, firm size - do not exhibit systematic significance during the 2010–2024 period. This pattern suggests that in the contemporary M&A environment classical determinants may have weaker explanatory power than historically documented.

Although the overall regression model showed limited effects, the event-study results revealed significant differences between horizontal and cross-border green deals. The findings of the study indicate that aggregate regressions may overlook important structural heterogeneity across deal types. These findings emphasise the methodological limitations of pooled cross-sectional approaches and highlight the need for subsample analyses and more refined variable construction in future research.

The absence of or limited statistical significance of results is a limitation of the study. However, it does not imply the absence of meaningful effects. The observable directional patterns across variables suggest indicative signals, that the current sample lacks sufficient power to confirm formally. Consequently, the results should be regarded as exploratory yet informative.

The absence of strong statistical relationships of the study suggests that key determinants of announcement-period returns in sustainability-oriented M&A may not be easily observable, motivating further development of empirical strategies capable of capturing the qualitative and informational dimensions of corporate transactions.

5. Discussion

The empirical study adds to the growing body of research looking at how financial markets react to sustainability-oriented mergers and acquisitions. The results indicate that acquirer returns in green M&A announcements are not consistently positive or negative, but rather exhibit short-term volatility and sensitivity to the specification of the event window. While initial optimism is evident in short-term windows, these gains often reverse in longer-term windows, suggesting a short-lived market response influenced by uncertainty and corrective price adjustments. This pattern is consistent with previous research showing that markets may overreact to the 'green' label of a transaction while underestimating the underlying financial and operational fundamentals (Cui and Docherty, 2020).

The findings also reinforce the argument that sustainability-oriented acquisitions involve significant information asymmetry. Investors have limited knowledge of companies' actual sustainability practices, their integration capacities, and the credibility of their environmental commitments. As Han et al. (2022) and Deng et al. (2013) demonstrate, the strategic benefits of environmental acquisitions tend to materialise in the long term, through cost efficiencies, innovation capacity and operational improvements. The negative immediate market reactions observed in this study are consistent with the delayed-value phenomenon.

DOI: 10.25103/ijbesar.182.04

Acquisition premiums and risk perceptions also influence short-term market responses. Green M&As may involve higher premiums due to reputational motives or strategic urgency, which can compromise short-term acquirer value. Evidence from Gomes and Marsat (2018) study suggests that bidders in sustainability-oriented deals sometimes overpay to secure environmental capabilities or strengthen their ESG positioning. Similarly, cross-border green acquisitions may expose the acquirer to increased regulatory, cultural and geographical risks, prompting a cautious investor reactions despite potential long-run strategic benefits.

Observed patterns are also influenced by synergy expectations of M&As. Horizontal green acquisitions in the sample consistently generated positive cumulative abnormal returns across event windows, though not at statistically significant levels. This is in line with established views that horizontal deals generate tangible operational synergies through economies of scale and market consolidation (Andrade et al., 2001). However, while cross-border deals also yield positive cumulative returns, they do not trigger strong market responses. Thus integration complexity in M&As may offset anticipated returns.

Together, the dynamics suggest that markets do not treat green M&As as inherently value-enhancing in the short term. Rather, investor reactions depend on the interplay of perceived sustainability credibility, integration risk, premium levels and strategic fit. Therefore, the findings suggest the need of a more nuanced view on the expectations that green M&As automatically generate market rewards, and highlight the importance of examining both the short-term and long-term effects.

These outcomes align with prior research suggesting that investors may not fully incorporate the potential long-term value of environmentally oriented acquisitions at the announcement date (Deng et al., 2013; Han et al., 2022). Any positive valuation effects for acquirers, if they arise, may therefore emerge gradually as information about sustainability integration and future performance becomes clearer.

6. Conclusions

In conclusion, this study provides new evidence on how the stock market reacts to green and non-green M&A announcements from the perspective of acquirers in the US between 2010 and 2024. This period was characterised by the rapid expansion of sustainability-oriented investment. The empirical results show that acquirers in green M&As do not systematically experience positive abnormal returns at the time of the announcement, although short-term cumulative returns may be modestly favourable. These effects dissipate over longer timeframes, suggesting either market overreaction or heightened uncertainty. However, overpricing effects, which are not systematic, follow immediately after the announcement of M&A deals, suggesting general market optimism towards sustainability-oriented investments. Previous research has argued that investors frequently undervalue green M&As on the day of the announcement (Deng et al., 2013; Han et al., 2022). The positive effect on the acquirer's stock price may be delayed due to the acquirer's long-term sustainability goals and future investments in them. Horizontal and cross-border green M&As generally produce positive returns, albeit without statistical significance, which highlights the complexity of investor interpretation in environmentally oriented transactions.

The results point out that green M&A status does not significantly influence short-term announcement returns, contradicting general consensus. This indicates that markets do not consistently reward environmental motives in M&A, at least within the immediate announcement period, and adds nuance to the scholarly debate.

The findings of the study indicate that the initial pricing of green M&As is affected by factors such as anticipated synergies, information asymmetry, integration risk, and acquisition premiums. These results are consistent with the wider body of literature documenting the delayed realisation of value in sustainability-driven acquisition strategies. Therefore, future research should explore the effects on longer-term performance, company integration outcomes, and the conditions under which environmental acquisitions generate long-lasting shareholder value.

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DOI: 10.25103/ijbesar.182.04