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Apakah Akuisisi Hijau Menciptakan Nilai? Bukti dari Pasar Amerika Serikat dan Australia

Do Green Acquisitions Create Value? Evidence from US and Australian Markets

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Abstrak

Penelitian ini mengkaji reaksi pemegang saham terhadap merger dan akuisisi hijau menggunakan 72 transaksi oleh perusahaan pengakuisisi di Amerika Serikat dan Australia selama periode 2018–2020. Sampel memasangkan 36 akuisisi hijau dengan 36 akuisisi non-hijau yang dicocokkan melalui propensity score matching, dengan identifikasi transaksi hijau dilakukan melalui penyaringan tekstual dan klasifikasi industri. Metodologi event study dengan jendela tiga hari [−1, +1] dan berbagai uji ketahanan menunjukkan bahwa akuisisi hijau pada awalnya menghasilkan cumulative abnormal returns yang lebih tinggi dibandingkan akuisisi non-hijau (2,85% versus 0,90%). Namun, regresi lintas-seksi menunjukkan bahwa premi hijau tersebut menjadi tidak signifikan secara statistik setelah determinan merger tradisional—ukuran transaksi relatif, diversifikasi lintas industri, dan rasio market-to-book—dikontrol. Temuan ini mengindikasikan bahwa investor mengevaluasi akuisisi hijau melalui metrik keuangan konvensional, alih-alih memberikan premi sistematis terhadap atribut lingkungan. Studi ini berkontribusi pada literatur green M&A dengan menunjukkan bahwa fundamental transaksi, bukan positioning lingkungan, yang mendorong reaksi pasar pada periode meningkatnya fokus kebijakan ESG, dengan implikasi bagi strategi lingkungan perusahaan dan kebijakan keuangan berkelanjutan.

***Kata kunci**: Green M&A; Nilai Pemegang Saham; Event Study; Investasi ESG; Kinerja Akuisisi*

***JEL Classification:** G14, G34, Q56*

Abstract

This study examines shareholder reactions to green mergers and acquisitions using 72 transactions by US and Australian acquirers during 2018–2020. The sample pairs 36 green acquisitions with 36 propensity-score-matched non-green deals, identified through textual screening and industry

classification. Event-study methodology with a three-day window [−1, +1] and multiple robustness tests reveals that green acquisitions initially generate higher cumulative abnormal returns than non-green deals (2.85% versus 0.90%). However, cross-sectional regression shows that this green premium becomes statistically insignificant once traditional merger determinants—relative deal size, cross-industry diversification, and market-to-book ratios—are controlled for. These findings indicate that investors evaluate green acquisitions through conventional financial metrics rather than assigning systematic premiums to environmental attributes. The study contributes to the green M&A literature by demonstrating that deal fundamentals, not environmental positioning, drive market reactions during a period of heightened ESG policy focus, with implications for corporate environmental strategy and sustainable finance policy.

Keywords: Green M&A; Shareholder Value; Event Study; ESG Investing; Acquisition Performance

JEL Classification: G14, G34, Q56

1. Introduction

The global shift towards sustainable business practices is reshaping corporate strategy and capital allocation. Environmental, social, and governance (ESG) considerations are increasingly embedded in investment decisions, reflecting broad evidence that ESG integration is associated with non-negative—and often positive—financial outcomes (Friede et al., 2015). Sustainable investment has expanded substantially: the Global Sustainable Investment Alliance reports that ESG-labelled assets reached USD 35.3 trillion across major markets in 2020, a 15% increase from 2018 (GSIA, 2020). Heightened stakeholder expectations have prompted firms to signal environmental commitment through operational choices, strategic investments, and, increasingly, mergers and acquisitions (González-Torres et al., 2020).

Global clean-energy investment has risen rapidly alongside these developments. The International Energy Agency estimates that investment in renewable power, grids, electric vehicles, and energy-efficiency technologies reached USD 1.7–1.8 trillion in 2023 (IEA, 2023). Yet this expansion has been accompanied by growing scrutiny of greenwashing, as empirical studies document substantial divergence amongst ESG ratings (Berg et al., 2022) and demonstrate that disagreement across raters can incentivise symbolic sustainability practices (Hu et al., 2023). In this environment, understanding how capital markets evaluate environmentally oriented acquisitions is theoretically and practically important.

Traditional M&A research consistently shows that target shareholders earn large premiums, whereas acquirer shareholders typically experience zero or modestly negative abnormal returns (Franks & Harris, 1989; Martynova & Renneboog, 2008; Tuch & O'Sullivan, 2007). More recent evidence indicates that bidder returns improved after 2009 under certain deal conditions (Alexandridis et al., 2017), although the consensus remains that value creation for acquirers is limited. A growing strand of literature examines whether this pattern changes in the context of green or ESG-related acquisitions. Prior studies find that acquirers can benefit when targets have stronger ESG or CSR characteristics (Aktas et al., 2011; Gomes & Marsat, 2018), and evidence from China suggests that green M&As improve environmental performance and accelerate green innovation, particularly when regulatory enforcement is strong (Sun et al., 2025).

Despite this growing body of evidence, a critical question remains unresolved: whether the apparent value effects of green acquisitions reflect genuine environmental premiums or are instead attributable to conventional deal characteristics that happen to correlate with green transactions. Most prior studies examine green and non-green deals without matching on observable deal attributes, making it difficult to isolate the incremental effect of environmental orientation. Moreover, evidence from major developed markets outside Asia remains limited, particularly during the recent period of accelerated ESG policy adoption.

This study addresses two central questions: (1) Do green acquisition announcements generate positive short-term shareholder value for bidders? (2) Do green acquisitions outperform matched non-green transactions once traditional determinants of bidder returns are taken into account? These questions are investigated using short-horizon event-study methods with enhanced robustness checks and cross-sectional regressions that incorporate established economic drivers of bidder returns. The sample comprises 72 US and Australian transactions completed between 2018 and 2020—a period characterised by intensified climate-policy attention and the onset of the COVID-19 pandemic, both of which shaped investor preferences.

This study contributes in three ways. First, it provides comparative evidence from two significant M&A markets with active ESG-policy developments and distinct institutional environments. Second, it applies methodological refinements—including propensity-score matching, rigorous outlier treatment, and multiple test statistics—to address common concerns in green M&A research. Third, it offers new insight into whether environmental deal characteristics exert incremental explanatory power once traditional value-creation mechanisms such as deal size, strategic relatedness, and bidder fundamentals are accounted for.

The remainder of this paper proceeds as follows. Section 2 reviews the literature and develops testable hypotheses. Section 3 describes the research design, sample construction, green acquisition identification procedures, and econometric specifications. Section 4 presents the empirical results. Section 5 discusses the findings and their implications. Section 6 concludes.

2. Literature Review and Hypothesis Development

2.1 Traditional M&A Performance and Shareholder Value

A substantial body of research identifies structural determinants of bidder performance. Relative deal size is one of the most robust predictors of value destruction: acquisitions that represent a larger proportion of bidder market capitalisation systematically generate more negative returns (Golubov et al., 2015). Diversifying or cross-industry acquisitions also tend to underperform focused transactions due to integration challenges and weaker synergy potential (Harford et al., 2012). Bidder valuation characteristics further shape performance: firms with higher market-to-book ratios often demonstrate superior post-deal adaptability and integration success, partly due to stronger managerial capabilities and investment discipline. Taken together, this literature underscores that bidder returns are highly sensitive to deal size, strategic

relatedness, and bidder fundamentals—factors that continue to frame market reactions even as ESG considerations become more prominent in corporate strategy.

2.2 Evolution of Sustainable Finance and Green Corporate Strategies

Sustainable finance has transformed significantly since the 2015 Paris Agreement. In the European Union, the Sustainable Finance Disclosure Regulation (Regulation (EU) 2019/2088) and the EU Taxonomy Regulation (Regulation (EU) 2020/852) established harmonised rules for defining environmentally sustainable activities and mandating ESG-related disclosures (European Commission, 2019, 2020). These frameworks aim to reduce greenwashing and enhance comparability across ESG-labelled investments.

Similar regulatory developments have emerged elsewhere. In the United States, the Securities and Exchange Commission adopted its final climate-disclosure rule on 6 March 2024, requiring listed firms to provide more standardised climate-risk information, although implementation has been partly stayed pending litigation (U.S. Securities and Exchange Commission, 2024). Australia has moved towards mandatory climate-related financial reporting aligned with TCFD and IFRS/ISSB climate standards (AASB/IFRS S2), with large entities entering the regime from 2025 following earlier ASIC guidance encouraging TCFD-aligned disclosures (AASB, 2023; ASIC, 2023).

The Inflation Reduction Act of 2022 in the United States established extensive tax credits and incentives supporting clean-energy investment. These provisions strengthen the financial case for acquiring renewable-energy and decarbonisation-related businesses (Congressional Budget Office, 2022), potentially accelerating consolidation within eligible sectors. Australia's Clean Energy Finance Corporation (CEFC), established in 2012, continues to supply concessional finance for low-emission technologies. Evidence suggests that such public financing instruments reduce investment risk and crowd in private capital, indirectly supporting environmentally oriented acquisitions (Clean Energy Finance Corporation, 2023).

Empirical evidence on green and ESG-related M&As is growing. Gomes & Marsat (2018) report that green acquisitions in the United States generate significantly positive announcement returns, particularly when acquirers possess strong marketing but weaker innovation capabilities. Broader CSR-target studies show that acquirers benefit from purchasing high-CSR or high-SRI targets, as markets reward the integration of socially responsible assets (Aktas et al., 2011).

In contrast, recent work from China highlights the critical role of regulatory context. Xu et al. (2025) find that green M&As reduce environmental capital expenditure and enhance green innovation when environmental enforcement is strong. Sun et al. (2025) show that green acquisitions can improve corporate environmental responsibility, but the extent of improvement depends on whether deals reflect substantive transformation or symbolic signalling. Environmental tax and green-finance policies also encourage pro-environmental M&A activity and strengthen value effects, particularly in settings with higher institutional quality.

Overall, the emerging consensus is that the success of green M&A depends on the interplay between firm capabilities, regulatory stringency, and the credibility of environmental commitments rather than on environmental classification alone.

2.3 Market Reactions to ESG Initiatives and Environmental Commitments

ESG characteristics may provide downside protection. During the global financial crisis, firms with high CSR intensity achieved higher stock returns and stronger profitability (Lins et al., 2017). Similar patterns appear during the COVID-19 market shock, where environmentally and socially responsible firms experienced higher returns and lower drawdowns (Albuquerque et al., 2020; Garel & Petit-Romec, 2021).

However, greenwashing creates complexity. Kim & Lyon (2015) distinguish between exaggerated and understated environmental claims, showing that such behaviour is shaped by growth pressures, deregulation, profitability, and scrutiny. Firms identified as engaging in ESG-related greenwashing subsequently face higher stock-price crash risk and lower valuations (Liu et al., 2024; Xu et al., 2025).

Recent evidence reveals that investors respond selectively to ESG information: Serafeim & Yoon (2022) show that stock prices react most strongly to financially material ESG news, with more muted responses to immaterial disclosures. Disagreement amongst ESG raters further shapes pricing dynamics (Bachner, 2025; Serafeim & Yoon, 2023). This suggests that markets evaluate ESG claims through an increasingly nuanced, information-driven lens—an important consideration for understanding how investors assess green acquisitions.

2.4 Hypothesis Development

Research suggests that ESG characteristics may influence value creation in M&A, although the magnitude and mechanisms vary (Deng et al., 2013; Ma et al., 2024; Tampakoudis & Anagnostopoulou, 2020; Teti et al., 2022). Building on stakeholder-value theory and sustainable-finance perspectives, two hypotheses are developed.

H1: *The announcement of green acquisitions has a positive effect on acquirer shareholder value.*

Green acquisitions may generate value by supporting compliance with tightening environmental regulation, improving access to sustainable finance, or enhancing stakeholder relationships. Prior evidence shows that acquirers with strong ESG profiles, or those purchasing high-ESG targets, often experience superior announcement returns (Deng et al., 2013; Ma et al., 2024; Tampakoudis & Anagnostopoulou, 2020; Teti et al., 2022; Zheng et al., 2023). H1 therefore concerns the unconditional short-term market reaction.

H2: *Green acquisitions generate higher cumulative abnormal returns than non-green acquisitions after controlling for deal- and firm-level characteristics.*

Given the importance of deal size, diversification, bidder valuation, and market conditions in shaping acquirer returns (Alexandridis et al., 2010; Moeller et al., 2005),

any observed green premium may disappear once these determinants are included. H2 therefore tests whether environmental attributes exert incremental explanatory power beyond established M&A drivers, consistent with recent studies embedding ESG variables within multivariate event-study frameworks (Deng et al., 2013; Ma et al., 2024; Tampakoudis & Anagnostopoulou, 2020; Teti et al., 2022).

3. Methodology

3.1 Research Design

This study employs a short-horizon event-study framework to isolate stock-price reactions to M&A announcements, following canonical procedures in financial economics (Campbell et al., 1997; MacKinlay, 1997). This design assumes semi-strong market efficiency, under which new public information is rapidly incorporated into prices (Brown & Warner, 1985). The empirical strategy proceeds in three steps: (1) identification of green and non-green transactions; (2) estimation of abnormal returns around announcement dates; and (3) cross-sectional regression analysis of cumulative abnormal returns (CARs). This framework is well suited to studying M&A, as announcement effects typically materialise within a narrow window and are sensitive to both deal and firm characteristics.

3.2 Event Window and Announcement Identification

The primary event window is the three-day interval [−1, +1] centred on the announcement date, capturing potential information leakage and immediate price adjustment. This window balances the need to capture the full investor reaction whilst limiting contamination from unrelated news. To assess robustness, CARs are also computed over [−2, +2] and [−3, +3], in line with established M&A event-study practice (Alexandridis et al., 2010; Deng et al., 2013).

The announcement date (t = 0) is defined as the earliest public disclosure of the transaction, confirmed through cross-validation across Refinitiv SDC Platinum, Bloomberg, and investor-relations announcements. This triangulation approach reduces measurement error and aligns with standard empirical procedures.

3.3 Normal Return Estimation and Statistical Testing

Normal returns are estimated using the market model over a 250-day estimation window ending ten trading days before the event window, thereby avoiding leakage effects (Brown & Warner, 1985; MacKinlay, 1997). Market benchmarks are the S&P 500 (US) and the ASX 300 (Australia), providing value-weighted indices consistent with prior research.

Abnormal returns are computed as:

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t}),$$

and cumulative abnormal returns over the event window are:

$$CAR_i = \sum_{t=-1}^{+1} AR_{i,t}.$$

Robust inference is ensured through four complementary test statistics addressing heteroscedasticity, event-induced variance, and non-normality: cross-sectional t-tests (Boehmer, 1991; Brown & Warner, 1985; Patell, 1976) variance-adjusted tests, and a generalised sign test.

3.4 Sample Construction and Data Sources

The M&A sample is drawn from Refinitiv SDC Platinum for 1 January 2018 to 31 December 2020—a period of heightened ESG-policy attention and pre-2021 market volatility (Albuquerque et al., 2020). Established filters used in M&A and ESG–M&A research are applied (Alexandridis et al., 2010; Deng et al., 2013; Ma et al., 2024): (1) Completed acquisitions only, (2) Publicly listed US or Australian bidders with sufficient trading histories, (3) Majority-control acquisitions (≥50.1% stake), (4) Minimum deal value of USD 10 million to exclude micro-deals, and (5) Complete stock-price and firm-level financial data. This approach ensures methodological comparability and reliable abnormal-return estimation. An initial sample of 80 transactions meeting these criteria was identified.

3.5 Green Acquisition Identification

Green acquisitions are identified using a multi-step procedure combining textual analysis, industry classification, and manual validation. Keyword searches are first applied to target descriptions covering renewable energy, clean technology, environmental services, waste management, water treatment, energy efficiency, and related domains. This taxonomy mirrors approaches used in recent work on clean-energy and low-carbon sectors (Bolton & Kacperczyk, 2021; Capasso et al., 2020).

Textual screening is supplemented with SIC and NAICS codes associated with environmental and clean-technology industries. Prior studies emphasise that combining keywords with industry codes reduces misclassification relative to single-method approaches (Capasso et al., 2020). Manual inspection is then used to validate each candidate green transaction, consistent with emerging ESG–M&A methodology.

In line with common practice, financial acquirers (SIC 6000–6999) are excluded due to their distinct motives and market reactions (Alexandridis et al., 2010). Transactions lacking sufficient data for event-study estimation are also removed.

3.6 Outlier Treatment and Sample Refinement

Percentile-based winsorisation at the 1st and 99th percentiles is applied to all continuous variables, consistent with best practice in corporate-finance research (Alexandridis et al., 2010). Specific thresholds for each variable are reported in Appendix Table A2.

Following winsorisation and removal of eight incomplete observations, the final sample comprises 72 transactions (36 green, 36 non-green).

3.7 Propensity Score Matching

To ensure comparability between green and non-green deals, a matched sample is constructed using propensity-score matching (PSM), following Rosenbaum & Rubin (1983). The logit model includes (1) Acquirer country (US vs. Australia), (2) Announcement year, (3) Industry classification (three-digit SIC and GICS sector), (4) Relative deal size, (5) Market conditions (VIX), and (6) Acquirer size quintiles.

Nearest-neighbour matching with replacement and a 0.25 standard-deviation caliper is used, consistent with Austin (2011). This approach balances observable characteristics and improves internal validity, in line with best practice in ESG–M&A research (Shipman et al., 2017).

Table A1 (Appendix) presents the covariate balance diagnostics, demonstrating that after matching, there are no statistically significant differences between green and non-green subsamples across all matching variables. Standardised differences fall below the conventional 10% threshold, and variance ratios are close to unity, indicating successful balancing.

3.8 Cross-Sectional Analysis Specification

To examine determinants of CARs and estimate incremental effects of green status, the following model is estimated:

$$CAR_i = \delta_0 + \delta_1 Green_i + \delta_2 (\frac{DV}{MCAP})_i + \delta_3 CrossIndustry_i + \delta_4 M2B_i + \delta_5 \ln(MCAP_i) + \delta_6 USAcquirer_i + \text{Year FE} + \varepsilon_i.$$

This specification reflects established M&A literature, which highlights deal size, strategic relatedness, valuation, and acquirer size as key drivers of bidder returns (Alexandridis et al., 2010; Moeller et al., 2004; Netter et al., 2011). ESG–M&A studies similarly include these controls when assessing environmental effects (Deng et al., 2013; Ma et al., 2024; Teti et al., 2022). Inference is based on White (1980) heteroscedasticity-robust standard errors.

4. Results

4.1 Descriptive Statistics and Sample Characteristics

Table 1 summarises the characteristics of the refined 72-deal sample. US acquirers account for 78% of observations, consistent with market depth differences relative to Australia (Moeller et al., 2004). Winsorisation reduces dispersion in key variables, producing distributions aligned with standard M&A event-study samples (MacKinlay, 1997).

The deal value-to-market capitalisation ratio averages 7.8%, with a maximum of 35%, eliminating extreme deals where deal value exceeded bidder market value. CARs for the [−1, +1] window range from −12.30% to +15.60%, with a standard deviation of 4.85%, consistent with the broad heterogeneity documented in bidder announcement returns (Andrade et al., 2001; Moeller et al., 2004).

Cross-industry acquisitions comprise 62.5% of the sample. Market-to-book ratios average 2.95, indicating a right-skewed distribution typical of mid- to large-cap bidders. These characteristics provide a reliable foundation for subsequent analysis.

Table 1. Descriptive Statistics (Post-Outlier Treatment)

Variable	N	Mean	Std. Dev.	Min	P25	P75	Max
CAR [−1, +1] (%)	72	2.14	4.85	−12.30	−1.20	4.10	15.60
Deal Value / Market Cap	72	0.078	0.095	0.005	0.018	0.125	0.350
Market-to-Book	72	2.95	2.10	0.85	1.75	3.65	8.90
ln(Market Cap)	72	8.42	1.85	4.12	7.23	9.55	12.15
Deal Value (USD millions)	72	285.4	315.8	15.2	52.8	385.0	1,250.0
Market Cap (USD billions)	72	12.9	18.5	0.06	1.35	15.2	85.4
Green Deal (dummy)	72	0.50	0.50	0.00	0.00	1.00	1.00
Cross-Industry (dummy)	72	0.63	0.49	0.00	0.00	1.00	1.00
US Acquirer (dummy)	72	0.78	0.42	0.00	1.00	1.00	1.00

Notes: CAR is cumulative abnormal returns estimated using the market model over the [−1, +1] announcement window. Financial variables are reported in nominal USD terms. Continuous variables are winsorised at the 1st and 99th percentiles to mitigate the influence of outliers, consistent with standard practice in M&A event studies.

4.2 Event Study Results: Market Reactions to Green versus Non-Green Acquisitions

Panel A of Table 2 shows that green acquisitions generate statistically significant abnormal returns on the announcement date and the following day. Day 0 AARs are 1.23% ($t = 2.46$, $p < 0.05$) and Day +1 AARs are 1.35% ($t = 2.79$, $p < 0.01$). These are corroborated by Patell Z-tests. Non-green acquisitions exhibit smaller and statistically insignificant AARs on both days.

Panel B shows that over the [−1, +1] window, green deals achieve a CAAR of 2.85%, compared with 0.90% for non-green deals—a difference of 1.95 percentage points. A two-sample t-test of this difference yields $t = 1.73$ ($p = 0.088$), indicating marginal statistical significance at the 10% level. The Patell Z-test for green acquisitions indicates significance at the 5% level ($Z = 2.13$, $p < 0.05$), although the more conservative BMP test falls short of conventional cut-offs (BMP = 1.46, $p = 0.14$).

These results provide initial support for H1, indicating that markets react more positively to green acquisition announcements in univariate settings.

Table 2. Event Study Results – Market Model (Outliers Removed)

Panel A: Daily Average Abnormal Returns (AARs)

Day	Green Sample (N = 36)			Non-Green Sample (N = 36)		
	AAR (%)	t-stat	Patell Z	AAR (%)	t-stat	Patell Z
−2	0.15	0.31	0.29	−0.07	−0.20	−0.15
−1	0.27	0.69	0.52	0.13	0.42	0.30
0	1.23	2.46**	2.12**	0.52	1.09	0.93
+1	1.35	2.79***	2.23**	0.25	0.53	0.42
+2	0.10	0.19	0.17	−0.13	−0.29	−0.20

Panel B: Cumulative Average Abnormal Returns (CAARs)

Event window	Green Sample (N = 36)			Non-Green Sample (N = 36)		
	CAAR (%)	Patell Z	BMP	CAAR (%)	Patell Z	BMP
[−1, +1]	2.85	2.13**	1.46	0.90	1.05	0.62
[−2, +2]	3.09	1.88*	1.23	0.70	0.79	0.43

Difference Test (Green – Non-Green):

CAAR [−1, +1]: 1.95 percentage points, t stat = 1.73* (p = 0.088)

CAAR [−2, +2]: 2.39 percentage points, t stat = 1.81* (p = 0.074)

*Notes: This table reports portfolio-level event-study results for 72 M&A announcements (36 green, 36 non-green). AARs and CAARs are computed using the market model over the event window centred on the announcement date (Day 0), after trimming outliers in key continuous variables. t-statistics are conventional cross-sectional tests on AARs. Patell Z is the standardised residual test, and BMP is the Boehmer, Musumeci, and Poulsen (1991) standardised cross-sectional test for abnormal returns under event-induced variance. Difference tests are two-sample t-tests comparing green and non-green CAARs. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).*

4.3 Cross-Sectional Analysis: Determinants of Acquisition Performance

Table 3 presents OLS regressions explaining CAR [−1, +1]. In Model (1), without additional controls, the coefficient on Green is 0.019 (s.e. = 0.010, p = 0.061), significant at the 10% level, consistent with the univariate CAAR difference.

Once established M&A determinants are included, the magnitude of the green coefficient shrinks to between 0.006 and 0.015 and becomes statistically insignificant across specifications ($p > 0.10$ in all cases). This indicates that much of the unconditional difference between green and non-green transactions is attributable to correlated deal and firm characteristics.

Three traditional determinants dominate ie., (1) Deal size effect: Relative deal size (DV/MCAP) carries a consistently negative coefficient (−0.087 to −0.092, $p < 0.01$), implying that larger deals relative to bidder size reduce announcement returns. A move from the 25th percentile (1.8%) to the 75th percentile (12.5%) in relative deal size reduces CAR by approximately 0.93 percentage points (= −0.089 × 0.107), (2) Diversification discount: Cross-industry acquisitions exhibit a −0.031 coefficient (≈ −3.1 percentage points, $p < 0.01$), statistically significant and economically large. Given that 62.5% of deals are diversifying, this effect influences a substantial portion of the sample, and (3) Growth premium: Market-to-book ratios show a consistently positive association with CARs (0.006–0.007, $p < 0.05$), consistent with q-theory predictions and the superior ability of high-growth bidders to create value.

Model explanatory power increases from $R^2 = 0.158$ (Model 1) to 0.425 (Model 5), driven almost entirely by traditional determinants.

The inclusion of ln(Market Cap) in Model (5) yields a small and statistically insignificant coefficient (0.004, p = 0.32), suggesting that after controlling for relative deal size and other characteristics, absolute acquirer size does not independently explain announcement returns.

Table 3. Cross-Sectional Regression Results (Outliers Removed)

Dependent variable: CAR [−1, +1] (%)

Variable	(1)	(2)	(3)	(4)	(5)
Green	0.019*	0.015	0.012	0.008	0.006
	(0.010)	(0.011)	(0.010)	(0.009)	(0.008)
Deal Value / Market Cap		−0.087***	−0.084**	−0.092***	−0.089***
		(0.029)	(0.032)	(0.028)	(0.029)
Cross-Industry			−0.024**	−0.028**	−0.031***
			(0.012)	(0.011)	(0.011)
Market-to-Book				0.007***	0.006**
				(0.002)	(0.003)
ln (Market Cap)					0.004
					(0.004)
Model statistics					
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	72	72	72	72	72
R^2	0.158	0.289	0.345	0.412	0.425
Adjusted R^2	0.124	0.252	0.306	0.371	0.378
F-statistic	2.13*	3.29***	4.16***	5.02***	4.89***

*Notes: CAR [−1, +1] is expressed in percentage points. All models are estimated by OLS with heteroscedasticity-robust standard errors (White, 1980) reported in parentheses and include year fixed effects. Deal Value / Market Cap is the ratio of deal value to bidder market capitalisation. Cross-Industry is a dummy equal to 1 for cross-industry (diversifying) acquisitions. Market-to-Book is the bidder's market-to-book ratio, and ln (Market Cap) is the natural logarithm of bidder market capitalisation. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).*

4.4 Robustness Tests

A series of robustness checks confirm the stability of the core findings. Results are summarised in Table 4 and discussed as follows: (1) CARs computed over [−2, +2] and [−3, +3] yield green coefficients that remain statistically insignificant once controls are included (Models 2–5 in Table 4, Panels A–B). Point estimates range from 0.005 to 0.018, all with p-values exceeding 0.10, (2) Using market-adjusted returns (assuming $\beta = 1$, $\alpha = 0$) and constant-mean returns produces qualitatively identical results. Green coefficients in fully controlled specifications remain insignificant (Panel C), (3) Re-matching using exact matching on two-digit SIC codes, GICS sectors, and announcement year yields a balanced sample with similar characteristics. Regression results remain unchanged (Panel D), (4) Winsorising at 2.5–97.5% and 5–95% percentiles yield consistent estimates. Green coefficients remain insignificant in controlled models (Panel E), and (5) Dividing the sample into 2018–2019 (N = 48) and 2020 (N = 24) reveals stable patterns. Despite heightened ESG salience and volatility surrounding the pandemic, green coefficients remain insignificant in both subperiods when controls are included (Panel F).

These robustness tests confirm the stability of the core findings.

Table 4. Robustness Tests Summary

Test	Green Coef. (Model 1)	Green Coef. (Model 5)	*p*-value (Model 5)
Panel A: Alternative Event Windows			
CAR [−2, +2]	0.024**	0.008	0.35

CAR [−3, +3]	0.021*	0.005	0.52
Panel B: Alternative Return Models			
Market-adjusted	0.018*	0.007	0.41
Constant-mean	0.020*	0.009	0.28
Panel C: Alternative Matching			
Exact SIC-2 match	0.019*	0.006	0.48
GICS sector match	0.021*	0.008	0.35
Panel D: Outlier Treatment			
Winsorised 2.5–97.5%	0.018*	0.006	0.45
Winsorised 5–95%	0.017	0.005	0.54
Panel E: Subperiod Analysis			
2018–2019 (N=48)	0.020*	0.007	0.42
2020 (N=24)	0.017	0.004	0.68

*Notes: This table summarises regression coefficients on the Green dummy from various robustness specifications. Model 1 includes only the Green indicator and year fixed effects. Model 5 is the fully controlled specification including all covariates from Table 3. All models use heteroscedasticity-robust standard errors. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).*

5. Discussion

5.1 Model Evolution and the Attenuation of the Green Effect

The regression results show that the initial green effect identified in the univariate tests largely reflects correlated fundamentals rather than an independent environmental premium. Model (1) produces a green coefficient of 0.019 (s.e. = 0.010, p = 0.061), marginally significant at the 10% level, indicating that green acquisitions appear to outperform non-green deals in a naïve specification. This aligns with the unconditional CAAR difference reported in the event-study results (1.95 percentage points, p = 0.088).

However, once relative deal size, diversification, and bidder characteristics are included, the green coefficient diminishes to between 0.006 and 0.015 and becomes statistically insignificant in all specifications (p > 0.10). This sharp attenuation—a reduction of approximately 68% from Model 1 to Model 5—is consistent with the interpretation that unconditional green differences are driven by the underlying structure and context of the transactions rather than environmental classification alone.

The economic magnitude of this attenuation is substantial. The raw difference of 1.95 percentage points between green and non-green CAARs represents approximately 91% of the mean CAR in the full sample (2.14%). After controlling for traditional determinants, the residual green effect of 0.6 percentage points represents only 28% of the sample mean and is statistically indistinguishable from zero.

These results highlight that green acquisitions do not generate incremental short-term value for bidders once traditional value-creation mechanisms are considered. They therefore do not provide support for H2, which posited a positive incremental effect after controlling for fundamentals.

5.2 Traditional Determinants as Primary Value Drivers

Across all specifications, traditional determinants of M&A performance remain the most robust predictors of bidder returns.

Deal Size Effect (Strong and Negative). The deal value-to-market capitalisation ratio consistently carries a large negative coefficient (−0.089 in the full model, $p < 0.01$). This effect is both statistically and economically significant. A one-standard-deviation increase in relative deal size (9.5 percentage points) is associated with a 0.85 percentage point reduction in CAR—equivalent to 40% of the sample mean. Moving from the 25th to the 75th percentile (1.8% to 12.5%) reduces CAR by approximately 0.93 percentage points. This finding accords with longstanding evidence that larger, transformational acquisitions destroy bidder value on average due to complexity, integration challenges, and bidding pressures (Moeller et al., 2004, 2005).

Diversification Discount (Persistent and Large). Cross-industry deals generate returns roughly 3.1 percentage points lower than within-industry deals ($p < 0.01$). This represents one of the largest economic effects in the model—exceeding the sample mean CAR by 45%. As 62.5% of the sample comprises diversifying transactions, this discount affects most observed acquisitions. This finding reinforces classic conclusions that unrelated acquisitions underperform due to weaker synergies and more complex integration requirements (Harford et al., 2012).

Growth Premium (Positive and Consistent). Market-to-book ratios consistently predict higher CARs (coefficient = 0.006, $p < 0.05$), reflecting the superior integration capabilities and strategic discipline of high-q bidders. A one-standard-deviation increase in M2B (2.1 points) is associated with a 1.26 percentage point increase in CAR—approximately 59% of the sample mean. This pattern is consistent with q-theory of investment and with substantial empirical evidence that high-growth bidders are better positioned to extract synergies.

Acquirer Size (Insignificant After Controls). The inclusion of ln(Market Cap) in Model (5) yields a small and statistically insignificant coefficient (0.004, $p = 0.32$). This suggests that after controlling for relative deal size and other characteristics, absolute acquirer size does not independently explain announcement returns. This finding differs from some prior studies (Moeller et al., 2004) but may reflect the matched-sample design and the focus on majority-control acquisitions, which reduces variation in deal complexity.

Overall, these results confirm the continued dominance of established economic determinants—deal size, strategic focus, and bidder quality—in shaping acquisition outcomes. Environmental status does not overturn these mechanisms.

5.3 Model Performance and Explanatory Power

The explanatory power of the regression models increases substantially as traditional economic determinants are added. Adjusted R^2 rises from 0.124 in Model (1) to 0.378 in Model (5), whilst F-statistics remain statistically significant throughout (ranging from 2.13 to 4.89). Virtually all gains in explanatory power stem from relative deal size, diversification, and bidder fundamentals.

The green indicator contributes negligibly to the explanatory power of the models. Comparing Model (1) to a null model with only year fixed effects (not reported), the green dummy explains approximately 3.4% of the variation in CARs. In

contrast, adding traditional determinants in Models (2)–(5) explains an additional 25.4% of the variation. This reinforces the conclusion that environmental classification is not an independent driver of short-term shareholder wealth.

These patterns align with broader findings that ESG-related variables in M&A often produce weak or insignificant effects once core economic determinants are controlled for (Kayser & Zülch, 2024). The results suggest that any informational content in the "green" label is already captured by traditional deal characteristics.

5.4 The Illusion of Green Premiums and Market Efficiency

The contrast between unconditional CAAR differences and regression-adjusted insignificance illustrates what might be termed the "illusion of a green premium." The univariate event-study results show a clear difference—2.85% for green versus 0.90% for non-green acquisitions (difference = 1.95 percentage points, $p = 0.088$)—but the disappearance of this premium under multivariate controls suggests that markets condition their reactions on deal fundamentals rather than environmental labels alone.

This interpretation aligns with a semi-strong form market-efficiency framework (Fama, 1970). Investors appear to recognise that green acquisitions can only create value when supported by strong strategic, financial, and operational rationales. Environmental claims lacking economic substance are unlikely to receive a favourable response, consistent with literature showing that markets penalise ESG-related greenwashing (Liu et al., 2024; Xu et al., 2025).

The wide dispersion of individual CARs—from −12.30% to +15.60%—further highlights the role of deal-specific characteristics. Among the 36 green acquisitions, 14 (39%) experienced negative announcement returns, whilst 22 (61%) experienced positive returns. This heterogeneity suggests that successful green acquisitions appear to be traditional value-creating deals that happen to involve environmental assets, not a distinct category warranting systematic premia.

Moreover, the marginal statistical significance of the raw difference ($p = 0.088$) and the sensitivity to test choice (Patell Z significant, BMP insignificant) suggest that even the unconditional premium is fragile. This fragility, combined with its complete disappearance under controls, indicates that investors do not systematically reward environmental positioning in isolation.

5.5 Reconciling Findings with Prior Literature

These results appear to contrast with some prior studies reporting positive effects of ESG characteristics on M&A performance (Aktas et al., 2011; Deng et al., 2013; Gomes & Marsat, 2018). Several factors may explain this divergence.

First, sample composition and period effects matter. Tuch & O'Sullivan (2007) examine US green acquisitions from 2005–2020 and find positive effects, but their sample may include the post-financial-crisis period when ESG momentum was building. This study focuses on 2018–2020, a period of heightened ESG awareness but also greater scrutiny of greenwashing. Markets may have become more discerning over time. Second, methodological differences are critical. Aktas et al. (2011); Gomes &

Marsat (2018) examine target ESG characteristics rather than green deal classification. High-ESG targets may possess genuine operational advantages (e.g., superior governance, stakeholder relationships) that drive value, whereas the "green" label applied to deals may be more superficial. Deng et al. (2013) find positive CSR effects but use US data from 1992–2007, a different regulatory and investor environment.

Third, matching and control variables differ. This study employs propensity-score matching and includes comprehensive controls for deal size, diversification, and bidder valuation—factors not always controlled in prior work. When traditional M&A determinants are omitted, spurious correlations between ESG characteristics and returns can emerge. Fourth, geographic context matters. Evidence from China (Sun et al., 2025) shows that green M&As improve performance when regulatory enforcement is strong. However, China's state-influenced capital allocation and different institutional environment may not generalise to developed markets with more sophisticated ESG screening.

Overall, these findings suggest that the relationship between environmental characteristics and M&A performance is highly context-dependent, sensitive to measurement choices, and contingent on the credibility and substance of environmental commitments.

5.6 Strategic Implications for Corporate Managers

The absence of a regression-adjusted green premium has direct implications for corporate strategy. Companies should avoid assuming that acquiring an environmentally oriented target will automatically yield favourable market reactions. As with any M&A transaction, value creation depends on clear strategic rationale, credible synergy pathways, integration capability, and sound financial discipline.

Environmental advantages—such as improved regulatory alignment, access to emerging clean-technology markets, or enhanced stakeholder relationships—may contribute to long-term value but cannot compensate for weak fundamentals. Environmental attributes should therefore be viewed as real options layered onto economically sound transactions, rather than guaranteed sources of value (Servaes & Tamayo, 2013).

Managers should also guard against "greenwashing by acquisition": investors differentiate between substantive and symbolic ESG actions and may penalise deals perceived as opportunistic or misaligned with organisational capabilities (Krüger, 2015). The evidence suggests that markets are sceptical of environmental claims unless they are embedded within transactions that make economic sense on traditional metrics.

Practically, this implies that managers considering green acquisitions should (1) Prioritise strategic fit over environmental labelling, (2) Ensure realistic integration plans that account for the diversification discount, (3) Avoid overpaying relative to bidder size, (4) Build credible environmental narratives supported by operational improvements, not just symbolic commitments, and (5) Focus on long-term value creation rather than short-term announcement effects

5.7 Policy and Regulatory Implications

If markets do not systematically reward environmental transactions, policymakers cannot rely solely on M&A-driven capital allocation to achieve climate objectives. This supports the broader view that environmental externalities are often underpriced in financial markets. Complementary policy interventions—such as tax incentives, disclosure regimes, and environmental due diligence—may be needed to encourage environmentally beneficial consolidation (Bolton & Kacperczyk, 2021; Stiglitz, 2019).

The findings suggest that disclosure and taxonomy regulations (e.g., EU Taxonomy, SFDR, emerging US and Australian climate-disclosure rules) play a critical role in ensuring that environmental claims are substantive rather than symbolic. Without such frameworks, the risk of greenwashing in M&A is substantial, potentially undermining market confidence in environmental transactions.

Regulators should prioritise assessments of environmental and economic substance over short-term market signals. Supervisory frameworks under the EU's sustainable-finance architecture and emerging US and Australian regimes increasingly recognise this need (ESMA, 2023; European Commission, 2019, 2020; OECD, 2022).

Moreover, targeted incentives such as those in the US Inflation Reduction Act (2022) may be more effective than relying on market-based premiums. By directly reducing the cost of capital for clean-energy investments, such policies can accelerate consolidation in a way that market forces alone may not achieve.

5.8 Contributions to the Literature

This study contributes to green M&A research in three ways: (1) Clarifying the source of unconditional green premia. The findings demonstrate that unconditional green announcement premia often reflect underlying deal fundamentals (size, diversification, bidder quality) rather than environmental attributes per se. This highlights the importance of multivariate analysis in ESG–M&A research and cautions against inferring causality from univariate comparisons, (2) Providing comparative evidence from two major markets. The study examines US and Australian acquisitions during a period of active ESG-policy development (2018–2020). These markets have received limited comparative attention in prior research, and the findings suggest that patterns of market reaction are similar across these developed-market contexts, and (3) Applying methodological refinements. The use of propensity-score matching, comprehensive outlier treatment, multiple test statistics, and extensive robustness checks addresses limitations in earlier work. The inclusion of covariate balance diagnostics and multiple robustness tests strengthens confidence in the findings.

These contributions reinforce the view that green M&As should be interpreted within the broader logic of acquisition strategy and execution, rather than as a distinct category of transactions warranting automatic premiums.

6. Conclusion

This study examines whether green acquisitions generate superior shareholder value for bidding firms in US and Australian markets. Using a matched sample of 72

transactions announced between 2018 and 2020, standard event-study techniques are combined with cross-sectional regressions to assess both unconditional and incremental effects of environmental classification.

Univariate results show that green acquisitions yield higher announcement returns than matched non-green deals. However, once traditional determinants of bidder returns—relative deal size, diversification, and bidder valuation—are included, the green effect becomes economically small and statistically insignificant.

Traditional M&A drivers remain dominant. Relative deal size, diversification discounts, and growth opportunities consistently explain bidder announcement returns, whereas environmental status adds no incremental explanatory power.

Robustness checks confirm the stability of these findings across alternative event windows, return models, matching procedures, outlier treatments, and subperiods. The results are consistent across all specifications, indicating that markets evaluate green acquisitions through the same economic lenses applied to conventional M&A: strategic fit, synergy potential, integration risk, and bidder quality. Environmental positioning alone does not generate systematic acquisition premia, limiting the scope for "greenwashing by acquisition" and underscoring the importance of strategic discipline in environmentally oriented transactions.

For policymakers, the lack of a market-based green premium suggests that complementary incentives and disclosure frameworks may be needed to align private M&A activity with environmental objectives. Tax credits, concessional finance, and mandatory disclosure regimes (such as those in the EU, US, and Australia) likely play a more important role in encouraging environmentally beneficial consolidation than market forces alone.

For practitioners, environmental attributes should be treated as potential value-enhancing features rather than automatic sources of shareholder wealth. Green acquisitions succeed when they satisfy traditional value-creation criteria—not when they merely carry an environmental label.

6.1 Limitations and Future Research

This study has several limitations that suggest avenues for future research. The sample of 72 transactions, whilst carefully matched and methodologically rigorous, limits statistical power for detecting small effects and precludes detailed subgroup analysis. Future research could expand the sample to include European acquirers, emerging markets, or longer time periods to assess whether patterns differ across institutional contexts.

This study examines three-day announcement returns, which capture immediate market reactions but not long-term operating performance. Future research should explore longer-run financial and operating outcomes of environmental acquirers using buy-and-hold returns, operating cash flows, and environmental performance metrics.

The green/non-green dichotomy may obscure heterogeneity within each category. Future research could develop continuous measures of environmental intensity or

distinguish between different types of green assets (renewable energy, waste management, clean technology) to identify contexts in which green acquisitions succeed.

This study documents that green status does not generate incremental returns on average but does not identify specific mechanisms or contingencies. Future research should examine when and why certain green acquisitions create value—for example, through regulatory advantages, innovation synergies, or stakeholder legitimacy—using detailed case studies or moderated regression designs.

The study period (2018–2020) precedes major policy interventions such as the US Inflation Reduction Act (2022) and EU CSRD implementation. Future research should evaluate whether these policies alter market reactions to green acquisitions by reducing information asymmetry or providing direct financial incentives.

Despite these limitations, the findings underscore that value creation in M&A depends fundamentally on deal economics and strategic fit—principles that apply equally to green and conventional acquisitions.

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Appendix

Table A1. Propensity Score Matching Balance Diagnostics

Variable	Green Sample	Non-Green Sample	Std. Diff (%)	Variance Ratio	*p*-value
US Acquirer	0.78	0.78	0.0	1.00	1.000
Year 2018	0.31	0.28	6.3	1.13	0.790
Year 2019	0.36	0.39	−5.1	0.91	0.820
Year 2020	0.33	0.33	0.0	1.00	1.000
Three-digit SIC match	0.64	0.67	−5.8	0.94	0.810
GICS Sector match	0.89	0.86	7.2	1.04	0.750
Relative Deal Size	0.079	0.077	1.8	1.03	0.930
VIX (announcement)	18.2	18.5	−2.1	0.98	0.910
Acquirer Size Quintile	2.8	2.9	−3.4	0.97	0.860

Notes: This table reports covariate balance after propensity-score matching. Standardised differences are computed as the difference in means divided by the pooled standard deviation. Variance ratios are the ratio of variances between green and non-green subsamples. p-values are from two-sample t-tests for continuous variables and chi-square tests for categorical variables. Successful balancing is indicated by standardised differences below 10% and variance ratios close to 1.0.