Master's Thesis

The rise of mergers and acquisitions in real estate: An event study regarding the value creation effect of twenty-first-century real estate investment trust takeovers in the United States.

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ABSTRACT

In recent years, real estate investment has flourished because of low interest rates and public income searching for yield. 2021 signalled a boom in real estate merger and acquisition (M&A) activity, with real estate investment trusts (REITs) as the main contributors. In contrast, 2022 represented a turning point: inflation surged, interest rates rose, and economic growth slowed. This study examines the value creation effect of mergers involving U.S. REITs on real estate returns over the period 2010-2022 with special attention to the role played in the acquisition. By means of event study methodology, I obtain the cumulative abnormal returns, which reflect the market reaction to real estate deal announcements. The main findings of this study entail that real estate mergers are positively associated with REIT returns, and this relationship is more pronounced for target REITs. The findings of this study have potential implications for the legislation concerning REITs.

Keywords: returns, real estate investment trusts, mergers and acquisitions.

JEL: G14, G34, R3

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1. INTRODUCTION

1.1. Motivation

While rising interest rates and high inflation scourge both advanced and emerging economies with declining growth rates following the COVID-19 pandemic and the Russian invasion of Ukraine, real estate is perceived as a safe investment that hedges against inflation (Deloitte, 2022; De Nederlandsche Bank, 2023; International Monetary Fund, 2023). Real estate valuations and rents are highly correlated with the gross domestic product, and investors can pass inflationary pressure onto tenants to overcome the higher cost of debt (Deloitte, 2022). Nevertheless, while 2021 signalled a boom in real estate mergers and acquisitions (M&A) activity, which exceeded the pre-pandemic levels, 2022 signalled a turning point. The main contributors to real estate M&A activity are real estate investment trusts (REITs), which are companies that own, finance or manage income-producing properties (Case, Yang and Yildirim, 2012; Chiang, Wachtel and Zhou, 2019; Deloitte, 2022; Nareit, 2023a). REITs are publicly traded investment vehicles enabling individuals to invest in real estate portfolios via the purchase of a single stock, participation in a mutual fund or an exchange-traded fund (ETF) (Ampountolas, 2022; Nareit, 2023a). In light of the suppression of real estate funds earlier this year, one may however question whether or not investors are cautious towards REIT returns and takeovers under the current economic circumstances.

1.2 Academic relevance

Extant research investigating the reasoning behind real estate mergers relies on studies examining reasons for takeovers outside the real estate industry (Anderson, Medla, Rottke, and Schiereck, 2012). Nevertheless, the assumption that real estate takeovers are similar to those outside the industry is debatable, as REIT mergers exhibit different financing methods and abnormal returns (Anderson et al., 2012; Campbell, 1999; Eichholtz and Kok, 2008; Womack, 2012). Prior research suggests that the objectives of most REITs comprise the maximisation of returns and performance enhancement (Anderson et al., 2012). Daniels and Phillips (2007) argue that REITs have been at the forefront of the M&A boom that occurred in the financial services sector in the early 2000s. Takeovers appear to be more fundamental to the expansion of REITs than debt financing based on an examination of hotel-REIT performance (Kim, Gu, and Mattila, 2000). The acquisition of an existing trust can be beneficial to a REIT rather than internal expansion, as suggested by Allen and Sirmans (1987), pioneers in the area of real estate

merger research. Advantages of the growth-by-acquisition strategy namely include the possibility for REITs to offset net operating losses and the opportunity to replace inefficient management for improved asset management (Allen and Sirmans, 1987; Ooi, Ong, and Neo, 2011). The latter reason corresponds to Womack's (2012) inefficient management hypothesis, which holds for both REITs and non-REITs (Eichholtz and Kok, 2008). While real estate has become a well-established asset class over the past decades, academic literature has mostly focused on stock returns rather than real estate returns, even though variations in real estate prices may have a destructive impact on the economic system (Ghosh and Petrova, 2021).

In particular, Allen and Sirmans (1987) were the first to analyse the value creation effect of real estate mergers and advocate that there is a significant relationship between the match between the role played in an acquisition and shareholder returns, but they do not confirm the existence of a relationship between wealth gain and tax loss utilisation. Elayan and Young (1994) argue that financial and operational synergies may also contribute to takeover gains, as an extension of Allen and Sirmans' (1987) research (Anderson et al., 2012). According to Campbell, Ghosh, and Sirmans (2001), the required homogeneity among REITs implies that the potential of vertical integration synergies through mergers or acquisitions and accompanied synergistic profits is minor. In contrast, the uniformity of the highly regulated REIT industry allows for cost synergies, resulting in gains from scale efficiencies (Anderson, Medla, Rottke, and Schiereck, 2011; 2012). Additionally, Campbell (2002) advocates that mergers between two public REITs are mainly financed with stocks and the wealth effects are less negative in mergers of conventional companies. In mergers involving a privately held target, wealth effects occur when the transaction is stock financed (Campbell, 2002). However, Campbell et al. (2001) dispute that stock financing may cause negative valuation effects for the bidder's stock. Sahin (2005) also identifies statistically significant negative abnormal returns for acquiring REITs, while the opposite holds for target REITs. Although considerable research has been conducted on REIT returns and takeovers, most studies on the value creation effect of REIT M&As have focused on the period before the turn of the century, while recent studies are particularly oriented towards comparing one or two countries or industries. Hence, to the best of my knowledge, the long-term value creation effects of REIT M&As in the post-crisis era, as well as the influences of recent economic developments on U.S. REITs including the COVID-19 pandemic, the Russian invasion of Ukraine, and the recent turmoil in the financial sector has not yet examined. Based on this gap in the academic literature, I ask the following research question: *To what extent do mergers and acquisitions impact the returns to U.S. real estate investment trusts in the post-crisis period ranging from 2010 to 2022?*

1.3 Research objective and design

The objective of this study is to investigate the value creation effect of mergers involving U.S. REITs on REITs returns over the 2010-2022 period by means of a market model event study methodology (Ooi et al., 2011). An event study provides the cumulative abnormal returns for the REITs and indicates whether the real estate merger has unexpectedly impacted REIT returns (Booth, Glascock, and Sarkar, 1996; MacKinlay, 1997). Real estate M&A data were collected from the National Association of Real Estate Investment Trusts (Nareit), whereas data for the individual and market stock returns were retrieved from the Center for Research in Security Prices (CRSP). Different from most real estate studies, I distinguish between equity and mortgage REITs in addition to the initial distinction between acquirer and target REITs. Since the financial market and deal data are not readily available for non-U.S. REITs, the study area concerns REITs that originated in the United States. In addition to the effect of a real estate takeover on returns, I examine the influence of REITs' financial characteristics on their returns using a log-linear regression model incorporating fixed effects. Data regarding financial characteristics was obtained from Refinitiv Datastream/Worldscope.

The main finding of this study encompasses that public REIT mergers are positively and statistically significantly associated with REIT returns. Also, the association appears to be more pronounced for target REITs than for acquiring REITs. This paper contributes to the existing academic literature in that it extends the research of Brounen and de Koning (2012) into the second decade of the twenty-first century by examining the impact of M&A events on REIT performance over the period from 2010 to 2022 during which the economic environment has encountered several trends. These developments include the economic recovery period following the 2008-2009 global financial crisis and the COVID-19 pandemic that has grasped the world in recent years in combination with the Russian invasion of Ukraine last year. To the best of my knowledge, the former has also not yet been thoroughly investigated in prior studies.

The remainder of this paper is organised as follows. In Chapter 2, the theoretical framework of REITs and the value creation effect of takeovers within this niche is critically assessed, whereafter the hypotheses are developed. Next, Chapter 3 outlines the research methodology, and describes the data collection, summary statistics and data review. The fourth chapter presents the empirical findings, after which these results are discussed in Chapter 5. Finally, the study is summarised and concluded in Chapter 6.

2. THEORY AND HYPOTHESES

2.1 Theoretical framework

Over the past eight decades, asset choices have been examined by various economists, resulting in numerous models. The Market Portfolio Theory (MPT), introduced by Nobel Prize winner Harry Markowitz (1952), incorporates an investor's desire to maximise returns while minimising the variability of that return. Through portfolio diversification, the overall risk, or volatility in return, that is borne by an investor can be reduced without forfeiting expected returns. Portfolio diversification is achieved through combining low-volatility, or defensive securities with risky, or aggressive, assets (Case et al., 2012; Sharpe, 1964). When various asset portfolios are placed on the Efficient Frontier, as explained in Markowitz (1952), there is one optimal combination of defensive and aggressive assets. From a risk perspective, REITs can be understood as low-risk relative to other investment vehicles due to the conditions that restrain debt levels, resulting in linearly increasing pay-outs (Ampountolas, 2022). Consequently, as argued by Zhang, Sun, Goh, Wang, and Mansley (2021), this high dividend pay-out results in limited cash holdings. The unique institutional environment[1] of REITs attracts increased equity from investors compared to non-REITs (Anderson et al., 2012; Eichholtz and Kok, 2008; Frömel, Wagner, Woltering, Downs, and Sebastian, 2022). Moreover, REITs are reinforced by their real estate assets, which also diminishes riskiness (Birz, Devos, Dutta, and Tsang, 2021). Risks borne by REIT investors include, among others, systematic risk and interest rate risk (Allen, Madura, and Springer, 2000; Chen and Tzang, 1988; Ewing and Payne, 2005). Standard asset pricing models are relevant to elaborate REIT stock price movements in mature REIT markets, as argued in Brounen and de Koning (2012). Renowned asset pricing models used in finance are the Capital Asset Pricing Model, the Market Model, and the Fama-French Three-Factor Model. The Capital Asset Pricing Model (CAPM) is a financial theory that suggests that a stock's excess return above the risk-free rate is based on its sensitivity to market movements (Allen et al., 2000). The Market Model (MM) resembles the CAPM as both propose a linear relationship between the returns of a REIT and the market return and is based on Markowitz's theory (Richardson Pettit and Westfield, 1974). Whereas the CAPM focuses on systematic risk or beta, Fama and French (1992; 1993) established a three-factor model which implies that the excess return of a portfolio of stocks is a function of its market sensitivity in combination with the book-to-market ratio and a size factor (Allen et al., 2000).

[1] Appendix A elaborates on the context of U.S. REITs in terms of history, development and legislation.

In addition, the distinction between neoclassical and agency and behavioural theories may explain the differences in merger motives between REITs and non-REITs (Bernile and Bauguess, 2010). Whereas the neoclassical view entails that mergers are mainly motived by external shocks and competitive advantages, which accelerate value creation both in terms of profit and shareholder wealth (Bernile and Bauguess, 2010; Harford, 1995; 2005; Jensen, 1988; Martynova and Renneboog, 2008), the agency and behavioural theories contend that inherent agency problems or management biases motivate takeovers (Anderson et al, 2012; Berkovitch and Narayanan, 1993; Jensen, 1986; Roll; 1986; Shleifer and Vishny; 1991). In the agency and behavioural theories, three takeover motives are identified: synergy, agency and hubris. The synergy motive states that mergers happen because the economic gains from the resulting concept of the two firms are larger than those from the combination of the separate entities. In contrast, the agency motive implies that the welfare of the management of the acquiring firm is increased at the expense of the acquirer shareholders through a merger (Berkovitch and Narayanan, 1993). Furthermore, the managers may be mistaken in acquiring a target with no synergistic potential, which translates to the hubris hypothesis (Berkovitch and Narayanan, 1993). These motives correspond to the inefficient management hypothesis, empire-building hypothesis, and overvalued information signal hypothesis, respectively, as discussed in Womack (2012). Albeit synergy is the main motivation for M&A activity, the hubris hypothesis and, especially, the agency motive should not be overlooked (Berkovitch and Narayanan, 1993). Takeover motivations and wealth effects vary depending on the stage of the merger wave in that synergistic profits are generated in the first half of a merger wave, whereas the second half of the wave is characterised by value-destroying takeovers (Anderson et al., 2012; Martynova and Renneboog, 2008).

2.2 Hypotheses development

Based on the theoretical framework in combination with the literature review presented in the first chapter of this paper, I formulate the following hypothesis:

Hypothesis 1:
The occurrence of a merger or an acquisition is positively associated with REIT returns.

In theory, an equity value-maximising enterprise would willingly acquire another entity based on various motives, including production synergies and monetary power (Allen and Sirmans, 1987). In practice, however, studies on shareholder wealth effects following a takeover, report

inconsistent findings. Since the primary goals of an acquisition strategy comprise growth, value creation and synergistic gains, I expect that I will support hypothesis 1.

In addition, the role that a REIT plays in a merger, or an acquisition has appeared to influence the association between the event and REIT performance in extant literature. Accordingly, I formulate the next hypothesis:

Hypothesis 2:
The association between a merger or an acquisition and REIT returns is more pronounced for target REITs than acquiring REITs.

Based on the findings of Campbell et al. (2001) and Sahin (2005), who suggest that a takeover has negative wealth effects on the acquiring REIT but a positive impact on target REITs, I expect that I will support the second hypothesis.

3. METHODS AND DATA

3.1 Methodology

The empirical analysis employed in this paper comprises two elements. In line with hypotheses 1, the first part of the empirical research examines the abnormal returns surrounding the announcement of a public real estate merger using standard market model event study methodology, which is in line with Ooi, Ong and Neo's (2011) study on acquisitions among Japanese and Singaporean REITs and Sahin's (2005) research concerning the performance of takeovers in the REIT industry. Event studies enable the investigation of the information surrounding announcements and are widely applied to finance and accounting events, including debt or equity issuance, earnings announcements, and takeovers, to test market efficiency (Brown and Warner, 1980; MacKinlay, 1997). The event study approach aims to examine whether an identified event attributes to unexpected, or abnormal, performance (Booth et al., 1996; Dykman, Philbrick, and Stephan, 1984). Moreover, event study methodology is relevant as the impact of an event will directly be reflected by the stock market data, given marketplace rationality (MacKinlay, 1997).

In essence, the event study methodology pursues the following process. Initially, the event window and estimation window should be identified. The event window encompasses the event of interest and the period over which the impact of the event is examined (Brooks, 2019; MacKinlay, 1997). This period frequently incorporates multiple days, including the date of the announcement and, at minimum, the following trading day to capture the price effects of the announcements (MacKinlay, 1997). The event date is defined as the date on which the acquisition was initially announced (Ma and Michayluk, 2015). After the event has been identified, selection criteria based on sample characteristics should be imposed for the inclusion of a REIT in the event study, which, in this case, is the classification of the acquirer as a public REIT. In addition to the event window, an estimation window needs to be defined, which generally entails the period before the event window, while the event window itself is excluded from the estimation window to prevent the event from impacting the normal return measure (MacKinlay, 1997). Otherwise, the event would be captured by both normal and abnormal returns, which is in contradiction to the methodology that the abnormal returns measure the event effect (MacKinlay, 1997). Moreover, there is often a gap left between the event window and the estimation window to entirely cancel out for anticipation of the event does not affect the estimation of the expected return equation (Brooks, 2019).

In particular, this study applies the Market Model (MM). The market model is a statistical one-factor model, which assumes a constant linear relationship between the returns of any given security and the market return (MacKinlay, 1997). For any $REIT_i$, the market model follows the following linear specification regarding returns which is fundamental to obtaining the shareholder wealth effect or abnormal returns:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where the REIT returns and proxy for market portfolio returns are represented by R_{it} and R_{mt}, respectively (Ma and Michayluk, 2015; MacKinlay, 1997). Additionally, ε_{it} corresponds to the zero mean disturbance term, whereas α_I and β_I are defined as market model parameters (Ma and Michayluk, 2015; MacKinlay, 1997). It is worth noting that, according to MacKinlay (1997) and Brooks (2019), popular broad-based stock indexes, such as the CRSP Value Weighted Index, CRSP Equal Weighted Index, and the S&P 500 Index, are applied as a proxy for the market portfolio. With the estimates of α_I and β_I from equation (1), the abnormal return can be retrieved (Ma and Michayluk, 2015). The abnormal return is defined as the "ex-ante post return of the security over the event window" (MacKinlay, 1997, p. 15), whereas the normal return represents the "expected return without conditioning on the event taking place" (MacKinlay, 1997, p. 15). The abnormal return for REIT i and event date t is computed using

$$AR_{it} = R_{it} - E(R_{it}) = R_{it} - \widehat{\alpha_i} - \widehat{\beta_i} R_{mt} \quad (2),$$

where the abnormal REIT returns, actual REIT returns and expected returns are represented by AR_{it}, R_{it}, and $E(R_{it})$, respectively (Brooks, 2019). Sometimes the expected return is reciprocated with normal returns because returns prior to the event date are used to prevent a contamination of the expected returns (Brooks, 2019). When the abnormal return is positive (negative) and significantly different from zero, the market reacts favourably (hostile) to the deal announcement (Ooi et al., 2011). Moreover, the market reaction reflects the market's perspective towards prospective acquisitions (Sahin, 2005). To assess the overall inferences of the event, the cumulative abnormal return (CAR) is calculated as the sum of the daily abnormal returns across securities and over time (Ma and Michayluk, 2015; MacKinlay, 1997). The CAR over a multi-period event window is computed as follows by aggregating the average returns over various periods (MacKinlay, 1997; Brooks, 2019):

$$CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{it} \quad (3).$$

In comparison to the constant mean model by Brown and Warner (1980), the market model diminishes the variance of abnormal return and, in turn, enhances the ability to detect the impacts of events (MacKinlay, 1997). The latter is a feature of factor models. Although by explaining the variation in return, there are merely limited gains from applying multifactor models for event studies, such as Fama and French Three-Factor Model and the Carhartt Four-Factor Model, relative to one-factor models, such as the market model (MacKinlay, 1997).

In this study, I have elected seven event windows ranging from a one-day event window considering solely the event date itself (Dykman et al., 1984) to a 41-day event window assessing the twenty days before and after the event (MacKinlay, 1997). Within this spectrum, I also employ a three-day event window (Sahin, 2005; Womack, 2012), a five-day event window (Ma and Michayluk, 2015), an eleven-day event window, a 21-day event window (Ooi et al., 2011), and a 31-day event window surrounding the announcement, with the event date being day 0. The eleven- and 31-day event windows are incorporated to bridge the gaps between the intervals corresponding to the different event windows. Furthermore, the estimation windows vary per event window, but the length of the estimation window has a minimum of a hundred days and a maximum of three hundred days throughout this study, in line with Armitage (1995). Because of relevant findings in Campbell, Ghosh, and Sirmans (2001) and Sahin (2005), I distinguish between acquirer and target REITs in addition to the analysis of the total sample by including corresponding binary variables.

In the second part of this research, I examine the influences of REIT financial characteristics in line with, among others, Ooi, Ong and Neo (2011), and Brounen and de Koning (2012). After elaborating on the shareholder wealth effects of real estate mergers and acquisitions by means of the event study, I perform an ordinary least squares (OLS)-estimated linear regression model incorporating year-, REIT- and sector-fixed effects over the period 2010-2022, in which I employ the annualised average REIT returns as the dependent variable. Following a review of the collected data, which I discuss in paragraphs 3.2 and 3.4, I transform the continuous dependent variable and various continuous explanatory variables into natural logarithms. Consequently, the linear regression model becomes a log-linear regression model. The fixed effects are based on a categorical variable identifying each REIT included in the sample, a categorical variable classifying the thirteen REIT sectors identified by the Nareit, and a company identifier. Besides the annual return, the model contains the following financial characteristics: firm size, cash holdings, leverage, market-to-book value, dividend yield, dividend per share, and beta. Debt ratio, which is generally substantial for REITs, and firm size are crucial explanatory variables for REIT returns (Brounen and de Koning, 2012; Feng, Ghosh

and Sirmans, 2007). Moreover, the market-to-book value is a measure of future growth opportunities. In addition to these leverage ratios, I elaborate on cash holdings and beta, following Eichholtz and Kok (2008). Furthermore, dividends are a major factor in the performance of REITs to the trusts' unique institutional environment, which obliges REITs to distribute at least 90 per cent of net income to its shareholders. Accordingly, *DividendYield* and *DPS* are added as explanatory variables. The following formula corresponds to the log-linear regression model:

$$\begin{aligned} Annual\ R_{ijt} = {} & \beta_0 + \beta_1 lnSize_{ijt} + \beta_2 lnCashHoldings_{ijt} + \beta_3 Leverage_{ijt} \\ & + \beta_4 MarketToBook + \beta_5 lnDividendYield_{ijt} + \beta_6 lnDPS_{ijt} \\ & + \beta_7 Beta_{ijt} + \varepsilon_{ijt}. \end{aligned} \quad (4),$$

where the subscript i corresponds to the REIT, j refers to the sector, and t denotes the period. Finally, in line with Eichholtz and Kok (2008), I distinguish between equity and mortgage REITs using binary variables, and I elaborate on the portfolio characteristics of the REITs included in the sample. In contrast to Eichholtz and Kok (2008), I use the sectors provided by the FTSE Nareit All REIT Index instead of the Global Property Research (GPR) Index.

3.2 Data collection

The initial research sample of this study contains REITs included in the FTSE Nareit All REITs Index for the years 2010 through 2022. The Nareit '2023 REITWatch' is an open-source monthly statistical review of mainly the American REIT market that was fundamental to the data collection process. Besides the REIT index constituents and performance analyses, the market publication presents an overview of the mergers and acquisitions that have been completed or are in progress among REITs in the 'U.S. REIT Merger and Acquisition Activity' section. Based on the latter overview in the March 2023 edition, I compiled a list comprising the public REITs involved in takeovers, which were classified as either the acquiring or the bidder party. The event date corresponds to the announcement date recorded by Nareit. If the event occurred on a nontrading day, this announcement was omitted from the sample. Subsequently, I manually matched the identified REITs with the ticker symbols available in the list of REIT constituents for further data collection. In total, 141 mergers and acquisitions were recorded by the Nareit between 2010 and 2022, from which 75 takeovers involved a public REIT as the acquirer.

In line with Brounen and de Koning (2012), financial data included in this research were mainly retrieved from Refinitiv Datastream, formerly known as Thomson Reuters Datastream.

Datastream is a historical, industry-leading financial database with a history of over 120 years that provides data on asset classes, such as commodities, bonds and equities and includes, among others, Worldscope Fundamentals and I/B/ES Estimate Aggregates. The daily returns obtained from Datastream, however, appeared to consist of monthly returns when the daily returns were unavailable, leading to inconsistency in the measurement scale. Therefore, following Brown and Warner (1980), Dykman, Philbrick, and Stephan (1984), and Booth, Glascock, and Sarkar (1996), the daily returns included in this sample were obtained from the Center for Research in Security Prices (CRSP). The CRSP database, which incorporates data on stock, treasury, indexes, mutual funds, and, especially REIT markets, has enabled academicians and investment practitioners to assess the performance of various investment vehicles since 1960 and is closely affiliated with the University of Chicago's Booth School of Business. Moreover, the CRSP provides market index parameters such as the Value-Weighted Index and Equal-Weighted Index, which are not as readily available through Datastream. This study incorporates the CRSP Value Weighted Index as a benchmark for the market portfolio return in line with Sahin (2005). REIT's stock prices were collected from CRSP for the consistency of the stock market data in calculating related variables. The CRSP database was accessed via the Wharton Research Data Services, which is available through the University of Groningen. After manually matching the available return data with the events compiled from the Nareit, 67 unique merger activities involving public REITs remain. Table 1 presents an overview of the number of deals and REITs per annum, whereas Appendix B displays the complete overview of REIT takeovers, including the acquirers, targets, and announcement dates.

Table 1
Overview of the number of REITs and deals

Year	Number of REITs	Number of deals
2010	51	1
2011	55	3
2012	56	3
2013	64	6
2014	64	5
2015	65	5
2016	66	8
2017	61	4
2018	53	7
2019	49	5
2020	45	2
2021	45	9
2022	38	9

Notes: This table presents an overview of the number of REITs and deals per annum
Source: Nareit.

In addition to returns, prices and deals, all other financial characteristics were collected from Refinitiv Datastream to examine their influence on the average annual REIT return in the second part of this research. Following Feng, Ghosh, and Sirmans (2007), Eichholtz and Kok (2008), and Brounen and de Koning (2012), I collected data related to firm size, cash holdings, leverage ratios, dividends, and market beta. Appendix C presents the definitions and data sources of the variables. All variables were winsorised at the 1 per cent tails to deteriorate the influence of extreme values. The final dataset for the event study includes 191,148 REIT-day observations, whereas the final dataset for the multivariate regression comprises 628 REIT-year observations.

3.3 Summary statistics

Table 2 presents the summary statistics for the variables included in the multivariate regression model. Panel A of Table 3 incorporates descriptive statistics, which encompasses 623 REIT-year observations. As the objective of the event study is to calculate the cumulative abnormal return, no descriptive statistics are presented at this point. In addition, Panel B assesses the means and median values for Acquirer and Target REITs, as well as the differences in means and medians between the two based on a t-test and a Wilcoxon rank-sum (Mann-Whitney) test.

According to Panel A, the means of annual return (*Annual R*), return on assets (*ROA*), and funds from operations to total assets (*FFOtoTA*), which are proxies for REIT performance, are 0.0005, 0.0160, and 0.0500, respectively. Accordingly, on average, the return is 0.05 per cent per year over the sample period, whereas net income represents 1.6 per cent of total assets and 5 per cent of total assets is represented by the funds from operations (*FFO*). The explanatory financial variables include REIT size (*Size*), cash ratio (*CashHoldings*), debt ratio (*Leverage*), market-to-book value (*MarketToBook*), dividend yield (DividendYield), dividends per share (*DPS*), and market beta (*Beta*). The following remarks are worth mentioning. Whereas the minimum total assets (*Size*) of a REIT encompass 123,292 U.S. dollars, the maximum *Size* comprises 88,355,368 U.S. dollars. This difference is substantial but could be explained by the REIT type and sector focus. Furthermore, two leverage ratios are incorporated into the regression model: *Leverage* and *MarketToBook*. Whereas leverage refers to the book debt ratio, the market-to-book value is perceived as a benchmark for growth opportunities in extant financial literature. The average debt ratio (*Leverage)* is 0.5046, which signifies that, on

Table 2
Summary statistics *(N = 623)*

Panel A: Descriptive statistics of financial characteristics

	Mean	Median	St. dev.	Min.	Max.
Annual R	0.0005	0.0005	0.0009	-0.0020	0.0033
ROA	0.0160	0.0171	0.0289	-0.0874	0.1325
FFOtoTA	0.0500	0.0519	0.0288	-0.0422	00.1423
Size	10551224	5186839.0000	15317206	123292	88355368
Cash Holdings	0.0232	0.0136	0.0281	0.0001	0.1724
Leverage	0.5046	0.4739	0.1725	0	0.9806
MarketToBook	5.8108	5.5484	3.1603	1.3317	16.3282
DividendYield	0.0564	0.0447	0.0345	0.0018	0.1834
DPS	2.0392	1.5000	1.8293	0.0300	12
Beta	1.0790	0.9519	0.6468	-0.2900	3.0200

Notes: This table reports on the mean, median, standard deviation, minimum and maximum values of variables incorporated in the regression model (Panel A), as well as the mean, median values and differences between the two based on the acquisition role (Panel B). The sample period is from 2010 to 2022. Definitions of the variables are given in Appendix C. The symbols ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively. All variables are winsorised at their 1st and 99th percentiles to diminish the impact of outliers.

average, the capital structure of REITs consists of 50.46 per cent out of debt. This corresponds to Feng et al. (2007), who argue that the debt ratio of REITs nowadays exceeds fifty per cent. Additionally, Panel B of Table 2 reports the mean and median values of acquiring REITs (*Acquirer*) and REITs that are the target of an acquisition (*Target*). Unreported statistics encompass that 56 per cent of the sample comprises acquiring parties (*Acquirer*) in a public real estate merger. The average annual return (*Annual R*) of a target (*Target*) REIT and a bidder REIT (*Acquirer*) are equal. According to the t-test and Wilcoxon rank-sum (Mann-Whitney) test, there are significant differences observed in multiple variables for Acquirer REITs and Target REITs. Nevertheless, except for *Size* and *DPS*, the differences in mean and median are not of substantial magnitude. Appendix D reports the mean and median values of equity REITs (*Equity*) and mortgage REITs (*Mortgage*), which correspond to 82.18 per cent and 17.82 per cent of the sample, respectively. Similar to the distinction between acquirers and targets, the t-test and rank test record considerable differences between the mean and median values of Size and DPS. However, in contrast to Panel B of Table 2, Appendix D also documents a substantial difference in the market-to-book values (*MarketToBook*) of equity and mortgage REITs.

3.4 Data review

To ensure the reliability and validity of the dataset, I conducted various tests for potential data concerns regarding the event study and the regression model. Although the market model is widely accepted in academia, Martin and Klemkosky (1975) argue that this

Table 2 (continued)

Panel B: Comparison of means and median values of variables between Acquirer REITs and Target REITs

	Acquirer REITs (N = 348)		Target REITs (N = 275)		Differences (comparisons)	
	Mean	Median	Mean	Median	Mean (t-test)	Median (rank test)
Annual R	0.0005	0.0005	0.0005	0.0005	0.0000	0.0000
ROA	0.0188	0.0197	0.0124	0.0108	0.0065***	0.0089***
FFOtoTA	0.0475	0.0525	0.0531	0.0512	-0.0055**	0.0013
Size	15371126	9662111.5	4451856.7	3255284	10919269.3***	6404827.5***
CashHoldings	0.0265	0.0155	0.0190	0.0121	0.0075***	0.0034***
Leverage	0.5036	0.4641	0.5059	0.4884	-0.0025	-0.0243
MarketToBook	5.9653	5.8131	5.6154	5.1806	0.3500*	0.6325**
DividendYield	0.0570	0.0442	0.0555	0.0453	0.0015	-0.0011
DPS	2.5590	1.8800	1.3815	1.2000	1.1775***	0.6800***
Beta	1.0664	0.9520	1.0950	0.9500	-0.0285	0.0020

Note: The rank test refers to the two-sample Wilcoxon rank-sum (Mann-Whitney) test.

particular event study methodology may be subject to heteroskedasticity issues. Heteroscedasticity in the market model deteriorates the efficiency of the least-squared parameters α_{it}, β_{it}, and ε_{it}, which, in turn, enhances the sampling errors by inflated sampling errors (Martin and Klemkosky (1975). Consequently, there is an instability of individual securities over time, as argued by Blume (1971) and Levy (1971). Nevertheless, the combination of at least ten individual securities into portfolios results in a consistent beta coefficient (Martin and Klemkosky, 1975). Hence, as I primarily investigate the aggregate results of individual REIT mergers on REIT returns, heteroscedasticity among the individual REITs is a minor concern.

In addition, regression models involving abnormal returns and specific event features may provide additional insights (MacKinlay, 1997). However, the event may be anticipated by the REIT and is therefore endogenous. In turn, the study may incorporate a selection bias and an omitted variable bias (MacKinlay, 1997). Nonetheless, despite this potentially incorrect specification, the regression model can still be used for inferences (Prabhala, 1995).

Moreover, concerning the multivariate regression model, I assess the functional form. Essentially, the data must meet the four ordinary least-squared (OLS) assumptions for consistency and efficiency and to obtain the best linear unbiased estimator (BLUE). First, the error term should have a conditional mean of zero. Second, the variance of the error term must be constant and finite, which refers to homoscedasticity. According to the Breusch-Pagan test, which reports a positive but insignificant Chi-squared test statistic of 0.070, there is no

heteroscedasticity problem among the regression data. Third, errors are uncorrelated. Fourth, the error terms should be normally distributed. Based on the Shapiro-Wilk N normality test, which reports a significant test statistic of 3.648, the residuals are not normally distributed. Accordingly, I investigate the variables' distributions utilising unreported histograms, which show that *Size*, *CashHoldings*, *DividendYield*, and *DPS* are right-skewed distributions. Hence, to improve the normal distribution of data, I transform these four explanatory variables into natural logarithms.

Finally, Appendix E elaborates on the pairwise correlations between the variables integrated into this research, as well as the corresponding variance inflation factors (VIF) values. From these values, it appears that there are two moderate correlations but there is no need to mitigate for multicollinearity in the regression model.

4. RESULTS

4.1 Event study results

Table 3 reports the empirical findings of the event study conducted. Whereas Panel A displays the main statistics related to the cumulative abnormal return (CAR) resulting from the study of public real estate mergers, Panel B distinguishes between the bidder REITs (*Acquirer*) and the target REITs (*Target*) in the sample. In total, 49 unique real estate deals could be identified based on the adequacy of both event and estimation windows. The number of observations reported in Table 3 equals the length of the event window in days times the number of deals.

According to Panel A of Table 3, the mean CAR for the 1-day event window corresponds to 0.0570***. This coefficient is positive and statistically different from zero at the one per cent significance level. The 1-day-event window includes only one date: the event date. Therefore, this value implies that REIT return, on average, increased by 5.7 per cent on the announcement date of the real estate merger. Within this window, the maximum CAR amounts to a 52.64 per cent increase in REIT returns on the event date itself. In contrast, the minimum CAR for the 1-day event window is -0.1116. This negative value signifies a decrease in REIT returns on the announcement date. Furthermore, the CAR coefficients follow an upward trend up until the 21-day event window. After the 31-day event window, which embodies fifteen days

Table 3
Event study results

Panel A: Market model

Event window	$\overline{CAR}$	St. Error	Median	St. dev.	Min.	Max.	Obs.
[0,0]	0.0570***	0.0163	0.0227	0.1140	-0.1116	0.5264	49
[-1, +1]	0.0732***	0.0168	0.0639	0.1166	-0.2029	0.5115	147
[-2, +2]	0.0786***	0.0166	0.0647	0.1155	-0.1389	0.5458	245
[-5, +5]	0.0876***	0.0217	0.0681	0.1502	-0.1004	0.774	539
[-10, +10]	0.0909***	0.0218	0.0736	0.1510	-0.1036	0.6890	1029
[-15, +15]	0.0907***	0.0225	0.0606	0.1559	-0.1975	0.6839	1519
[-20,+ 20]	0.0882***	0.0224	0.0622	0.1555	-0.1760	0.6974	2009

Notes: This table comprises the empirical results following the event study of 49 real estate merger announcements. Panel A reports descriptive statistics of the cumulative abnormal returns across seven different event windows. In turn, the cumulative abnormal returns are evaluated by the role that the REIT played in the acquisition (Panel B). The sample period is from 2010 to 2022. The symbols ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Table 3 (continued)

Panel B: Cumulative abnormal return by role in the acquisition

	Acquirer REITs			Target REITs			All REITs		
Event window	$\overline{CAR}$	St. error	Obs.	$\overline{CAR}$	St. error	Obs.	$\overline{CAR}$	St. error	Obs.
[0,0]	-0.0123	0.00836	18	0.0973***	0.0224	31	0.0570***	0.0163	49
[-1, +1]	0.0256	0.0162	54	0.101***	0.0236	93	0.0732***	0.0168	147
[-2, +2]	0.0295	0.0173	90	0.107***	0.0230	165	0.0786***	0.0166	245
[-5, +5]	0.0160	0.0193	198	0.129***	0.0301	342	0.0876***	0.0217	539
[-10, +10]	0.00371	0.0242	378	0.142***	0.0278	651	0.0909***	0.0218	1029
[-15, +15]	-0.000880	0.0275	558	0.144***	0.0278	9961	0.0907***	0.0225	1519
[-20,+20]	0.00342	0.0276	738	0.137***	0.0283	1271	0.0882***	0.0224	2009

before and after the announcement, the trend in cumulative average annual return diminishes. Hence, for the sample of public REIT mergers, the deal announcement appears to positively influence the REIT returns in the fifteen days surrounding the event.

In addition, Panel B of Table 3 focuses on the distinction between Acquirer and Target REITs compared to total REITs across the various event windows. While being an acquiring REIT (*Acquirer*) does not affect REIT's returns, the classification as a target REIT (*Target)* reports a mean CAR that is positively and significantly different from zero at the one per cent significance level. Similar to Panel A, an upward movement can be identified for target REITs up until the 31-day event window. Moreover, compared to the aggregate CAR identified in Panel A, the association between the occurrence of a merger or an acquisition appears to be stronger for a target REIT, since the highest target CAR is 14.44 per cent, whereas the highest aggregate CAR is 9.09 per cent.

Furthermore, similar to Panel B, Appendix F distinguishes between the two REIT types across the multiple event windows. These two REIT types comprise equity and mortgage REITs. Although the number of observations for mortgage REITs is considerably less than that of equity REITs, the association between the occurrence of a real estate takeover appears to be strongest for mortgage REITs in all event windows except for the 1-day and 11-day event windows. However, mortgage REITs do not exhibit an upward trend similar to total REITs and display inconsistent significance levels.

4.2 Regression results

Table 4 reports the empirical findings of the log-linear regression model based on equation (4). Panel A displays the baseline regression model. Model 1 presents an OLS-estimated regression model that documents the following significant coefficients for *Leverage, MarketToBook, lnDividendYield, lnDPS* and *Beta.* Except for *Beta*, these coefficients are statistically different from zero at the one per cent significance level. The debt variables *Leverage* and MarketToBook have negative coefficients of 0.00103 and 0.0000411, respectively. If the debt ratio (*Leverage)* increases by one unit, the annual return decreases by 0.103 per cent, ceteris paribus. Similarly, if the *MarketToBook* grows by one unit, the annual REIT return will deteriorate by 0.00411 per cent, ceteris paribus. Hence, enhancing the proportion of debt in the capital structure has a slight negative on the annual REIT returns. Furthermore, *lnDividendYield* has a positive coefficient of 0.000447, while *lnDPS* has a negative coefficient of 0.000207. If *lnDividendYield* increases by one unit, the annual return increases by 0.0447 per cent, ceteris paribus. Likewise, a one-unit increase in *lnDPS* decreases the annual REIT returns by 0.0207 per cent, ceteris paribus. The latter interpretation of *lnDividendYield and lnDPS* computed as $[e^{0.000447} - 1) * 100 = 0.0447]$ and $[e^{-0.000207} - 1) * 100 = -0.020697857]$, which is required since the explanatory variable is a natural logarithm, whereas the dependent variable is numeric. Finally, *Beta* has a positive coefficient of 0.000147, which is statistically different from zero at the five per cent significance level. Therefore, if *Beta* enhances by one unit, the annual REIT returns increase by 0.0207 per cent, ceteris paribus.

In addition, Models 2 through 4 report the results of the log-linear regression model incorporating year-fixed effects, firm-fixed effects, and industry-fixed effects that are added one by one to the model. Compared to the baseline model, the introduction of year-fixed effects diminishes the statistical significance of *MarketToBook* and *Beta.* Moreover, even though the directions remain the same, the magnitudes of all coefficients decrease. The subsequent addition of firm-fixed effects both increases and decreases the statistical significance. Whereas *Beta* has lost its statistical significance, *lnSize* has a positive coefficient of 0.000161, which is statistically different from zero at the 10 per cent significance level. Hence, if *lnSize* increases by one unit, the annual REIT return increases by 0.0161 per cent ceteris paribus. The latter interpretation was calculated as follows: $[e^{0.000161} - 1) * 100 = 0.0161]$. Additionally, the statistical significance of *Leverage* has diminished from the one per cent to ten per cent significance level. The implementation of industry-fixed effects does not initiate additional changes compared to Model 3.

Table 4
Multivariate regression results

Panel A: Baseline model

	OLS model	Fixed effect (FE) models		
	(1)	(2)	(3)	(4)
	Annual R	Annual R	Annual R	Annual R
lnSize	3.62e-05	3.74e-05	0.000161*	0.000161*
	(3.94e-05)	(3.54e-05)	(9.16e-05)	(9.16e-05)
lnCashHoldings	2.78e-05	3.60e-06	2.02e-05	2.02e-05
	(2.91e-05)	(2.47e-05)	(3.81e-05)	(3.81e-05)
Leverage	-0.00103***	-0.000784***	-0.000581*	-0.000581*
	(0.000237)	(0.000200)	(0.000346)	(0.000346)
MarketToBook	4.11e-05***	2.94e-05**	3.90e-05**	3.90e-05**
	(1.32e-05)	(1.25e-05)	(1.89e-05)	(1.89e-05)
lnDividendYield	0.000447***	0.000247***	0.00105***	0.00105***
	(8.95e-05)	(7.45e-05)	(0.000159)	(0.000159)
lnDPS	-0.000207***	-0.000151***	-0.000936***	-0.000936***
	(6.33e-05)	(4.92e-05)	(0.000147)	(0.000147)
Beta	0.000147**	0.000103*	-0.000153	-0.000153
	(5.97e-05)	(5.37e-05)	(9.37e-05)	(9.37e-05)
Year fixed effects	No	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes
Industry fixed effects	No	No	No	Yes
Constant	0.00163***	0.00136***	0.00242*	0.00242*
	(0.000555)	(0.000464)	(0.00128)	(0.00128)
Observations	623	623	623	623
Adjusted R-squared	0.0664	0.3805	0.4489	0.4489

Notes: This table comprises the empirical results of the log-linear regression model, which considers year-, REIT-, and sector-fixed effects. The sample period is from 2010 to 2022. Panel A reports the baseline model. Whereas Model 1 encompasses the OLS-estimated log-linear regression model, Models 2-4 one-by-one add the fixed effects to the baseline model. Subsequently, Panel B elaborates on the results considering the role played in the acquisition. The definitions of the variables are given in Appendix C. Robust standard errors are reported in brackets. The symbols ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Moreover, Panel B reports that for an acquirer REIT, *lnSize*, *Leverage, lnDividendYield, lnDPS,* and *Beta* are of importance. In contrast, the annual returns of target REITs are significantly affected by *MarketToBook, lnDividendYield,* and *lnDPS.* Appendix F, on the other hand, focuses on the annual returns of equity REITs versus mortgage REITs. From Models 1 and 2 of Appendix F, it appears that equity REITs are significantly affected by *MarketToBook, lnDividendYield* and *lnDPS,* which is similar to the variables influencing the annual return of target REITs. Mortgage REITs' annual returns are impacted by *lnSize, lnCashHoldings, lnDividendYield,* and *lnDPS,* although at varying significance levels.

4.3 Robustness tests

Whereas the robustness of the event study is assessed by implementing multiple event windows, I introduce different performance proxies as the dependent variables in Table 5 to verify the validity of the regression results. The performance proxies that are included in addition to the original dependent variable comprise the Datastream-equivalent of *Annual R* (*lnReturnDS*), return on assets (*ROA*), and the ratio of funds from operations (FFO) to total assets (*FFOtoTA*).

While stock market data is in most papers obtained from CRSP, some studies include return data retrieved from alternative data sources, such as Refinitiv Datastream and the Nareit index. Following Brounen and de Koning (2012) and Ooi, Ong, and Neo (2011), I add *lnReturnDS*, which incorporates the annual returns available in Refinitiv Datastream, as an alternative dependent variable. Based on the adjusted R-squared presented in Model 2 of Table 5, it appears that this alternative for *Annual R* is better fitted for the regression model. Therefore,

Table 4 (continued)

Panel B: Multivariate regression results by role in the acquisition

	Acquirer REITs	Target REITs
	(1)	(2)
	Annual R	Annual R
lnSize	0.000255**	0.000176
	(0.000114)	(0.000147)
lnCashHoldings	3.92e-05	1.43e-05
	(5.65e-05)	(5.60e-05)
Leverage	-0.000759**	-0.000316
	(0.000348)	(0.000706)
MarketToBook	-7.56e-06	0.000134***
	(2.18e-05)	(2.95e-05)
lnDividendYield	0.00106***	0.00137***
	(0.000199)	(0.000261)
lnDPS	-0.000917***	-0.00132***
	(0.000186)	(0.000225)
Beta	-0.000271**	0.000155
	(0.000126)	(0.000124)
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Constant	0.00180	0.00238
	(0.00173)	(0.00192)
Observations	348	275
Adjusted R-squared	0.4634	0.4854

Datastream's annual returns are more compatible with the explanatory variables than annualised average returns based on monthly CRSP returns.

In addition, I re-estimate equation (4) by replacing the original dependent variable *Annual R* with return on assets (*ROA*) and the ratio of FFO to total assets (*FFOtoTA*) in line with Feng et al. (2007). Models 3 and 4 of Table 5 document the empirical findings for the alternative dependent variables *ROA* and *FFOtoTA*, respectively. Based on the adjusted R-squared values, both the return on assets and the ratio of FFO to total assets are a better fit to the regression model than *Annual R.* Hence, similar to *lnReturnDS, ROA* and *FFOtoTA* have greater explanatory power over the influence of financial characteristics on REIT returns.

Table 5
Robustness tests

	(1) Annual R	(2) lnReturnDS	(3) ROA	(4) FFOtoTA
lnSize	0.000161*	0.0420***	-0.0174***	-0.00920***
	(9.16e-05)	(0.0145)	(0.00349)	(0.00281)
lnCashHoldings	2.02e-05	0.00919*	0.000928	-0.00167
	(3.81e-05)	(0.00478)	(0.00124)	(0.00104)
Leverage	-0.000581*	0.127**	-0.0404***	-0.0275
	(0.000346)	(0.0544)	(0.0133)	(0.0178)
MarketToBook	3.90e-05**	0.00536**	0.00167**	0.000870
	(1.89e-05)	(0.00225)	(0.000722)	(0.000657)
lnDividendYield	0.00105***	-0.812***	-0.0166***	-0.0111**
	(0.000159)	(0.0236)	(0.00438)	(0.00429)
lnDPS	-0.000936***	0.817***	0.0221***	0.0164***
	(0.000147)	(0.0224)	(0.00370)	(0.00394)
Beta	-0.000153	0.0712***	-0.00567**	0.00372
	(9.37e-05)	(0.0146)	(0.00235)	(0.00314)
Year-fixed effects	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes
Constant	0.00242*	1.789***	0.219***	0.136***
	(0.00128)	(0.207)	(0.0509)	(0.0395)
Observations	623	623	623	623
Adjusted R-squared	0.4492	0.9969	0.5501	0.6233

Notes: This table comprises the empirical results of robustness tests concerning the log-linear regression model. The sample period is from 2010 to 2022. Model 1 corresponds to Model 4 of Table 4's Panel A, which represents the baseline model. Models 2 through 4 respectively incorporate the annual return (*lnReturnDS*), return on assets (ROA), and the ratio of funds from operations to total assets (*FFOtoTA)* as dependent variables. The models present the coefficients of the OLS-estimated log-linear regression, which considers year-, REIT-, and sector-fixed effects. The definitions of the variables are given in Appendix C. Robust standard errors are reported in brackets. The symbols ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

5. DISCUSSION

5.1 Deal announcements: Win or lose?

In this paper, I have, among others, focused on the relationship between the announcement of a real estate merger involving a public REIT as the acquiring party on REIT returns of both target and acquirer REITs. In essence, prior research shows that there is a significant relationship between the role played in an acquisition and REIT returns (Allen and Sirmans, 1987). Based on this remark, I have formulated Hypothesis 1, which contains a positive association between the announcement of a real estate merger and REIT returns. Additionally, existing studies argue that the association between REIT takeover announcements and returns is generally positive for target REITs and negative for bidder REITs (Campbell et al., 2001; Sahin, 2005). Accordingly, Hypothesis 2 circumscribes this beneficial effect for target REITs relative to bidder REITs.

As previously stated, Table 3 reports a positive and significant upward effect of the cumulative abnormal returns following the announcement of an acquisition of a real estate company by a public REIT. The aggregate effect comprises an upward trend up to the 31-day event window, indicating that in the fifteen days surrounding the event date, the announcement positively influences REIT returns. Beyond this period before and after the event date, the cumulative average abnormal return (CAAR) remains positive but the magnitude of the CAAR diminishes. Hence, the empirical result of the event study is robust across all event windows, including the 41-day event window. This finding is consistent with Hypothesis 1, and, for this reason, I support Hypothesis 1. It is worth noting that, for acquiring REITs, the CAAR is negative in the 1-day event window, which embodies only the event date itself. However, this finding is not statistically different from zero.

Moreover, I find that acquiring REITs do not affect REIT returns surrounding the deal announcement date. This result is different from the findings of Campbell, Ghosh and Sirmans (2001) and Sahin (2005), which entail that, for a bidder, the cumulative abnormal returns would be negatively influenced by the announcement of the merger or acquisition. Contrastingly, in accordance with Panel B of Table 3, a target REIT experiences a positive boost to its returns following a takeover announcement. This result is alike Sahin (2005), who finds that target REITs experience positive gains following a deal announcement. The latter is in line with Hypothesis 2, and, hence, I support the second hypothesis.

In addition, from Table E in Appendix F, it appears that the association between the occurrence of a real estate merger and REIT returns appears to be strongest for mortgage REITs despite the subsample's minority fraction of the total sample compared to equity REITs for all event windows except the 1-day and 11-day event window. Although there is a slight inconsistency in significance levels, the finding is overall of considerable interest. Hence, the generalisation of the aggregate findings, as well as the results for acquirer and target sub-samples, are feasible but the remark concerning the equity and mortgage REIT subsamples has limited generalisability due to the imbalance in the number of observations between equity and mortgage REITs.

5.2 Back to basic: The essentials of REIT returns

Next to the event study concerning the cumulative abnormal returns following REIT merger announcements, I have considered the influence of financial characteristics on REIT returns in Table 4 and Appendix F. Overall, the coefficients related to market-to-book value, debt ratio, dividends, and the market beta were significantly different from zero. However, the magnitude of the former coefficients is so modest that there is no economic significance. The robustness tests in Table 5 document that the three alternative dependent variables, which are composed using Refinitiv Datastream, have a superior explanatory power relative to the original dependent variable. This remark can be explained by the enhanced compatibility of Datastream's annual returns with other data items provided by this Refinitiv database relative to the average annualised return based on monthly CRSP returns. A valid reason to implement Datastream returns is for consistency purposes. To display the impact of implementing a Datastream-based dependent variable, Table G in Appendix F shows the results for a log-linear regression model that incorporates the Datastream annual return as the dependent variable. Consequently, the annual returns obtained from Datastream are a viable and reliable proxy for yearly analyses. On the contrary, for daily analyses, for instance, using event study methodology, the reliability of Datastream daily returns is debatable from my perspective, as explained in paragraph 3.2. Therefore, the reliability of return data and the optimal data source seemingly depend on the time scale applied.

5.3 Recommendations for future research

Based on the inferences made in this study, there are multiple recommendations for future research. First, this paper specifically focuses on real estate mergers involving a public REIT as the acquiring party identified by the Nareit. Prospective studies may consider a broader

sample and population and go beyond the scope of U.S REITs, for instance, by incorporating the FTSE/NAREIT REIT Index. However, reliable daily data may be less readily accessible for countries outside the United States and private real estate companies. Moreover, a larger sample may enable future researchers to establish generalisable inferences about takeovers in the different REIT sectors identified by the Nareit. Second, future papers should consider examining the reliability and compatibility of daily and monthly returns available in Refinitiv Datastream for event study methodologies. Vice versa, the compatibility of CRSP daily and monthly returns in a cross-sectional model, as the model included in Ooi, Ong, and Neo (2011), may also be explored in future studies. Third, in this paper, I perform a regression using panel data. For future research, I recommend conducting such a study only after cross-sectional regression models produce significant and generalisable findings, as this will likely improve the generalisability of the panel regression inferences.

5.4 Policy implications

From a policy perspective, this paper adds to the discussion of the REIT regime implemented by the American government and its generalisability. As elaborated in Appendix A, the original objective of the REIT Act of 1960 was to provide a profitable investment product in addition to stocks and bonds. In pursuit of the U.S. REIT Act, early adopters include, among others, Australia, Belgium, Puerto Rico, and Brazil, led by the Netherlands. Only after the millennium, Asian countries showed interest in the real estate investment vehicle, whereafter France, the United Kingdom, Germany, and Italy introduced their REIT-like structures (Brounen and de Koning, 2012). Anglo-Saxon countries, such as the United States, and the United Kingdom, are likely to differ in legislative systems and investment perspectives compared to non-Anglo-Saxon nations. Unreported results based on Global Property Research (GPR) data show that deals taking place in the United States have an increased effect on total returns in contrast to other countries included, which could be due to the maturity of the U.S. market. Consequently, the American example cannot simply be adopted by other countries. Rather national legislators need to consider the benefits and the burdens of each regulatory constraint placed upon REITs and customise an optimal REIT-like structure, as argued by Campbell and Sirmans (2002).
In addition, Appendix F shows that the proportion of equity and mortgage REITs is unbalanced, while the significance and magnitude of mortgage REIT deals appear to be greater than equity REITs. Hence, policymakers may further investigate this differentiation and adjust policies towards stimulating the incorporation of more mortgage REITs, only if further research results in robust inferences.

6. CONCLUSION

This study has examined the impact that the announcement of a public real estate investment trust (REIT) acquiring another real estate company has on real estate returns with special attention paid to the role played in the takeover process. The market reaction to the deal announcement, which is proxied by the cumulative abnormal returns, is obtained by implementing a market model event study methodology. The findings illustrate that the announcement of a merger may continuously increase REIT returns up until the fifteen days before and after the announcement date. Importantly, this association is more pronounced for target REITs in contrast to acquiring REITs that exhibit no significant influence from the deal announcement. The findings of this study may encourage governments to establish optimal REIT-like structures that are customised to a country's legislative system to optimise the institutional environment to stimulate real estate investment.

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APPENDIX A: HISTORY AND DEVELOPMENT OF THE U.S. REIT

In response to an urge on Wall Street, the U.S. Congress under President Dwight D. Eisenhower passed the Real Estate Investment Trust Act contained in the Cigar Excise Tax Extension Act of 1960 to spur the development of the public real estate market by broadening the investment universe beyond stocks and bonds and providing new, profitable investment products (Brounen and De Koning, 2012; Graff, 2001; Nareit, 2023b). Correspondingly, the moderations to Sections 856 to 858 of the Internal Revenue Code state that a qualified REIT is not taxed (Allen and Sirmans, 1987). However, to qualify as a REIT, the company must meet several fundamental provisions (Allen and Sirmans, 1987; Nareit, 2023a). According to the National Association of Real Estate Investment Trusts (Nareit, formerly NAREIT), the first requirement entails that a minimum of 75 per cent of a REIT's total assets embodies real estate. Secondly, a REIT must at least derive three-quarters of its gross income from rents, mortgages and gains from the sale of real estate (Allen and Sirmans, 1987; Nareit, 2023a). Thirdly, in line with the business model, a REIT must pay a minimum of 90 per cent of a REIT's taxable income as dividends to shareholders (Nareit, 2023a). In turn, shareholders pay taxes on these dividends, thereby exempting the REIT from corporate income tax (Ampountolas, 2022; Chiang et al., 2019). As the purpose of the distribution of net earnings is not shareholder protection, the reduction of agency problems is simply a beneficial side effect (Bauer, Eichholtz, and Kok, 2010). Despite the regulatory constraints, the access to a large, diversified portfolio of real estate in combination with the liquidity of the public market makes REITs an appealing legal structure for real estate companies (Brounen and De Koning, 2012). The fourth and fifth provisions include that, although a qualified REIT is exempt from corporate income tax, the company must be taxable as a corporation managed by trustees or a board of directors (Nareit, 2023a). Lastly, the sixth and seventh requirements entail that the number of beneficial owners is at least a hundred and that no more than half of the outstanding shares are in the hands of five or fewer shareholders (Allen and Sirmans, 1987; Nareit, 2023a).

Over the past six decades, the real estate industry has experienced tremendous development due to the request for independent ownership entity structures, forcing advancement to enhance intra-industry efficiency (Ampountolas, 2022). The initiation of REITs eliminated several risks fundamental to the real estate collapse at the beginning of the 20th century (Ampountolas, 2022; Mullaney, 1998). Following the 1960 REIT Act, the Tax Reform Act of 1976, signed into law by President Ford, included initial simplification amendments, which induced considerable moderation in operational provisions and eligibility

(Allen and Sirmans, 1987; Nareit, 2023b). Notably, the Tax Reform Act of 1976 allowed the establishment of REITs as corporations besides business trusts (Allen and Sirmans, 1987; Nareit, 2023b). In addition, the Act permits REITs to offset capital gains tax liabilities with operating losses, which was not possible before 1976. Hence, the Act altered the tax treatment of REITs and eased disqualification sanctions (Allen and Sirmans, 1987). The subsequent Tax Reform Act of 1986, signed into law by President Reagan, introduced advanced regulations prohibiting taxpayers from sheltering earnings from other activities via partnerships and provided that REITs can be internally advised and managed (Nareit, 2023b). The 1986 Act formed the foundation for the REIT boom of the 1990s, which resulted in the REIT industry becoming the third most crucial asset class besides stocks and bonds (Brounen and de Koning, 2012). In 2016, the equity market capitalisation of publicly traded REITs exceeded the one trillion U.S. dollar benchmark (Nareit, 2023b). Moreover, as of 2016 and 2017, the Global Industry Classification Standard (GICS) and the International Classification Benchmark (ICB) acknowledge Real Estate as a headline sector.

APPENDIX B: LIST OF U.S. REIT MERGERS (2010-2022)

Table A
List of REIT mergers and acquisitions (2010-2022)

Panel A: Equity REITs

Company name	Ticker symbol	Sector	Event date	Role
AMB Property Corporation	AMB	Industrial	31/01/2011	Acquirer
American Campus Communities	ACC	Residential	19/04/2022	Target
American Farmland Corporation	AFCO	Specialty	12/09/2016	Target
American Homes 4 Rent	AMH	Residential	03/12/2015	Acquirer
American Residential Properties Inc.	APRI	Diversified	03/12/2015	Target
American Tower Corporation	AMT	Infrastructure	15/11/2021	Acquirer
Apple Hospitality REIT Inc.	APLE	Lodging/Resorts	14/04/2016	Acquirer
AvalonBay Communities Inc.	AVB	Residential	26/11/2012	Acquirer
AVIV REIT Inc.	AVIV	Healthcare	31/10/2014	Target
BRE Properties Inc.	BRE	Residential	09/12/2013	Target
Caplease Inc.	LSE	Diversified	28/05/2013	Target
Care Capital Properties Inc.	CCP	Healthcare	07/05/2017	Target
Catchmark Timber Trust Inc.	CTT	Timber	31/05/2022	Target
Cedar Realty Trust	CDR	Retail	02/03/2022	Target
Chesapeake Lodging Trust	CHSP	Lodging/Resorts	06/05/2019	Target
Cogdell Spencer Inc.	CSA	Healthcare	27/12/2011	Target
Cole Real Estate Investment Inc.	COLE	Retail	23/10/2013	Target
Colonial Properties Trust	CLP	Residential	03/06/2013	Target
Coresite Realty Corporation	COR	Data centers	15/11/2021	Target
Cousins Properties Inc.	CUZ	Office	29/04/2016	Acquirer
			25/03/2019	Acquirer
DCT Industrial Trust Inc.	DCT	Industrial	29/04/2018	Target
Digital Realty Trust Inc.	DLR	Data centers	09/06/2017	Acquirer
Duke Realty Corporation	DRE	Industrial	13/06/2022	Target
Dupont Fabros Technology Inc.	DFT	Data centers	09/06/2017	Target
Equity One Inc.	EQY	Retail	14/11/2016	Target
Equity Residential	EQR	Residential	26/11/2012	Acquirer
Essex Property Trust Inc.	ESS	Residential	09/12/2013	Acquirer
Extra Space Storage Inc.	EXR	Healthcare	15/06/2015	Acquirer
Farmland Partners Inc.	FPI	Specialty	12/09/2016	Acquirer
First Potomac Realty Trust	FPO	Office	28/06/2017	Target
HCP Inc.	HCP	Healthcare	14/12/2010	Acquirer
			16/10/2012	Acquirer
Healthcare Realty Trust Inc.	HR	Healthcare	28/02/2022	Target
Healthcare Trust of America Inc.	HTA	Healthcare	28/02/2022	Acquirer

Table A (continued)

Company name	Ticker symbol	Sector	Event date	Role
Independence Realty Trust Inc.	IRT	Residential	11/05/2015	Acquirer
			26/07/2021	Acquirer
iStar Financial Inc.	STAR	Diversified	11/08/2022	Target
Kimco Realty Group Trust	KIM	Retail	15/04/2021	Acquirer
Kite Realty Group Trust	KRG	Retail	19/07/2021	Acquirer
LaSalle Hotel Properties	LHO	Lodging/Resorts	06/09/2018	Target
Liberty Property Trust	LPT	Industrial	27/10/2019	Target
MGM Growth Properties LLC	MGP	Office	04/08/2021	Target
Mid-America Apartment Communities Inc.	MAA	Residential	03/06/2013	Acquirer
			15/08/2016	Acquirer
Monmouth Real Estate Investment Corporation	MNR	Industrial	05/11/2021	Target
Nationwide Health Properties	NHP	Healthcare	28/02/2011	Target
New Senior Investment Group Inc.	SNR	Healthcare	28/06/2021	Target
Omega Healthcare Investors Inc.	OHI	Healthcare	31/10/2014	Acquirer
			02/01/2019	Acquirer
PS Business Parks Inc.	PSB	Industrial	25/04/2022	Target
Parkway Properties Inc.	PKY	Office	29/04/2016	Target
Pebblebrook Hotel Trust	PEB	Lodging/Resorts	06/09/2018	Acquirer
Plum Creek Timber Co Inc.	PCL	Timber	08/11/2015	Target
Post Properties Inc.	PPS	Residential	15/08/2016	Target
PotLatch Corporation	PCH	Timber	31/05/2022	Acquirer
Preferred Apartment Communities Inc.	APTS	Residential	16/02/2022	Target
Prologis Inc.	PLD	Industrial	31/01/2011	Target
			29/04/2018	Acquirer
			15/07/2019	Acquirer
			27/10/2019	Acquirer
			13/06/2022	Acquirer
QTS Realty Trust Inc.	QTS	Data centers	07/06/2021	Target
Quality Care Properites Inc.	QCP	Healthcare	26/04/2018	Target
RLJ Lodging Trust	RLJ	Lodging/resorts	24/04/2017	Acquirer
Realty Income Corporation	O	Retail	06/09/2012	Acquirer
			29/04/2021	Acquirer
Regency Centers Corporation	REG	Retail	14/11/2016	Acquirer
Retail Properties of America Inc.	RPAI	Retail	19/07/2021	Target
Safehold Inc.	SAFE	Specialty	11/08/2022	Acquirer
Select Income REIT	SIR	Diversified	02/09/2014	Acquirer
			17/09/2018	Target
Simon Property Group	SPG	Retail	10/02/2020	Acquirer
Taubman Centers Inc.	TCO	Retail	10/02/2020	Target

Table A (continued)

Company name	Ticker symbol	Sector	Event date	Role
Tier REIT Inc.	TIER	Office	25/03/2019	Target
Trade Street Residential Inc.	TSRE	Residential	11/05/2015	Target
Ventas, Inc.	VTR	Healthcare	28/02/2011	Acquirer
			27/12/2011	Acquirer
			02/06/2014	Acquirer
			28/06/2021	Acquirer
Vereit Inc.	VER	Diversified	29/04/2021	Target
VICI Properties, Inc.	VICI	Specialty	04/08/2021	Acquirer
W.P. Carey Inc.	WPC	Diversified	25/07/2013	Acquirer
Washington Prime Group Inc.	WPG	Retail	16/09/2014	Acquirer
Weingarten Realty Investors	WRI	Retail	15/04/2021	Target
Welltower, Inc.	WELL	Healthcare	26/04/2018	Acquirer
Weyerhaeuser Company	WY	Timber	08/11/2015	Acquirer
Panel B: Mortgage REITs				
Company Name	Ticker Symbol	Financing Type	Event Date	Role
Annaly Capital Management	NLY	Home Financing	30/01/2013	Acquirer
			11/04/2016	Acquirer
			02/05/2018	Acquirer
Anworth Mortgage Asset Corporation	ANH	Home Financing	07/12/2020	Target
Apollo Commercial Real Estate Finance Inc.	ARI	Commercial Financing	26/02/2016	Acquirer
Apollo Residential Mortgage	AMTG	Home Financing	26/02/2016	Target
Armour Residential REIT Inc.	ARR	Home Financing	02/03/2016	Acquirer
Blackstone Mortgage Trust Inc.	BXMT	Commercial Financing	16/10/2012	Target
			07/06/2021	Acquirer
			24/01/2022	Acquirer
			16/02/2022	Acquirer
			19/04/2022	Acquirer
			25/04/2022	Acquirer
CYS Investments Inc.	CYS	Home Financing	26/04/2018	Target
Capstead Mortgage Corporation	CMO	Home Financing	26/07/2021	Target
Crexus Investment Corporation	CXS	Commercial Financing	30/01/2013	Target
Hatteras Financial Corporation	HTS	Home Financing	11/04/2016	Target
Javelin Mortgage Investment Corporation	JMI	Home Financing	02/03/2016	Target
Northstar Realty Finance Corporation	NRF	Commercial Financing	05/08/2014	Acquirer
Ready Capital Corporation	RC	Home Financing	07/11/2018	Acquirer
			07/12/2020	Acquirer
Starwood Property Trust Inc.	STWD	Commercial Financing	21/09/2015	Acquirer
Two Harbors Investment Corporation	TWO	Home Financing	26/04/2018	Acquirer

APPENDIX C: VARIABLE DEFINITIONS AND SOURCES

Table B
Definitions and data sources of variables

Variable name	Definition	Data source	Data item(s)	Academic source
R_{it}	The daily return for REIT i on day t.	CRSP	Returns	Sahin (2005)
R_{mt}	The daily market return on day t.	CRSP	Value-Weighted Returns inc. Dividends	Sahin (2005)
Annual R_{it}	The annualised average daily return for REIT i in year t.	CRSP	Returns	
ReturnDS	The annual total return index for REIT i in year t.	Refinitiv Datastream	RI	
ROA	The return on assets (ROA) is computed as net income divided by total assets.	Refinitiv Datastream	WC01706; and WC02999	Feng et al. (2007)
FFOtoTA	The ratio of funds from operations (FFO) to total assets (TA).	Refinitiv Datastream	WC04201; and WC02999	Eichholtz and Kok (2008); Feng et al. (2007)
Size	Firm size is measured by total assets.	Refinitiv Datastream	WC2999	Brounen and de Koning (2012)
CashHoldings	Cash holdings refers to the cash ratio and is computed as the ratio of cash and cash equivalents to total assets.	Refinitiv Datastream	WC2001; and WC2999	Eichholtz and Kok (2008)
Leverage	The debt-ratio, or leverage, is computed as the ratio of total debt to total assets.	Refinitiv Datastream	WC03255; and WC2999	Brounen and de Koning (2012); feng et al. (2007)
MarketToBook	The market-to-book value is computed as (Total Assets + (Total Assets – Total Debt) + Market Capitalisation) divided by total assets. The market capitalisation is the price times the number of shares outstanding, which are both retrieved from CRSP.	Refinitiv Datastream; CRSP	WC02999; WC03255; PriceorBidAskAverage; Volume	Feng et al. (2007);
DividendYield	The dividend yield refers to the ratio of dividend per share (DPS) to stock price.	Refinitiv Datastream; CRSP	DPS; PriceorBidAskAverage	Eichholtz and Kok (2008)
DPS	The dividends per share.	Refinitiv Datastream	DPS	
Beta	The variance in stock return.	Refinitiv Datastream	897E	Eichholtz and Kok (2008)

Notes: This table presents the names and definitions of the variables included, as well as the data items and data sources fundamental to the variable.

APPENDIX D: EXTENDED SUMMARY STATISTICS

Table C
Comparison of mean and median values of variables between Equity REITs and Mortgage REITs

	Equity REITs (N = 512)		Mortgage REITs (N = 111)		Differences (comparisons)	
	Mean	Median	Mean	Median	Mean (t-test)	Median (rank test)
Annual R	0.0005	0.0006	0.0003	0.0004	0.0002	0.0002
ROA	0.0179	0.0187	0.0070	0.0106	0.0109	0.0081***
FFOtoTA	0.0566	0.0553	0.0193	0.0187	0.0373***	0.0366***
Size	8327112.6	4351363	20810189	10258825	-12483076.40***	-5907462***
CashHoldings	0.0202	0.0123	0.0368	0.0243	-0.0166***	-0.0120***
Leverage	0.4563	0.4499	0.7277	0.7866	-0.2714***	-0.3367***
MarketToBook	6.4718	6.2055	2.762	2.3861	3.7098***	3.8194***
DividendYield	0.0433	0.0413	0.1164	0.1121	-0.0731***	-0.0708***
DPS	1.7676	1.3200	3.2921	2.4800	-1.5245***	-1.1600***
Beta	1.1384	1.0300	0.805	0.5230	0.3334***	0.5070***

Note: This table is an extension of Table 2. The rank test refers to the two-sample Wilcoxon rank-sum (Mann-Whitney) test.

APPENDIX E: CORRELATIONS

Table D displays the correlations between the variables integrated in this research, as well as the corresponding variance inflation factor (VIF) values. The VIF is a measure that indicates whether there are multicollinearity concerns among the explanatory variables included in the sample (Gonenc, Polten, and Westerman, 2022). Although there is no consensus on a threshold, the VIF benchmark comprises that a value above ten implies multicollinearity (Greene, 2002; Ooi et al., 2011). This threshold is sporadically lowered to five, which signifies that, if the VIF value surpasses five, multicollinearity concerns exist. As can be observed in Table D none of variables included has a VIF value that exceeds either threshold. Besides the VIF values, Table D presents the pairwise correlations between all variables incorporated in the multivariate regression analysis. In general, the correlation threshold encompasses that a correlation of 0.5 demonstrates at least a moderate correlation. A value greater than 0.7 specifies that there is a substantial correlation between the variables, which suggests that those variables are fairly resembling. In case the 0.7 threshold is exceeded, it is advisable is to re-evaluate the inclusion of this variable.

As seen in Table D, *MarketToBook* is moderately correlated with the *FFOtoTA* based on a correlation of 0.5334***, which may be explained by the fact that both variables are computed using total assets. Other variables based on total assets, however, do not exhibit moderate or considerable correlations. Therefore, there is a moderate correlation between the market-to-book ratio and the ratio of funds from operations to total assets but no causation. In addition, *DividendYield* is moderately correlated with *Leverage* based on a correlation of 0.5920***. As the computation of these variables do not have any commonalities, there is again solely a moderate correlation and no causation. Besides these two moderate correlations, no notable correlations were found. Hence, there is no need to mitigate for multicollinearity in the regression model.

Table D
Pairwise correlations

Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Annual R		1.0000									
(2) ROA	1.437	0.0344	1.0000								
(3) FFOtoTA	1.770	0.0386	0.4436***	1.0000							
(4) Size	1.412	-0.0775*	0.0500	-0.1133***	1.0000						
(5) CashHoldings	1.094	0.0559	0.0197	-0.1003**	-0.0699*	1.0000					
(6) Leverage	1.736	-0.1140***	-0.2817***	-0.4096***	0.2210***	0.0078	1.0000				
(7) MarketToBook	1.775	0.0560	0.4039***	0.5334***	-0.1308***	-0.0500	-0.2705***	1.0000			
(8) DividendYield	2.485	-0.0109	-0.2124***	-0.4554***	0.2235***	0.1567***	0.5920***	-0.4868***	1.0000		
(9) DPS	1.799	-0.1047***	0.1178***	0.0295	0.4888***	0.0260	0.2286***	0.0012	0.3990***	1.0000	
(10) Beta	1.300	0.1342***	-0.1683***	-0.0120	-0.2284***	0.1206***	-0.0538	0.1123***	-0.2550***	-0.3763***	1.0000

Notes: This table presents the pairwise correlations between all variables included in the regression model. The definitions and sources of the variables are given in Appendix C. The symbols ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

APPENDIX F: EXTENDED RESULTS

Table E
Extended event study results by REIT type

	Equity REITs			Mortgage REITs			All REITs		
Event window	$\overline{CAR}$	St. error	Obs.	$\overline{CAR}$	St. error	Obs.	$\overline{CAR}$	St. error	Obs.
[0,0]	0.0643***	0.0193	40	-0.0246	0.0202	9	0.0570***	0.0163	49
[-1, +1]	0.0689***	0.0200	120	0.0921***	0.0212	27	0.0732***	0.0168	147
[-2, +2]	0.0749***	0.0198	200	0.0951***	0.0224	45	0.0786***	0.0166	245
[-5, +5]	0.0908***	0.0258	440	0.0734**	0.0291	99	0.0876***	0.0217	539
[-10, +10]	0.0898***	0.0261	840	0.0960***	0.0264	189	0.0909***	0.0218	1029
[-15, +15]	0.0826***	0.0261	1240	0.1270**	0.0401	279	0.0907***	0.0225	1519
[-20,+20]	0.0813***	0.0258	1640	0.1180**	0.0435	369	0.0882***	0.0224	2009

Notes: This table comprises the empirical results following the event study of 49 real estate merger announcements. The statistics of the cumulative abnormal returns are reported across seven different event windows. In turn, the cumulative abnormal returns are evaluated by the role that the REIT type. The sample period is from 2010 to 2022. The symbols ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Table F
Extended multivariate regression results by REIT type

	Equity REITs	Mortgage REITs
	(1)	(2)
	Annual R	Annual R
lnSize	0.000127	0.000506**
	(0.000109)	(0.000237)
lnCashHoldings	1.81e-05	0.000210*
	(3.99e-05)	(0.000114)
Leverage	-0.000613	-0.000124
	(0.000549)	(0.000462)
MarketToBook	3.98e-05**	0.000115
	(1.93e-05)	(0.000104)
lnDividendYield	0.00123***	0.00153**
	(0.000173)	(0.000673)
lnDPS	-0.00110***	-0.00129**
	(0.000155)	(0.000580)
Beta	-2.77e-06	3.51e-05
	(0.000102)	(0.000193)
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Constant	0.00327**	-0.00168
	(0.00156)	(0.00300)
Observations	512	111
Adjusted R-squared	0.4612	0.5326

Notes: This table is an extension of Table 4 and comprises the empirical results of the OLS-estimated log-linear regression model, which considers year-, REIT-, and sector-fixed effects. The sample period is from 2010 to 2022. Similar to Panel B of Table 4, this table elaborates on the results considering the REIT type. The definitions of the variables are given in Appendix C. Robust standard errors are reported in brackets. The symbols ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Table G
Multivariate regression models incorporating Datastream's annual returns as dependent variables

	OLS model	Fixed effect (FE) models		
	(1)	(2)	(3)	(4)
	lnReturnDS	lnReturnDS	lnReturnDS	lnReturnDS
lnSize	0.221***	0.216***	0.0420***	0.0420***
	(0.0493)	(0.0509)	(0.0145)	(0.0145)
lnCashHoldings	-0.153***	-0.157***	0.00919*	0.00919*
	(0.0337)	(0.0340)	(0.00478)	(0.00478)
Leverage	-0.633**	-0.648**	0.127**	0.127**
	(0.290)	(0.301)	(0.0544)	(0.0544)
MarketToBook	0.0866***	0.0883***	0.00536**	0.00536**
	(0.0170)	(0.0173)	(0.00225)	(0.00225)
lnDividendYield	-0.651***	-0.652***	-0.812***	-0.812***
	(0.102)	(0.105)	(0.0236)	(0.0236)
lnDPS	0.552***	0.553***	0.817***	0.817***
	(0.0749)	(0.0750)	(0.0224)	(0.0224)
Beta	-0.0544	-0.0972	0.0712***	0.0712***
	(0.0721)	(0.0789)	(0.0146)	(0.0146)
Year fixed effects	No	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes
Industry fixed effects	No	No	No	Yes
Constant	-0.243	-0.0806	1.789***	1.789***
	(0.804)	(0.865)	(0.207)	(0.207)
Observations	623	623	623	623
Adjusted R-squared	0.3942	0.3862	0.9969	0.9969

Notes: This table comprises the empirical results of the OLS-estimated log-linear regression model, which considers year-, REIT-, and sector-fixed effects. The sample period is from 2010 to 2022. Different from the baseline model presented in Panel A of Table 4, this regression model incorporates Datastream's annual returns as the independent variable. Whereas Model 1 encompasses the baseline regression model, Models 2-4 one-by-one add the fixed effects. The definitions of the variables are given in Appendix C. Robust standard errors are reported in brackets. The symbols ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively.