Exchange options in the REIT industry

Article

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Abstract

This article models mergers as exchange options where acquirers offer stocks and/or cash to target firms in exchange of acquiring some shareholding in target firms. Mergers analysed in this article happen between homogeneous entities. The B-S and Margrabe models are used to price cash and stocks (including stocks and cash) deals respectively. The M&A traits are grouped as conflict of interest, market growth, funding and specialisation. Regression results illustrate that exchange options react to M&A characteristics differently. Thus, the results are beneficial to both sell-and buy-side investors in terms on how one manages merging firms. The goodness of fit suggests that strategic acquisitions played important roles.

Keywords: Exchange option, REIT
JEL: G34, G12

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1 Introduction

Growth options are suitable to analyse strategic decisions as they capture the flexibility of firms in either allowing scaling down or increasing operations. Therefore, this flexibility is of paramount importance as it indirectly allows firms to hedge against possible emerging risks during the lives of firms. In other words, growth options especially exchange ones have multiple capabilities which go beyond assisting firms in strategic growth ventures. Those exchange options do not occur in isolated environment. That is, there are numerous economic variables or parameters that react in the presence of exchange options being exercised. That relationship-reaction of economic variables in the presence of exchange options is central to this article. Questions that might arise, do those economic variables increase or decrease value of exchange options, who benefits in that kind of environment, etc. Exchange options emerge specifically due to merger and acquisition (M&A) transactions. M&A deals are similar to new ventures. New ventures tend to offer a lot of opportunities for growth. According to Schulte (2018), new ventures offer practical insights into unique enterprises and and new-entrants to markets. On the other hand, M&A represents one of the most important phenomena where exchange options have been explored. Studies in this area argue that option pricing is able to capture the full value of target firms as flexibility would not be accounted for within other modelling set ups. After one of the earliest work applying a general option pricing model to M&A operations-Bhagat et al. (1987), other researchers adopted the same theoretical framework to study stocks financed deals in the real estate investment trust (REIT) industry-Sebehela (2008)-and cash financed M&As in non-real estate sectors-Sorwar and Sudarsanam (2010). The value of new information, especially in option trading environment has been illustrated by He et al. (2010).

This empirical study combines previous studies on growth of REITs and options, and it focuses on REITs as a laboratory to explore exchange options during REIT acquisitions. One believes that this industry represents a unique laboratory to explore the value of such options and its driving factors. The evolution of the REIT industry throughout the world, it is a unique one. U.S. REITs were created on 14 September 1960 when then President Eisenhower signed the REIT Act contained in the Cigar Exercise Tax Extension. On September the 15th 1960, NAREIT (National Association of REITs) was created. Initial the REITs debut happened during the mid-1960s, which saw new listing including Continental Mortgage Investors (first one to be listed in the New York Stock Exchange), Bradley Real Estate Investors, First Mortgage Investors, Winthrop Realty Trust, Pennsylvania REIT and Washington REIT. The first European country to pass REIT legislation was the Netherlands in 1969. Soon after, in 1971, Australia introduces Listed Property Trusts.

In the U.S. the growth of this industry was fuelled by mortgage REITs and vehicles engaged mainly in land development and construction financing. During the 1973 oil embargo, mortgage REITs were hit hard the most. The Realty Trust Review was launched in March 1970 and devoted exclusively to public real estate securities. Sector specific vehicles were immediately introduced. As an example, the Health Care REIT (then Health Care Fund) was the first REIT in health care established in June 1970. Finally, NAREIT started

to produce a publicly available REIT index in January 1972 splitting the sample between equity, mortgage and hybrid REITs. In the 1980s, billions of U.S. dollars were raised in private placements due to the proliferation of real estate tax-sheltered partnerships. Particularly, this era saw the birth of open-end mutual funds primarily investing in REITs, with the first one (National Real Estate Stock Fund) being established in 1985. Today one can count about 200 real estate mutual funds. The first largest real estate mutual fund was Cohen & Steers, and it had $26 billion assets under management. As far as REIT-related products are concerned, the first real estate ETF (iShares Dow Jones. U.S. real estate index fund) was launched in June 2000. After a year, more real estate ETFs followed and today there are about 20 ETFs only investing in REITs.

After the downturn at the end of 1980s, Kimco Realty Corporation made the first equity REIT IPO in November 1991, while a month after the first REIT reached a market capitalisation of $1 billion. The introduction of the UPREIT structure started a consolidation period where these vehicles have become larger in size-Simon Property Group is today the biggest REIT and has a market capitalisation of $23 billion. As far as the transparency and knowledge of such investment market and associated returns, in January 1997 one saw improvements thanks to the release of a real time index by NAREIT, which also joined up with EPRA and Euronext to launch the EPRA/NAREIT global real estate index in October 2001. During the same period, Standard & Poor opened its indexes to REITs which became part of the biggest 500 companies traded in the U.S (initially only Equity Office Properties Trust and Equity Residential). According to the REITWatch report as of the 29th of August 2014, REITs being S&P 500 constituents are 20 with size ranging from $5 to just over $53 billion, while S&P 400 mid-cap REIT constituents are 30 with size ranging from at $1.7 to just over $10.3 billion and S&P 600 small-cap REIT constituents are 35 with size ranging from $0.4 to just over $3.3 billion. Furthermore, the REITWatch report illustrates that there has been consolidation in the U.S. REIT industry: the constituents of S&P 500 are worth $410.3 billion, constituents of S&P 400 mid-caps are worth $149.01 billion and constituents of S&P 600 small-caps are worth $50.4 billion.

Today, about 40 countries have REIT legislation in place. The first Asian REIT was introduced in Japan in September 2001, while in Europe France adopted REIT legislation in 2003, Germany in 2007, and the UK in 2007. South Africa introduced REIT legislation in 2012. The significant presence of M&A activities in the REIT industry reveals the potential gains achievable by joining different companies. The reasons of this gain are several and have been explo8red in the literature. However, so far no REIT study has approached this phenomenon as the exercise of the option to acquire/merge to another firm. In this context the option would be exercised only if a potential growth is achievable. Particularly, these growth options represent exchange options, where one asset (shares of a company) is exchanged for another (shares of the other company involved in an M&A deal).

Numerous questions arise in this article. What is unique about REITs? What is interesting about option pricing theory (OPT) being applied in the REIT

industry? Firstly, REITs offer a unique institutional setting with very codified and transparent corporate governance. Hence the option pricing revelation should be more easily identifiable. Secondly, the valuation of a REIT merger could be seen as the union of two funds, or in other words two asset portfolios that are combined together and REIT synergies rules. This article also explores factors that drive options of REIT M&As and this is because some prior empirical studies such as one by Hitt et al. (1990) illustrated that characteristics of firms contributed to the merged entity value. The four groups of variables explored in this article are conflict of interests-these are variables which benefits one stakeholder while disadvantaging another stakeholder, funding-variables that symbolise how REIT finance their expansion opportunities and growth-those are variables when they are perceived positively by the markets, REITs grow-normally their share prices increase. Finally, specialisation shows the sector in the real estate industry that a particular REIT invests in. Finally, when M&A deals are financed through the combination of stocks and cash, this article alters the original Margrabe (1978) (henceforth Margrabe) model so that the model prices a M&A deal financed through cash and stocks. All the points raised in this paragraph are the contributions of this article.

The study that is close to this article is Kim (1992). Kim (1992) developed an equilibrium option model in the context of option. At the heart of his study, he allowed prices to be dynamic. This article by mentioned three authors, follow the same concept. Although, the Margate model will be expanded but the expanded Margrabe model will be a closed one. For the modelling part, Kim (1992) start with the general equilibrium considerations-maximising the utility of individual, then have dimensional vector for various parameters and there is a risk-free default unit discount bond rate. Central to the analysis, is to determine the optimal investment policy or portfolio-similar to the illustration is this article. In order to explicitly to illustrate equilibrium models, Kim (1992) demonstrated two regimes-1 and 2. Regime 1 is on pure exchange economy where one is allowed to consume everything available at that time. More, goods are perishable. Kim (1992) states that in case similar to regime 1, a call option is written on another asset which is synonymous with B-S framework. In this article, it would be where deals are financed through only cash. Regime 2 is on the same pure exchange economy except the fact that an individual is given a constant-absolute-risk-aversion utility. Kim (1992) opined that in that environment prices do not follow a time-homogenous diffusion process-drift and time are dependent on time because of the discounting factor. A latter situation would be suitable for hedging options (See; Sebehela 2015). That is, just like Kim (1992), this article derives alternative option valuation which can provide useful information when pricing options that cannot be explained by B-S framework. This is because despite that ad hoc B-S can price options in different circumstances but the equilibria and smiles are open-ended (See; Byun et al. 2018).Byun et al. (2018) investigate two scenarios: first, when implied volatility skew is treated as fixed function of moneyness $\left(\frac{S}{K}\right)$. In the latter case, strike price (K) does not change and volatility floats as stock index (S) changes-sticky volatility method, second approach that they explored is when is when both K and implied volatility are fixed regardless of S level-sticky delta. Marcato et al. (2018) demonstrated that

when both K and implied volatility change with respect to the change in S, the volatilities tend to be much better than in sticky volatility and delta cases.

In summary, our results illustrate that some REIT traits contribute to M&A option values and in certain cases REIT M&As might be driven by strategic positioning of firms. More, the results illustrate that when REITs merge, extra values are generated from deals in the form of exchange options. Due to the emerging of exchange options, liquidity in the REIT industry increases and more information spillover to stakeholders happens. Furthermore, one illustrates that some REIT characteristics systematically contribute to option values during M&A activities. Overall, results are in line with prior studies that analyzed abnormal returns in several industries. On the other hand, the impact of variables on emerging exchange options is consistent with the pecking order theory (POT) of finance and OPT. Despite the fact that some models have negative adjusted R-squared, the adjusted R-squared for the combined models show a significant improvement with more than one fifth of growth options explained by our estimation-Hartzell et al. (2005). The implications from the analysis are several. Firstly, when REIT firms merge, stakeholders will have better insights in REIT mergers if they price those M&A deals using option pricing techniques. Second, for accurate pricing and hedging, one can infer from coefficients that in certain cases it is costly and at other times it is cheap as illustrated by high and low coefficients respectively. Third, some REIT characteristics (i.e. conflicts of interest, internal funds and market risk) are important in explaining growth opportunities in mergers. Finally, zero options values suggest that REIT mergers might be driven by strategic objectives as opposed to financial gains.

The remainder of the article is organised as follows. Section 2 debates the related literature and section 3 discusses the theory behind modelling M&A options. Section 4 presents the data while section 5 presents results on empirical analysis. The last section concludes this study.

2 Literature Review

The literature review is divided into two sections; (i) M&A options-to understand real options in mergers and (ii) parameters impacting M&A behaviour-parameters that influence value during mergers. As stated earlier, the contribution of this article is combining those two narratives.

2.1 M&A Options

M&A is a strategy in which firms engage themselves in expansion processes. Reasons cited as M&A drivers by previous studies include information asymmetry, governance, agency conflict, market timing and monopoly according to Hansen (1987) and Amihud et al. (1990). All those factors mentioned as reasons driving M&As are underpinned by one motive which is to increase profitability of firms by forming a well-managed merged entity. Previous studies value M&A deals using traditional valuation techniques (TVTs) such as discounted cash flows (DCFs) and traditional accounting principles (see Reinganum and Smith, 1983). One of the short comings of TVTs is that they cannot take into account flexibility embedded in M&A deals. Therefore, a pricing

technique that accounts for flexibility in M&A deals is needed and one such technique is OPT. The pricing of exchange options using closed-form solutions on two securities without barriers when exercise prices are uncertain can be traced back to Fisher (1978) and Margrabe (1978), although those studies were not explicit on whether exchange options are found within M&A framework. Although, the two models are similar; however, the exercise price in the Fisher model is fundamental price such as net asset value per share while the exercise in Margarbe model is a financial price such as share price. Both models draw their principles from the Black and Scholes (1973) (henceforth B-S) model.

Some of the earliest study that was explicit in exploring option pricing within M&A framework is Benston et al. (1995), which is based on their argument on insurance put-option hypothesis (IPOH) without using a specific option pricing model. IPOH states that when one deposits money into a bank, there is a premium paid into the bank account which acts as insurance for the deposit because regulators use policies to force banks to meet certain minimum levels of liquidity. That premium is measured as the difference between acquisition price paid for target firm and the market value of a target firm. If the difference is positive then the difference is consistent with IPOH. The results were inconsistent with IPOH because acquiring banks wanted to increase risk or enhance operations of target firms so that returns of the merged entity increase from addition of new products.

From early 2000s, option pricing within M&A framework compared flexibility values of discounted cash flows (DCFs) and real options-Qiu and Yeo (2003), and deferral options in M&As when one merging firm is private-Fuller et al. (2002). Officer (2004) and Subramanian (2004) are some of empirical studies that acknowledged limitations of options models like B-S model: according to them, these limitations were due to the type of options embedded in their data samples. They argue that options models should be improved in order to capture other parameters that were not captured by original options models such as the B-S model.

Officer (2004) explored deals financed through combination of stocks and cash, in addition, when collars entice mergers. One of arguments put forward in relation to collars is that they allow specific exchange ratio conditional on certain price levels provided the potential merger stays within anticipated price levels. As in the REIT industry, it is a normal practice that exchange ratios at announcement and closing dates are the same, this article adopts the same principle. Due to the conditions of collars in M&As, Officer (2004) used both the B-S model and Asian option-pricing algorithms. The other trait of a collar is that its inclusion minimises re-negotiation possibilities when resolutions are passed, a phenomenon dissimilar to American options. Despite of differences in the B-S model and Asian option-pricing algorithms results, similar patterns were illustrated by both groups of results.

The use of option pricing to value corporations has been used extensively, not only in real estate markets, where very recently Cline et al. (2014) explore stock options and combine them with REITs secondary equity offerings data to

investigate insider trading activities. From mid 2000s, Hackbarth and Morellec (2008) and Sorwar and Sudarsanam (2010) started to value M&A synergies using option pricing techniques. Sorwar and Sudarsanam (2010) priced put options within B-S framework and, as in Bhagat et al. (1987); they assumed that the observed price is the difference between the underlying price and fractional put option[**]. Implied options prices and volatilities were modelled based on the logic of the later statement. Results indicated that there is a premium obtained by target firms from acquiring firms in M&A deals. Hackbarth and Morellec (2008) analysed stock returns behaviour based on real options approach. Hackbarth and Morellec (2008) argued that growth options in M&A context involves two firms entering one deal which implies that one is valuing expansion strategies of acquiring firms and exit strategies of target firms simultaneously. They designed a dynamic model of takeovers in order to account for many model parameters including competition, risks associated with M&As, firms operations and deferral possibilities. However, they acknowledged that the Margrabe model is appropriate in pricing exchange options when M&A deals are financed through stocks. Results of Hackbarth and Morellec (2008) indicate that risks decrease after M&A completion period while returns increase during the same period.

After determining the exchange option value associated to each M&A deal, this article is also interested in identifying the sources of such value and hence whether there is a systematic component attached to specific REIT characteristics.

2.2 Parameters Impacting M&A Behaviour

Born et al. (1989) exemplified effects of M&As on wealth of shareholders of target firms. The sample was made of M&As over a period of 1969-1986. Born et al. (1989) used Market-Adjusted Return (MAR) method to define wealth and used different windows to calculate excess returns (ERs) and cumulative excess returns (CERs). For (+8;0) window ERs were statistically significant but CER were statistically insignificant, and for the rest of pre-M&A periods, ERs and CERs were statistically insignificant, for post-M&A period, ERs were statistically significant for (0;-10) window, and other post-M&A windows ERs and CERs were statistically insignificant. According to Womack (2012) the reason why excess returns are statistically insignificant especially in long run has to do with the fact that REIT M&As are beneficial to everyone. Born et al. (1989) argue that although ERs and CERs are statistically insignificant especially in the long run, excess returns presence illustrate information asymmetry in the REIT industry. From the 1990s, empirical studies on REIT M&As explored multiple factors that drive REIT M&As. Among cited REIT M&A drivers are sizes of firms, earnings growth, governance structures, value creation and information asymmetry, Mueller (1998) and Campbell et al. (2001 and 2005). Mueller (1998) illustrated that size has impact on the growth of REIT firms; although, in the long run what matters is funds from operations (FFOs) per share because dividends effects need to be accounted for in value calculations. In addition, Mueller (1998) stated that for small-cap and mid-cap REIT firms,

[**] A fractional put option is put option where one does not account for full option value.

growth in value is largely bolstered by quality as opposed to size of merging firms over the 1994-1998 period. A full review of real estate merger motives is presented in Anderson et al. (2009).

Campbell et al. (2001) explored REIT stocks financed M&As when target is a private firm. According Campbell et al. (2001), when target is private, acquiring firm would require positive returns because of presence of information asymmetry and this is consistent with blockholders hypothesis. Campbell et al. (2001) used CARs for acquiring and target firms to illustrate effects of information asymmetry on M&As. Starting from one-day window, day 0 to (-1;0;+1) including (0;-1) windows, Campbell et al. (2001) showed that abnormal returns (ARs) coefficients are small and statistically significant. However, in the long run, ARs and CARs coefficients were statistically insignificant. Moreover, Campbell et al. (2001) used regressions and results illustrated that size (i.e. book value of acquirer in billions of dollars), ratio of acquirer size to target size (sizerat) for acquirer being part of umbrella partnership of REIT, UPREIT (ACU), geographical diversification (GD) and for transaction being announced in the fourth quartile (CFOUR) are all statistically significant, coefficients of size and GD are negative while sizerat, ACU and CFOUR coefficients are positive.

Campbell et al. (2005) explored on how governance influence value creation in REIT M&As over the period of 1995-2001. Campbell et al. (2005) argue that governance structures in REITs during 1990s were influenced by UPREIT. Other than improvement of governance structure due to establishment of UPREIT, UPREIT brought in convertibles that benefited REIT shareholders. Campbell et al. (2005: 225) stated that "we find that wealth effects from central managerial changes are positively related to the degree to which payment takes the form of convertible equity units of UPREIT subsidiaries, and the minimum lock-up period for those units prior to conversion". ARs were higher when target management were part of new REIT structure and lower when target management were not part of new REIT structure. Daniels and Phillips (2007) explored impact of financial advisors on REIT M&As over the period of 1981-2001. The main hypothesis in Daniels and Phillips (2007) was to find out if financial advisors bring any benefits in REIT M&As. The results indicated that a financial advisors especially ones with good monitoring skills reduces levels of information asymmetry. Moreover, the reduction of information asymmetry was found to have a positive impact on REIT values, stocks, options, regions and divest of REITs.

Finally, after valuation and due diligence, acquiring firms have a choice of financing prospective M&A deals through cash and/or stocks. M&A deals that involve undervalued firms tend to be financed through cash while M&A deals that are made up of firms which are overvalued tend to be stock financed, as Fuller et al. (2002) argue. Womack (2012) illustrated that the REIT industry is different from most industries in terms of M&A financing as most deals are financed through combination of stocks and cash. Ghosh et al. (2012) present evidence of excess use of cash holdings leading to value destruction in REIT corporate acquisitions. Fundamentally, one infer from prior studies such as Leland (2007) that systematic components that contribute to values of firms can

be grouped as follows: beta (i.e. risk), insider shareholding, institutional holding, management style (self or not), board type (staggered or not) contribute to conflict of interest; return on equity (ROE), volatilities of acquirer and target respectively, growth (M&A era), ratings, dividend yield and leverage contribute to organic growth of firms; debt and equity forms funding type for financing growth and REIT type include whether a listed fund is a REIT or not are due to the specialisation of a firm.

3 Modelling M&A Options

In pricing exchange options; firstly, this article presents cash-financed only options; secondly, the stocks-financed only options and finally, the article extended the Margrabe (1978) such that it is suitable for pricing exchange options financed through a combination of cash and stocks.

3.1 Cash-Financed Only Options

When M&A deals are financed through cash only, the B-S model is used to price exchange options rising from the right of target companies to sell their shares for a pre-defined sum of money. When two firms merge, the emerging option represents a put option that target firm obtains from the acquiring firm and the put option can be computed as follows:

$$p = Xe^{-r\tau}N(-d_2) - S_0N(-d_1) \tag{1}$$

with

$$d_1 = \frac{ln\left(\frac{S_0}{K}\right)+\left(r+\frac{\sigma^2}{2}\right)\tau}{\sigma\sqrt{\tau}} \tag{2}$$

$$d_2 = d_1 - \sigma\sqrt{\tau} \tag{3}$$

where p is the put option, S_0 is the spot price (i.e. target price), X is the exercise price (i.e. the deal value per share which SNL Financial calculates as amount paid for target acquisition over shares used to calculate deal, those shares include ordinary shares and operating units outstanding), r is the continuous risk-free interest rate, τ is tau which represents time to expiration (in this case time to expiration starts when the merger is announced until when the deal is closed), σ is the volatility of the stock, d_1 and d_2 are probabilities of being in-the-money position, $N(d_1)$ and $N(d_2)$ are univariate cumulative normal density functions with upper integral limits d_1 and d_2 respectively.

3.2 Stocks-Financed Only Options

When mergers are only stock-financed the Margrabe (1978) (from here Margrabe) model is an appropriate model. The Margrabe model with no cost of carry is illustrated as follows:

$$C[S_1, S_2, \tau] = KS_1N(d_1) - S_2N(d_2) \tag{4}$$

with

$$d_1 = \frac{ln\left(\frac{KS_1}{S_2}\right)+\left(\frac{\sigma_p^2}{2}\right)\tau}{\sigma_p\sqrt{\tau}} \tag{5a}$$

$$d_2 = d_1 - \sigma_p\sqrt{\tau} \tag{5b}$$

$$\hat{\sigma}_p = \sqrt{\sigma_1 + \sigma_2 - 2\sigma_1\sigma_2\rho_{1,2}} \tag{6}$$

where c is the long call option, S_1 is the acquiring asset, S_2 is the target asset, σ_1 and σ_2 are volatilities of assets one and two respectively, r is the continuous risk-free interest rate, $\hat{\sigma}_p$ is the combined volatility of two assets, $\rho_{1,2}$ is the correlation coefficient between the two assets, d_1 and d_2 are probabilities of being in-the-money position, $N(d_1)$ and $N(d_2)$ are univariate cumulative normal density functions with upper integral limits d_1 and d_2 respectively. During M&As, the acquiring firm sometime offers an exchange ratio fraction, K of its own shares in exchange of shares of the target company. The reason why S_1 is multiplied by the exchange ratio because the SNL Financial defines the exchange ratio as "number of the common stocks of the buyer (i.e. acquiring firm) to be exchanged for common stocks of seller (i.e. target firm)". The estimated volatilities of S_1 and S_2 are from their historical prices as historical volatilities are model free. This implies that those historical volatilities are very good in predicting future volatilities as implied volatilities predict future volatilities well. The positive and negative sign before S_1 and S_2 illustrate that S_1 and S_2 sold and bought respectively. Any income generated by underlying assets is treated as dividends in order to avoid over estimation of options prices.

This article uses the Margrabe model with no cost of carry because of poor quality of the data used in this article. Issues leading to poor quality of data will be discussed under data section of this article.

3.3 Cash and Stocks Financed Options

Then, the Margarbe (1978) model is extends such that it suitable for pricing exchange options when financed through a combination cash and stocks. The main model assumption is that for stocks and cash financed M&A deals, M&A optionality is disentangled in combinational funding by assuming that cash and stocks are mutually exclusive (i.e. correlation is zero). In other words, the amount of stocks and cash injected in an M&A deal depends on how the target firm shareholders want to funded in terms funding types. The phenomenon can be traced back to Officer (2004) and Subramanian (2004).

$$C\left[(S_{spot} + S_{stocks}), S_2, \tau\right] = K\left(S_{spot} + S_{stocks}\right)N(d_1) - S_2 N(d_2) \tag{7}$$

with

$$d_1 = \frac{ln\left(\frac{\left(S_{spot} + KS_{stocks}\right)}{S_2}\right) + \left(\frac{\sigma_p^2}{2}\right)\tau}{\sigma_p\sqrt{\tau}} \tag{8}$$

$$d_2 = d_1 - \sigma_p\sqrt{\tau} \tag{9a}$$

$$\hat{\sigma}_{p_{spot;stocks}} = \sqrt{\sigma_1 + \sigma_2} \tag{9b}$$

$$\hat{\sigma}_{p_{1;2}} = \sqrt{\sigma_1 + \sigma_2 - 2\sigma_1\sigma_2\rho_{1,2}} \tag{9c}$$

where S_{stocks} is the amount of stocks injected into the M&A deal over outstanding ordinary shares of the acquirer, S_{spot} is the price per share of the acquiring firm (i.e. the spot price of the acquirer at the time of the merger which is made up of cash injected in the merger over outstanding ordinary shares of the acquirer). That is, the S_{stocks} in eq. (8) is similar to the S_1 in eq. (4) and the S_{spot} is the extra parameter due to cash injection in the M&A deal. The volatility of S_1 and S_2 is illustrated by $\hat{\sigma}_{p_{1;2}}$ and $\hat{\sigma}_{p_{spot;stocks}}$ illustrates volatility of S_{stocks} and S_{spot} (i.e. volatility of S_1). The correlation coefficient between spot price and stocks

amount; $\rho_{spot;stocks}$ is zero because positive correlation decreases options values while negative correlation increases options values. That is, cash and stocks financing in M&A deal are additive. The correlation coefficient of the price of the acquirer spot price (i.e. spot price at the time of the merger and stocks amount) and the price of the target firm, $\rho_{1,2}$ is taken into account. The rest of the variables are the same as in the non-altered Margarbe model.

4 Data

The total sample size is made of 178 M&As. Some are mergers between two REITs and others are mergers between a REIT and a REOC, and the remaining between a REIT and a non-REIT firm (i.e. financial services and/or investment management, and conglomerates). The sample is taken from SNL Financial and some other economic and financial variables are obtained from Bloomberg and Thomson/DataStream. Out of 178 M&A deals, 121 (i.e. 67.98%) deals are public-to-public mergers and the remaining 57 (i.e. 32.02%) are public-to-private mergers. Since our analysis requires the availability of share prices for both target and acquiring firms, this article focuses on the former in our analysis and one also needs to reduce the sample by further 15 deals because the available data is incomplete. Given that preliminary data has short comings, this article does not present it but gives an overview of preliminary-both acquiring and target firms. The preliminary data on acquiring firms is as follows.

Most deals were in the shopping centres sector, followed by multi-family, then health care and the rest of other sectors. In terms of deal sizes, most valuable deals were in the diversified sector followed by shopping centres and offices, the health care and the rest of sectors. According to the REITWatch report as the 29th of August 2014, the industrial sector had the highest performance, followed by shopping centres and then rest of the sectors. In addition, the REITWatch report shows that in 2006, every sector's annual return excluding diversified and self-storage were more than 20% per annum. In 2008, all sectors excluding self-storage had negative annual returns-probably because the self-storage sector has defensive stock characteristics. If one adopts a principle similar to Bhagat et al. (1987), and Sorwar and Sudarsanam (2010) using the differences between mean and median, spreads significantly different from zero are found in every group especially in the funding group. This evidence supports the fact assumption that funding group variables should contribute more to options values than other variable groups. And the preliminary data on target firms is as follows.

In the conflict of interest group, all variables are positively skewed except institutional shareholding (i.e. institut) and being self-managed (i.e. Msself). In other words, risk (i.e. beta), insider shareholding (i.e. insider) and staggered board or not (i.e. Sboard) should contribute more to options values than institut and Msself. In the growth group, all variables are positively skewed except REOC and dividend. All the specialisation group variables are positively skewed. Therefore, specialisation group variables should contribute significantly to values of options. In both acquiring and target firms, there were issues

relating to poor quality of data.

From the entire sample of downloaded M&A deals, some issues of data quality are raised for some M&A deals which lack observations for all the required calculations in the two empirical hypotheses. Poor quality of data issues include: no dividends period or recorded dividends, missing data points in between first and last data points, no coupon rates recorded on debt, equity and debt not recorded, and data recorded over short periods (i.e. less than a year and therefore, one cannot estimate historical volatilities over required period). Although not in every case, SNL Financial removes the target firms from its database once they are taken over and it only lists the merged entity. This is part of data cleaning and storage process by SNL Financial. Hence, most data shortage is on the target firms. In certain cases, share price series of target firms stop way before the M&A announcement date. Another parameter which is important in calculating exchange options is the exchange ratio of each deal. Hence, one had to dismiss 10 M&A deals for which SNL Financial did not record exchange ratios. Some M&A exchange ratios were collected from the Thomson DataStream. On dividends, SNL Financial has dividends on 47 firms of the final sample and all annual dividends periods are shorter than 7 years, therefore dividend yields for 11 firms were obtained from Bloomberg terminal.

In total 72 M&A deals are left out from the final sample, which means the final sample is made up of 106 transactions. In the final sample, one also kept a very small number of deals where one of the two firms appeared already in another deal (i.e. it merged more than once during the 1994-2010 sample period). Our GARCH (1,1) calculations illustrate that during the sample period, the U.S. REIT industry was in a bull market phase as spot volatilities converge to their long-term average volatilities from the top. Therefore, financing those REIT M&A deals was easier than in other more bullish periods as described in-Bygrave and Timmons (1986). Table 1 exemplifies some appropriate M&A characteristics of our sample:

Table 1: Descriptive Statistics

Acquiring Firms								
Effect	**Variable**	**Mean**	**Median**	**Min**	**Max**	**Std Dev**	**Skewness**	**Kurtosis**
Conflicts of Interest	beta	0.62	0.59	0.16	0.91	0.18	-0.15	-0.33
	insider (%)	8.40	3.87	0.00	57.40	11.26	2.56	7.94
	instit (%)	92.97	97.18	39.57	110.58	92.97	7.8	60.92
	msself	0.93	1.00	0.00	1.00	0.25	-3.55	10.86
	sboard	0.19	0.00	0.00	1.00	0.39	1.63	0.68
Growth	ROE (%)	12.15	7.07	0.00	226.84	26.01	6.12	45.67
	dividend	1.00	1.00	0.00	11.00	1.20	4.75	36.19
	volatility	0.40	0.26	0.00	1.26	0.35	0.08	0.74
	audit fees ($mn/p.a.)	14.36	14.24	0.91	29.00	3.06	-3.24	14.68
	growth	2001	2002	1994	2009	4.18	-0.20	-1.32
	rat_inv	0.64	1.00	0.00	1.00	0.48	-0.62	-1.66
Funding	tf_debt ($mn)	1,175.47	525.9	0	13,276.20	2,116.26	4.30	21.02
	tf_FFOs ($ mn)	1,957.14	596.4	4.93	24,472.70	4,217.69	4.30	19.27
	tf_cash ($mn)	1,585.26	239.62	0	24,472.70	4,233.44	4.49	20.52
	tf_stock ($ mn)	402.56	22.1	0	3,310.70	770.84	2.61	6.44
	tf_ps ($ mn)	7.01	0.00	0.00	175.00	29.64	4.74	22.6
	tf_cou ($ mn)	5.56	0.00	0.00	67.41	11.93	4.84	22.41
Specialisation (i.e. sectors)	sc	0.07	0.00	0.00	1.00	0.23	5.38	40.30
	ind	0.05	0.00	0.00	1.00	0.20	5.24	29.92
	mf	0.07	0.00	0.00	1.00	0.20	7.39	71.40
	diversified	0.72	1.00	0.00	1.00	0.45	-0.99	-1.04
	off	0.07	0.00	0.00	1.00	0.25	3.57	10.91
Target Firms								
Effect	**Variable**	**Mean**	**Median**	**Min**	**Max**	**Std Dev**	**Skewness**	**Kurtosis**
Conflicts of Interest	beta	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	insider (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	instit (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	msself	0.78	1.00	0.00	1.00	0.42	-1.36	-0.14
	sboard	0.51	1.00	0.00	1.00	0.51	-0.04	-2.09
Growth	ROE (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	dividend	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	volatility	0.43	0.19	0.00	1.34	0.46	0.07	0.49
	audit fees ($mn/pa)	13.24	13.28	10.21	15.66	1.16	-2.85	7.56
	growth	2001	2002	1994	2009	4.18	-0.20	-1.32
	rat_inv	0.64	1.00	0.00	1.00	0.48	-0.62	-1.66
Specialisation (i.e. sectors)	sc	0.11	0.00	0.00	1.00	0.27	4.11	21.32
	ind	0.04	0.00	0.00	1.00	0.19	5.39	30.92
	mf	0.08	0.00	0.00	0.67	0.18	3.85	35.49
	diversified	0.84	1.00	0.00	1.00	0.39	-1.40	1.50
	off	0.15	0.00	0.00	1.00	0.36	1.99	2.01

Note: beta is for the risk, insider is for insider ownership, ROE is return on equity, dividend is dividend paid, tf is for total funds, FFOs is funds from operations (i.e. internal funds), pf is for preference shares and cou is common operating units, msself is for self-managed, sboard is for staggered board, $mn is for millions in U.S. dollars, growth and rat_inv (i.e. investment rating) symbolise M&A period (i.e. year) and for investment grade respectively, and they applicable in a similar manner to acquiring and target firms, and growth is based on announcement year as opposed to completion one, msself, growth and all specialisations variables are identified by dummies, sc is for shopping centres and it includes sc, regional malls and outlet centres, Ind is for industrial and it includes ind and self-storage, mf is for multi-family and it includes mf, manufactured homes and residential homebuilders, and off is for offices.

In table 1, from the conflict of interest group, beta (i.e. risk) and being self-managed (Msself) are negatively skewed while other parameters-i.e. insider

shareholding (insider), institutional holdings (instit) and staggered board or not (Sboard)-are positively skewed and hence contribute more to options values. Moreover, positively skewed parameters from the conflict of interest group tend to have higher standard deviations. This is one of the reasons why insider, instit and Sboard contribute more to options values. In the growth group, ROE, the dividend yield and volatility are positively skewed while auditing (audit) fees, growth period and rating investment (Rat_Inv) are negatively skewed. The reason why dividend yield and volatility contribute more to options values is partly due to OPT. As far as ROE is concerned, if earnings are retained in business then that retained money can be used for expansion purposes. The reason why audit fees contribute less to options values is because audit fees represent cash outflows which minimise the money left in the business to be reinvested. Growth is during the period of a continuous and steady growth (i.e. 1990s) of REIT firms; therefore, any positively change had little impact on option values as the M&A activity was already high. As far as Rat_Inv is concerned, since properties are speculative investments by nature and take into account all parameters that drive property values; therefore, the Rat_Inv does not change the real rating of properties. All the different types of financing are positively skewed; this implies that they contribute more to options values. This might be due to the fact that funding whether of debt or equity nature contributes positively to the value of firm. Gatchev et al. (2009) share the same view on how funds contribute to values of companies, even if different types of funds to company values differently (e.g. POT).

From the specialisation group, shopping centres (SC), industrial (Ind), multi-family (MF) and offices (Off) are positively skewed while diversified is negatively skewed. The reason why being a diversified contributes less to options values is because most of the U.S. REIT firms are specialised; moreover, Anderson et al. (2009) illustrate that it is more advantageous to be a specialised REIT firm in the U.S. than to be a diversified firm. On the other hand, Anderson et al. (2009) find that diversification costs out way diversification benefits in the U.S. REIT industry. If one explore average group spreads, one notices that the spread for the conflict of interest is 6.71%, 49.75% for the growth group and -0.40% for the specialisation group. Similar spreads can be inferred from Bhagat et al. (1987), and Sorwar and Sudarsanam (2010). Positive spreads are desired as they illustrate amount of money that one can make by taking position in a certain market. The reason why the growth group reports the highest spread(s) may lie on the fact that variables include financial option parameters such as volatility and dividend yields. The average spread for the funding group is left out because for the target firms, the funding values are missing (i.e. data provider does not have them). In recoding dates, SNL Financial provides M&A announcement and closing dates for each M&A deal with no extension or possible termination dates on all M&As; therefore, it is assumed that all options are of European nature. The announcement date is decided in two ways, SNL Financial either takes the earliest event date as the announcement date or where there is letter of intent (LOI) dated prior to the definitive agreement date, SNL Financial registers the LOI date as the announcement date. The closure date is estimated by SNL Financial based on interviews with respective companies involved in M&As and

should the actual date be different, SNL Financial changes the date accordingly after the M&A completion (hence only the modified date is observed).

5 Empirical Analysis

In presenting options values, this article separates cash financed deals from stocks financed ones. Furthermore, the study distinguishes between hot and cold M&A deals. Table 2 illustrates options values:

Table 2: Options Values during 1994-2010 Period

Model Type	Mean	Median	Min	Max	Std Dev	No	Skewness	Kurtosis
B-S model	3.92	2.17	0.26	29.02	5.22	49	3.26	12.93
Margrabe model	3.24	1.12	0	33.92	6.23	57	3.4	12.62
M&A Type								
REIT & REIT	3.55	1.76	0	18.19	5.83	66	3.28	12.05
REIT & REOC	3.71	1.77	0.88	33.92	6.04	25	3.14	10.92
REOC & REOC	3.79	1.8	0.26	29.02	6.47	7	3.31	11.53
NONRE & NONRE	3.61	1.77	0.65	12.19	5.92	8	3.34	12.39
Hot Sectors								
Diversified	0	0	0	0	0	2	0	0
Health Care/Hotel	0.85	0.81	0	1.72	0.86	3	0.16	0
Industrial/ Self-Storage	3.65	0.93	0.02	18.19	7.17	6	2.38	5.72
Multi-Family	1.65	1.08	0	6.86	1.96	18	1.49	1.76
Office	1.98	1.98	0.83	3.13	1.62	3	0	0
Shopping Centres	3.27	0.39	0	17.09	6.8	6	2.39	5.78
Cold Sectors								
Conglomerate	1.77	1.02	0.65	3.64	1.63	3	1.63	0
Correctional Services	2.77	2.77	2.77	2.77	0	1	0	0
Diversified	1.65	1.65	1.51	1.8	0.2	2	0	0
Financial Services	2.32	2.32	0.98	3.66	1.89	2	0	0
Health Care/Hotel	4.19	2.43	0	24.82	6.32	15	2.89	8.96
Industrial/ Self-Storage	2.34	2.03	0.54	4.77	1.84	4	0.8	-0.25
Multi-Family	3.51	4.04	0	8.21	3.05	11	0.25	-1.3
Office	4.3	1.78	0	29.02	8.1	12	3.04	9.65
Power Generation	33.92	33.92	33.92	33.92	0	1	0	0
Shopping Centres	3.19	1.44	0	15.52	4.66	16	1.88	2.77
Wireless Telecom	7.8	7.8	7.8	7.8	0	1	0	0

Note: health care and hotel are put together because they are within hospitality industry, industrial and self-storage are put together because they offer similar services; multi-family, apartments and residential homes are grouped together as they offer similar services, outlet-centres and regional malls with shopping centres are put together because of their similarities. Each option is either B-S or Margrabe option not both, N.: is sample size for that particular variable, REIT is for real estate investment trusts, REOC is for real estate operating company, and nonre if for non-real estate company although nonre do have some investments in real estate sectors. Sectors are grouped per acquiring and target firms sector specialisation and in case where acquiring and target firms are from different sectors, the acquiring firm's sector is taken as the sectors for each M&A deal. Definition of hot and cold is adopted from Colak et al. (2008), basically, hot is when event reached its peaks or higher levels (i.e. 1990s) and cold (i.e. 2000s) is the opposite of hot. From hot sectors; from shopping centres, 2 target firms are not shopping centres firms, from multi-family, 2 target firms are not multi-family sectors, from industrial/self-storage, 2 target firms are not industrial/self-storage firms, from offices, 1 target firm is not within office sector and from diversified, 2 target firms are non-diversified firms. From cold sectors, within office sector, 7 target firms are not office firms, from shopping centres, 2 target firms are non-shopping centres firms, from multi-family, 4 target firms are not multi-family firms, from healthcare/hotel, 7 target firms are not in health care/hotel sectors, from industrial/self-storage, 1 target firm is not from industrial/self-storage sector and from diversified, 1 target firm is non-diversified firm.

Table 2 illustrates that most M&As were financed through stocks (including stocks and cash) than cash and this is in line with Womack (2012) who finds that financing REIT mergers with completely or partly stocks as a common phenomenon. Some curves are positively skewed while a few are normally distributed, this expected as options payoffs are non-linear in shape. Peiro (1999) stated that marginal returns are higher when skewness is positive than negative. Cash financed options seem to be less skewed than stocks financed options and this is due the fact that the B-S options incorporates risk-free rates,

which minimises mispricing of options values. Most REIT M&As took place in retail, multi-family and offices sectors, and one of the reasons is that those sectors performed better than other REIT sectors. Hotels make less than 10% of the U.S. REIT industry and their share prices performed poorly at least in the last ten years. Another reason that might have led to the poor performance of hotels is that their lease and income structures tend to be risky. It seems that the mergers in the hotel sector were largely for strategic reasons. Harrison et al. (2011) stated that hotels offer organic growth as they present a relatively low debt ratio.

Lastly, when one compares cold and hots sectors, most deals took place during the cold period. This is due to fact that during hot periods markets are very noisy and some investors do get overcompensated during the hot periods. Therefore, it is wiser to wait for the cold periods so that valuations of firms' valuations represent fair values. Colak et al. (2008) stated that although one can earn good returns during hot periods; however, hot periods have their own challenges that erode returns if risks are not properly mitigated during those periods. Given that clustering tend to occur in multiple options, this article verifies the independence of the options. Since options are non-linearly distributed, a chi-square test for two scaling constants is used as linearity is not a requirement for chi-square tests given that its distributions are truncated similarly to options values. Table 3 illustrates independence test results:

Table 3: Statistically Significance Difference of Unequal Means

Variable	Difference	Chi-Stat	P-Value	Decision
Leverage	4th vs 1st quartile	22.02***	0.00	Reject H0
Rating	Investment vs speculative grade	38.11***	0.00	Reject H0
Acquirer's institutional holding	4th vs 1st quartile	15.07***	0.00	Reject H0
M&A	Cash vs non-cash financed	50.98***	0.00	Reject H0
M&A	Stocks vs. non-stocks financed	50.98***	0.00	Reject H0
FFOs	Small vs medium	42.37***	0.00	Reject H0
FFOs	Medium vs large	26.51***	0.00	Reject H0
Acquirer audit fees	4th vs 1st quartile	19.00***	0.00	Reject H0
REITs	Specialised vs non-specialised	53.38***	0.00	Reject H0
Debt	Small vs medium	42.69***	0.00	Reject H0
Debt	Small vs large	42.26***	0.00	Reject H0
Debt	Medium vs large	25.16***	0.00	Reject H0

Note: Chi-square independence test, the critical chi-stat is 3.84 for all variables tested, ***, ** and * denote alphas at 1%, 5% and 10% levels, respectively, acquirer audit fees and acquirer institutional holding, we compared 4th and 1st quartiles as 2nd and 3rd quartiles might have similar traits because of their proximity; therefore making them statistically insignificant, H_0 is the null hypothesis, cash financed means only financed through cash, non-cash financed means financed through stocks or combination of stocks and cash, stock financed means only financed through stocks, non-stock financed means financed through cash only, amount sizes definitions were adopted from Mueller (1998); 0-$500 million are classified as small-caps, 501-$1,000 million are mid-caps, $1,001-$4,000 million are large-caps and above $4,000 million are mega-caps, and last some parameters were left of out because their sample was small, i.e. less than ten.

The null hypotheses are rejected at significantly high p-values; this implies that means of two groups are statistically different from each other. Leverage for

different quartiles should be different as the more leverage a REIT firm has on its balance sheet, the higher are expansion chances without major difficulty. Allen et al. (2000) stated that coefficients of leverage are positive and statistically significant because leverage is advantageous to REIT firms during expansion periods. Investment and speculative grades are different as most investors prefer investing in investment grade than speculative one. The reason why different quartiles of acquirer institutional holdings are different might be due to the fact that REITs are formed by investors who have a common goal. Therefore, high institutional holdings eliminate unnecessary conflicts of interest in managing REIT firms.

Cash and non-cash (i.e. stocks) deals are different because the latter are normally overvalued while cash (i.e. non-stocks) deals are normally undervalued. Daniels and Phillips (2007) echoed similar view. The availability of either internal (i.e. FFOs) or external funds (i.e. debt) allows acquirer to source funds during growth phases, although preference would be given to FFOs as per POT and amount of debt should ideally not matter in good real estate markets. Finally, on audit fees, Bairagi and Dimovski (2012) found that firms should be concerned with net proceeds in initial public offering (IPOs) as the amount that matters in REIT firms is only net proceeds when funding growth of firms. In the U.S. it seems that it is easier for specialised REITs to expand than diversified REIT firms. Campa and Hernando (2004) reported that several combinations of variables as well as univariate regression results show the importance of each single factor in explaining growth option values. This article derives a non-linear model to map various parameters against options values as below. An exponential equation can be represented as follows:

$$Y_t = AX_{1t}^{\beta_1} X_{2t}^{\beta_2} e^{\mu_t} \tag{10}$$

One advantage of using an exponential model is that it can be transformed into a linear equation using logarithm functions. On the other hand, independent variables in linear regressions are elastic in relation to the dependent variable in linear models. Logarithms are taken on both sides and eq. (10) is re-arranged:

$$ln(Y_t) = ln(A) + \beta_1 ln(X_{1t}) + \beta_t ln(X_{2t}) + \mu_t \tag{11}$$

where A is a constant (i.e. y intercept), β_1 and β_2 are estimated parameters, and X_{1t} and X_{2t} are independent variables, μ_t is the mean and Y_t is dependent variable. Now, one assumes that $ln(A) = \alpha$, $ln(Y_t) = Y_t$, $ln(X_{1t}) = X_{1t}$ and $ln(X_{2t}) = X_{2t}$, then:

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \mu_t \tag{12}$$

Given that Y_t, options values are non-linear, it is decided to keep dependent variable as $ln(Y_t)$ in order to maintain non-linearity approximation of options values. Therefore, eq. (12) becomes:

$$ln(Y_t) = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \mu_t \tag{13}$$

After all the transformations, one can see that eq. (13) is a log-linear model simultaneously accounts for linear and non-linear distributions. More, eq. (13) is used to test different effects and models heterogeneity controlled. Models for conflict of interest are called conflicts, models for organic growth effect are called

growth, models for funding effect are called funding and models for specialisation effect are called specialisation and models for combined effects are called amalgamated. For conflict of interest, target firms parameters were left out as there is limited data on those parameters. Table 4 illustrates results for conflicts:

Table 4: Option Value Determinants: Conflicts of Interest

Effect	Variable	C1	C2	C3	C4	C5	C6	C7
Conflict of Interest	Constant	1.5905*** (0.000)	0.9070*** (0.0000)	1.0042*** (0.0000)	0.8614*** (0.0000)	1.1391*** (0.0000)	0.5487 (0.2354)	1.1004** (0.0273)
	ac_beta	-0.8474 (0.1198)					-0.1531 (0.8215)	-0.2719 (0.6933)
	ac_insider		0.0179* (0.0646)				0.0221** (0.0424)	0.0198* (0.0779)
	ac_instit			0.0001*** (0.0000)			0.0001*** (0.0009)	0.0001**** (0.0049)
	ac_msself				0.1330 (0.4195)		0.4022*** (0.0090)	
	ac_sboard					-0.4260** (0.0223)		-0.4370* (0.0736)
Adjusted R^2		1.81%	4.13%	1.24%	-1.32%	2.61%	5.58%	6.91%
White Test		0.1569 (0.6920)	1.2007 (0.2732)	0.3433 (0.5579)	0.1018 (0.7507)	3.2111* (0.0731)	4.1578 (0.9651)	1.7298 (0.7853)
Durbin-Watson		1.54	1.52	1.59	2.08	1.69	1.68	1.75
F-Stat		2.3256 (0.1317)	4.3164** (0.0411)	1.7180 (0.1953)	1.1434 (0.2849)	3.0076* (0.0870)	1.8267 (0.1377)	2.0022 (0.1085)
Akaike IC		2.60	2.52	2.53	2.44	2.54	2.56	2.56
Schwartz IC		2.60	2.58	2.61	2.51	2.61	2.73	2.75
Hannan-Quinn IC		2.57	2.55	2.56	2.47	2.57	2.63	2.63

Note: Each model maps logarithm of option price against independent variable(s), for each model, the first number is the co-efficient of independent variable followed by p-value, ***, ** and * denote alphas at 1%, 5% and 10%, respectively; ac is for acquiring firm, beta is the risk, instit is for institutional holding, msself is for self-managed, sboard is for staggered board and insider is for insider shareholding. Dummies identify ac_msself and ac_sboard. As ac_msself and ac_sboard are correlated; therefore, we decided to have conflicts 6 and 7 so that ac_msself and ac_sboard are not in the same model. White test is for heteroscedasticity and durbin-watson for autocorrelation. For white test, the first numbers is the co-efficient followed by p-value and, akaike, schwarz and hannan-quinn criteria compares models in relative terms. The C in the first row of the table 4 stands for conflict of interest.

In column 2 and 3, insider ownership and institutional holdings are positive and statistically significant. The positive insider ownership coefficient can be attributed to the fact that insiders have more information about a REIT firm than outsiders. Moreover, insiders will do everything in their power in order to be overcompensated in M&A deals. Capozza and Sequin (2003) echoed positive impact of insider ownership in REIT firms. The positive coefficient of institutional holding has to do with the POT as when firms expand, they first look at amount of cash available as it is cheap considering than debt as has benefit of being tax-deductible in the case of a REIT firm. In the context of REITs, money first comes from insiders (i.e. people owning and managing a REIT firm); thereafter, retail investors; lastly, institutional investors. The latter statement also explains why the coefficient of institutional holding is small. In conflict 5, staggered board is negative and statistically significant because board members serve on firms boards for a specific period; therefore, there is no incentive for sitting board members to contribute to a REIT firm beyond their tenure. The statistical significance of insider ownership and institutional holdings in conflicts 6 and 7 is for the same reasons mentioned earlier. Msself and Sboard are correlated; therefore, in order disentangle the correlation between those two variables, there are two conflicts; i.e. 6 and 7. The F-statistics

illustrate that there are structural breaks in conflicts 2 and 5; however, one cannot do anything about them given that the analysis is based on cross sectional data. The White test illustrates that there is white noise in conflict 5. Table 5 illustrated funding:

Table 5: Option Value Determinants: Funding

Effect	Variable	F1	F2	F3	F4	F5
Funding	constant	1.0618** (0.0297)	0.9042*** (0.0000)	0.1206 (0.7272)	0.1272 (0.7140)	-0.0899 (0.8052)
	debt	0.0071 (0.9898)			0.0238 (0.8245)	
	leverage		0.3899 (0.3954)			0.4602 (0.2424)
	FFOs			0.1506*** (0.0078)	0.1456** (0.0178)	0.1534*** (0.0062)
Adjusted R^2		-1.02%	-0.35%	6.46%	5.55%	6.44%
White Test		4.0203** (0.0450)	1.3280 (0.2492)	1.1558 (0.2823)	5.9624 (0.3099)	4.8502 (0.4344)
Durbin-Watson		1.85	1.83	1.86	1.87	1.85
F-Stat		0.0003 (0.9857)	0.6537 (0.4207)	7.8423*** (0.0001)	3.9080** (0.0233)	4.4072** (0.0147)
Akaike IC		2.54	2.53	2.46	2.48	2.47
Schwartz IC		2.59	2.58	2.51	2.56	2.55
Hannan-Quinn IC		2.56	2.55	2.48	2.51	2.50

Note: Each model maps logarithm of option price against independent variable(s), for each model, the first number is the co-efficient of independent variable followed by p-value, ***, ** and * denote alphas at 1%, 5% and 10%, respectively; ac is for acquiring firm, debt is illustrated in three ways, first, debt is a sum of stocks, cash, preference shares and common operating units all over total funds, and that ratio is subtracted from one and FFOs are funds from operations (i.e. internal funds in this case). The reason why debt is defined the way is it is because its results are consistent with prior empirical studies on debt's impact on values of firms. When we use other debt definitions, actual debt and debt as proportion of total funds, results are inconsistent with debt's impact on values of firms. White test is for heteroscedasticity and durbin-watson for autocorrelation. For white test, the first numbers is the co-efficient followed by p-value and, akaike, schwarz and hannan-quinn criteria compares models in relative terms. We tested whether options values if they financed through stocks and/or combination of cash, or cash only matters, the results had a negative co-efficient is-0.1793 with a p-value is 0.2614. The F in the first row of the table 5 stands for funding type.

From all the funding variables, only the FFOs are statistically significant. The positive coefficient of the FFOs is consistent with the notion that the FFOs are part of expansion funds available and the more funds a firm has, the easier is to expand. On the other hand, the statistically significance and of FFOs supports the POT in the sense that during expansion, firms tend to use internal funds before looking for alternatives. Although debt and leverage are statistically insignificant, their coefficients are consistent with prior empirical studies that illustrate that debt increases values of firms. The small coefficient and statistically insignificance of debt has to do with the fact that when firms take on debt especially large amounts, financiers issue stringent conditions on debt issuance. That is, those conditions minimises the impact of debt on options values. Parallel to exploring fund effect, the second hypothesis tested whether the way the M&A deal is financed (i.e. cash or stocks financed) matters. The results produced -0.1793 with a p-value of 0.2614. Thus, financing method type does not have any effect on options values. This could be due to the fact that most M&A deals were executed during the bull phase; therefore, it easier to finance M&A deals during the bull market phase. The F-statistics illustrate that there are structural breaks in funding 3, 4 and 5; however, one cannot do anything about them given that the analysis is based on cross sectional data. Table 6 illustrates growth effects on options values:

Table 6: Option Value Determinants: Growth

Effect	Variable	G1	G2	G3	G4	G5	G6
Growth	Constant	0.6805** (0.0320)	0.9975*** (0.0000)	0.9971*** (0.0000)	1.1744*** (0.0000)	1.1453*** (0.0000)	0.8273 (0.1465)
	ac_audit_f	0.0253 (0.2689)					0.0268 (0.4526)
	ac_ROE		0.6850 (0.2336)				0.0268 (0.4526)
	ac_volp			0.0017*** (0.0012)			0.0021** (0.0348)
	growth				-0.2976 (0.1016)		-0.2677 (0.2645)
	rat_inv					-0.1291 (0.5344)	-0.2339 (0.3217)
Adjusted R^2		-0.75%	0.62%	2.19%	1.86%	-0.89%	2.44%
White Test		0.7671 (0.3811)	0.0001 (0.9908)	0.9584 (0.3276)	0.2872 (0.5920)	0.8965 (0.3437)	2.5574 (0.7678)
Durbin-Watson		1.64	1.89	1.87	1.96	1.38	1.64
F-Stat		0.4419 (0.5083)	1.6220 (0.2058)	2.2132* (0.0761)	2.8720* (0.0933)	0.3558 (0.5527)	1.4637 (0.2152)
Akaike IC		2.56	2.52	2.51	2.51	2.65	2.67
Schwartz IC		2.62	2.57	2.56	2.56	2.71	2.87
Hannan-Quinn IC		2.59	2.54	2.53	2.53	2.67	2.64

Note: Each model maps logarithm of option price against independent variable(s), for each model, the first number is the co-efficient of independent variable followed by p-value, ***, ** and * denote alphas at 1%, 5% and 10%, respectively; ac and ta are for acquiring and target firms respectively, growth is during the 1990s when there marathon growth of REITs, audit_f is for auditing fees, rat_inv is for investment grade rating and it is best case, and out of 106 M&A deals, 49 are rated as investment, 27 speculative and 30 have no ratings. We didn't include speculative grade is it is the opposite investment grade, volp is volatility for a given asset. White test is for heteroscedasticity and durbin-watson for autocorrelation. For white test, the first numbers is the co-efficient followed by p-value and, akaike, schwarz and hannan-quinn criteria compares models in relative terms. The G in the first row of the table 6 stands for growth.

In table 6, the volatility is statistically significant with a positive coefficient. The reason why volatility is positive it is because volatility represents risk and investors want to be compensated for investing in risky investments. Amenc et al. (2012) found similar results on returns in relation to risks. On the other hand, the impact of acquirer volatility on options is consistent with the OPT. The reason why growth does not have an impact on options is that during the growth phase, investors tend to invest directly in underlying assets, thereby leading to fewer investments in options. He et al. (2010) illustrated that growth stocks react positive to new information (especially when the information positive) within trading environment, especially traders. Volatilities of target firms were left out as there is limited data on them. Dividends are left out because they are highly correlated with volatilities and audit fess of acquiring firms. The F-statistics illustrate that there are structural breaks in growth 3 and 4; however, there is nothing one can do about it given that this analysis is based on cross sectional data. The last independent category that is examined is specialisation. For the specialisation categories, there is dummy 1 when there is that specific sector or fund type and 0 otherwise. For specialisation analysis, single-tenants, hotels and health care REITs are excluded because their inclusion causes multicollinearity. On the other hand, some acquiring and target REIT firms are correlated; therefore, most on the analysis for the specialisation category is on target firms. This is due to the fact that most of M&A intensity is mainly target firms. Parallel to testing for specialisation effect, this hypothesis tested whether most M&A options are within sectors or not. The within sectors coefficient for the

latter statement is -0.0058 with a p-value of 0.0005. Thus, options values which are within sectors decrease overall value firms. It could due to the fact that most of the U.S. REITs are specialised. Outside sectors have limited benefits as it costly to be a diversified REIT firm in the U.S. Table 7 illustrates results of specialisation:

Table 7: Option Value Determinants: Specialisation

Effect	Variable	S1	S2	S3	S4	S5	S6
Specialisation	constant	0.9347*** (0.0000)	1.3531*** (0.0000)	1.0635*** (0.0000)	0.6933*** (0.0000)	0.7133*** (0.0000)	0.7076*** (0.0000)
	ac_REOC	0.3851* (0.0907)					
	ac_nonre	0.2507 (0.2353)					
	ac_div		-0.3477* (0.0603)				
	ac_ind		-0.6080*** (0.0051)				
	ac_mf		-0.1837 (0.1689)				
	ac_sc		0.1671 (0.4711)				0.1287 (0.7972)
	ac_off		-0.1693 (0.5335)				
	ta_REOC			-0.2759 (0.3545)		-0.2012 (0.5501)	-0.1889 (0.5766)
	ta_nonre			0.1629 (0.6069)			0.0589 (0.8630)
	ta_div				0.3483** (0.0358)	0.3444** (0.0402)	0.3389* (0.0524)
	ta_ind				-0.2568 (0.2350)	-0.2744 (0.2147)	-0.2775 (0.2053)
	ta_mf				-0.2891** (0.0178)	-0.3062** (0.0175)	-0.2922** (0.0216)
	ta_sc				0.2722 (0.2540)	0.2542 (0.2959)	0.1384 (0.7938)
	ta_off				0.3633 (0.1591)	0.3454 (0.1878)	0.3499 (0.1909)
Adjusted R^2		4.94%	2.61%	1.10%	1.73%	0.95%	-1.06%
White Test		1.0058 (0.6048)	3.8825 (0.5664)	1.1773 (0.5551)	4.4987 (0.4801)	4.6684 (0.5870)	4.8616 (0.6768)
Durbin-Watson		2.14	1.87	1.85	1.90	1.90	1.91
F-Stat		3.4182** (0.0370)	1.5310 (0.1876)	0.4611 (0.6320)	1.3489 (0.2508)	1.1584 (0.3354)	0.8698 (0.5450)
Akaike IC		2.51	2.54	2.55	2.55	5.56	2.61
Schwartz IC		2.59	2.70	2.63	2.71	2.75	2.84
Hannan-Quinn IC		2.54	2.60	2.58	2.61	2.64	2.70

Note: Each model maps logarithm of option price against independent variable(s), for each model, the first number is the co-efficient of independent variable followed by p-value, ***, ** and * denote alphas at 1%, 5% and 10%, respectively; ac and ta are for acquiring and target firms respectively, SC is for shopping centres and includes shopping centres, regional malls and outlet centres sectors, off is for office, ind is for industrial and includes industrial and self-storage sectors, div is for diversified, mf is multi-family and includes multi-family, residential homebuilder and manufactured home. Given some variables such as REITs sectors and traits are identified by dummies, when some groups were put together in one model, econometrical the model didn't work as some of those parameters are explained by combination of some other parameters, i.e., multicollinearity, white test is for heteroscedasticity and durbin-watson for autocorrelation. For white test, the first numbers is the co-efficient followed by p-value and, akaike, schwarz and hannan-quinn criteria compares models in relative terms. Out of 106 M&A deals, 66 are within sectors and 40 outside sectors and we tested whether options values that are within sectors matter or not, results illustrated a co-efficient of -0.0058 with a p-value of 0.0005. The S in the first row of the table 7 stands for specialisation.

For the acquirers, diversified and industrial sectors are statistically significant with negative coefficients. This is due to the fact that being diversified is the best case scenario in terms of specialisation while industrial sector is expensive one. Anderson et al. (2009) stated that in the U.S. most REITs are specialised as expertise within sectors may lead to a more proficient management and

reduction of costs. On the industrial sector, it provides specialised services and finances its operations with most of its retained earnings. Gibson and Lizieri (1999) stated that industrial REIT leases are rigid given that they are suitable for long-term horizons. For the target firms, coefficients of diversified and multi-family are positive and negative respectively, and statistically significant. The diversification issue is relevant because target firms are likely to be overcompensated in mergers as it is costly to be diversified. The reason for negative and statistically significant multi-family coefficient might be due to the fact that multi-family sector has the highest cost-to-income ratio. On the other hand, Harrison et al. (2011) stated that leases of multi-family sectors are risky, and if the risks are not properly mitigated, one stands a chance of losing income of leases of multi-family sector. The F-statistics illustrate that specialisation 1 has structural breaks; however, there is nothing one can do about it given that this analysis is based on cross sectional data. Table 8 reports three versions full models when the four aggregated factors driving M&A options are put together:

Table 8: Option Value Determinants: All Factors

Effect	Variable	A1	A2	A3
Conflict of Interest	constant	-0.4383 (0.3952)	-0.6920 (0.7202)	-0.57222 (0.4518)
	ac_insider	0.0273** (0.0145)	0.0243* (0.0594)	0.0298* (0.0861)
	ac_instit	0.0002*** (0.0000)	0.0001*** (0.0000)	0.0002** (0.0281)
	ac_sboard	-0.4155* (0.0519)	-0.4254** (0.0479)	
Funding	debt	0.0065 (0.9629)	0.0149 (0.7785)	0.0046 (0.9514)
	FFOs	0.2145** (0.0203)	0.1978* (0.0725)	0.1856* (0.0792)
Growth	growth		-0.1660 (0.5478)	-0.0016 (0.9959)
	ac_audit_f		0.0331 (0.7966)	
	ac_volp			0.0019** (0.0018)
	rat_spec			0.0089 (0.9748)
Specialisation	ac_secsc			0.2579 (0.5727)
	ac_nonre			0.2534 (0.5967)
	ta_nonre			0.2680 (0.6202)
	ta_secoff			0.1382 (0.7034)
Adjusted R^2		18.20%	15.70%	22.03%
White Test		18.4416 (0.4931)	33.0444 (0.4651)	11.2588 (0.4218)
Durbin-Watson		1.52	1.54	1.49
F-Stat		3.4033** (0.0102)	2.4366** (0.0324)	3.3103** (0.0264)
Akaike IC		2.45	2.51	2.52
Schwartz IC		2.67	2.80	2.97
Hannan-Quinn IC		2.54	2.62	2.70

Note: Each model maps logarithm of option price against independent variable(s), for each model, the first number is the co-efficient of independent variable followed by p-value, ***, ** and * denote alphas at 1%, 5% and 10%, respectively; ac and ta are for acquiring and target firms respectively, beta is the risk, instit is for institutional holding, sboard is for staggered board, insider is for insider shareholding, FFOs are funds from operations (i.e. internal funds in this case), debt is calculating as sum of stocks, cash, preference shares and common operating units all over total funds and that ratio is subtracted from one, growth is during the 1990s when there was marathon growth of REITs, audit_f is for auditing fees, volp is volatility for a given asset, rat_spec is speculative grade rating and it is made up of the following ratings; BB+, BB, B+ and B. This article didn't include investment grade as it is the opposite speculative grade, SC is for shopping centres and includes shopping centres, regional malls and outlet centres sectors, nonre is for non-real estate firm and off is for office. Given some variables such as REITs sectors and traits are identified by dummies, when some groups were put together in one model, econometrical the model didn't work as some of those parameters are explained by combination of some other parameters, i.e., multicollinearity. White test is for heteroscedasticity and durbin-watson for autocorrelation. For white test, the first numbers is the co-efficient followed by p-value. When conflict 6 and funding 4 are put together, ac_beta and debt change to opposite signs from their initial signs in their respective groups due to multicollinearity; therefore, in combine 1 ac_beta and debt are excluded. When conflict 6, funding 4 and growth 6 are combined, debt and volp maintain their respective signs but change their statistical significance levels. Initial signs before ac_beta and audit_f coefficients change, in addition, ac_beta is highly correlated to ac_instit, ac_insider, ac_audit_f (audit fees) and growth while ac_audit_f is highly correlated to ac_beta, and growth, rat_spec and ac_volp are highly correlated with funding variables; therefore, ac_beta, ac_ROE, ac__volp and rat_spec are left out in combine 2. When conflict 6, funding 4, growth 6 and specialisation 7 are combined, the following parameters change their original signs; ac_beta, ac_audit_f, ac_secsc (SC is for shopping centres) and ta_secind (ind is for industrial), and the following parameters change their original statistical significance; ac_sboard (staggered board), debt, ac_volp, ta_secdiv (div is for diversified sector) and ta_secsc. Therefore, parameters that are inconsistent with their original results were left out. Moreover, excluded variables (i.e. ac_sboard and ac_audit_f in combine 3) were highly correlated with other variables. The following combinations; conflict 6 and growth 6, conflict 6 and specialisation 7, and conflict 6, funding 4 and specialisation 7, the three stated combinations yielded mixed-bag type of results. Akaike, schwarz and hannan-quinn show that models improve in relative terms. F-stats illustrate that combine 1, 2 and 3 do not fit well together; this might be due to grouping of limited data of different systematic components. The A in the first row of the table 7 stands for amalgamated.

All combine equations are consistent and show that the cross sectional explanatory power ranges between 15.70% and 22.03%. Combine 1 includes conflicts of interest and funding variables, combine 2 includes conflicts of interest, funding and growth variables and combine 3 includes conflicts of interest, funding, growth and specialisation variables. The positive and negative coefficients and statistical significance as for the same reasons mentioned earlier when specific effects where explored. When conflict 6 and funding 4 are put together, ac_beta and debt change to opposite signs from their initial signs in their respective groups due to multicollinearity; therefore, in combine 1, ac_beta and debt are excluded. When conflict 6, funding 4 and growth 6 are combined, debt and volp maintain their respective signs but change their statistical significance while ac_beta and audit_f (audit fees) change their initial signs before their coefficients. In addition, ac_beta is highly correlated to ac_instit, ac_instit, ac_audit_f and growth while ac_audit_f is highly correlated with ac_beta. Growth, rat_spec and ac_volp (acquirer volatility) are highly correlated with funding variables; therefore, ac_beta, ac_ROE, ac_volp and rat_spec in combine 2 are left out.

When conflict 6, funding 4, growth 6 and specialisation 7 are combined, the following parameters change their original signs; ac_beta, ac_audit_f, ac_secsc (SC is for shopping centres) and ta_secind (Secind is for industrial sector). The following parameters change their original statistical significance levels; ac_sboard (staggered board), debt, ac_volp, ta_secdiv (div is for diversified) and ta_secsc. Therefore, parameters that are inconsistent with their original results are left out. Moreover, excluded variables (i.e. ac_sboard and ac_audit_f in combine 3) were highly correlated with other variables. The combinations of conflict 6 and growth 6, conflict 6 and specialisation 7, and conflict 6, funding 4 and specialisation 7 yield mixed-bag results. The F-statistics show structural breaks in combine 1, 2 and 3; however, there is nothing one can do given that the analyses are based on cross sectional data. Growth and specialisation effects in combine models seem to affect options values less than the conflicts of interest and funding effects.

6 Conclusion

Firstly, when one compares the full sample, only cash-financed merger generated 9.4% average returns while deals financed through a combination of cash and stocks generate 10% average loss. Secondly, due to the emerging exchange options, liquidity in the REIT industry increases and more information spillovers to stakeholders in the REIT industry. Furthermore, it is illustrated that some REIT characteristics contribute to options values during mergers. Fourth, the overall results are in line with the previous studies that analysed abnormal returns, which are not exclusive to studies on the REIT industry. On the other hand, the impact of variables on emerging exchange options is consistent with POT and OPT. Fifth, despite the fact that some models have negative adjusted R^2, the adjusted R^2 for the combined models show a significant improvement as models are rolled over. Hartzell et al. (2005) stated that low adjusted R^2 are common in the real estate industry because of its nature.

The implications of this study are important. Firstly, when REIT firms merge, stakeholders will have better insights in REIT mergers if they price those M&A deals using option pricing techniques. Therefore, option pricing techniques illustrated more insights than traditional valuation techniques such as the DCFs. Secondly, for accurate pricing and hedging, one can infer from betas that in certain cases it is costly and other times it is cheap as illustrated by high and low betas respectively. Thirdly, some REIT traits (i.e. conflicts of interest, internal funds and market risk) have a high explanatory power than others in mergers. Finally, zero options values suggest that REIT mergers might be driven by strategic objectives as opposed to financial gains. Fifth, the statistical measures in the REIT industry tend to have counter-intuitive reasoning when compared with other capital markets.

References

Allen MT, Madura J and Springer TM (2000). REIT Characteristics and the Sensitivity of REIT Returns. *Journal of Real Estate Finance & Economics, 21 (2):* 141-152.

Amenc N, Goltz F and Lodh A (2012). Choose Your Betas: Benchmarking Alternative Equity Index Strategies. *Journal of Portfolio Management, 39 (1):* 88-111.

Amihud Y, Lev B, and Travlos NG (1990). Corporate Control and the Choice of Investment Financing: The Case of Corporate Acquisitions. *Journal of Finance*, 45(2), 603-616.

Anderson RI, Benefield JD and Zumpano LV (2009). Performance Difference in Property-Type Diversified versus Specialized Real Estate Investment Trusts (REITs). *Review of Financial Economics, 18 (2):* 70.79.

Bairagi RK and Dimovski W (2012). The Direct Costs of Raising External Equity Capital for US REIT IPOs. *Journal of Property Investment & Finance, 30 (6):* 538-562.

Benston GJ, Hunter WC and Wall LD (1995). Motivations for Bank Mergers and Acquisitions: Enhancing the Deposit Insurance Put Option versus Earnings Diversification. *Journal of Money, Credit & Banking, 27 (3):* 777-788.

Bhagat S, Brickley JA and Loewenstein U (1987). The Pricing Effects of Interfirm Cash Tender Offers. *Journal of Finance, 42 (4):* 965-986.

Black F and Scholes M (1973). The Pricing of Options and Corporate Liabilities. *Journal of Political Economy*, 81(3), 637-654

Born JA, Officer DT and McIntosh W (1989). The Wealth Effects of Merger Activties: Further Evidence from Real Estate Investment Trusts. *Journal of Real Estate Research, 4 (3):* 141-155.

Byun SJ, Kim S and Rhee DW (2018). Ad Hoc Black and Scholes Procedures with the Time-to-Maturity. *Review of Pacific Basin Financial Markets & Policies*, 21(01), 1850006.

Bygrave W D and Timmons JA (1986). Venture Capital's Role in Financing Innovation for Economic Growth. *Journal of Business Venturing, 1 (2):* 161-176.

Campa JM and Hernando I (2004). Shareholder Value Creation in European M&As. *European Financial Management*, *10*(1), 47-81.

Campbell RD, Ghosh C and Sirmans CF (2001). The Information Content of Method of Payment in Mergers: Evidence from Real Estate Investment Trusts (REITs). *Real Estate Economics, 29 (3):* 361-387.

Campbell RD, Ghosh C and Sirmans CF (2005). Value Creation and Governance Structure in REIT Mergers. *Journal of Real Estate Finance & Economics, 31 (2):* 225-239.

Cappoza DR and Sequin PJ (2003). Inside Ownership, Risk Sharing and Tobin's Q-Ratios: Evidence from REITs. *Real Estate Economics, 31 (3):* 367-404.

Cline B, Fu X, Springer T and Tang T (2014). Insider trading in REITs: Evidence From Informed Stock Option Exercise Around Seasoned Equity Offerings. *Journal of Real Estate Research*, 36(4), 11-540.

Colak G, Yung C and Wang W (2008). Cycles in the IPO Market. *Journal of Financial Economics, 89 (1)*: 192-208.

Daniels K and Phillips RA (2007). The Valuation Impact of Financial Advisors: An Empirical Analysis of REIT Mergers and Acquisitions. *Journal of Real Estate Research, 29 (1):* 57-74.

Fisher S (1978). Call Option Pricing when the Exercise Price is Uncertain, and the Valuation of Index Bonds. *Journal of Finance, 33 (1):* 169-176.

Fuller K, Netter J and Stegemoller M (2002). What Do Returns to Acquiring Firms Tell Us? Evidence from Firms That Make Many Acquisitions. *Journal of Finance, LVII (4):* 1763-1793.

Gatchev VA, Spindt PA and Tarhan V (2009). How do Firms Finance Their Investments: The Relative Importance of Equity Issuance and Debt Contracting Costs. *Journal of Corporate Finance, 15 (2):* 179-195.

Ghosh C, Petrova M and Xiao Y (2012). Do REITs Use Cash Reserves Efficiently? Evidence from Corporate Acquisitions. *Journal of International Money and Finance,31 (7):*1953-1970.

Gibson VA and Lizieri CM (1999). New Business Practices and the Corporate Property Portfolio: How Responsive is the UK Property Market*? Journal of Property Research, 16 (3):* 201-218.

Hansen R. G. (1987). A Theory for the Choice of Exchange Medium in Mergers and Acquisitions. *Journal of Business,* 60(1), 75-95.

Hackbarth D and Morellec E (2008). Stock Returns in Mergers and Acquisitions. *Journal of Finance, LXIII (3):* 1213-1252.

Harrison DM, Panasian CA and Seiler MJ (2011). Further Evidence on the Capital Structure. *Real Estate Economics, 39 (1):* 133-166.

Hartzell JC, Kallberg JG and Liu CH (2005). The Role of the Underlying Real Estate Market in REIT IPOs. *Real Estate Economics, 33 (1):* 27-50.

He W, Lee YS and Wei P (2010). Do Option Traders on Value and Growth Stocks React Differently to New Information? *Review of Quantitative Finance & Accounting*, 34(3), 371-381.

Hitt MA, Hoskisson RE and Ireland RD (1990). Mergers and Acquisitions and Managerial Commitment to Innovation in M-Form Firms. *Strategic Management Journal, 11 (SP: Entrepreneurship)*: 29-47.

Kim IJ (1992). Option Pricing: A General Equilibrium Approach. *Review of Quantitative Finance & Accounting*, 2(1), 97-110.

Leland HE (2007). Financial Synergies and the Optimal Scope of the Firm: Implications for Mergers, Spinoffs, and Structured Finance. *Journal of Finance, LXII (2):* 765-807.

Marcato G, Sebehela T, and Campani C (2018). Volatility Smiles When Information is Lagged in Prices. *North American Journal of Economics & Finance* 46, 2018, 151-165.

Margrabe W (1978). The Value of an Option to Exchange One Asset for Another. *Journal of Finance, 33 (1):* 177-186.

Mueller GR (1998). REIT Size and Earnings Growth: Is Bigger Better, or a New Challenge? *Journal of Real Estate Portfolio Management, 4 (2):* 149-157.

Officer MS (2004). Collars and Renegotiation in Mergers and Acquisitions. *Journal of Finance, LIX (6):* 2719-2743.

Peiro A (1999). Skewness in Financial Returns. *Journal of Banking & Finance, 23 (6):* 847-862.

Reinganum MR and Smith JK (1983). Investor Preference for Large Firms: New Evidence on Economies of Scale. *Journal of Industrial Economics, 32 (2):* 213-227.

Schulte R (2018). What Do We Know About New Venture Investment Time Patterns? *Review of Pacific Basin Financial Markets & Policies*, 21(01), 1850004.

Sebehela T (2008). Valuing a Listed Property Fund or Trust on the JSE Using a Real Options Technique. *Icfai Journal of Derivatives Markets, V (3):* 64-71.

Sebehela T (2015). Exchange Options in the REIT Industry. Unpublished Ph.D. Thesis, University of Reading, UK.

Sorwar G and Sudarsanam S (2010). Determinants of Takeover Premium in Cash Offers: An Option Pricing Approach. *Journal of Business Finance & Accounting, 37 (5/6):* 678-714.

Subramanian A (2004). Option Pricing on Stocks in Mergers and Acquisitions. *Journal of Finance, LIX (2):* 795-829.

Womack KS (2012). Real Estate Mergers: Corporate Control and Shareholder Wealth. *Journal of Real Estate Finance & Economics*, *44 (4):* 446-471.