

## REAL OPTIONS AND APPLICATION TO AUSTRALIAN PROPERTY DEVELOPMENT: A CONCEPTUAL ANALYSIS

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### **ABSTRACT**

**Problem/Purpose** - The paper thoroughly reviews the major dissimilarities in the suppositions underlying the DCF and the real options approach, and develops a conceptual framework of real options for the entire real estate development process.

**Design/methodology/approach** – Extensive literature review of journal publications on DCF valuation and real options valuation with critical analysis to result in the development of the conceptual framework for real options.

**Findings** - The findings provide the evidence needed to support the practical appeal of the method to practitioners in the industry. This will enable property practitioners to capture the upside potentials and limit downside losses for investment projects.

**Research limitations/implications** - In Australia according to KPMG (2013), property practitioners and stakeholders are applying discounted cash flow to evaluate the viability of development projects. Standard property development appraisal centred on DCF method discards the potential upside gains and fails to limit the possible downside losses of an investment from managerial flexibility. Achieving practical usability of the real options method would enhance risk assessments in property developments in Australia.

**Originality/value** - The flexibility afforded to property developers to alter future decisions based upon the arrival of new information can be valuable due to the cyclical nature of property markets. Adoption of the real options method in practice has been very slow. This paper expands the theory of real options to enhance the practical usability of the method via a conceptual framework.

**Keywords:** Real options, property development, discounted cash flow, managerial flexibility, uncertainty

### **1.0 INTRODUCTION**

Real estate development can be characterised as an irreversible investment due to the inflexible nature of the development after committing funds. Developers do not have opportunity to reverse a decision after implemented. Even though a developer can abandon a project midstream to salvage some of its value, it is at a cost. Besides, real estate development presents low liquidity, slow payback spanning several years, and capital intensive outflows that are not immediately recovered (Rocha et al., 2007).

Therefore, in competitive real estate development markets, property development firms should retain flexibility to respond to changes from the competitive business environment due to the irreversible nature of developments. The irreversibility requires firms to be proactive in formulating flexible plans and be prepared to alter course when the need arise. Thus, firms that can be successful in competition are improbable to have rigid long term plans in their approach to investments in property development in order to mitigate risks.

In this sense, firms must be flexible and active in managing property developments rather than passively watch events unfold. Actively managing property developments means firms are capable of exercising real options available to them during development in order to capitalise on emerging opportunities. The value of these real options embedded in real property development can be valuable because firms can capitalise on upside potentials and limit downside losses. The value from active management cannot be determined using traditional methods of valuation. Trigeorgis (1993a) emphasises that, standard valuation methods that disregard these real options altogether (passive DCF) or endeavour to value these investment opportunities using a single discount rate can result in substantial appraisal inaccuracies.

Luehrman (1998) argued that a superior evaluation approach must capture the uncertainties embedded in property development that has the potential to affect forecasts and also, the dynamic management essential for a development project to succeed. A new method, real options analysis (ROA) and valuation (ROV) has been introduced to fill this gap. Through the real options analogy, property developments can be actively managed and proactive decisions taken to mitigate losses and improve future payoffs.

Surprisingly, several publications whether theory or practice oriented in real estate have not attached much importance to ensuring that, property practitioners fully understand and appreciate the theoretical proposition for adoption. There is an assumption that flexibility is significant in real estate development for a certain, and that firms have accepted for the implementation of real options theory (Dimpfel & Algesheimer, 2002). Consequentially, the contributions in the literature have focused on rigorous mathematical modelling of real options framework without considering practical adoption (Brady, 2015; Grenadier, 1995; Quigg, 1993; Williams, 1991).

However, the application of the concept in practice has been slow (Kogut & Kulatilaka, 1994). Teach (2003) found only 9% respondents from 30 industries using real options. Recently, Bennouna, Meredith and Marchant (2010) also found that only 8 % of respondents from a list of 88 large firms in the US are using real options. Chiefly among the reasons given is the sophistication in identification and quantification of real options. In real estate, Lucius (2001) further argued that, the slow adoption of the method in real estate industry is the lack of a consistent systematic framework for locating real options in real estate. As such, real option is too theoretical with lack of practical application.

As a solution, Lucius (2001) identified some real options in real estate development based on the work of Trigeorgis (1993a) but without a conceptual framework. Recently, a real options conceptual framework was proposed by Baldi (2013) for real estate analysis. However, the conceptual framework did not show exact stages in the development process where real options occur. It was a matrix of categorisation based on scaling and timing of the real options with respect to the immediacy or deferability of the real option.

Therefore, the focus of this work is to develop a conceptual framework capable of systematically categorising real options existing in real estate development at different stages of the property development process. This takes the shape of exploring the underlying assumptions of both DCF and real options to

determine the differences in the theoretical propositions of both methods before proposing the conceptual model. It also uses the characteristics of particular real options to achieve the categorisation. This study has the potential to enhance the practical understanding and appeal of real options valuation for adoption by practitioners. In order to facilitate the development of the conceptual framework and determine all potential options embedded in property development, it is assumed that, the developer uses equity as the main source of capital. The effect is that, options such as deferring presales can be determined.

## 2.0 LITERATURE REVIEW

### 2.1 Valuation techniques

Several evaluation methods are employed by practitioners in determining the viability of proposed developments in practice. Traditionally, the main techniques for determining the value of projects include direct sales comparison, cost method, profits method, residual method and discounted cash flow (DCF). Different methods signify that significant differences in results can occur, depending on which approach is used (Damodaran, 2012) and actually, French (1997) emphasises on the importance of adopting the appropriate method for specific valuations rather than demonstrating methodology superiority.

### 2.2 Discounted cash flow technique

The discounted cash flow by far is the most widely used by corporate organisations in decision making regarding investments and capital budgeting (Bennouna, Meredith & Marchant, 2010; Gitman & Forrester Jr, 1977; Ryan & Ryan, 2002). It uses measures including the internal rate of return, development yield/profit, and the net present value (NPV) for assessing the viability of proposed projects. The internal rate of return produces a net present value of zero while the NPV is the difference between the total present values of expected inflows over the life of the asset and the anticipated costs. The use of the net present value requires developers to know the discount rate needed to derive the present values.

Classical economic theory suggests that, a positive NPV means a project is viable and must be pursued immediately. A negative NPV on the other hand suggests that, a project is not viable and must be discarded outright. A risk neutral firm may choose to execute a project with an NPV of zero (0). Equation 1 can be used to derive the NPV of a development project when all the input variables are determined.

$$NPV = -I + \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^n} \quad Eq\ 1$$

Where  $n$  = Life of the asset

$CF_t$  = Cash flow at period  $t$ ,

$r$  = discount rate reflecting the riskiness of the asset.

$I$  = the initial investment outlay of the project

Using the NPV requires analysts to determine the expected future cash flows, the appropriate discount rate that reflects the perceived risks of the investment, and costs to determine the NPV. Since the NPV is based on the estimated future rents, discount rates and costs, uncertainties are implicitly built into the valuation model. Further, selecting the required discount rate that represents perceived risks and uncertainties is awkward, especially for property developments that are characterised by considerable uncertainty.

Approaches to determining the appropriate discount rate for proposed developments includes choosing the opportunity cost of capital plus a profit (Geltner et al., 2007). Similarly, a developer of a proposed development can set a required rate of return as a discount rate based on the perceived risks and uncertainties associated with the project. Also, firms and analysts can adopt the weighted average cost of capital (WACC). This weighted average cost of capital is composed of the average weights of the total contribution of different sources of capital to fund the project. Using equation 2, the expected rate of return can be derived by expected Rate of return =  $R_f$  + risk premium (Damodaran, 2012).

Where

$$E_r = R_f + \sum_{j=1}^{j=k} \beta_j \quad Eq2$$

Where  $\beta_j$  = Beta of investment relative to factor j,

Risk premium j = Risk premium for factor j.

$R_f$  = the risk free rate of a 10 year average treasury rate

Due to the DCF's approach to risks and uncertainties such as adjusting discount rates,

Sirmans (1997) opposed the traditional DCF model and suggested that, it is insufficient for evaluating real estate projects. This is primarily due to the inability of the model to capture potential future changes in the property market. Similarly, the model fails to account for value embedded in downside risks mitigation. Also, the procedure of selecting discount rates and the failure of DCF model to add real options in the appraisal of real estate projects have been severely criticised (Hayes & Abernathy, 1980; Hodder & Riggs, 1985). As discussed, the discount rate selection lacks transparency; hence analysts and developers have to use subjective judgement to arrive at the rate. Myers (1984)'s critique centred on four major estimation errors that have profound implications on the use of DCF: discount rate, expected cash flows, cross-sectional links between alternative investments and time-series links between alternative investments. In his argument, the fourth error is the most problematic because time-series linked investments (e.g. strategic investments) are often growth opportunities (options), which the DCF method cannot properly evaluate because options are rights, not obligations, to implement a project. A further limitation is that capital budgeting theory in textbooks on the subject concentrates almost exclusively on the financial criteria (Brealey & Myers, 1988; Brigham & Gapenski, 1991). Even though the numbers are relevant to investment analysis in real estate development, there are other managerial decisions that affect the outcome of the analysis.

The deterministic assumptions of the cash flows are also problematic because in practice, cash flow projections can differ from the actuals. The real estate market is affected by several factors; both endogenous and exogenous. Therefore, even the best of statistical analysis are unable to accurately predict future movements of the property market and any deterministic approach to cash flow uncertainty results in poor treatment of risks.

The argument advanced above means that failing to account for variations in future cash flows and discount rates triggered by real options that exist in development projects biases the outcome of a DCF model. Myers (1984) concluded that options could be used to complement DCF as an attempt to link together financial and strategic analysis. Kester (1984) then examined growth opportunities as real options through a conceptual analysis. This has resulted in the need to model investments to respond to uncertainties and risks through real options.

### **2.3 Real options**

The term “real options” was coined by Myers (1977) and referred it to the application of option pricing theory in finance to the valuation of “real” physical assets where much of the value is attributable to flexibility (managerial flexibility in decision making) and better information to prepare in the event of an uncertainty. This was followed by the breakthrough of Black and Scholes (1973) and Merton (1976) in developing a model capable of valuing financial options. After this breakthrough, the development of the concept and its application to real assets has been given much attention through research (Borison, 2005).

According to Broyles (2003, p. 91), real options “*is the right to make favourable future choices regarding real asset investments*”. It is also the right, but not the obligation; to proceed with development at a pre-fixed cost and for a prearranged period of time (Copeland & Antikarov, 2001). In this vein, a holder of a real option such as a property developer has the right to develop an already acquired land or abandon it altogether because the developer is not under any obligation to construct the proposed scheme. It is also an opportunity for voluntary future investments in a real asset when at least part of the required investment expenditure is certain.

Adner and Levinthal (2004) also argued that real options are synonymous to financial options such that the option is acquired in the beginning, held over a period to determine future outcome, the expiration time is due, and the option is exercised if the value meets expectation or discarded if the value is lower than the cost. Consequently, real options in real estate can be likened to a situation where a developer can acquire the right to develop a land, wait until uncertainties surrounding property prices are resolved before developing or abandoning the project.

Practically, real options are features of a project that provide flexibility (Broyles, 2003) and gives the holder the chance to flexibly decide on the right course of action to take based on the arrival of new information in the market. As stated by Guthrie (2013), in a world of volatile market conditions, the ability to change course due to the arrival of new information including slowing down or discarding construction, and resuming it at a later date, can be extremely valuable. Using the real options analogy to value projects mean

that, developers understand the value of flexibility and how it can impact on analysing investment decisions. In effect, through real options theory, investors have the opportunity to wait for the arrival of new information before committing capital to investment projects.

The argument is that real options are present under circumstances where a firm has the ability to decide between alternative decisions with the opportunities involving physical assets including properties. Therefore, real options analysis offers the potential to evaluate projects and recognize the existence of such flexibility and to determine the best means and timing to exercise this flexibility in order to capitalise on emerging opportunities while limiting downside uncertainties.

The real options framework is a way of analysing and making decisions based on resolved uncertainties rather than depending on best guess estimates. It functions with uncertainty and the approach has the potential to conceptualize and quantify the value of uncertainty from active management of property developments (Trigeorgis, 1993b). Cunningham (2006) further underscores the need for developers intending to undertake investments in real options to demand a net return above zero to rationalise discarding the real option and committing to projects presently. The real options theory is pivoted on better preparation for future uncertainties rather than predicting the future and incorporating it into a constant discount rate using DCF. As a result, property development firms can cope with the risks related to potentially unfavourable market while retaining the prospect to benefit in a positive market.

#### **2.4 Managerial flexibility embedded in real estate projects**

A key feature of real option is that it creates economic value by generating future decision rights (McGrath, Ferrier & Mendelow, 2004). These rights are flexible decisions embedded in real estate development projects at different stages of a scheme's life cycle. A proactive management, in the face of uncertainties may decide to defer, contract, expand or abandon an entire project completely.

Deferring a decision to embark on development denotes management's ability to postpone the development in order to resolve uncertainties. This is needed to make a good decision regarding the investment and to avoid losses while having the opportunity to capitalise on potential upside gains in future. Abandoning a project on the other hand would mean an organisation attempting to cut down losses from a failed project. In this instance, the ability of management to make flexible managerial decisions that are capable of adding value to a project via limiting downside losses and retaining an unlimited upside potential has enormous value. In a competitive and dynamic market, the deterministic scenarios assumed by the DCF are practically unrealistic because of the effects of several forces including changes in market conditions. Thus, cash flows, interest rates and costs of property developments may differ periodically and the ability of firms to respond to these changes is the panacea for keeping the organisation in such a competitive dynamic market. As uncertainty surrounding the cash flows, interest rates and costs are gradually resolved due to the arrival of new information, the managers of a project can choose to alter their decisions by way of deferring the development idea, contracting the scale of the initial development idea, abandon the entire project midway to cut losses or expand to take advantage of emerging opportunities.

The ability of management to flexibly adapt its future actions in response to changes in future market conditions introduces asymmetry in the payoff distribution of the NPV, resulting from the improvement in the project's upside prospect while reducing downside losses comparative to initial deterministic expected scenarios under inactive management. The asymmetric results triggered by flexibly managing a project demands for an "expanded NPV" rule capturing both values from standard NPV of deterministic cash flows, and the real option value of operating and retaining opportunity for changes (Trigeorgis, 1993b). This is not to say rejecting the traditional NPV rule for evaluating project viability, but rather should be seen as an important input to a real options-based valuation.

The use of DCF is valuable but does not capture the upside potentials of future changes and the losses. At best, it works under conditions of stable economic environments which are rarely the case in reality. Therefore, the need for the use of real options methodology, which is a new and better approach for evaluating capital intensive projects to either replace or complement the DCF cannot be overemphasised (Dixit & Pindyck, 1994). Because it measures the flexibility afforded developers to better manage their developments to gain maximum benefits at the same time incorporating the value from the passive DCF model.

### **3.0 METHODS**

Since the objective of this study was to conceptually analyse the theoretical underpinnings of both the DCF and real options, and to further propose a conceptual framework, the research was based on a review of published studies on real options that are real estate specific. This involved searching leading online database including Property Management, Pacific Rim Real Estate Society Journal, Journal of Property Investment and Finance and others (see table 1.). The information gathered from the search was used to discuss the introduction and literature review. This preceded a critical analysis to determine the ability of real options theory to resolve the weaknesses of the DCF. Based on the literature, a conceptual framework was developed using the real options identified by tracing the entire property development process using a quadrant-like diagram with a circle in the middle to capture the entire real options interacting in a real estate development project. Grounded on the theoretical propositions of both the real options and DCF, discussion of the two theoretical propositions was completed and conclusions drawn for the study.

### **4.0 DISCUSSION AND FINDINGS**

#### **4.1 A conceptual analysis and development of real options framework**

Real estate development is a staged activity. Wilkinson, Reed and Cadman (2008) argue that, based on the event sequence approach to describing real estate development, there are eight stages. It includes initiation, evaluation, acquisition, design and costing, permissions, commitment, implementation, and let/manage/dispose. For the purposes of this study, the stages are grouped into four; initiation, design, construction and marketing/let/dispose. This is based on critical examination of the stages where real options are embedded in the process in order to advance the argument on the framework.

Investment in real options is profitable when the payoff from the option is greater than the cost needed to incur to exercise such an option. Due to the irreversibility nature of real estate development, real options are naturally embedded in it and are numerous (Paxson, 2005). Trigeorgis (1993a) identified and termed real options into wait/defer, expand, switch (input/output), abandon, growth, contract and compound options. Based on this, Lucius (2001) also identified real estate specific real options to generally include reduction, delay, compound and growth.

**Table 1 Sample list of journals and their fields used as source of information on real options**

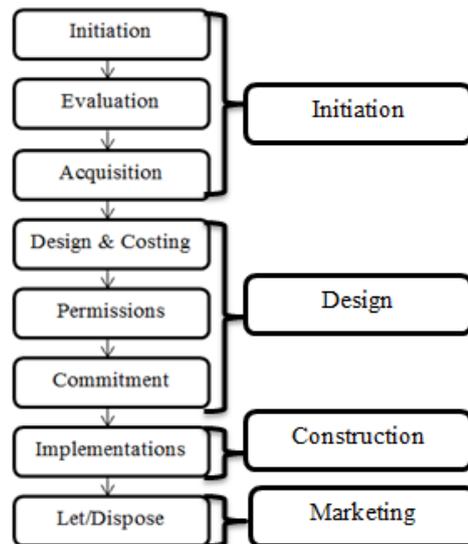
Name of Journal	Focus of Journal
1. Journal of European Real Estate Research	Real Estate
2. Journal of Urban Economics	Real Estate
3. Journal of Property Valuation and Investment	Real Estate
4. Pacific Rim Property Research Journal	Real Estate
5. Journal of Real Estate Finance and Economics	Real Estate
6. Journal of Management decision	Management Science & operations
7. Journal of Business and Management	Business and Management
8. Academy of management review	Management
9. California Management Review	Management
10. Journal of Financial Economics	Finance & Economics
11. Journal of Applied Corporate Finance	Finance
12. Journal of Financial Management	Finance
13. Journal of Finance	Finance
14. Journal of Financial And Quantitative Analysis	Finance
15. Financial Management Science	Finance in Emerging markets
16. Emerging Markets Review	Finance in Emerging markets
17. Harvard business review	Business Strategy and Technology
18. CFO magazine	Banking, Finance, Accounting and Risk
19. Journal of Political economy	Economics

Source: Author (2015)

The reduction options included abandonment, shut down, and contract. This emanated from the nature of these options that are either used to mitigate possible downside losses or take advantage of upside gains. The delay options on the other hand capture the staging of property development and deferment of a proposed development. Mostly, these options are primarily for deferment of a proposed development while pertinent information unfolds to determine the level of certainty of project success or otherwise. Again, a developer may decide to stage a development for reasons of unfavourable market pending possible turn of economic conditions. The staging of a development takes the shape of a developer constructing a certain number of

floors out of the total planned floors pending changes in market conditions. Another group also identified by Lucius (2001) are the compound options and growth options. The compound options are the aggregate of all options interacting in an entire real estate development project whereas the growth options can be likened to the takeover of a real estate firm strategically for expansion reasons by another. All these real options are either call or put like options. When the right but not the obligation to either buy or sell an asset is present in a proposed development, they are referred to as call and put options respectively.

**Figure 1 Real estate development process**



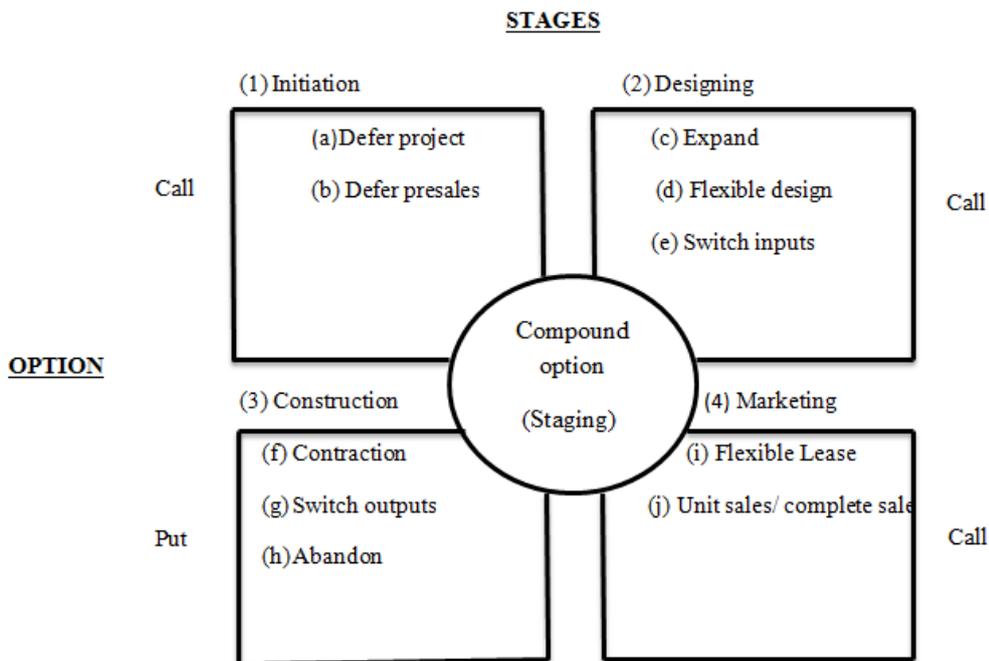
Source: Adapted from Wilkinson, Reed and Cadman (2008)

A conceptual framework is developed and proposed for identification of options at different stages of the development process (see figure 2). The framework is a combination of the stages and the different types of options embedded in real estate development forming a four quadrant diagram with a circle in the middle. The north western quadrant represents the intersection of the initiation stage and the options types resulting in the determination of a real option decision. In this quadrant, the real options identified are the waiting option which is a call like real option to defer.

Secondly, the north eastern quadrant combines designing and the options to form a group of real options including expansion, flexible designs and switching output. The expansion option captures the ability of a developer to increase output of a proposed project when market conditions are favourable. Therefore, during the designing stage, the developer can deliberately incorporate the expansion option and wait for the opportune time to develop. For example, the construction of high rise apartments and offices can be developed with the intention of expanding later. Embedding real options in such projects require developers to proactively design columns and slabs to support the intended number of floors. Therefore, in future the developer can take advantage of rising property prices by expanding the project due to the embedded expansion option. Also, flexible designs also involve the ability of a completed development to adapt to

different uses through internal layout flexibility. For example, the ability to turn an office into a conference room by dismantling the internal layout with ease, which can be refitted after use as a conference. This is important due to the emerging trends in office layout types including hot-desking and club like offices that are rarely used by employees.

**Figure 2 a conceptual framework for real options in property development**



Source: Author (2015)

Moreover, the third quadrant is the nodal point of the construction stage and the options. During this stage, the developer has a choice to stage, contract, shutdown, switch inputs and/or abandon a project entirely. Due to the reduction nature of the different option types, they are likened to put-like real options. All these options are used to mitigate downside losses temporary but the abandonment real option seeks to close a project entirely in order to salvage some of its value. This may happen due to possible persistent unfavourable market or lack of demand. Staging investments involve sequential smaller outlays at various stages of projects. This has the potential to limit losses because the developer has the chance to assess the viability of the outlay in relation to the value of the overall project at that stage.

Finally, at completion of the development, the developer has the right to either sell or hold and manage the property as part of a portfolio of properties. In the event of a sale, a choice can be made between unit sales or a complete sale. Unit sales will be a flexible deferral option where the prices of apartments can increase with time as compared to a single complete sale. If the property is held as part of a portfolio, there are flexible leasing options also available to the developer. It is found in the south eastern quadrant.

The circle in the middle represents the aggregate of all the options that are embedded in real estate development. This is referred to as the compound option and it's a call like option. In most real-life property

development projects, the required capital investment is not incurred as a single upfront outlay. Staging real life projects as a series of capital outlays over time creates valuable options to "default" at any given stage should the price of real estate assets be lower than expected (Trigeorgis, 1993b). Thus, each stage is deemed as an option on the value of the next stage because, the capital outlay serves as the exercise price to acquire the right to develop the next stage. This option is highly valuable in uncertain industries such as real estate and can be considered as a compound option. The compound option is found at the middle of the quadrant suggesting its presence at all stages of the development process. Even though it is an aggregate of all the real options embedded in a project, Trigeorgis (1991) argues that, there is a non-additive principle, hence the combined value of all the real options is not necessarily the sum of the individual real options due to interaction. Therefore, summing the individual real options without proper treatment of the interaction can overstate the value of a project.

#### **4.1 Comparative analysis of DCF and ROA**

Fundamentally, DCF assumes that projects are now or never investment opportunities. Thus, property development projects must be executed now or never based on the output of the development appraisal using assumed discount rates, costs and cash flows as variables (Dixit & Pindyck, 1995). However, real options approach models the reality by capturing the decision to defer a project until a later date in future when uncertainty is resolved. The real option framework possesses the ability to evaluate such intrinsic values makes it superior.

The DCF model again assumes that property development projects will be operated on continuously over certain duration and at a pre- determined scale despite future uncertainties. Therefore, DCF suggests a passive approach to the management of projects without management interventions to alter course when the need arises. In reality however, projects are actively and constantly managed by property developers to ensure that outcomes are controlled. In this sense, the DCF ignores the value that management can add to the project through flexibility. The value embedded in flexibility is the ability of management to capitalise on upside potentials while limiting downside losses resulting from changes in market conditions. This value is accurately captured by the real options framework.

Another assumption of the DCF is the use of deterministic cash flows in the evaluation process. In effect, the DCF assumes an expected scenario. Practically, expectations can deviate from actual figures during and after project completion. Even though management might alter cash flow levels in tandem with changes in market conditions, DCF fails to take into account, these inevitable changes. Therefore, capital budgeting decisions based on DCF provides little insight into the quantification of benefits and the process of estimating cash flows for real estate projects (Weaver et al., 1989). Real options on the other hand models development projects and treat cash flows with uncertainty to dynamically consider the changes that can potentially occur in future. This enhances risk assessment in real estate development. The inputs into the DCF model, cash flow and discount rate have been identified as the main sources of uncertainty in property development, yet the model fails to incorporate them into the decision analysis. The impact is twofold; first, the inflows from

property development is indeterminate and secondly the output from DCF valuation is unreliable (French & Gabrielli, 2004; French & Gabrielli, 2005). Therefore, the failure of the DCF to explicitly deal with uncertainty in property developments in order to increase the value of projects during favourable market conditions but rather, implicitly adopts a risk-adjusted discount rate makes it problematic and unrealistic. Conclusively, the assumption that, management has an inactive commitment to an already determined plan without regard for future uncertainties, make the DCF model undervalue projects, especially upside potential which has value (Kogut & Kulatilaka, 1994). The real options methodology however, accounts for the changes in these variables to determine a range of possible values of the underlying asset in order to better treat uncertainties rather than using single point estimates.

#### **4. CONCLUSION**

This study has explored the theoretical underpinnings of both the DCF and the real options theory. The shortcomings of the DCF makes it essential for practitioners to adopt real options methodology because it is capable of dealing with uncertainty surrounding demand, supply, rental prices, vacancy, yield and interest rate in property development. It therefore enhances risk assessment in property development.

Different real options are embedded in property development at different stages of the development process. At the initiation stage, complete deferral of the project and presales are at the disposal of the developer. During the designing of the project, the developer can intentionally embed the expansion option, flexible design and switching output options. When construction begins, the developer can stage, contract, shutdown, switch inputs or abandon the project entirely. At completion, the developer has the choice to either completely sell the project to an investor or sell the units gradually. Due to price movements in the property market, a developer can make a decision to gradually sell the development in order to take advantage of the price changes. The real options approach evaluates such future decisions better.

The identification of different types of real options at different stages of the development process has been made relatively easier by the conceptual framework proposed in this study. It has the potential to improve the adoption of the method in practice because developers can now determine the stages where real options can be considered during the process of development. The discussion on the underlying assumptions of the real options can also aid developers who decide to adopt the real options approach in property development evaluation.

Due to slow adoption of the method in practice, there is the need to provide further evidence of the real options ability to enhance uncertainty assessments in property development. In Australia in particular, there is the need to apply the method to development projects and demonstrate the ability of the real option method to enhance risk assessment. This will improve the practical appeal of the method. Moreover, specific case studies that arise in real estate development, investments and finance can be considered for application. As part of a broader study, the researcher will consider the application of the method to real life cases in order to make a case or its integration in property development evaluation analysis.

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