

Real Options: An Alternative Valuation Model for the U.S. REIT Market

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ABSTRACT

REITs are alternative investments that offer asset managers high returns and diversification opportunities. In an active management process, securities selection and more specifically their valuation is a key component of future performance. In this paper, we propose a model that combines a Discounted Cash Flow model with real options in order to take into account the different drivers of real estate investment value, such as net asset value, future rentals income and capital expenditures policy. Our theoretical model for Real Estate Investment Trusts provides an average spread around 16% compared with the market value.

JEL Classifications: G11, G13, R32

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I. INTRODUCTION

Institutional investors began to take interest in real estate markets at the beginning of the 1980s due to their potential for growth, their risk diversification benefits and as inflation hedging instruments. Real estate is traditionally considered as a safe haven when financial markets are unstable. Investors can access the real estate market directly by purchasing buildings, land, shopping centers, office space; or indirectly by investing in real estate investment trusts. Direct investment in real estate is characterized by a lack of liquidity, significant transaction sizes, a degree of opacity, and high levels of heterogeneity. On the contrary, real estate investment trusts provide investors with exposure to the real estate sector without liquidity constraints given that they are stocks listed on financial market. This relative lack of liquidity in real estate investments tends to smooth performance and reduce volatility levels (Fisher, Gatzlaff, Geltner, and Haurin, 2003). In a portfolio management strategy, real estate is considered as an alternative investment. Westerheide (2006) shows that REITs are a class of assets on their own that evolves differently from stocks and bonds. These features have justified real estate investment to spread the risk inherent in a portfolio made up entirely of traditional assets (stocks, bonds and cash). Simon and Ng (2009) show that real estate plays this role in spreading risk even more when the stock market is bearish. Real estate distinguishes itself by its defensive character, being less sensitive to the macro-economic environment than traditional classes of assets. According to Hoesli, Lekander, and Witkiewicz (2004), real estate leads to a reduction of 5-10% in total portfolio risk, and nearly 20% when international real estate investments are taken into account.

In a “top down” analysis, the selection of the best stocks in the real estate industry is a key performance factor. The selection of stocks to include in a portfolio is traditionally based on classic discounted or multiple valuation models. Real estate investments include options such as the utilization of property reserves, extension, renovation (brownfield sites) or the renewal of leases. These options ought to be included in valuation models. In practice, managers react to events and modify their strategy with the use of additional information. Such flexibility is lacking in standard discounted models, which make their valuation based on a single scenario for future cash flow. Flexibility based on monitoring investments with regard to incoming information is rather like an option. According to Copeland, Koller, and Murrin (2000), the development of option theory is a real innovation in the field of corporate valuation. Options take into account the ambiguous, dynamic features of financial projects. Our article proposes a valuation model of REITs that adds real options to traditional discounted cash flow. Using securities that are on both the FTSE/EPRA NAREIT North America index and the S&P 500 Index, we analyze price differences between our theoretical model with options and the market. Our paper is organized as follows. The first section reviews traditional theoretical models for valuing real estate assets. The second section describes our sample and discusses the results of DCF models based on realistic assumptions. The third section introduces real options and analyzes the main results. Finally, we conclude by presenting the theoretical and practical contribution of our research.

II. THEORETICAL MODELS FOR VALUING REAL ESTATE ASSETS

Three main methods are used to value real estate investments. The first is based on the adjusted net asset value, the second on a comparison with similar assets and the third is based on discounted future operating cash flows. The net asset value (NAV) is an adjustment of the value of real estate assets based on the fair value of assets in the balance sheet. The value of the shareholders' equity is calculated by subtracting revalued liabilities from the fair value of assets. Capozza and Lee (1995) define the value of the net assets of REITs using the following formula:

$$\text{NAV} = \frac{\text{Market Value of properties} + \text{Other assets} - \text{Total Liabilities}}{\text{Number of shares}} \quad (1)$$

For REITs, the major challenge is to account for investment property. The EPRA (European Public Real Estate Association) has drawn up recommendations for best practice in the accounting and financial reporting of listed firms in the real estate sector. Its aim is to ensure comparability and transparency throughout the European real estate sector. EPRA uses the IAS 40 standard, which allows the valuation of investment property using historical cost or fair value. Historical cost records the property asset at its initial cost of acquisition. When using this method, EPRA recommends that the amortization method and lifetime used should be indicated. In fair value accounting, the variation in value of property investment is recorded in the income statement when the fluctuations occur.

The choice of fair value is not without consequences for the financial statements and for their transparency. On a sample of 45 real estate firms in 16 countries, Edelstein et al. (2012) show that adopting fair value resulted in an average increase of net income of more than 50% during the year 2005. These results confirm the conclusions of Fortin et al. (2011), who show that the IFRS standards tend to magnify the consequence of economic cycles in the financial statements of real estate companies. In the multiples approach, the investor will compare the price of buildings that have recently been sold with similar features to the real estate to be valued. The existence of differences between the property sold and the building that is to be valued is taken into account during the valuation process: the investor adjusts the price on the basis of the disparities observed. The hedonist method uses the fact that a property transaction is motivated by the nature of the property and its intrinsic characteristics. Investing in property gives a certain degree of satisfaction, and this depends on the different features of the asset. By regression of the data linking the market price to these features, it is possible to quantify the value of each of these determinants. Regression analyses are performed on the price, represented as y , and different independent variables (x_i). Date of construction, location, size, rate of occupancy and economic environment are examples of independent variables (Equation 2):

$$y = \sum_{i=1}^n \beta_i x_i + \varepsilon_i \quad (2)$$

Hedonist regressions use a linear model. A variation in the price of the asset is a consequence of an increase of one unit of value, represented by β_i , of one or more variables. This method has been widely discussed in the academic literature (see Sirmans et al., 2005, for a review). Finally, the third method of valuing direct and indirect real

estate is based on an estimation of future rents related to the real estate investment. The model discounts projected cash flows according to the risk of the asset. The first discounted model for a property asset takes up Irving Fisher's (1930) model, which assumes a constant and perpetual Net Operating Income (NOI):

$$V_0 = \frac{NOI_1}{R_0} \quad (3)$$

The operating income is discounted at a rate, R_0 , known as the capitalization rate. This rate corresponds to the cost of equity capital when the real estate investment is internally funded or to the average cost of funding sources (WACC) when the firm uses financial leverage for its investment decisions. The net operating income (NOI) measures all the rents received less taxes, insurance, maintenance and repair costs and losses due to vacancy. The NOI corresponds to the EBITDA in the income statement of REITs.

Because of the simplified hypotheses it introduces, the previous model has been neglected in favor of the DCF (Discounted Cash Flow) approach. This consists in discounting at the weighted average cost of capital the net operating income over an explicit period of time rather than to infinity, and a terminal cash flow.

$$V_0 = \sum_{t=1}^n \frac{NOI_t}{(1+k)^t} + \frac{TV_n}{(1+k)^n} \quad (4)$$

The operating income is estimated using different hypotheses of growth, rate of occupancy, economic and fiscal environments. The terminal value (TV_n) is the selling price of the property at the end of the planning period. It is a function of the hypotheses on the level of inflation and the valuation model selected (NAV, multiple or perpetual rental). The discounting rate (k) is based on the return on equity capital, the yield curve and the credit spread. The international valuation standards committee, or IVSC 2005, recommends in its note no. 9 the use of DCF to determine the fair value of real estate investments. We first choose this model to value REITs and give details of our assumptions in the next section.

III. US EMPIRICAL EVIDENCE BASED ON DCF VALUATION

In this section, we carry out an intrinsic valuation of property companies based on the book value and discounted approaches presented in the previous section. We then extend these traditional models, by considering real options.

A. Presentation of the Sample

The sample is made up of fourteen firms listed on both the FTSE/EPRA NAREIT North America Index and the S&P 500 Index. The real estate market is analyzed by investors in terms of sub-sectors. The most important are retail, offices, residential and industrial property. The components of our sample are presented in Table 1.

The choice of stocks operating in the real estate industry was based on the FTSE/EPRA NAREIT North America index, which serves as a benchmark for numerous

investment strategies targeting the real estate sector. The firms selected operate mainly in the United States of America and cover all the different real estate sub-sectors to guarantee a diversified portfolio. The major player in our sample is Simon Property Group with real estate assets estimated at more than \$25 billion.

Table 1
Characteristics of the property firms in the sample as at 31/12/2013

Companies	Sectors	Geographical presence	NAV (in million USD)
1. Apartment Investment & Management	Multifamily Apartment Properties	USA, Puerto Rico	5391
2. Avalonbay Communities Inc	Multifamily Communities	USA	14284
3. Boston Properties Inc	Office Properties	Boston, Washington DC, Midtown Manhattan, San Francisco	15817
4. Equity Residential	Apartment Complexes	USA	21993
5. Essex Property Trust Inc	Multifamily Residential Properties, Commercial Properties	California & Washington DC	4239
6. General Growth Properties	Shopping Mall Centers	USA	21113
7. HCP Inc	Senior Housing, Life Services, Medical Offices, Hospital, Skilled Nursing Homes	USA	10627
8. Health Care REIT Inc	Senior Housing & Health Care Real Estate	USA	20277
9. Host Hotels & Resorts Inc	Upscale and Luxury Hotel Lodging Properties	USA, Canada, Mexico, Chile, Italy, Spain, Poland, Belgium, UK, Netherlands	11168
10. Kimco Realty Corp	Shopping Center	USA, Canada, Puerto Rico, Mexico, Chile, Brazil, Peru	7519
11. Macerich Co	Shopping Center	USA	7622
12. Public Storage	Self-storage Facilities	USA	8240
13. Simon Property Group	Regional Mall, Outlet Centers, International Properties, Lifestyle Centers	USA & International	25059
14. Vornado Realty Trust	Office and Retail Properties	New York City, Washington DC, California, Puerto Rico	14944

B. Net Asset Valuation

The property companies are valued based on their real estate assets. We analyzed the “Price-to-book” multiples of each of the fourteen firms in our sample between 12/31/2000 and 12/31/2013, and compared them with the S&P 500 Index. For the book value, we selected the adjusted net assets, published annually in the financial statements. This year-end asset valuation has been compared with the market value displayed on Bloomberg for the same period.

The real estate industry valuation, based on the P/B multiple, appears slightly higher than other sectors, with an average ratio of 2.9 vs 2.5 for the S&P 500 Index. This valuation is related to organic growth rates, nearly 5% on average in our sample, attractive yields around 3% higher than US government bond yields, and relatively low interest rates to leverage real estate investments. According to our sample, financing costs have fallen by more than 20% over the last four years in the real estate sector, due to improved ratings. These perspectives have turned into a rise of 36% for the EPRA index between 2000 and 2013. In the following sub-section we propose to value property companies using a DCF model that takes account of future operating cash flows and financing costs.

C. Discounted Cash Flows (DCF)

Companies in the real estate industry have several features that have to be taken into account when determining their intrinsic value via a discounting model. The real estate sector is closely correlated to the economic environment and to interest rate levels. Sub-sectors such as retail property and offices are very cyclical and depend on the consumer confidence levels and household spending. This dependence on the economic environment is even more marked when the assets held by property companies are not located in so-called “prime” areas, which are always attractive. The quality of the valuation depends on the relevance and realism of the hypotheses made for future forecasts. We list below the principal assumptions used in the DCF model:

$$P_0 = \left[\sum_{t=1}^n \frac{NOI_t}{(1+k)^t} + \frac{TV_n}{(1+k)^n} \right] - D_0 \quad (5)$$

- To forecast operating cash flows (NOI_t), we use the average of operating margins (EBITDA/Sales) over a thirteen-year period (01/01/2000 to 31/12/2013). The operating income is considered before adjustment for changes in the value of property investment (IAS 40 standard) to limit their volatility. The revenue is made up of gross rental income. Rents are very volatile, being linked to both economic cycles and prime investment projects. We have used an average growth in sales corrected from seasonal changes over the last 13 years;

- CAPEX is a significant component of the activity of REITs, which constantly modify their assets by developing new projects and selling off mature assets. In some years, CAPEX exceeds sales, making the notion of Free Cash-Flow inconsistent. The property companies are valued on the operating cash flow considering only investments in net working capital requirements.

- The real estate industry uses significantly the leverage to finance assets. Today these financing operations are stimulated by low interest rates, strategic refocusing on “prime” property and improved ratings. In our sample, average net financial debt stands at more than €5.5 billion. Five companies over fourteen have more than €10 billion of debt in their balance sheet. Simon Property Group shows financial debts close to €22 billion on our date of valuation (12/31/2013). The net debt (D_0) amount will reduce significantly the intrinsic value of the stocks.

- We used the weighted average cost of capital (WACC) as the discount rate (k) for operating cash flow. The WACC was obtained from Bloomberg on 12/31/2013 and adjusted for the cost of debt depending on the credit risk of the firms in our sample.

- At the end of the Thirteen-year forecasting period, we compute the terminal value (TV_n) based on the Gordon Growth Model. We assume a growth to perpetuity of 2.35 %. This rate was chosen to reflect the economic growth in the United States where the REITs in our sample mainly operate. The figure is the average of the last 2 years (2013 and 2012). The assumptions used for our valuation model are summarized in Table 2. Using these assumptions, we present in Table 3 the intrinsic value of the companies in our sample and the differences with the market value at the valuation date (12/31/2013).

The stock market overvalues the property firms. The market value is higher than the theoretical DCF valuations for all companies of the sample. The average premium is 24.8% with a standard deviation of 47%. The largest market premium is for General Growth Properties with a premium paid by the market equals to 182.28%. This company presents a tremendous amount of debt. Investors agree to overpay in the real estate sector for reasons that are both tangible and intangible. We have highlighted the impressive performance of the real estate sector during the period of our study, which can be explained by attractive rental yields and favorable financing conditions. Every investor agrees on the importance of psychology in investment decisions. Research into behavioral finance shows the sometimes irrational and illogical behavior of investors in terms of choices and decision-making. The influence of emotional factors, but also a certain number of cognitive biases in information processing lead to errors of evaluation and judgment. Tetlock (2007) has shown that investors’ “feeling” affects their asset valuation. This emotional interference might explain to some extent the differences between theoretical and market values highlighted by our study. Kyle (1985) described these investors guided by their feeling as “noise traders”.

The next section examines the persistent overvaluation by the markets of property firms. We propose to improve discounted cash flow model by adding real options.

IV. VALUATION OF REITS BY REAL OPTIONS

Real options deal with tangible assets and make it possible to adjust the course of an investment project during its lifecycle. Real options capture the value of uncertain growth opportunities.

A. Theoretical frame of real options

Real options have been widely used to analyze decisions to develop/abandon physical property (Chan et al., 2012) and financing opportunities (Changwen et al., 2007). The conditions for the existence of real options in an investment project are irreversibility, uncertainty and flexibility explained below:

Table 2
Assumptions of the DCF model

Companies	Sales Growth Rate	Operating Margin	Terminal Value	Net Debt	WACC
1. Apartment Investment & Management	5%	55.73%	10270	4332.43	6.77%
2. Avalonbay Communities Inc	10%	63.40%	26381	5863.85	7.00%
3. Boston Properties Inc	9%	58.62%	31314	8976.37	6.51%
4. Equity Residential	3%	63.93%	29464	10712.72	6.18%
5. Essex Property Trust Inc	11%	64.27%	14262	3023.08	6.72%
6. General Growth Properties	3%	67.58%	27917	15301.37	6.50%
7. HCP Inc	15%	82.46%	41160	8361.07	8.63%
8. Health Care REIT Inc	10%	49.94%	32452	10493.23	6.90%
9. Host Hotels & Resorts Inc	13%	23.59%	20704	3898.00	10.12%
10. Kimco Realty Corp	8%	60.98%	15359	4072.63	7.67%
11. Macerich Co	14%	58.69%	14471	4513.02	8.06%
12. Public Storage	9%	68.11%	33364	819.88	8.60%
13. Simon Property Group	11%	72.50%	83032	21871.68	7.30%
14. Vornado Realty Trust	15%	52.18%	32242	9395.43	7.78%

Table 3
Spreads between theoretical and market valuations

Companies	Market Value	Intrinsic Value	Spread	Market Premium
1. Apartment Investment & Management	25.91	25.08	-0.83	3.31%
2. Avalonbay Communities Inc	118.23	111.05	-7.18	6.47%
3. Boston Properties Inc	100.37	98.67	-1.70	1.72%
4. Equity Residential	51.87	34.07	-17.8	52.25%
5. Essex Property Trust Inc	143.51	123.86	-19.65	15.86%
6. General Growth Properties	20.07	7.11	-12.96	182.28%
7. HCP Inc	36.32	32.43	-3.89	12.00%
8. Health Care REIT Inc	53.57	50.98	-2.59	5.08%
9. Host Hotels & Resorts Inc	19.44	16.04	-3.40	21.20%
10. Kimco Realty Corp	19.75	19.24	-0.51	2.65%
11. Macerich Co	58.89	45.81	-13.08	28.55%
12. Public Storage	150.52	146.11	-4.41	3.02%
13. Simon Property Group	143.06	137.22	-5.84	4.26%
14. Vornado Realty Trust	88.79	81.76	-7.03	8.60%

- With irreversibility, it is impossible to turn back without losing a significant amount of the funds already expended. If the decision can be altered without cost, the real option has no value.
- Uncertainty will encourage managers to wait and keep the investment opportunity in order to benefit from the release of new information (Yavas and Sirmans, 2005).
- Flexibility represents the possibility of making or not making an investment, in other words of exercising or abandoning the option depending on market conditions. It takes its value from the uncertainty and flexibility of the environment surrounding the holder of the property investment project (Sebehela and Tumellano, 2008). Different categories of real options exist in real estate investment projects by property firms, such as options to postpone, develop, abandon or sell assets (see Grovenstein et al., (2011) and Paxson (2007) for a review) When valuing real estate firms, these options should naturally be considered as future sources of value creation. Real options premiums are valued using Black and Scholes' model (1973). Assuming fixed interest rate, constant volatility and no transaction costs, the premium of a European-type call option is calculated using the following formula:

$$C = SN(d) - Ke^{-Rft} N(d - \sigma\sqrt{t}) \quad (6)$$

with

$$d = \frac{\log\left(\frac{S}{K}\right) + \left(R_f + \frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}} \quad (7)$$

where S is the rate of the underlying stock; K, the exercise price; R_f , the risk-free rate; t, the life of option; σ , the underlying volatility and $N(d)$, the cumulative normal function. The assumptions used to value property firms with real options are presented in the next section.

B. Hypotheses in the Real Options Model

We follow the procedure proposed by Rappaport and Mauboussin (2003), which consists in quantifying the value of a firm's implicit real options on the basis of the investments carried out or planned for in the business model. The performance of the property companies is directly related to their investment strategy and their assets turnover. Such firms sell off mature assets to refocus their portfolio on more profitable sectors, develop new projects or improve their financing conditions. In our procedure, and in line with the recent work by Tsekrekos (2013), we value property firms by combining discounted cash flow model and real options. The firm's value is the sum of its economic value (discounted cash flow model) and the value of its investment opportunities (real option model). According to the Black and Scholes method (1973), the premium of an option depends on five parameters: the value of the underlying stock, the exercise price, the volatility, the maturity date and the interest rate. We have formulated the following hypotheses to determine the parameters of the model:

- The intrinsic value of the underlying stock, expressed as S , is equal to the CAPEX. Investment opportunities create value. The CAPEX is the expense carried out over the year 2013;

- In line with the hypotheses of Rappaport and Mauboussin (2003), we suppose that $S/K = 100\%$. It means the Net Present Value (NPV) of the project at the time of decision is zero;

- Maturity is the time that a company can defer an investment decision without losing an opportunity. The length of time is five years;

- For the risk-free rate, we have retained the yield-to-maturity on US medium term government bonds;

- Volatility measures the potential variability of a project's cash flow and future value. We have retained the historic annualized volatility of real estate firm performance for the period of our study (2000 to 2013).

The value of the parameters in our real options is indicated in Table 4.

Table 4
Parameters of real options

Companies	Volatility	CAPEX	S/K	US YTM
1. Apartment Investment Management	32.05%	350.34	100%	1.5%
2. Avalonbay Communities Inc	29.32%	2151.80	100%	1.5%
3. Boston Properties Inc	25.25%	1098.98	100%	1.5%
4. Equity Residential	21.97%	625.70	100%	1.5%
5. Essex Property Trust Inc	24.36%	470.74	100%	1.5%
6. General Growth Properties	27.73%	982.47	100%	1.5%
7. HCP Inc	18.61%	259.55	100%	1.5%
8. Health Care REIT inc	16.92%	3981.35	100%	1.5%
9. Host Hotels & Resorts Inc	36.23%	488.00	100%	1.5%
10. Kimco Realty Corp	27.75%	485.72	100%	1.5%
11. Macerich Co	40.86%	726.60	100%	1.5%
12. Public Storage	18.96%	1323.59	100%	1.5%
13. Simon Property Group	24.30%	1707.75	100%	1.5%
14. Vornado Realty Trust	24.25%	923.18	100%	1.5%

C. Results

The results obtained by a real options model are presented in Table 5. The use of real options allowed us to refine the intrinsic value and move closer to the market value. Indeed, by including the investment options of these property firms, we have reduced the average gap between the theoretical value and the market value from 24.8% to 16.2% with a standard deviation of 27.5%. The range of value is more homogeneous with our combining valuation. Compared to the previous DCF intrinsic values, the market does not automatically overvalue the REITs. We value 4 companies with theoretical prices

Table 5
Results of the theoretical valuation using real options (RO)

Companies	Market Value	Real Options Premium	DCF + RO	Spread (USD)
1. Apartment Investment Management	25.91	1.13	26.21	-0.30
2. Avalonbay Communities Inc	118.23	6.47	117.52	0.71
3. Boston Properties Inc	100.37	2.92	101.59	-1.22
4. Equity Residential	51.87	1.48	35.55	16.32
5. Essex Property Trust Inc	143.51	1.21	125.07	18.44
6. General Growth Properties	20.07	2.82	9.93	10.14
7. HCP Inc	36.32	0.54	32.97	3.35
8. Health Care REIT inc	53.57	7.70	58.68	-5.11
9. Host Hotels & Resorts Inc	19.44	1.75	17.79	1.65
10. Kimco Realty Corp	19.75	1.39	20.63	-0.88
11. Macerich Co	58.89	2.88	48.69	10.20
12. Public Storage	150.52	2.79	148.9	1.62
13. Simon Property Group	143.06	4.39	141.61	1.45
14. Vornado Realy Trust	88.79	2.37	84.13	4.66

higher than market prices (Apartment Investment and Management, Boston Properties Inc., Health Care REIT Inc., Kimco Realty Corp.). Considering investment opportunities in the valuation process make market value and intrinsic value to converge. Our combined approach resulted in differences of less than two dollars for seven of the fourteen companies in our sample. The use of real options can in no way be reduced to a process of simple technical calculation. These options reflect the strategic and financial constraints that real estate firms face. They try to invest in “premium” assets to generate stable income and manage debt that can cast doubt on the profitability of their future projects. We recommend an approach combining a discounted model and real options to value alternative investments such as real estate companies. Indeed, the value of listed real estate firms depends simultaneously on the quality of their assets, the rental income generated by the business, their future development projects and their asset turnover policy.

V. CONCLUSION

In this research, we have stressed the importance for fund managers to consider investing in the real estate sector to improve their performance. During the period we have studied, the real estate sector performed on average 7.65% per year. However, we have underlined the problem of valuing property companies, given their specific features. Property investments depend to a great extent on the economic environment for their rental income, the value of the assets and the development of new projects. The main contribution of this research is that it proposes a theoretical frame for valuation that combines discounted cash flow models and real options. In the “stock picking” process,

managers should favor the discounted approach to the NAV approach with an exit hypothesis estimated based on perpetual growth rate rather than a multiple. To this should be added options that are justified by the company's asset turnover policy. Considering options results in an average difference of 16.2% between the intrinsic value and market values. The conclusions of our research are based on a relatively small sample, which could be extended to other countries and other market environments.

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