

# Modeling the Corporate Real Estate Decision

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*Abstract.* The corporate real estate decision has been viewed traditionally in a capital budgeting context. Due to recent capital market innovations, it is now more useful to view this decision from a combined capital budgeting/corporate financing framework. With the new combined perspective, all corporate real estate decisions should be reviewed on a regular basis. Given this need for frequent review, and the large number of variables involved, a formal model is helpful.

The individual techniques needed for a model with this joint perspective are well known. The interactions between real estate valuation, accrual accounting and corporate valuation methodologies are quite complex, however, as demonstrated in this paper. Moreover, the application of the theoretical model to real life situations is a challenging task as shown in the analysis of recent corporate restructurings. Detailed information on a corporation's real estate holdings, and subjective estimates on the impact of changes in real estate holdings on the firm's cost of capital, debt capacity, systematic risk, and operating revenues and expenses is required.

## Introduction

In June 1988, the market capitalization of listed securities in America was approximately \$2.3 trillion,<sup>1</sup> with real estate believed to comprise over 25% of that value.<sup>2</sup> While real estate plays an important role on the corporation's balance sheet, Zeckhouser and Silverman [34] find that only 40% of American firms clearly and consistently evaluate the performance of their real estate, and only 20% manage their real estate for profit (i.e., try to match or exceed the rate of return they could achieve through alternative investments). Instead, corporations traditionally have treated real estate as a necessary cost of operations and, after careful analysis of the initial lease versus buy decision, have entered purchased real estate on the firm's balance sheet and thereafter largely ignored it. Given the magnitude of corporate real estate in both absolute and relative terms, the lack of management attention is a serious problem.

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Date Revised—September 1989; Accepted—October 1989.

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The normal sequence of events involved in a corporate real estate decision includes:

- The corporation decides on a need for additional space. This is usually *part* of a larger capital budgeting decision tied to *operations*.<sup>3</sup>
- The space need is passed on to the corporation's real estate group for implementation.<sup>4</sup>
- Major builder/developers and/or real estate brokers are contacted about the need, and some subset of these professionals is hired to perform their services. This involves an investment decision (via discounted cash flow analysis), but with a focus on flexibility and the residual position of the corporate investor.<sup>5</sup>
- Either the real estate professional or the corporation brings in an investment banking firm to advise on financing. There are a few basic alternatives with innumerable bells and whistles as shown in Exhibit 1.
- The group then selects a financing alternative which best meets all *stated objectives*. Inevitably, without the kind of model described in this paper, this final selection will be an apples vs. oranges comparison with no good way to price alternative risks or to risk adjust alternative costs.
- The real estate is entered on the firm's balance sheet then largely ignored.

Exhibit 2 lists some of the possible objectives a corporation might pursue through the more exacting management of its corporate real estate after the initial acquisition and financing decision. The purpose of this paper (and a companion paper, *Information and Agency Issues in Corporate Real Estate Decisions*) is to help move real estate into the mainstream of corporate financial management by providing a vehicle for the systematic pursuit of these objectives. This point is particularly pertinent today since firms now enjoy additional flexibility in managing their real estate holdings due to (1) the creation

### Exhibit 1 Financing Alternatives

Type	Actions	Key Issues
Conventional-investor owned, corporate lessee, a bank construction loan, insurance company permanent financing	Swap for fixed rate prefund permanent, joint venture equity with tenant or long-term lender	Length of lease, maturity of debt
Special purpose corporation for financing, ownership financing, ownership flexible but the corporation takes the risk through a master lease	Rate commercial paper or domestic bond depending on maturity preference (backed by AAA letter of credit), privately placed lease payment bonds, construction period tranches	Long term financial and operating flexibility
Use some form of zero coupon to advance the realization of the expected appreciation	Combine lease payment bond with first mortgage	Size of residual and related risk
In all the basic approaches		Returns (and risks) to all three participants considering both current results and the expected residual values

## Exhibit 2

### Objectives for Corporate Real Estate Management<sup>a</sup>

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- Cash Generation (but the related costs are again in apples and oranges unless a formal model is used).
  - Takeover prevention (real estate financed to real estate motivated takeovers must be considered).
  - More effective utilization of the tax laws.
  - Minimizing agency cost (shareholder/bondholder and shareholder/manager).
  - The use of real estate financing as a market signal.
  - Playing the local real estate market by using the comparative advantage generated by the corporation's long-time horizon.
  - Maintaining flexibility given the firm's current and expected space needs, flexibility is an important consideration while pursuing the objectives above.
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<sup>a</sup>Objectives beyond the obvious desire to maximize the value of the firm

of new financial instruments involving real estate; and, (2) the increased liquidity created by the presence of more institutional and foreign buyers in the market.

Due to this increased flexibility, the well-managed firm should view real estate decisions from a combined capital budgeting and corporate financing perspective *on an ongoing basis*. This paper identifies the potential gains from more active management of real estate, highlights some of the problems and issues, and models the corporate real estate decision process.

The interactions of real estate with many aspects of the firm's operations and financing decisions creates a level of complexity that requires careful analysis. This research approaches the task by first developing the logic for a corporate valuation model that focuses on real estate. The third section then makes the case for a "wholistic"<sup>6</sup> corporate valuation model, while the fourth section applies that model to data from several large corporations with recent large real estate transactions. A summary and conclusions follow in the last section.

### Theoretical Support for a Corporate Real Estate Valuation Model

Lack of active management of real estate assets, along with changes in the environment surrounding corporate owned real estate, may result in significant value that is undetected by managers and investors alike. The potential hidden value in real estate is a function of (1) changes in capital market conditions, (2) changes in firm prospects (3) changes in utilization of real estate, (4) tax and accounting changes, and (5) changes in factors affecting agency costs of the firm. Specifically, changes in the capital markets affect real estate values via changes in market capitalization rates on real estate relative to those of other assets.<sup>7</sup> Changes in a firm's operating prospects due either to changes in return prospects or changes in risk exposure have a similar impact. The expected return on real estate may justify ownership (as opposed to leasing) of real estate in periods when firm operating prospects are poor, but this relationship can reverse when firm prospects improve. The magnitude of the value increment created by changes in the use of a firm's real estate obviously depends on how much value the new use adds to the property. Changes in tax laws in 1984 and 1986 had a major impact on real estate values, and recent accounting changes embodied in the *Financial Accounting Standard*

(FAS) #94 and #98 add to this impact.<sup>8</sup> Finally, a companion paper, *Information and Agency Issues in Corporate Real Estate Decisions*, explores the potential of corporate real estate to reduce the agency costs of the firm.

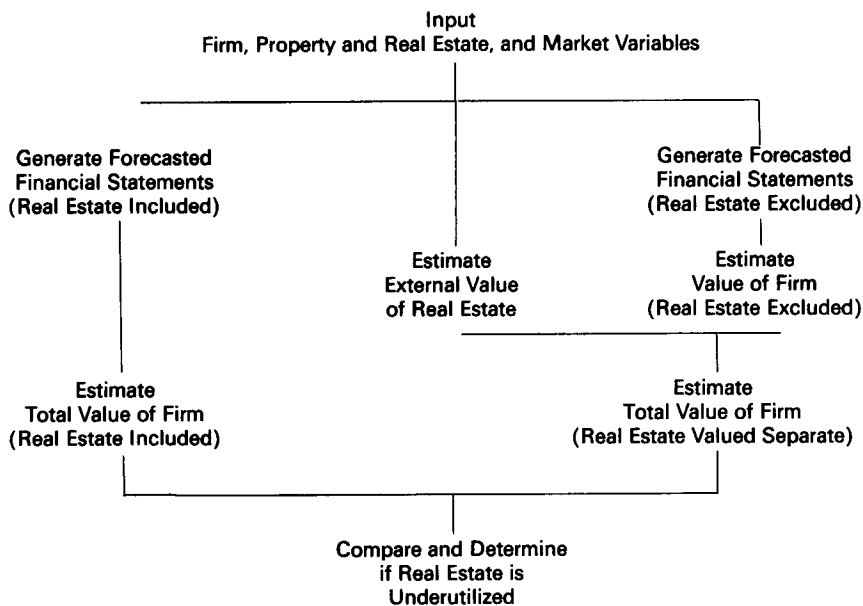
The potential to increase firm value (in addition to the threat of takeover) suggests that firms should consistently review the performance and the value of their real estate. Appraisal models of real estate value have been around for a long time, and these models do a satisfactory job of determining the market value of real estate in isolation. Knowing the value of real estate in isolation is not sufficient, however. A corporation must understand how its real estate holdings are affecting its *total* market value to determine how to utilize this asset, and this requires a valuation model of real estate *within* the corporate setting. The third section of this paper describes such a methodology.

### An Integrated Approach to the Corporate Real Estate Decision

Techniques for valuing real estate separately from the remaining assets of the firm—the normal appraisal process—are well known. To value real estate within the context of the firm as a whole (and thereby properly account for interactions between real estate valuation, accrual accounting, and corporate valuation parameters) requires a comprehensive corporate valuation model that explicitly recognizes (and separately values) a firm's real estate holdings. Exhibit 3 presents the basic structure of such a model.

Valuing a corporation in this manner exposes the interactions of the corporation's real estate holdings with the overall financial structure of the firm. Real estate is shown to

**Exhibit 3**  
**Model of Corporate Valuation with Real Estate Explicitly Considered**



affect the cost of equity, cost of debt, debt capacity, systematic risk, and the book-to-market value ratio of the corporation. While it is not always obvious what the direction or magnitude of the changes in these attributes will be, this model clearly points out the minimum information that is needed by the market value a firm independent of its real estate holdings.

### ***Basic DCF Methodology***<sup>9</sup>

Valuing an unlevered flow using *DCF* methodology is straightforward: cash flows expected in the future are discounted at a rate that reflects both the time value of money and the operating or business risk of the flows. When leverage is introduced, the valuation problem becomes more complex, for the process then must account for financial leverage and interest deductibility in addition to operating risk.

When a firm owns real property, valuation takes on yet another degree of complexity as real estate is different than other corporate assets from an accounting, tax, and appreciation/depreciation aspect.

In recognition of the potential for hidden value in company-owned real estate, a thorough financial analysis must specifically address the individual value of the firm's real estate, and incorporate the financing alternatives inherent in the real estate. This is of particular importance because the degree of financial latitude implicit in real estate is different from one firm to another. The next part of this section expands on this notion by separating the value of the firm into two distinct components, the value of the operating cash flows and the value of the real property. Each of these is independently evaluated with consideration given to whether separation of the components substantially alters the riskiness of either component in isolation.

### ***Valuing a Firm***

Consider the following hypothetical example in which privately held Alpha Manufacturing Company is being evaluated as an acquisition target by Omega Corporation. The problem at hand is to determine the value to Omega of Alpha's equity.<sup>10</sup>

A check of beta coefficients for comparable public companies might suggest a relevant market beta for Alpha.<sup>11</sup> Using publicly available data (as shown in the Atlantic Richfield example in the fourth section) for the bond rate and market risk premium yields an equity capitalization rate for Alpha as follows:<sup>12</sup>

$$K_e = \text{Risk free rate} + \text{Market Risk Premium} \times \text{Beta}$$

Assuming that Omega's management has determined the appropriate financing mix for the acquisition,<sup>13</sup> the weighted average cost of capital (*WACC*) is easily calculated using an estimate of the forward tax rate (*T*).

The *WACC* takes into account three factors: operating risk, financing mix, and tax deductibility of interest. Since financing mix and interest deductibility are accounted for in the discount rate, the *WACC* should be applied to Alpha's expected after-tax *operating* cash flows for a period of years, with interest excluded completely.

The terminal value for the cash flow stream must also be calculated.<sup>14</sup> The nominal perpetuity approach to estimating terminal value is straightforward and is the method normally used.<sup>15</sup> Starting with expected earnings before interest and taxes (*EBIT*), in the

final year of the estimated period, one first multiples by  $1-T$  to account for the tax liability on the operating flow. Assuming (1) that the flow is a perpetuity in nominal terms, (2) that depreciation is reinvested to cover capital expenditure requirements, and (3) that there is no additional investment in working capital, then cash flows from operations for all future years will be constant. Valuing this the *WACC* gives a terminal value for the operating flows.

After using the *WACC* to discount the operating flows, Alpha's interest-bearing debt at time  $t$  must be subtracted to determine the equity value of the firm. Note that the *market value* of the debt, rather than its book value, should be subtracted.

### *Valuing the Real Estate Option*

A look at Alpha's fixed assets might reveal that the firm owns its headquarters building. By looking first at the office building as a separate asset and valuing it in an unlevered state, one begins to see the potential for hidden value in the real estate. It is hidden not because it is hard to find on the balance sheet, but because its effect is not specifically considered in the firm valuation methodology outlined in the previous section. In fact, most financial analysts estimating a firm's earnings do not consider operating or financing options inherent in the firm's real estate, mainly because they do not have access to the necessary information. This would not be a serious problem if all firms had the same proportionate option, but clearly that is not the case. Some firms have great flexibility in their real estate, while others have practically none.

The estimated future sale price might be derived by capitalizing the last-year net operating income (*NOI*). Note that *NOI* is defined here as *EBDIT* (earnings before depreciation, interest and taxes). The capitalization rate is empirical and not derivable theoretically. It is simply the typical ratio of *NOI* to market value for a local sample of real estate sales.

It should be noted that the general purpose nature of the office building in this example greatly facilitates a transaction. With special purpose buildings, an outside investor is less likely to see any appreciation potential.<sup>16</sup>

The operating flows are discounted at the required pre-tax return for unlevered real estate. This rate can be estimated from the mean *DCF* return actually realized on large national samples of properties. It can be calculated by relating ending market value plus cash flows received to beginning market value. Such a rate is analogous to the Ibbotson-Sinquefeld data on common stock returns, both in its method of computation and in that it is post corporate (nonexistent in this case) pre-personal tax. This rate will exceed the *NOI* capitalization rate for the same reason that market required rates of return on common stocks typically exceed earnings/price ratios. That is, the capitalization rate is an earnings multiplier whereas the discount rate is a total return figure.<sup>17</sup>

Note carefully that the discount rate is derived from *historical* data.<sup>18</sup> Using this figure requires the same leap of faith required to use the Ibbotson-Sinquefeld data, namely, an assumption that market risk premia will remain about the same in the future as in the past. It may often be advisable to adjust the historical data up or down to reflect current conditions; or, as in the corporate situation, one could use analysts' forecasts of future real estate returns such as those now available from both Salomon Brothers and Goldman Sachs.

Regardless of whether the buyer finances the purchase in some part with a mortgage, the corporation's capital structure will be affected by any real estate disposition. Since the real estate previously served as indirect collateral for corporate debt, it is logical to assume that part of the proceeds from sale would be used to reduce corporate debt. One could assume that the market values the real estate at its current value and that the firm is at its optimal debt ratio. In this case, one would reduce the corporate debt by the appropriate amount of mortgage debt (the optimal financing ratio for the property standing alone, e.g., 80% of the market value of the real estate) and continue to use the original weighted average cost of capital.

Alternatively, if the market were totally ignorant of the real estate's value, one might reduce corporate debt by the book value change times the target percentage debt in the capital structure. In a world of imperfect information (i.e., the market does not have sufficient information to price the real estate), corporate debt might be reduced by the market value (rather than book) of the real estate times the target percentage debt in the capital structure. This intermediate position parallels the typical corporate loan which requires a prorated debt reduction upon the sale of any major asset.

### *Operating Flow without Real Estate*

Having valued the real estate to a potential buyer,<sup>19</sup> consider now the valuation of Alpha's operating flows with the real estate removed. If the real estate is separated from the company, the firm's operating flows are altered significantly. Specifically, when the real estate is removed, the firm:

- Loses rental income;
- Is relieved of all operating expenses associated with the real estate;
- Is relieved of all depreciation expense associated with the real estate;
- Now must pay rent at market rates for its employees that remain in the building.<sup>20</sup>

Revised *WACC* Cash Flows are calculated by starting with the revised *EBIT* and adjusting for depreciation, capital expenditures, change in working capital, and interest earned on investment of the cash netted from sale. Next, the revised operating flows of the company with real estate removed are valued. Caution is warranted here. Separating the real estate from the firm might significantly change the riskiness of the firm. If the real estate involved secure long-term leases, and operating expenses were subject to little uncertainty, the real estate flows might be less risky than the firm's operating flows. Pulling out the real estate flows would cause the firm's beta to rise. On the other hand, if leases were not long term and if uncertainty were high regarding local market supply and demand conditions, the real estate flows might be more uncertain than the operating flows.<sup>21</sup>

Original Unlevered Cost of Equity ( $K_0$ ) is the starting point.

$$K_0 = K_d + [K_e - K_d] \frac{E}{E + D(1 - T)}$$

Using a revised target debt ratio (with a resulting level of debt ( $D^*$ ) and equity ( $E^*$ ))

after the real estate sale and corresponding loan payoff, the revised  $K_e$  and  $K_w$  are

$$K_e^* = K_d + [K_o - K_d] \frac{E^* + D^*(1-T)}{E^*}$$

$$K_w^* = W_d^* K_d(1-T) + W_e^* K_e^*$$

From these, the revised Terminal Value and the present values of the total cash flows are calculated. Finally, to arrive at a total value for the firm, the net cash realized from the real estate sale and assumed to be paid out as a dividend must be added back. This cash dividend can be estimated as follows:

$$\text{Cash Dividend} = \text{Market Value of R.E.} - \text{Tax} - (\text{Market Value of R.E.} \times \text{Target Debt}\%)$$

### **Summary Model Output**

When the real estate is sold, the firm immediately captures both the income and appreciation components of value that are inherent in the real estate asset. Since traditional accounting, on which *WACC* is based, recognizes only the income side of real estate value, the firm might appear to be more valuable after the sale. If the analysis extended over a long period of time (say, fifty years), however, the difference would disappear as the firm experienced higher rent expense (and less rent income) as the long-term cost of recognizing the real estate's appreciation at the front end.

In "perfect" capital markets, there would be no change in value resulting from the separation except where the separation was 1) accompanied by an operating change such as a move of some workers to cheaper space or 2) a more advantageous set of tax rates were encountered as a result of the separation. (A loose translation of Miller [21] might even argue that rates of return would adjust to eliminate the potential tax benefit.) The argument here is information-, not market efficiency-, based. The information available to analysts is insufficient to properly value the appreciation component of the real estate return.

### **Using the Paradigm**

The preceding model is no more than a combination of well-known accounting, finance and real estate methodologies. It is a challenging task because it requires an explicit combination of accrual accounting, actual after-tax cash flows and finance theory. (Traditionally, most analysts have focused on only one of these three areas at a time and hence ignored difficulties in the interfaces.) It is useful in practice because it facilitates sensitivity analysis on key variables. The completeness of the model allows a wholistic view of corporation finance not possible with any of the three methodologies in isolation. As market conditions change, the model helps the corporate financial officer continually reevaluate the firm's capital structure, particularly the real estate component, to maximize shareholder value.



## Application of the Expanded Model using Publicly Available Data

The above analysis indicates that when real estate comprises a significant portion of the firm's assets and has more potential for real capital gains than most of other corporate assets, it is important for corporations to independently value their real estate. To value the remainder of the firm independent of its real estate holdings requires the removal of all cash flows and financing related to these assets. The most enlightening aspects of valuing a corporation in this fashion are the observed interactions of the corporation's real estate holdings with the overall financial structure of the firm. Exhibits 4 through 8 present the application of data from Atlantic Richfield to the model. Exhibit 9 then presents in condensed form the results of similar analysis for Exxon, International Paper, and Time Incorporated. All of these firms, like Atlantic Richfield, experienced a major real estate restructuring in the past two years.

Specifically Exhibit 4 presents the necessary variables for corporate valuation when real estate is to be considered independently in a real life situation. Panel A of Exhibit 4 displays general firm variables, with Atlantic Richfield's 1986 data obtained from the firm's annual report,<sup>22</sup> and projections on most financial variables for the following four years (1987-1990) obtained from *Value Line*.<sup>23</sup> Information on the real estate is presented in Panel B, as obtained from the report of the real estate's sales in the *Wall Street Journal*, private surveys of local brokers, and/or estimates of the authors. Panel C displays general capital market variables that are required for the valuation analysis. These are obtained from the *Wall Street Journal*, *Value Line*, and estimated company annual reports. Finally, Panel D discusses some of the key underlying assumptions of the model.

Exhibit 5 presents expected financial statements (based on the data in Exhibit 4 for Atlantic Richfield, with real estate included in the estimates. Exhibit 6 presents these same expected financial statements with real estate omitted from the balance sheet and its effects on the financial and operational aspects of the firm removed from the income statement.

Exhibit 7 looks at estimates of the independent values of the real estate to both a tax-exempt and taxable investor. This analysis requires substantially more information than is publicly available for properties that have not recently been sold. To obtain the necessary information for this analysis, only corporations that had recent major real estate transactions (like Atlantic Richfield) were selected for this study, and only the specific properties sold (instead of all real estate as would be desirable) are analyzed. Although market transaction prices are available on the properties analyzed here making this analysis unnecessary, Exhibit 7 indicates how real estate that has not recently been sold could be evaluated by internal management using standard discounted cash flow methods.

Finally, Exhibit 8 presents the estimates of the value of Atlantic Richfield both with and without its real estate. Note that given the set of circumstances relevant to the 1986 time period, Atlantic Richfield's value is maximized by selling the real estate. This result is not obvious from casual observation, as removing the real estate from the financial statements affects many aspects of the firm's financial operation—including the firm's cost of capital, debt capacity, and systematic risk—as well as its operating revenues and expenses.

The model of firm valuation examined here integrates real estate valuation, accrual

**Exhibit 4**  
**Valuation Variables for Atlantic Richfield**

Panel A: Firm Variables	1986	1987	1988	1989	1990
Sales (\$MM)	14993.0	16000.0	17377.9	18874.5	20500.0
Annual Sales Growth	-0.333	0.067	0.086	0.086	0.086
Operating Margin	0.209	0.215	0.205	0.205	0.205
Depreciation (\$MM)	1646.0	1630.0	1745.0	1868.2	2000.0
Non-Operating Income	781.0	781.0	781.0	781.0	781.0
Coupon Rate on Corporate Debt	0.113	0.113	0.113	0.113	0.113
Market Rate on Corporate Debt	0.093	0.093	0.093	0.093	0.093
Corporate Tax Rate	0.528	0.460	0.380	0.380	0.380
Capital Gains Tax Rate	0.280	0.380	0.380	0.380	0.380
Net Profit (\$MM)	615.0	910.0	993.7	1085.2	1185.0
Currents Assets/Sales	0.316	0.316	0.316	0.316	0.316
Book Value of Land & R.E. (\$MM)	130.0	120.0	110.0	100.0	90.0
Depreciation of R.E. (\$MM)	10.0	10.0	10.0	10.0	10.0
Working Capital (\$MM)	993.0	1000.0	1091.4	1191.1	1300.0
Long-Term Debt (\$MM)	6969.0	5800.0	6085.7	6385.5	6700.0
Other L.T. Liabilities (\$MM)	5626.0	5626.0	5626.0	5626.0	5626.0
Net Worth (\$MM)	5259.0	5450.0	5740.0	6047.3	6370.0
Panel B: Real Estate Variables	1986	1987	1988	1989	1990
Square Footage Owned	1200000	1200000	1200000	1200000	1200000
Market Rent per Sq.Ft.	34.50	35.54	36.60	37.70	38.83
Rent per Sq.Ft. (Leased Space)	43.00	44.29	45.62	46.99	48.40
% Change in Market Rent	0.03	0.03	0.03	0.03	0.03
Vacancy and Collection Losses (% of Gross Income)	0.05	0.05	0.05	0.05	0.05
Operating Exp. (% Gross Inc.)	0.45	0.45	0.45	0.45	0.45
% Building Occupied by Firm	0.80	0.80	0.80	0.80	0.80
Life of Building to New Investor	31.5	31.5	31.5	31.5	31.5
Land Market Value (\$MM)	110.00	110.00	110.00	110.00	110.00
Mortgage Interest Rate	0.0975	0.0975	0.0975	0.0975	0.0975
Mortgage Term (Yrs.)	30	30	30	30	30
Maximum Loan to Value Ratio	0.80	0.80	0.80	0.80	0.80
New Investor Personal Tax Rate	0.35	0.35	0.35	0.35	0.35
Transaction Cost of Sale (%)	0.08	0.08	0.08	0.08	0.08
Capitalization Rate for NOI	0.1025	0.1025	0.1025	0.1025	0.1025
Req. Return on Unlevered R.E.	0.1350	0.1350	0.1350	0.1350	0.1350
New Investor's Levered Req. Ret.	0.1723	0.1723	0.1723	0.1723	0.1723
Panel C: Valuation Variables	1986	1987	1988	1989	1990
20 yr. U.S. Bond Rate (Rf rate)	0.085	0.085	0.085	0.085	0.085
Stock Market Return	0.145	0.145	0.145	0.145	0.145
Firm's Beta	1.0	1.0	1.0	1.0	1.0
Firm's Debt Ratio	0.520	0.520	0.520	0.520	0.520
Cost of Debt	0.044	0.050	0.058	0.058	0.058
Cost of Equity	0.145	0.145	0.145	0.145	0.145
Weighted Average Cost of Capital	0.092	0.096	0.100	0.100	0.100

**Exhibit 4** (Continued)

*WACC versus Equity Residual Method:* Valuing an unlevered cash flow using basic discounted cash flow methodology is straightforward—cash flows expected in the future are discounted at a rate that reflects the time value of money and the operating risk of the flows. When leverage is introduced, the valuation problem becomes more complex as the process must account for financial leverage and interest deductibility as well. The two most commonly used approaches to this problem are the weighted average cost of capital (*WACC*) approach, and the equity residual (*ER*) approach. Under ideal conditions (where debt can be continuously adjusted so that it remains a constant percentage of the cash flows to be received), the two methodologies yield the same result. Under normal conditions, however, the two methodologies may yield substantially different results.<sup>1</sup> In light of the typical corporate situation of fairly decentralized investment decisionmaking, but centralized financing, the *WACC* methodology will be used here. This methodology assumes a constant financing ratio rather than estimating specific amortization schedules for each project as the *ER* methodology requires. The cost of equity is estimated as the risk-free rate of return over the relevant time period (as measured by the 20-year Treasury bond rate), plus the market risk premium (6% over this time period) adjusted for the specific risk of the firm (estimated by the *Value Line* reported beta for the firm). The cost of debt is estimated as the holding period return on the corporation's bond issue with approximately 20 years to maturity, and relative weights are estimated by the current market value of equity and book value of debt.

*Ex post versus Ex ante Risk Premiums:* This analysis uses the Capital Asset Pricing Model (*CAPM*) to determine appropriate risk premiums for the individual firms. The *CAPM* has come under increasing criticism from academics and recently has been seriously questioned in regulatory rate of return testimony (see ATT Divestiture FCC Docket 84-800). A more forward-looking alternative is to estimate the risk premium from a composite of analysts' forecasts. Because derivation of the proper cost of capital is not the primary concern of this paper, the *CAPM* methodology is followed despite questions of its accuracy.

*Terminal Values:* Both the *WACC* and the *ER* methodologies require estimates of future cash flows for some time into the future, followed by an estimate of the terminal value of the project (or in this case, the firm). The following analysis estimates annual cash flows for four years, and then estimates a terminal value of the firm. Terminal values may be estimated by discounting an assumed perpetual cash flow at a nominal or real rate of return. In an inflationary world it is not certain whether cash flows assumed constant into perpetuity should be considered real or nominal cash flows. The nominal perpetuity approach is more straightforward, is the approach most frequently used in practice, and is therefore the approach used here. Starting with the ending year projections of cash flows, multiplying this figure by 1 minus the tax rate to account for the tax liability, assuming depreciation is reinvested to cover capital expenditure requirements and that there is no additional investments in working capital, and valuing this cash flow at the *WACC* yields a terminal value for the firm.

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<sup>1</sup>For a thorough discussion of the issues that differentiate these two methodologies, see Salomon Brothers [12].

**Exhibit 5**  
**Expected Financial Statements for Atlantic Richfield**  
**(Real Estate included)**

Panel A: Balance Sheet	1986	1987	1988	1989	1990
Current Assets	4743.00	5061.56	5497.47	5970.91	6485.13
R.E. (Single Property)	130.00	120.00	110.00	100.00	90.00
Fixed Assets	16731.00	15756.00	16251.17	16767.58	17306.00
<b>Total Assets</b>	<b>21604.00</b>	<b>20937.56</b>	<b>21858.64</b>	<b>22838.49</b>	<b>23881.13</b>
Current Liabilities	3750.00	4061.56	4406.07	4779.77	5185.13
Long-term Debt	6969.00	5800.00	6085.70	6385.47	6700.00
Other L.T. Liabilities	5626.00	5626.00	5626.00	5626.00	5626.00
<b>Total Liabilities</b>	<b>16345.00</b>	<b>15487.56</b>	<b>16117.77</b>	<b>16791.24</b>	<b>17511.13</b>
<b>Net Worth</b>	<b>5259.00</b>	<b>5450.00</b>	<b>5740.87</b>	<b>6047.26</b>	<b>6370.00</b>
<b>Total Liab. + N.W.</b>	<b>21604.00</b>	<b>20937.56</b>	<b>21858.64</b>	<b>22838.49</b>	<b>23881.13</b>
<b>Panel B: Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
Sales	14993.00	16000.00	17377.93	18874.52	20500.00
CofGS and Op. Expenses	11853.00	12560.00	13815.45	15005.24	16297.50
<b>EBDIT</b>	<b>3140.00</b>	<b>3440.00</b>	<b>3562.47</b>	<b>3869.28</b>	<b>4202.50</b>
Depreciation	1646.00	1630.00	1745.03	1868.17	2000.00
<b>EBIT</b>	<b>1494.00</b>	<b>1810.00</b>	<b>1817.45</b>	<b>2001.11</b>	<b>2202.50</b>
Other Income/Expenses	781.00	781.00	781.00	781.00	781.00
Interest Expense	972.00	905.81	995.66	1031.86	1072.21
<b>EBT</b>	<b>1303.00</b>	<b>1685.19</b>	<b>1602.79</b>	<b>1750.25</b>	<b>1911.29</b>
Taxes	688.00	775.19	609.06	665.10	726.29
<b>Net Income</b>	<b>615.00</b>	<b>910.00</b>	<b>993.73</b>	<b>1085.16</b>	<b>1185.00</b>
<b>Panel C: Financial Statistics</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
Return on Assets	0.028	0.043	0.045	0.048	0.050
Return on Net Worth	0.177	0.167	0.173	0.179	0.186

**Exhibit 6**  
**Expected Financial Statements of Atlantic Richfield**  
**(without Real Estate)**

Panel A: Balance Sheet	1986	1987	1988	1989	1990
Current Assets	4743.00	5061.56	5497.47	5970.91	6485.13
Fixed Assets (Less R.E.)	16731.00	15876.00	16361.17	16867.58	17396.00
Land and Real Estate	130.00				
<b>Total Assets</b>	<b>21604.00</b>	<b>20937.56</b>	<b>21858.64</b>	<b>22838.49</b>	<b>23881.13</b>
Current Liabilities	3750.00	4061.56	4406.07	4779.77	5185.13
Long-term Debt	6969.00	5800.00	6085.70	6385.47	6700.00
Other L.T. Liabilities	5626.00	5626.00	5626.00	5626.00	5626.00
<b>Total Liabilities</b>	<b>16345.00</b>	<b>15487.56</b>	<b>16117.77</b>	<b>16791.24</b>	<b>17511.13</b>
<b>Net Worth</b>	<b>5259.00</b>	<b>5450.00</b>	<b>5740.87</b>	<b>6047.26</b>	<b>6370.00</b>
<b>Total Liab. + N.W.</b>	<b>21604.00</b>	<b>20937.56</b>	<b>21858.64</b>	<b>22838.49</b>	<b>23881.13</b>
<b>Panel B: Income Statement</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
Sales	14993.00	16000.00	17377.93	18874.52	20500.00
Original EBIT	1494.00	1810.00	1817.45	2001.11	2202.50
Lost Rent		10.10	10.40	10.71	11.03
Operating Expenses Saved		19.19	19.76	20.36	20.97
Lease Payment		42.52	43.79	45.11	46.46
Depreciation Saved		10.00	10.00	10.00	10.00
Revised EBIT	1494.00	1786.57	1793.02	1975.65	2175.97
Other Income/Expenses	781.00	781.00	781.00	781.00	781.00
Interest Expense	972.00	905.81	995.66	1031.86	1072.21
PBT	1303.00	1661.76	1578.35	1724.79	1884.76
Tax	688.00	764.41	599.77	655.42	716.21
<b>Net Income</b>	<b>615.00</b>	<b>897.35</b>	<b>978.58</b>	<b>1069.37</b>	<b>1168.55</b>
Gain From Sale of RE		33.48			
<b>Revised Net Income</b>	<b>615.00</b>	<b>930.83</b>	<b>978.58</b>	<b>1069.37</b>	<b>1168.55</b>
<b>Panel C:</b>	<b>Financial Statistics</b>				
ROA	0.028	0.044	0.045	0.047	0.049
RONW	0.117	0.171	0.170	0.177	0.183

**Exhibit 7**  
**Estimated Value of Atlantic Richfield Real Estate**  
**(Sold 11/25/86 for \$200m)**

Panel A:	Value To Tax-exempt Investor			
	1987	1988	1989	1990
Cash Flows from Real Estate:				
Gross Income (Maximum)	42.64	43.92	45.24	46.60
Vacancy and Collection Loss	2.13	2.20	2.26	2.33
Gross Income (expected)	40.51	41.73	42.98	44.27
Operating Expenses	19.19	19.76	20.36	20.97
Net Operating Income	<u>21.32</u>	<u>21.96</u>	<u>22.62</u>	<u>23.30</u>
Terminal Value of Real Estate:				227.30
Ending Year NOI/Req. Ret. on NOI				<u>          </u>
Total Cash Flow From RE	<u>21.32</u>	<u>21.96</u>	<u>22.62</u>	<u>250.60</u>
Present Value of Unlevered Real Estate	<u>202.31</u>			

Panel B:	Value To Taxable Investor			
	1987	1988	1989	1990
Annual After Tax Cash Flows:				
Net Operating Income	21.32	21.96	22.62	23.30
{Interest}	15.78	15.68	15.57	15.45
{Depreciation}	2.93	2.93	2.93	2.93
Taxable Income	2.61	3.35	4.12	4.92
{Taxes}	0.91	1.17	1.44	1.72
{Principal Payment}	1.03	1.13	1.24	1.36
Depreciation	2.93	2.93	2.93	2.93
Cash Flow After Tax	<u>3.60</u>	<u>3.98</u>	<u>4.37</u>	<u>4.76</u>
Terminal Value				227.30
Less Ending Period Loan Balance				157.08
Less Tax on Sale				<u>12.85</u>
Terminal Value Cash Flow				<u>57.37</u>
Total Cash Flow After Tax	<u>3.60</u>	<u>3.98</u>	<u>4.37</u>	<u>62.14</u>
Present Value of Levered Real Estate	41.58			
Debt on Real Estate	161.85			
Total Value of Real Estate	<u>203.42<sup>2</sup></u>			

<sup>2</sup>In this case the value appears to be greater to the taxable investor. This result will vary, particularly with changes in the level of pension fund interest in real estate (causing the discount rate in Panel A above to change), changes in tax laws, and changes in mortgage interest rates.

**Exhibit 8**  
**Estimates of Atlantic Richfield Value (with and without Real Estate)**

Panel A:	Value with Real Estate Included			
	1987	1988	1989	1990
Total Cash Flow:				
Earnings Before Interest & Tax <sup>3</sup>	2591.0	2598.4	2782.1	2983.5
{Tax on EBIT}	1191.86	987.41	1057.20	1133.73
Depreciation	1630.00	1745.03	1868.17	2000.00
{Capital Expenditures}	645.00	2230.20	2374.58	2528.42
{Change in Working Capital}	7.00	91.39	99.75	108.86
<b>Net Operating Cash Flows</b>	<b>2377.14</b>	<b>1034.48</b>	<b>1118.75</b>	<b>1212.49</b>
Terminal Value of the Firm Perpetuity—Ending Year EBIT(1-T)/Kw				26231.7
<b>Total Cash Flow</b>	<b>2377.14</b>	<b>1034.48</b>	<b>1118.75</b>	<b>27444.1</b>
Present Value (Discounted at Kw)	22639.6			
Less Beginning Period Debt	6969.0			
<b>Present Value of Equity</b>	<b>15670.6</b>			

Panel B	Value with Real Estate Valued Separately			
	1987	1988	1989	1990
Total Cash Flow				
Earnings Before Interest & Tax	2567.57	2574.02	2756.65	2956.97
{Tax on EBIT}	1181.08	978.13	1047.53	1123.65
Depreciation	1620.00	1735.03	1858.17	1990.00
{Capital Expenditures}	635.00	2220.20	2364.58	2518.42
{Change in Working Capital}	7.00	91.39	99.75	108.86
<b>Net Operating Cash Flows</b>	<b>2364.49</b>	<b>1019.33</b>	<b>1102.96</b>	<b>1196.05</b>
Gain from Sale of Real Estate	33.48 <sup>4</sup>			
Terminal Value of the Firm: Perpetuity—Ending Year EBIT(1-T)/Kw				26295.5
<b>Total Cash Flow</b>	<b>2397.97</b>	<b>1019.33</b>	<b>1102.96</b>	<b>27491.5</b>
Present Value (Discounted at Kw)	22713.5			
Less Beginning Period Debt	6969.00			
<b>Present Value of Equity</b>	<b>15744.5</b>			

<sup>3</sup>Operating earnings before interest and taxes plus other income.

<sup>4</sup>The gain from the sale of real estate is based on the actual market transaction as reported in the *Wall Street Journal* (11/20/88).

**Exhibit 9**  
**Value of Selected Corporations with and without Real Estate Holdings**  
**(millions of dollars)**

	Real Estate Owned	Real Estate Sold and Leased Back	Difference
Atlantic Richfield	15670.6	15744.5	{73.9 <sup>6</sup> }
Exxon	54513.8	54517.7	{3.9}
International Paper	3162.4	3230.3	{67.9}
Time Inc.	4731.9	4756.6	{24.7}

<sup>6</sup>While the differences are large absolute numbers, they are small percentages of overall firm value. For perspective, the average difference in value is less than 1% of total value, while the market value of these firms differs from the theoretical value (model estimates) by an average of 14.66%. Hence the magnitude of the real estate card is often dwarfed by potential valuation errors. This only indicates the importance of the kind of detailed evaluation of each property that is only possible with inside information (e.g., lease provisions). Even with better internally available data, financial valuation models are not perfect and differences between theoretical and market prices may still be larger than the "real estate card". However, if the theoretical model generates values that are comparably biased for the firm with and without its real estate holdings, the differences may still be an accurate estimate of the magnitude of the "card".

accounting, and firm valuation in a consistent theoretical framework. Although this general model can provide a guideline for all firms, every corporate situation is unique and consideration must be given to the idiosyncrasies of each firm. To illustrate, Exhibit 9 shows the results of similar analyses of real estate transactions of four corporations: Atlantic Richfield with a \$200 million sale, Exxon with a \$305 million sale, International Paper with a \$118 million purchase, and Time Incorporated with a \$118 million sale. Relevant information for estimating the value of real estate was very difficult to obtain, even for real estate that recently sold. Similar public information is nearly nonexistent for real estate that has been held by the same corporation for any significant period.

The analysis presented here is done exclusively with public information and is for illustration purposes only. Application of this methodology in practice would rely on superior internal forecasts and records available only to management. The fact that management alone typically has access to this information gives rise to the agency issues discussed in Miles, Pringle and Webb [20]. This companion piece shows that interesting agency issues derive from the interplay of three factors: underutilized real estate, the asymmetric information sets in the hands of management versus the markets, and management compensation plans that may exacerbate conflicts of interest.

## Conclusions

Many corporations have the opportunity to increase their profitability through more effective management of their real estate. This entails evaluating real estate on an on-going basis using an approach that treats the interactions of real estate with the capital structure, debt capacity, cost of capital, and the overall operations of the firm. Real estate values so determined must be regularly compared to the external market value of the real estate in its highest and best use to determine whether it is being efficiently utilized.



Managers who evaluate their real estate and determine it to be undervalued have considerable flexibility in their actions. The market in general does not have the information to recognize underutilization, and the cost of obtaining the necessary information across a wide range of firms is often prohibitive.

Increased interest in real estate on the part of institutional investors adds another dimension to the problem. As pension funds and insurance companies become more active in this market, companies may find it increasingly attractive for others to own the real estate they occupy. It is now, more than ever, important for firms to view real estate as an asset that can and should be actively managed to achieve corporate goals.

## Notes

<sup>1</sup>Market capitalization from *Anatomy of World Markets*, Goldman Sachs, September 1988.

<sup>2</sup>Zeckhouser and Silverman [34] survey major American corporations concerning their real estate holdings and find that buildings and land owned by corporations that are not primarily in the real estate business typically account of 25% or more of the firm's assets. Veale [32] updates this survey in 1987 and concludes that very little has changed in the six years since the Zeckhouser and Silverman study.

<sup>3</sup>Traditionally this operating decision is, itself, separate from the related financing decision.

<sup>4</sup>In corporations with higher-level real estate officers, the real estate group has been actively involved in the spatial aspects of the original capital budgeting decision.

<sup>5</sup>Important spin-off issues involve reputation, major client relations, and potential peripheral development profits.

<sup>6</sup>This idiom emphasizes that real estate holdings affect many aspects of both the financial and operating structure of the firm, and therefore cannot be isolated, but must be analyzed within the context of the "whole" firm.

<sup>7</sup>If required returns on real estate fall relative to required returns on other assets (as they have over the past several years due to an increased demand for investment grade real estate by foreign and institutional investors), firms may find superior alternative investments.

<sup>8</sup>FAS #94 requires consolidation of most real estate subsidiaries, potentially causing a major change in the firm's debt/equity position. FAS #98 curtails the use of sale-leaseback transactions by limiting the ability of a corporation to retain control of real estate while receiving off-balance-sheet treatment for the asset—unless the buyer has truly assumed the major risk position. These accounting changes, coming on the heels of the 1984 and 1986 tax law changes, clearly have the potential to affect the optimal structure of many corporate real estate financings.

<sup>9</sup>There are at least four different ways to apply standard discounted cash flow techniques to the valuation of either financial or real assets. Each of these approaches uses a different discount rate applied to a different stream of cash flows. The most widely used by corporate America in the evaluation of capital investments is the weighted average cost of capital (*WACC*) approach. *WACC* values operating cash flows at a calculated discount rate and then subtracts the value of debt to determine the market value of equity. A second methodology is called the "equity-residual" (*ER*) approach. This technique has been used in evaluating firms as well as individual projects. Under the *ER* methodology, the *net* cash flows to equity are valued after all debt service is subtracted. Two other approaches are less widely used. These are Stewart Myers' "adjusted present value" approach and a variation on the *WACC* technique suggested by Arditti and Levy. The *WACC* approach is described and utilized here. See any standard finance textbook for derivation of, and examples of the use of, the *WACC* methodology. For a technical discussion and critique of the strengths and weaknesses of *WACC*, see Myers [24] and Miles and Ezzell [17]. See Chambers, Harris and Pringle [1] for a detailed conversion of the four methods.

<sup>10</sup>For simplicity, it is assumed that there will be neither positive operating synergies in the combined firm (such as those that might result from previously overlapping distribution systems) nor negative organizational reactions to a merger (culture clashes, for example.)

<sup>11</sup>Betas for many public companies can be obtained from the *Value Line Investment Survey*. The market portfolio used by *Value Line* in calculating its beta coefficients contains firms with financial leverage in their capital structures. For consistency reasons, levered betas and levered market risk premia are assumed throughout this note.

<sup>12</sup>This presentation uses the *Capital Asset Pricing Model* which has been the primary model in corporate finance textbooks since the early 1970s. It has come under increasing criticism from academics (see Roll [27]) and recently has been seriously questioned in regulatory rate of return testimony (see ATT Divestiture FCC Docket 84-800). A more forward-looking alternative is to estimate the risk premium from a composite of analysts' forecasts (see Harris [8]). Since derivation of the proper cost of capital is not the primary concern of this note, the *CAPM* methodology is followed. Note, however, that the use of analysts' forecasts to determine  $K_c$  is perfectly consistent with this overall presentation and would have no effect on the results shown later in this paper beyond the implications of using a different  $K_c$ .

<sup>13</sup>For a theoretical discussion of optimal capital structure, see Copeland and Weston [5]. In practical terms, the optimal capital structure is a function of the tradeoff between the lower after-tax cost of debt (interest, unlike dividends, being tax deductible) and the increased risk of insolvency as the required debt service payment is increased with increased debt. Theoretically the value of  $K_d$  used to calculate the *WACC* should be the interest rate applicable to Alpha.

<sup>14</sup>For a practical application of this discussion of terminal values, see Exhibit 4.

<sup>15</sup>To treat the terminal flow as a perpetuity in real terms raises some potentially tricky questions in dealing properly with debt flows.

<sup>16</sup>If a refinancing is undertaken using special purpose real estate, then the investor will be relying heavily on the corporate seller's promised lease payments. This presents difficult problems from valuation and tax standpoints. From the valuation perspective, an appraiser would have to estimate a residual value at the end of the lease period, which could prove difficult if the next most logical use were not readily apparent.

<sup>17</sup>As a comparison, in December 1987 the market RRR on the *Standard and Poors' 500 stock index* was about 14.5% (long-term government rate of 8.0% plus Ibbotson average historic risk premium), whereas the earnings/price ratio is 6%–7%. The RRR includes an expected growth component, whereas the *e/p* ratio does not.

<sup>18</sup>The FRC index returns, which are often used to estimate total returns for real estate, do involve the use of appraisals. For an empirical comparison of these figures with corresponding sales prices, see Cole, Guilkey and Miles [2, 3, 9].

<sup>19</sup>This real estate analysis makes a number of simplifying assumptions in order to facilitate the presentation of the main issues. This illustration assumes that all rents are at current market rates for both premium (executive) and lesser (clerical) office space. Also ignored is the possibility of long-term leases whose pay-offs might complicate a restructuring, as well as all the many important lease terms that can alter net rent over the years. Conceptually these complications are not difficult but the level of detail in the cash flow computations and financial reporting can be quite extensive. They can be very material and should clearly be included in any specific application of this methodology.

From a tax standpoint, the problem is doubly difficult since the tax reform act of 1984. Under the "original issue discount" rules, the buyer's basis cannot be inflated with artificially high lease payments or artificially low interest rates. For example, the IRS will not allow a firm to deduct above-market lease payments and then have the investor take higher depreciation write-offs from the higher tax basis in the building with that higher basis substantiated by the present value of the above-market lease payments.

<sup>20</sup>If the corporation chooses to move a less visible group to cheaper space i.e., combine financial strategy with a real operating move, the value of the cash flows without real estate would obviously rise.

<sup>21</sup>To infer an unlevered equity rate,  $K_o$ , from observable,  $K_e$  and  $K_d$ , there are at least four possible valuation models. The formula shown is based on MM [3]. See Harris and Pringle [9] for a fuller discussion.

<sup>22</sup>The compact disk data service "DATEXT" is the source for the annual reports.

<sup>23</sup>*Value Line* does not supply information concerning a firm's short-term interest-bearing debt, or the division of working capital into current assets and current liabilities. Information concerning nonoperating income and expenses are only reported as special information and not reported on a consistent basis. Actual values for these variables were obtained for 1986 from the annual reports and projected into the future by the authors.

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