

# The Quantification of Corporate Real Estate Risk

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THE ANALYSIS OF THE DECISION-MAKING FRAMEWORK for the efficient usage of corporate real estate assets is a growing aspect of the analysis of real estate assets in general. For example, the major academic literature has devoted significant space to corporate real estate issues.<sup>1</sup> One of the more recent developments in corporate decision making is the consideration of real property risk (Huffman, 2002). The rather recent, and to some extent belated, attention to real estate risk analysis is not surprising since the consideration of corporate risk analysis in general is one of the more recent developments in corporate finance and corporate strategic management. This paper offers some insight to consultants and analysts by attempting to quantify the risk inherent in property usage and summarize these measurements into a score or index that can be used to represent the real estate risk exposure of an individual firm. To that end, this paper first considers the analysis and measurement of corporate risk. We then extend the discussion down to the property level. We develop the concept of a risk score and offer a basic example of how such an index could be constructed. We begin with a discussion of the risk concept.

## RISK DEFINITION

Risk in general can be defined and measured in several ways. An early definition of risk was that risk is associated with the probability of an event (Baird and Thomas, 1985). Given that corporate decision makers rarely know every possible outcome, the precise determination of probabilities (and thus overall probability distributions) is difficult. Today, risk, especially in corporate finance, is most often measured in terms of the variance (or its square root, the standard deviation) of expected returns. Unlike the determination of probabilities, which is to some degree subjective, the variance of returns can be estimated so long as sufficient data on past returns are available.<sup>2</sup> The variance in

returns, in effect, sets the boundaries of uncertainty or the “riskiness” of a particular venture.

One difficulty in the use of variance of returns lies in the need for sufficient return data from which to calculate variability. Investment real estate suffers from this shortcoming. Each piece of real estate is, to some extent, unique. Although rental income can be estimated, the lack of sales prices makes determining capital values cumbersome. Corporate real estate assets would also suffer from the lack of information on returns.

A more fundamental problem for the corporation exists in the need to be able to translate specific risk exposures, such as from the use of debt or the impact of poor human resource decisions, into a suitable estimate of the impact on returns. That is, a major weakness of the use of returns and return variability as a measure of risk is that generally the underlying causes of that variability and their specific impacts on variability are often unknown.

## CORPORATE RISK MANAGEMENT

The relevant aspects of corporate risk management really began in the 1980s with the development of models of corporate risk taking. Baird and Thomas (1985) was one of the first attempts at development of a model that would encompass the various components of corporate risk exposure and the development of corresponding corporate risk policies. Much of the early discussion centered on the true

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# The Quantification of Corporate Real Estate Risk

relationship between corporate risk and corporate returns. The discussion was crucial since one early study, Bowman (1980), found that, contrary to general accepted theory, risk and return were negatively related.

Subsequent studies amplified and extended the relationship between risk and return such that it became clear that while there might be some circumstances where firms might accept higher risk for lower returns, the expected positive relationship generally held true.<sup>3</sup>

Current corporate risk assessment models entail an analysis of specific risk exposure and a consideration of their impact on returns as discussed next.

## **CORPORATE RISK MEASUREMENT AND REPORTING**

Corporate risk management is rapidly being integrated into the corporate culture. Barton, et al (2002) propose an "enterprise-wide" risk management strategy that manages all corporate risks together. They specify a three stage model for corporate risk assessment that consists of risk identification, ranking and measurement. Other techniques are the plotting of functions to assess the effect of corporate risk exposure on revenues, earnings and shareholder values; and the development of scenarios to identify key risks and their impacts.

The key element to all of these strategies is the identification and impact assessment of corporate risks. Assuming major risks can be identified and quantified in some way, the next step might be the development of an overall risk index for the firm; in effect, an enterprise-wide numerical representation of the risk exposure of the firm.

A major shortcoming in the assessment of specific corporate risks is that there is very little detailed reporting of specific risk exposure for any corporation. Annual reports of U.S. corporations are required to enumerate various risk possibilities. Along other filings with regulators, these reports give some idea of the financial health of the firm and its vulnerabilities. But recent events such as the collapse of Enron, World-Com and others illustrate that current GAAP financial disclosure requirements are far from perfect.

One of the difficulties in the reporting of risks is often that the corporation is unaware of its vulnerabilities. As Thornton (2002) notes, firms report very little on how they assess, monitor and mitigate specific corporate risks and the firm may have little understanding of its risk exposure or be unable to predict what may happen.

Thornton describes the impact of a purchase by Halliburton Company of Dresser Industries in 1998. Although Dresser Industries' exposure to asbestos liability was known and accounted for, Halliburton subsequently discovered that its losses were not indemnified as expected.

Barton et al, (2002) discusses some corporate characteristics that could be used to develop an index of corporate financial prospects. Relevant items range from the existence of off-balance-sheet liabilities, the presence of management experience and the size of the corporate audit staff. Other third-party assessments of corporate risk exposure are available.<sup>4</sup> Bond ratings by Moody's and Standard and Poor can give indications of the financial health of the firm, particularly its default risk on corporate debt. Also, the reporting of betas, which measure the volatility of the firm relative to a market benchmark, is available. However, these estimates of the firm's well being do not reveal the specifics that the rating agency used.

At least one risk index of corporate risk has been developed. CCN Business Information, an English commercial credit information company, has developed an index that estimates the likelihood of company failure. The firm uses information on over one million UK companies to create the index (CNN, 1994).

## **CORPORATE REAL ESTATE RISKS**

Executives face a number of risks in managing corporate real estate assets. Most important are varied risks associated with property development. The risks incurred in development activities run the gamut from financing risk to physical risks to regulatory risk (Huffman, 2002).

Bajai (2001) examines the risks associated with construction and bidding (or cost estimation) specifically. A number of factors enter into the decision to bid. Most relevant to corporate decision makers in estimating the construction costs of corporate facilities would be such variables as the size of the project, duration, and the state of the market.

Real estate development also entails significant interest rate risk associated with construction loans, the effect of interest rates on the demand for rental space, and the effect of interest rates changes at any future sale or refinancing. Cameron, et al (1990) illustrates various meth-

# The Quantification of Corporate Real Estate Risk

ods of offsetting interest rate risk including the use of interest rate caps, collars and swaps. However, given the multitude of activities comprising real estate development, no single risk management strategy can suffice.

Risks that can be incurred outside the development sphere include the financial risks incurred in leasing, purchasing and the potential reversion of the asset; and various physical risks such as design weaknesses and site and location risks. Corporate real estate will also be burdened by the risks associated with the regulation of such assets by a host of local, state and national agencies (Huffman, 2002).

As noted above, one of the more difficult risks is assigning accurate values to corporate real property. According to Brueggeman, et al, (1990), one of management's greatest challenges is to capture "hidden value." The underestimation of corporate property assets artificially depresses share values and can provide the incentive for hostile takeovers.

## **REAL ESTATE RISK IDENTIFICATION**

Despite the difficulty of quantifying corporate risks and more particularly, real property asset risks, any legitimate attempt in risk assessment must eventually arrive at an overall determination of the corporate real estate risk exposure of the firm. Such a risk index would require an identification of specific real property risks affecting the firm and attempt to measure or rank these risks. An overall risk index could then be developed based on the identification and assessment stages.

Following the developments in general corporate risk assessment, the first step in creating a real estate risk index would be to identify the appropriate factors inherent in the control and use of property. The next step is to attempt to measure or rank these risks. Using a standard index or scoring methodology, an index could then be constructed.

A discussion of specific risk identification can be found at Huffman (2002). Specific risks would include, at a minimum: development risks, financial risks, physical risks and regulatory risks. To recognize the risks associated with potential hidden values, one could also include a risk factor to account for other risks such as under-valued (over-valued) real estate assets. These risk measurements could then be compared, or added to, other corporate risks and risk measurements to integrate real property risks with the overall corporate risk profile.

Looking at development risks first, corporate real estate development is perhaps the single most important real estate risk exposure to the firm since it encompasses many other related risks and thus significantly increases the risk exposure of the firm. This exposure would require a significant risk premium or ranking.

Financial risks would be a function, to some extent, of the firm's preference for owning over leasing. Ownership would require the consideration of potential mortgage default risk, property management risk, and perhaps most importantly, reversion risk. Leasing, on the other hand, would require the measurement of the risk exposure associated with lease terms, particularly their length. It would also consider the risks associated with escalations, increased expenses under a net lease and the amount of space leased.

A measurement of physical risks would require a determination of the amount of functional obsolescence in various buildings and improvements such as parking lots, etc., as well as an assessment of site and locational strengths. Regulatory risks involve the consideration of environmental and, other land regulations and restrictions.

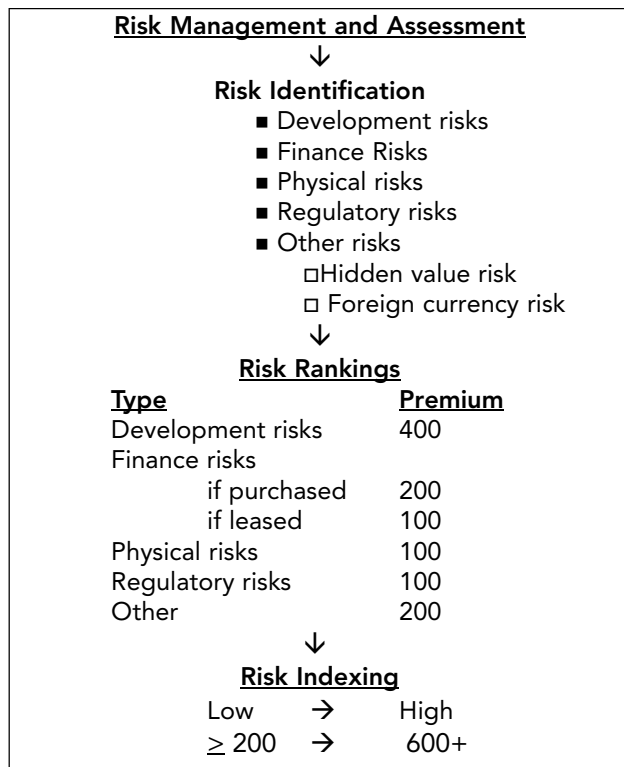
## **RISK MEASUREMENT AND RANKING FOR CORPORATE REAL PROPERTY**

A vexing problem that one must face in the quantification of any risk exposure is that risk premium assessment, magnitude and structure may not be the same for all participants. In fact, it should be expected that they would not be. Risk assessments are, to some extent, arbitrary, since risk determinations themselves, are subjective. This simple truism presents several thorny problems in the construction of any risk measurement system. For instance, is development more risky than, say, the real estate risks associated with regulation? Most might think so but what about those for those with substantial experience and the ability to minimize the risks of development through the use of options, hedging and insurance and bonding?

If we can all agree on a basic risk hierarchy, how does one determine the basic unit of measurement? Is development 100 points more risky than the risk exposure due to local regulatory restrictions? 200 points? 1,000 points? How much risk does each unit of measurement capture? Thus any numbering scheme may hide a multitude of assumptions regarding the risk averseness of the participating firm.

# The Quantification of Corporate Real Estate Risk

**Figure 1—Corporate Real Estate Risk Index Development**



Source: Huffman (2002) and text.

Once we arrive at a basic premium structure, we must decide how to levy these assessments across the firm. That is, is it likely that a multi-national firm with thousands of pieces of real estate is only 500 points, say, more risky than a small firm with a single piece of real estate? Another way might be to evaluate each real estate holding individually and aggregate into a total score for the entire firm. Sub-aggregates might also be employed such that, for instance, all holdings of land receive one score, while buildings of various types are scored as a group. Given any number of complicating factors, any risk premium construction mechanism illustrated here can only be a first approximation of any risk index. For illustration purposes we use a constant scale model in which all firms are scored on the same scale, ie, 1-1,000.

However, some rules will apply. For instance, we can assume that all firms are risk averse and will only accept higher risks by receiving an appropriate 'return' and an appropriate ranking. Secondly, some risks, specifically development risk, will be ranked higher than other, less potentially damaging risks. With these general rules in

mind, we illustrate how a corporate real property risk index might be constructed (see Figure 1).

The usual first step in constructing an index is to establish a base value. The Consumer Price Index is calibrated to a base value of 100.<sup>5</sup> For illustration purposes and keeping simplicity in mind, we decide to set a base value at 1,000 points. Our next task is to allot points across the various risk exposures.

Of the total 1,000 points, we allot 400 points to development risk exposure. In effect, development risk would then constitute 40% of the total real estate risk exposure to the firm. Since many firms will never engage in development, this development risk premium will for many firms equal zero.

Taking each of the remaining risks in turn we look next at the purchase/lease decision. The purchase/lease decision is probably the most critical financial decision for most corporations since the result is easily translated into financial statements and the firm's bottom line. Since the decision is an either/or proposition, we look at the two choices in tandem.<sup>6</sup>

Possession by purchase or lease of an existing structure could be thought of as possession without construction, where construction includes development activities such as construction financing, permit approvals, environmental issues, design requirements, location analyses, etc. Taking possession of an existing building, by purchase or lease, eliminates the volatility (or uncertainty) in these actions. Looking at the ownership alternative first, we rank ownership risk premiums at 200 points total. A portion of these points would be allocated to financing risk, including default risk.

Leasing eliminates much of the uncertainty associated with ownership, in particular the risks associated with disposition. Furthermore leasing does not expose the firm to mortgage default risk. We therefore begin our leasing premium at 100 points (essentially one-half the exposure of ownership). Risk premiums would fall to the extent the firm can negotiate significant options for renewal and avoid the pass through of various expenses.

We next assign a risk premium for physical risks of 100 points with approximately half of this premium allotted to various location risks. We allot 100 points to various regulatory risks such as zoning restrictions. Finally, in the

# The Quantification of Corporate Real Estate Risk

**Figure 2—Real Estate Space Needs**

The firm is a service corporation currently occupying 40,000 sq. ft. of Class B office space, located in central city with good proximity to clients. Firm is currently leasing on a gross rent basis with options to renew at third and fifth years. Lease includes rent escalations based on inflation adjustments with a maximum adjustment of 5% annually. Firm is responsible for cleaning and maintenance. Firm is anticipating expansion of space needs due to new hiring and will be in the market for an additional 10,000 - 20,000 sq. ft. in the near future. The firm has expressed its desire for leasing in the same general area under approximately similar conditions and terms. The firm may consider a move to Class A space if lease terms are acceptable.

**Risk Identification and Quantification:**

1.	Development Risk	0
2.	Financial Risk	
	■ Lease only	
	■ Gross with CPI adjustments (capped)	25
	■ Class A rent exposure	25
3.	Physical Risks	
	■ Parking and congestion	25
4.	Regulatory Risks	25
5.	Other	25
<b>TOTAL SCORE</b>		<b>125</b>

(Risks allotted in 25 point increments for illustration purposes)

Source: text

other category, we assign the remaining 200 points to account for miscellaneous and unique risks faced by specific situations. These might include the failure to mark real estate values to market, foreign market risks, unusual location risks and so on. Note that the failure to mark to market might affect lessees as well as fee simple owners. Lease terms may have value in a rising market or costs to the firm with fixed lease payments in a declining property market.

Figure 1 shows a potential index range with potential total values from about 200 points to 600+. A score at the low end of the scale would indicate a firm that does not develop, prefers to lease with gross leases or minimal pass

**Figure 3—Example B: Moderate Risk Firm**

**Real estate space needs:**

Firm is small firm with a national market for its products. The firm currently holds fee simple ownership of 50,000 sq. ft. of office space plus a 150,000 square foot production and distribution facility in suburban area close to interstate highway. Firm is currently looking to expand production, subject to potential development incentives in current location. Firm would consider taking an option on an appropriate site in immediate location until location decision is reached. Firm will negotiate build-to-suit facility with local developer. Additional square footage would be in the 50,000 - 60,000 range. Final decision will be dependent upon analysis of various location alternatives.

**Risk Identification and Quantification:**

	<b>Current</b>	<b>Proposed</b>
1. Development Risk	0	200
2. Financial Risk		
■ Ownership	200	200
3. Physical Risks		
■ Design and Location Risks	25	100
4. Regulatory Risks	25	50
5. Other	25	25
<b>TOTAL SCORE</b>	<b>325</b>	<b>575</b>

through of expenses and has little exposure to physical, regulatory or other risks. A high score would indicate a firm that develops its own properties, holds fee simple ownership and does not offset the remaining risks significantly.

Figures 2, 3 and 4 present three examples of firms with differing real property risk characteristics and how a risk score might be calculated for each. Firm A has minimal risks associated with leasing efficient facilities at market rents with relatively few physical, regulatory and other risks. Firm B is larger and facing the possibility of expansion and developing the proposed space. Finally, Firm C is a large international corporation with over 3,000 locations. Corresponding risks thus range from below 200 to a risk index of 900.

**CONCLUSIONS**

Although the above is certainly only a crude approximate measurement, the basic components necessary for the creation of an index are present. The essential risk exposure

# The Quantification of Corporate Real Estate Risk

**Figure 4—Example C: High Risk Firm**

**Real estate space needs:**

The firm is one of the largest retailers in the world. The firm operates over 3,000 stores in 10 countries. Stores are can be divided by size into neighborhood stores, standard, and "Supercenters." The average size of a neighborhood outlet is 44,898 square feet, standard outlet average size is 96,875 square feet and Supercenters average over 186,000 square feet. The firm aims to increase productivity, pass cost reductions to consumers and provide as complete an inventory for sale as possible. The firm expects to add 50 million square feet of new space in the 2005 fiscal year based on expected net sales growth of about 12%. The firms prefers free standing "big box" stores in rural and suburban areas but is moving into higher density areas as opportunities arise.

**Risk Identification and Quantification:**

1. Development Risk	300
2. Financial Risk	
■ Ownership	200
3. Physical Risks	100
■ Functional Obsolescence	
4. Regulatory Risks	100
5. Other	200
■ Miscellaneous foreign	

**TOTAL SCORE 900**

of the corporation's real estate assets has been identified, measured, and indexed. Certainly each corporation will have differing risk factors with differing weights allotted to each factor but the basic risk index structure is evident. Following these general guidelines can allow analysts to evaluate and quantify the risks of corporate real estate and thus be able to adjust those risks in a manner consistent with the overall corporate risk profile. The next step in the development of corporate risk index measurement would be to refine the index to more accurately reflect specific circumstances and premium structures.

It also must be noted that the values for corporate real estate risks identified and measured here are for illustration purposes only. A significant evaluation and reporting process will have to be developed before analysts use these techniques to assess the real estate risks of any specific corporation.

**ENDNOTES**

1. See, for example, the second special issue on corporate real estate by The Journal of Real Estate Research, Vol. 17, 3(1999).
2. The use of probabilities is a major component in the development of Monte Carlo simulations. Other measures of risk are the use of expected values and the adjustment of returns using certainty-equivalence. See any university level finance text for details.
3. See, for instance, Figenbaum and Thomas (1986) and (1988) and, more recently, Bromley (1991). The basic premise underlying the acceptance of higher risk is the necessity of achieving a corporate "target" rate of return which in turn requires the firm to become a higher than usual risk taker.
4. See "CNN Scores with Risk Index," 1994.
5. The base value of the Dow Jones Industrial Average Index is a price index in which the per share prices of the 30 firms was totaled in the base year and then divided by a divisor such that the base value (100) is derived. Unfortunately real estate risk premiums are much more difficult to price.
6. For a more detailed discussion of the purchase/lease decision, see Deeble (2000).

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