CHAPTER 20  REAL ESTATE DEVELOPMENT AND INVESTMENT

20.1 INTRODUCTION

Real property constitutes the largest sector (over 50 percent) of US gross private domestic investment and is a substantial component of the gross national product. Real estate also is a very important component of individual (and society) wealth. In terms of world wealth, in 1984 US real estate constituted 18 percent and total foreign real estate, 36.9 percent. Investment in real estate is financed by both debt and equity. Debt typically is in the form of mortgages and is almost $3 trillion, consuming approximately thirty percent of total funds available for new investment in the US every year, an increasingly large share of which comes from foreign sources. For example, by the end of 1988, 64 percent of Los Angeles downtown office space was foreign owned, 20 percent of Chicago, and 25 percent of Atlanta.

Real estate development (or additions to the existing supply of real estate) occurs in order to replace obsolete and worn out buildings, to provide for population growth, or as a result of increases in national income. While increases in national income can result from population growth, the focus here is on those increases which are caused by technological innovations, allowing either more efficiency in the production of real estate or the more efficient production of other goods and services (so that surplus resources can be utilized for expanding the amount of real estate). In recent years the net population growth (births + immigration - deaths) of the US has been less than one percent per year. In the future, the aging of the population as baby boomers mature will cause population growth to slow even further. This means that the majority of real estate development in the US has occurred as replacement for old buildings, as a result of technological change and production efficiency, or in response to regional migration. For example, in the Sunbelt states of the South and West, population growth occurred at the expense of the Frostbelt states, providing a major impetus for real estate development in the southern region of the country.

The relative population growth of different states can be observed by comparing their populations over the period 1980 to 1989. During this period, the total US population increased by 9.6 percent. The populations of six states -- Alaska, Arizona, California, Florida, Nevada, and New Hampshire -- increased by more than twenty percent while Georgia, Hawaii, New Mexico, Texas, Utah, and Washington increased between fifteen to twenty percent. Twenty states, including Indiana, Kentucky, and Ohio experienced a growth of less than five percent. In addition, most of this growth occurred in smaller metropolitan areas and in the suburbs while the larger cities and the city centers declined, a trend that may be expected to continue despite efforts to the contrary by city officials and planners.

Another phenomenon that occurred during this period from 1980 to 1989 was that relatively undiversified local economies were often identified with volatile boom-bust conditions. The speed of economic changes in these areas had a dramatic impact in real estate values and development. For example, some cities (such as Denver, Houston) and regions (Texas, Colorado) whose economies were closely correlated with oil production went into immediate recession as the spot price of oil fell from $28.50 a barrel in January, 1986, to $9.00 in May. Shortly after this, the office building vacancy rate reached 30 percent and real estate development was halted abruptly, often with buildings partially finished.

The vast majority (93 percent in 1985) of the construction of new buildings in the US is undertaken by the private sector. Much of this private development is of a small scale (houses, small renovations etc.) with a direct relationship between owner and contractor such that architects are seldom involved in providing professional services. Thus, for

3. The framework of Production Possibilities as discussed in Chapter 3 provides a basis for understanding the contribution of technology to real estate production
most architects, the client for a building project is likely to be a developer. The developer's primary goal is to maximize the economic value of the project. The developer also integrates the contributions of a variety of participants in an environment which is becoming increasingly complex with a growing number of stakeholders, including public institutions and community groups. In addition, the sensitivity of private speculative development to a wide range of economic factors is such that real estate is becoming increasingly riskier. In this environment, it is essential for architects to understand not only the development process but also their own contributions to the value of real estate.

20.2 THE DEVELOPMENT PROCESS

The Urban Land Institute (ULI) has formulated an eight-stage model that identifies the major stages in development. However, in the complex and changing environment described above, development involves constant and complex interaction among participants with very different value systems. Creativity, and the management of uncertainty are key components in speculative development and are not easily contained in a model that oversimplifies the process. Despite this limitation, the ULI model provides a useful orientation to the role of the developer.

1. Inception of the "Idea"

The “idea” for a development project begins with an unsatisfied need in the market or an existing site which is being under-utilized. In the former approach -- often referred to as a use looking for a site -- the developer analyzes the market to discover a particular need or a segment (or niche) whose needs are not being filled by existing buildings. Once the need(s) is understood, the analysis focuses upon discovering the best site. In the latter approach, the developer might own, or have knowledge of a specific site which is under-utilized; that is, the site is not being employed at its "highest and best use." Site and location analysis is performed to discover the characteristics of the site and to match these attributes with the requirements of different uses. In both situations there exists an opportunity to create value through the enhancement of existing real estate or satisfying human needs. This opportunity is the motivation for the developer to continue on to the subsequent stages.

The developer might examine many potential ideas, performing quick feasibility tests that consider legal, political, site, market, and financial factors and eliminate alternatives if they do not meet the established criteria.

2. Refinement of the "Idea"

In this stage the "idea" is studied in specific physical detail -- with the site and use identified. The developer may work with prospective tenants, lenders, partners, and other professionals to develop a tentative program and schematic design. At some point the developer may acquire an option to purchase, locking in the right to buy the property but without being legally obliged to do so. For a sum of money, the developer is guaranteed that the property owner will sell the property for a stipulated amount on or before the expiration date of the option. The use of options allows the developer to minimize the capital outlays in the initial stages of the project while preserving rights to acquire the property once more sophisticated analysis has confirmed the project's feasibility.

3. Feasibility Analysis

In this stage the developer expends a considerable amount of capital and effort to ascertain the feasibility of the project. Formal market studies to determine the demand and supply conditions (usually expressed in revenue projections, absorption, vacancy, and capture rates) and advanced architectural and engineering studies are undertaken. The

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2. Options are legally binding contracts that, in return for a specific sum, certain rights (usually as a fixed price) are promised at a stated time in the future. Options can be acquired for real estate, financial assets, leasing rights, etc., and are an important technique of reducing risk for some participants by reallocating it to others. If the option is not exercised by the expiration date, it has no value and the amount of the option is lost.
expected initial cost of the project then is compared to the estimated value. Value is a function of the future benefits (and costs) associated with ownership. Approval of preliminary plans for the project is then sought from government agencies and community groups.

4. **Contract Negotiation**

Once the project has demonstrated its feasibility, a market survey is used to refine the program so that it reflects what the "users want and will pay for." Architectural and engineering studies are completed, and lenders are approached for formal commitments (in writing) to provide construction financing and, when the building is completed, a permanent mortgage. Frequently, lenders will require that a percentage of the building be pre-leased before such commitments are provided, reducing the risk of finding tenants once the construction phase is finished. This will require marketing the project and negotiating lease contracts. Bids are called for the construction and a contract negotiated with a general contractor. Permits are obtained from government agencies.

5. **Formal Commitment**

At this stage the contracts are signed. Since development contracts often are contingent on other contracts, this stage recognizes that many of the parties have been brought together successfully. The contracts include agreements with joint venture partners, public sector "partners," construction lender, permanent lender, and contractor. The option for the land is exercised, and the lease agreements are signed.

6. **Construction**

In this stage, the developer monitors the time and cost of the project to ensure that it meets the schedule and budget. If costs escalate during construction, the cost can exceed the value; and the developer will lose some (or all) of the equity invested. Similarly, if the construction is delayed, the project may "arrive" on the market at a bad time when demand is slow or after other competing projects are finished. In addition, the construction loan is made at a relatively high interest rate; and any delay increases the amount of interest which is owed to the lender. During this phase, the developer continues to market the project, actively seeking tenants and arranging for tenant spaces to be completed to meet their individual needs.

7. **Completion and Opening**

If the project is not fully leased, the developer increases the marketing effort as completion nears. Occupancy certificates are sought from government agencies, final inspections and "punch list" corrections are made, and the tenants move in. The permanent mortgage is closed, and the funds obtained are used to "pay off" the construction loan and the interest that has accrued during the construction loan.

8. **Asset and Property Management**

If the developer is also the owner of the property, then the developer may undertake the role of managing the property. Alternatively, the developer may sell the property to an investment group such as a pension fund, insurance company, real estate investment trust, or a limited partnership. As property manager, the developer is responsible for a wide range of activities, including leasing, remodeling, and maintaining the asset so as to maximize its economic value.
20.3 THE ECONOMIC VALUE OF REAL ESTATE

From the preceding discussion, it can be observed that the economic value of a project is of prime concern to a developer. The determination of value is the focus of all investment decisions as has been discussed in preceding chapters (2, 19). Simply, if the value of a project exceeds its cost, then the difference is the profit to the developer. The architect plays a very important role in "creating" economic value, a role that is seldom addressed in the process of architectural education.

The expected value of a real estate project and its expected cost are the underlying factors that determine whether a project is constructed. In a recession, real estate values decline to a level where the expected profit is not enough to compensate for the risk inherent in the development process and in long-term ownership. Projects are not commenced, and even projects that are partially completed may be postponed until conditions improve. If conditions deteriorate too much, developers are forced into bankruptcy and lenders take over the real estate assets which provided the security (collateral) for their loans.

Central to the discussion of value is its definition. Two concepts of value are important: market value and investment value. The concept of market value hinges upon the concerns of all of the participants in the market and the market framework. One useful definition of market value is:

"The most probable price in terms of money which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeably, and assuming the price is not affected by undue stimulus." 1

The concept of investment value refers to the expected value of the benefits to a specific decision maker derived from the ownership of real estate. Thus, market value is the "result" or aggregate of the individual investment values of all of the participants in the marketplace. A property is sold when the investment value of the buyer is equal to or exceeds that of the seller, both of whom usually are well informed and act in their own best interests.

But, what is the expected value of the benefits from ownership? If we assume that all of the costs and benefits that accrue from the ownership of real estate can be expressed in economic terms, the benefits (and costs) are measured in real, spendable dollars; that is, cash. Equation 20.1 expresses the expected present value (PV) of an investment in real estate. It should be noted that the variables may be identified by different names or abbreviations, but the basic concept is unchanged.

\[
P V_0 = \sum_{t=0}^{N} \frac{ATCF_t + ATER_N}{(1 + i)^t}
\]

where:

- \(ATCF_t\) is the expected after-tax cash flow in year \(t\).
- \(ATER_N\) is the expected after-tax equity reversion in year \(N\)
- \(N\) is the holding period for the investment at the end of which the property is sold.
- \(i\) is the discount rate reflecting the required rate of return appropriate for the level of risk inherent in the investment.

The after-tax cash flow (ACTF) is the amount (in cash) after all cash expenses, loan payments, and taxes have been paid which is obtained from the project periodically. The ATCF is calculated using an equation similar to Equation 20.2

\[
ATCF_t = (GR_t - VAC_t) - (EXP_t + TAX_t + DS_t)
\]

where:

- \(GR_t\) is the potential gross revenue expected from the project in year \(t\), assuming it is leased fully.
- \(VAC_t\) is the adjustment for vacancies expected in year \(t\).
- \(EXP_t\) is the expected expenses in year \(t\), including the cost of management, maintenance, insurance, property taxes, utilities, and advertising - where they are not included under the

terms of the lease contract and are a cost to the owner of the property.

\( \text{TAX}_t \) is the expected tax payable in year \( t \). This is calculated on the taxable income of the property and requires that an adjustment is made for depreciation and the interest on the debt used to finance the investment.

\( \text{DS}_t \) is the expected debt service in year \( t \) or payment to the lender and includes the interest and (if applicable) the repayment of principal such that the mortgage is amortized (repaid) by a stipulated time (term).

The **after-tax equity reversion** (ATER) is the expected cash amount which remains after the sale when all expenses and obligations have been met and the capital gain (if any) is taxed. Equation 20.3 is used to calculate the ATER.

\[
\text{ATER}_N = SP_N - (SE_N + CT_N + MB_N)
\]

*Equation 20.3*

where:

- \( SP_N \) is the expected selling price (market value) in year \( N \).
- \( SE_N \) is the expected selling expenses in year \( N \).
- \( CT_N \) is the expected capital gain tax on the proceeds from the sale after an adjustment is made for unused depreciation. In 1986, the capital gains tax rate was set at the same rate as ordinary income tax.
- \( MB_N \) is the remaining unpaid mortgage balance in year \( N \).

If the present value of the property is adjusted for the initial outlay to acquire the investment, then the result is the net present value (NPV), a measure of the net profit or loss resulting from the investment. Simply, if the NPV is equal to or exceeds \$0.00, then the investment should be undertaken. A fair rate of return that reflects the required rate of return on the invested capital and compensation for risk has been included already through the mechanism of the discount rate (\( i \)). Thus, in this sense, any profit is an excess or economic profit which increases the wealth of society. Such profits usually are the result of entrepreneurship.

\[
\text{NPV} = \sum_{t=0}^{N} \frac{\text{ATCF}_t}{(1 + i)^t} + \frac{\text{ATER}_N}{(1 + i)^N} - IO
\]

*Equation 20.4*

Another concept that is of importance is the internal rate of return (IRR) or yield that equates the benefits and cost of the property. If the NPV is set at \$0.00 and the valuation equation, such as Equation 20.4, solved for the value of \( i \), then the result is the internal rate of return. However, in this form, Equation 20.4 is a polynomial that usually must be solved with an iterative technique which approaches the value of the IRR with each iteration. While the internal rate of return is an accepted measure of an investment's rate of return, it is subject to a number of problems that can limit its effectiveness under certain circumstances (for example, multiple solutions). Other measures are available that preserve the strengths of the IRR while eliminating the weaknesses, but such measures have not gained wide acceptance yet. If the IRR exceeds the required rate of return (\( i \)), then the investment should be undertaken.

Tables 20.1 and 20.2 illustrate "pro-forma" statements of income from operations and the sale of the property. Computer programs quickly provide analysis of cash flows and are used by developers to examine a project's feasibility.
THE ARCHITECT’S CONTRIBUTION TO ECONOMIC VALUE

The value of real estate arises from several different economic concepts. These concepts are reflected in the components of Equations 20.1, 20.2, 20.3, and 20.4. These “determinants” of value include:

a. Demand - the extent to which people are willing and able to rent, buy, and shop at the subject property and the degree to which the property can satisfy demand (or provide utility).

b. Supply - or the relative abundance or scarcity of other properties which compete with the subject property.

c. Transferability and marketability of property rights through sales and leasing.

20.4
d. Servicing and management costs of the property over time.

e. Non-market factors such as the preferential treatment of real estate under Federal Income Tax law.

f. Financing of the investment - also (under certain circumstances) may affect the value of the property.

The architect undertaking the design of a building directly and indirectly affects these components of value, but categories a and d (demand and servicing costs) are of greatest importance. In terms of demand, architectural design can influence the desirability of the property and its ability to satisfy the needs and wants of its users. This is reflected in such variables as the level of rents and vacancies or in the prices and absorption rates. In addition, the architect can determine the relative efficiency or productivity of the building by the arrangement and organization of spaces, the use of circulation space, etc. The architect also can have important effects on the ongoing expenses such as maintenance and utilities through decisions on configuration, and construction and engineering systems and materials. Since these benefits and costs occur over the life of the building, they may be very significant factors in the total value of a property.

Similarly, the decisions of the architect can influence the cost of construction and the time to complete the construction process. The construction cost and market value (MV) are important in determining the relative amounts of equity (contained in the term, initial outlay - IO) and debt since the amount of "cash" equity is:

\[ EQUITY_{cash} = TPC - DEBT \]

where:

TPC is the total cost of the project, including land, fees, construction cost etc.

DEBT is the amount borrowed from a lender such as a bank, pension fund etc. Debt is a typically a function of the market value of the project (usually 70-85% of the market value).

As construction cost (and, therefore, total project cost) increases and the market value decreases, the difference between them is absorbed by the developer. Thus, from the developer's perspective, the ideal project is one in which the market value of a project considerably exceeds the total cost of the project. In this case, no "cash" equity may be required because the funds provided by the lenders "cover" all of the costs or even provide a "development profit."

Since such a large percentage of architectural work is for developers, and cost-value considerations are so important, it would seem reasonable to expect that architectural education and research address the economic contributions of architects to real estate projects. However, this is not the case, and most students enter practice ill-equipped to deal with the demands of developers; and many faculty adopt self-righteous and indignant postures, claiming that their real contributions to society are unrealized.

Nonetheless, there have been several studies in recent years that seek to understand the contribution of good design to value. Remarkably, these studies have not been undertaken by architects but by individuals who are trying to understand the value of real estate. One study, undertaken by Hough and Katz in 1983, studied office buildings in Chicago and found that even after adjustment had been made for a wide range of other factors, there was a significant premium for good design impounded in real estate prices. In this study, "good" design was identified by the Chicago AIA through their design awards program. A subsequent study in Boston by Lane and Vandell, 1987, attempted to overcome some of the problems inherent in the earlier study, allowing a broader (and more diverse) opinion about the quality of architectural design and extending the analysis to include vacancy effects and the cost of construction. The results also supported the hypothesis that there was a positive premium for good design.

20.5 RISK AND REAL ESTATE PROJECTS

In Equations 20.1, 20.2, and 20.3, all of the components of value occur in the future and, therefore, must be estimated or forecasted. All of these components are subject to variation; and most depend upon a wide range of underlying economic, social, and political outcomes and events. Since our knowledge of future outcomes and events is a long way short of perfect, all of these components are uncertain or risky. When "added" together, the return, or rate of return, is also a variable though considerably more so than the "sum" of the individual components since risk is multiplicative in nature. Perhaps the simplest way of seeing the multiplicative nature of risk is to employ a "matrix" of only two vari-
ables each with three outcomes: optimistic, realistic, and pessimistic. For example, imagine that a project is affected by interest rates (I1 = 10%, I2 = 12%, I3 = 14%) and the level of rents (R1 = $500, R2 = $550, R3 = $600). There are nine possible outcomes:

<table>
<thead>
<tr>
<th>Outcome #.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination</td>
<td>I1,R1</td>
<td>I1,R2</td>
<td>I1,R3</td>
<td>I2,R1</td>
<td>I2,R2</td>
<td>I2,R3</td>
<td>I3,R1</td>
<td>I3,R2</td>
<td>I3,R3</td>
</tr>
</tbody>
</table>

The "best" outcome is #3 (I1,R3) while the worst outcome is #7 (I3,R1), assuming that the probabilities of the outcomes are the same. Even if the probabilities of getting realistic outcomes, I2 and R2, are 50 percent each; the chance of getting the two together is only 25 percent. There is a 75 percent chance of getting a return that is either a higher or lower than the "realistic return."

Thus, if we consider only the realistic outcomes that we expect to occur, then the analysis is incomplete and the alternative results are overlooked. In many situations, an investment/development decision may be wrong. Some models do exist that consider the inherent uncertainty in investment projects. For example, Exhibit 20.2 represents the "typical" page of computer-based analysis of a project in which all of the factors underlying value are considered to be uncertain.[7]

The results indicate that there is not just one rate of return possible; but based on the sample of 1,000 different economic scenarios, there is a wide range of possibilities. This dispersion or variance is a measure of the risk inherent in the project. In the appropriate hands, such models are extremely beneficial in understanding the risks in real estate development and investment and developing effective strategies for maximizing value and minimizing risk.

The problem underlying advanced analytical techniques of this type is that the models depend on substantial quantities of data and employ high levels of skill. Data, or information, and skilled workers are available but only at a high price so that there is a cost-benefit trade-off that occurs with increasing sophistication and accuracy (or understanding). This means that if the developer's resources are to be used effectively, the models and data must be appropriate to the benefits derived from them at any given stage in the development/investment process. For example, it would be pointless to spend large sums on a market study of housing only to discover that the site is too steep to support housing and the project must be abandoned. While this is an extreme situation, it does explain many of the actions and attitudes of developers with respect to architects:

a. The developer attempts to reduce the cost of development proposals and feasibility analyses by having the architect produce schematic drawings, perspective renderings and models in the initial phases of the project. This information is used to elicit support from lenders, government agencies, and prospective tenants. Often the architect undertakes this work at his/her own cost in the hope that the commission will be awarded when the project proceeds.

b. In an effort to maximize the profitability of the project, the developer takes an adversarial role in dealings with the architect, struggling to maximize the "productivity" of the building. This is achieved partly by maximizing the efficiency of the plan, reducing "waste" space, and unnecessary circulation/public spaces so that the ratio of net leasable area to gross building area approaches 1:00. The construction cost of the building also is monitored, and the architect is under constant pressure to select more cost-efficient materials and systems. Similarly, time constraints restrict the architect and provide an impetus for quick decisions and maximum productivity.

c. Since most projects are "aimed" at a specific market, the developer requires that the architect's design meet the needs of the market - instead of the architect's own aspirations and intentions. A further problem is that innovative design approaches may not always be accepted by the market -- an important element of risk. This means that many developers are reluctant to try design ideas until they have been accepted widely; and it is not surprising to find the majority of innovative architects working for "Medici" clients (public institution and individuals) and not for private-sector developers.
RISK ANALYSIS

While the preceding sections might imply that real estate investment and development decisions focus upon tax sheltering, financing techniques, or forecasting of property revenues and expenses, it should be realized that although these factors are important, they are not the critical elements in the analysis. The analysis of risk, its identification, assessment, and the formulation of appropriate risk-management strategies is the crux of investment analysis. Without risk, the profitable outcome of owning a property would be known and guaranteed at the time it is acquired; but such knowledge of the future is unrealistic, if not impossible.

There are a variety of methods available for risk analysis. They range from rudimentary analysis of pessimistic and optimistic scenarios to complex probabilistic modeling and simulation, to highly sophisticated applications of modern portfolio theory (though application to real estate is still in the research stages and limited by the availability of data). One technique that often is used is sensitivity analysis -- changing the value of one variable so as to observe its effect on the investment. While this is not true of risk analysis, it does assist in revealing significant or influential variables. All of these methods endeavor to give the decision maker a greater understanding and control of the final outcome of the investment project.

THE RELATIONSHIP BETWEEN RISK AND RETURN

It has been observed that all of the components of value occur in the future and are not known with certainty. The interaction among these components means that the actual rate of return on an investment may be higher, lower, or the same as that expected. This dispersion is the risk of the investment; the potential for achieving returns greater than or less than that which is expected. It is a key factor in determining the required rate of return. As a generalization, risk increases over time because it is more difficult to forecast accurately (B).

In recent years economic and political conditions have exhibited considerable changes that have been unanticipated (for example, changes in the Federal Tax Code). This potential for change is one of the major reasons that it is difficult to forecast accurately, significantly increasing the level of risk over time. One result of this is that investors have tended to prefer shorter holding periods with most income-producing real estate being evaluated over a period of approximately ten years.

Equations 20.6 and 20.7 represent the expected return, E(R), and risk (variance of returns), respectively:

\[
E(R) = \sum_{i=1}^{m} R_i \times p_i
\]

\[
\sigma_r^2 = \sum_{i=1}^{m} [R_i - E(R)]^2 p_i
\]

where:
- \( \sigma_r^2 \) is the variance of returns
- \( R_i \) is the ith return - for all (m) possible outcomes
- \( p_i \) is the probability of the ith return occurring

There exists a relationship between risk and return that is fundamental to all investments such that for rational investors, a higher level of risk must be accompanied by a corresponding higher rate of return, relative to other investments of lower risk. If an investor could acquire an asset (A) with the same risk level as another asset (B) but with a higher rate of return, then ceteris paribus, the investor would acquire only A as he or she would be better off. Because all rational investors are motivated similarly, the high demand for A would increase its price while the low demand for B would decrease its price. The increase in the price of A would effectively would reduce its rate of return while that of B is
increased, bringing them into risk-return equilibrium with the same rate of return. Figure 20.1.A illustrates the relationship between the required rate of return and the risk level, where \( R_f \) is the risk-free rate of return such as that available on US Government Treasury bills, notes and bonds.\(^1\)

**The Components of Risk**

The total risk of an investment can be subdivided or partitioned into several components. These components include:

a. **Business risk** - the risk inherent in the operation of the business. It is the fluctuation in the income of the business caused by changes in the economic conditions.

b. **Financial risk** - the risk which arises when funds are borrowed externally to finance the business. This risk of default increases with higher leverage.

c. **Inflation risk** - this is the potential for changes in the real value of the asset as a result of changes in the nominal prices of goods and services (i.e., inflation) when such changes are unexpected.

d. **Interest rate risk** - this risk arises from the effects that unexpected changes in the interest rate can have on the yield or required rate of return for a given investment.

Since the components or variables underlying the value of an investment may have actual outcomes different from what is expected, it is possible in many cases to represent the range of outcomes as a probability distribution such as that in Figure 20.1.B. In some cases the distribution can be estimated objectively using historical data and statistical analysis; while in other situations, the investor may depend upon personal judgment in assigning the likelihood of different outcomes. This is a subjective probability distribution and given the experience of the investor may not be less accurate than objective distributions.

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1. Another factor that affects the required rate of return is the term to maturity; this relationship often is referred to as the yield curve -- a changing relationship that reflects expectations for future economic conditions -- especially inflation. Under "normal" conditions, there is a positive premium for increasing the term to maturity.
As the last of the employees left for the evening, Jim Preston sat down heavily and sighed with relief as he remembered his coming vacation only two days away. He had earned it over the last few weeks, he thought; but the extra effort had been well worth it. The representatives of the client, Matsui, Inc., had been surprised (to say the least) when he had presented not one but two designs for their new project so quickly after the initial contact had been made. Preston and Associates had worked, literally, around the clock for two weeks with everybody putting in at least twelve-hour days to develop the schemes. Forming two project teams to prepare the different proposals had been the key to success, he realized. It had engendered a spirit of friendly competition that had made everyone work very hard to create the winning design which would be the firm’s biggest project to date. The winning design was to have been selected by the associates before the presentation; but it was obvious that both schemes were equally outstanding and worthy of being presented to Matsui, Inc.

Matsui, Inc., was a Japanese financial and banking company that provided funds for capital investment projects throughout the world. While most of their investments had been for industrial plants for either high-technology manufacturing or chemical production, the company recently had begun to follow a policy of diversification into other enterprises. This involved the formation of a new real estate division to develop or purchase office buildings in six regions throughout the United States and Canada. Each region was covered by a team of experts whose function was to discover and analyze investment opportunities in a specific area. The Midwest team was under the leadership of Steven Polk. Cincinnati was considered to be desirable for long-term investment because of its economic stability. The availability of a potential site in the immediate area of the business district was brought to Steven Polk's attention in October 1977. Polk was an architect who had been graduated from the University of Wisconsin with a degree in business administration before going on to obtain a master's degree in architecture from the Illinois Institute of Technology. He had worked for several large real estate developers in Chicago before accepting the offer from Matsui, Inc. The six regional teams were supervised by Mr. Temalo. He had joined Matsui immediately upon his graduation from the University of Tokyo with a degree in engineering. He had spent several years in Japan before becoming an investment manager in South America. When the real estate division was formed, he was selected personally by the new vice-president of the division, Mr. Honshu, to head the North American office from Los Angeles.

If a regional team discovered a potential real estate investment project, it was subjected to further investigation and preliminary negotiations between Matsui and the other parties involved in the project. These meetings usually involved the team leader of the region and Mr. Tenaki. If the project involved the construction of a building, an architect was selected to prepare a preliminary scheme and an estimate of its cost. The project was then presented to Mr. Honshu in the Los Angeles office of Matsui. Architects for Matsui projects were selected by using three criteria:

1. The ability to prepare the contract documents and manage the construction work so that the project would be completed on time and within the budget;

2. The ability to create a building that would by virtue of its design quality would be able to generate higher levels of rent than would be normal for another building of conventional design in its location.

3. The ability to gain the support of the local community for the project.

To help meet the three criteria, team leaders were encouraged to develop a list of local architectural firms and project management firms that had achieved reputations for good design. This list, together with the brochures and proposals of the firms and the name of the architectural firm recommended for the project, was forwarded to Los Angeles. Generally, the recommendation was accepted if the criteria were fulfilled. However, if local firms were unacceptable, the team leader could propose joint ventures between nationally recognized firms and local firms.
The Midwest team had selected a site located on a corner two blocks from Fountain Square. The site had been acquired as several smaller parcels by a local developer over a six-year period. Lack of funds and limited expertise in high-rise office buildings made the developer explore opportunities for joint ventures with larger firms. Matsui was interested sufficiently in the site to buy out the developer's interest and begin preliminary analysis. By the end of 1989, the preliminary research had indicated that an office building might be financially feasible if it was available for occupancy in three or four years and it was kept to about 250,000 square feet of net leasable area. Polk contacted Preston and Associates to begin the preparation of a design proposal for the site which would be presented at the next meeting in Los Angeles. A time schedule was established for Preston Associates. In four weeks they would present a preliminary design to Polk and Tenaki at a meeting in Cincinnati. If the design was acceptable, they would have three more weeks to develop a budget for the different building systems and prepare drawings for the important meeting in Los Angeles.

The Cincinnati meeting had been very successful with only a few problems of translating some complex architectural terms for Mr. Tenaki. The two schemes had been received very well, and it had been impossible to choose between them. Preston had been careful to stress that Matsui would be charged only for one scheme, but he had thought it was important to explore an alternative because of the significance of the downtown site and the corner location. The firm had struggled with the problem and had explored alternatives that turned the corner by creating an urban space or establishing a focal point for the intersection of the two streets. The two schemes presented had emphasized these approaches in site planning. The two building designs differed in other ways as well, and it was obvious to everyone at the meeting that there would be cost ramifications as well as an impact on the revenues generated from each project and the expenses associated with maintenance and heating and cooling the building. It was decided that Preston and Associates would prepare estimates of construction costs, revenues, and expenses for the two schemes; and the most cost-efficient scheme would be forwarded to the Los Angeles meeting for review and acceptance.

Sitting at his desk, Preston casually looked over the two perspectives. While he had his own personal favorite, he knew that the selection now largely would depend on the "economics" of the two projects. The "economics" had been determined as a result of the design approaches taken in developing the different schemes. He decided that the best approach for developing the analysis would be to prepare initial estimates for the schemes as they currently were designed and then determine if the costs could be reduced through a process of refinement. At the same time, revenues and expenses would be studied and consolidated into an overall financial feasibility analysis. The design teams then could spend a couple of days examining the impacts of the changes required to reduce the construction costs or increase revenues. This would ensure that the final project would be within the established budget of $28 million while meeting Matsui's profitability objectives.

At the next meeting, Jim Preston met with Jean Hanley and Peter Lord, the leaders of the two teams, to explain what needed to be done during the next week while he was away in Bermuda for his much needed vacation. Hanley and Lord were both senior associates of the firm; and Preston had decided already that they would be given partnership status at Christmas in recognition of their skills, dedication, and long tenure with the firm. He had hinted to Peter Lord that the partnership was in the offing when they had been waiting at O'Hare airport for a return flight to Cincinnati a few weeks earlier, and he had expected that Peter would convey the surprise Christmas present to his fellow associate.

Preston had realized during the last year that both Hanley and Lord were indispensable to the firm when his wife's illness had required that he visit her frequently in the hospital. Often when he returned to the office, he was drained emotionally and physically exhausted; and it was then that he had come to depend on his two senior associates. Their support and sympathy provided considerable relief, and their "take-charge" and "get-things-done" attitudes had enabled him to reduce his own workload to the point where it was bearable. Jean Hanley had taken on the responsibility for the day-to-day administration of the office. Peter Lord had monitored the contract documentation and project administration departments and, together with Jean, had been engaged in design marketing and client contact.

"Well, it looks as if it's simply a matter of getting out some estimates, though this income and expense thing is a bit unusual, isn't it?" Jim Preston observed. "It always seems to come down to 'economics' doesn't it?" he joked. "It's a pity we have to worry about budgets and costs. You know, it's the one thing that really influences what we design, but it was never addressed in school."
The two associates agreed, and Preston continued: "I don't think we have enough expertise or data to analyze either project in the office, so we'll have to use a consultant -- probably Davis-Brown -- if you both agree." They nodded; and he added, "We can get initial studies for both projects and work up some suggestions about where to cut costs if we're over $28 million, then get your teams to do some sketches to see what it means for the two proposals. Hopefully, it's nothing major because we only have two more weeks before we have to be in L.A." The two associates nodded and waited with Preston while he telephoned Davis-Brown and set up the initial meeting for the next afternoon.

Paul Davis, the senior partner, attended that meeting with Larry Sanders, the cost analyst who would be preparing the feasibility studies. Davis pointed out that what Matsui wanted was termed "value-engineering." "It's something," he said, "we do frequently for developers and major institutional clients who want value; the biggest bang for the buck, so to speak. What we try to establish are those aspects of the design which do not contribute to the overall economic value. It doesn't mean that you have to eliminate them; simply by understanding where the dollars go in construction and what the tenants are prepared to pay for get you some ideas of what to do to increase the value of the project."

Preston nodded and looked at Hanley and Lord: "Well, why don't you each give a brief overview of your proposals?"

By the end of that week, Sanders faxed a brief summary of the analysis to Preston Associates (Exhibit 1) and a list of questions regarding Matsui's investment criteria and parameters.

**Question:** If you were Preston, which scheme (if any) would you recommend to Matsui?

**Exhibit 1.a: Analysis Of Proposal A (Summary)**

- U-shaped building based on 35 sf bay, steel framed structure, glass curtain wall and marble panel
- Gross Floor Area:
- Vertical Circulation:
- Horizontal Circulation And Foyer:
- Mechanical System:
- Construction System:
- Other Non-leasable:
- Total Non-leasable:
- Efficiency Ration (Nla/gla):
- Net Leasable Area:
- Architects/engineers Fees:
- 9%
- Construction Cost $/sq.ft.:
- 21 Months
- Construction Time:
- 31.5 Years
- Depreciation Term:
- Site Cost:
- $2.9 Million
- Lease Rates:
  - A. $125,000 ☺ $19.50/sf
  - B. $100,000 ☺ $17.50/sf