PROJECT EVALUATION

BY THE PUBLIC SECTOR AND THE PRIVATE SECTOR

by

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ABSTRACT

Observing project evaluation methods differ depending on the point of view, this thesis is concerned with how the different evaluation methods lead to the different results and what the implication of the different evaluation results will be to the decision making process about a project which involves intensive interactions between the private and the public sector. Net Present Value method, from the private sector point of view, Social Cost Benefit Analysis from society point of view, and Economic Impact Assessment from a local government point of view are examined in terms of their economic rationale, technical procedure and interpretation of analytical results.

One of the important issues is the choice of an appropriate discount rate. The extensive review of literature reveals that there are no dominant views about

the public discount rates. Consideration of risk and economic efficiency suggests the public sector should use "social discount rates" although no attempts have ever been made to measure them.

An urban redevelopment project is chosen as an example to actually apply these evaluation methods, since it usually involves intensive interactions among a private developer, a local government, and the State/Federal government. Park Plaza Urban Renewal Project in Boston is studied as a numerical example. Although there are serious difficulties to obtain data necessary to conduct serious analysis since some items do not have market prices and other items have distorted market prices, the case study provides very interesting findings as well as general directions of analytical procedure. First, there can exist "zero-sum" relation between a city and a developer which lead them to a fertile negotiation, however, the State/Federal government may solve the problem between the two, making every party better off. Secondly, "tax surplus" role of a local government may not be able to make even its constituents better off due to external diseconomies.

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William Wheaton, Professor of Urban Studies and Planning

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CHAPTER I

INTRODUCTION

Project Evaluation can mean different concepts depending on the point of view to a project. From the private sector point of view, Project Evaluation simply means to find whether a project can bring more money than it will spend. From the society point of view, Project Evaluation should measure real benefits and costs to the society which differs from market prices in the economy. From a local government point of view, Project Evaluation means to assess the impacts of a project on its constituency.

Accordingly, a project may appear differently depending on from which point of view it is being analyzed.

In case a project involves intensive interactions between the public sector and the private sector, this difference in the ways to analyze the same project is of great significance.

Recognizing there are three distinctive methods, Chapter II examines the Net Present Value Method which is often used by the private sector, Social Cost Benefit Analysis which is used by economists or the government

analysts, and Economic Impact Assessment which is used by a local government. The underlying economic rationale of each method, the way to measure benefits (profits) and costs are discussed.

In Chapter III we review the literature about the public and private discount rates and then suggest what might be appropriate discount rate for each method.

In Chapter IV, an urban redevelopment project is chosen as an example to be analyzed by the three methods. Some modifications are suggested to apply the general methods to a specific project.

A case study, Park Plaza Urban Renewal Project in Boston, is presented in Chapter V. We will evaluate this particular project from three different points of view and see the consequences of their interactions.

Finally, recommendations and conclusion are discussed in Chapter VI.

CHAPTER II

PROJECT EVALUATION METHODS

In general, the purpose of project evaluation is to identify and measure the benefits and costs of a project so as to help decision makers in capital investment problems. However, depending on the point of view, there are three distinctive methods. The Net Present Value method assesses the profitability of a project for the private sector; economic and social impact assessment measures the impacts of a project from a local government point of view; and social cost-benefit analysis focuses on the benefits and costs of society as a whole. Each of these techniques and its economic rationale will be discussed below.

1. Net Present Value Method

When evaluating capital investment projects, private firms can use the Net Present Value (NPV) method. It is considered to be the best method to reach optimal investment decisions. The rule itself is the following:

1. Forecast a project's incremental after-tax cash flow.
2. Select an appropriate discount rate according to the risk characteristics of the project.
3. Calculate the NPV of the project by using the formula:

$$NPV = \sum_{t=o}^{n} \frac{C_t}{(1+i)^t}$$

where i = discount rate

C_t = cash flow

4. Under no capital constraints
   - Accept any project if NPV is positive under capital constraints.
   - Accept projects with the highest $\frac{NPV}{cost}$ ratio until funds become exhausted.

Assuming a perfect capital market[1] and mutually independent projects, the above rule for investment decisions is universally correct.[2] By accepting projects with positive NPVs firms can increase their own market values, thereby increasing their shareholders' wealth and maximizing their utility.

1.1 Economic Rationale of NPV Method

We can see Fisher's solution to demonstrate why the NPV method can give optimal investment criteria. Assuming a perfect capital market without uncertainty and equal

lending and borrowing rates which are determined by aggregate supply and demand of cash for consumption, Fisher's solution considers an investment-consumption problem over two periods of time. The present (today) and some future time (tomorrow).

In Figure 1, the horizontal axis labeled K_0 represents the amount of actual or potential income available for consumption today. The vertical axis K_1 represents the amount of income available tomorrow. Now suppose the individual has a cash flow of R today and R' tomorrow. His wealth corresponds to the point R" on his budget line QQ' (Capital Market Line) which has a slope representing the lending and borrowing rate. This individual's decision problem now is to choose an optimal time pattern of consumption within the opportunities available to him on the line QQ'. The existence of a capital market enables him to choose any point on the line QQ' through borrowing or lending.

Introduction at an investment opportunity now enables him to invest today's consumption and get tomorrow's consumption which is higher than returns in the capital market. The curve QV, called the "production possibility frontier," is the locus of all possible combinations of consumptions (K_0,K_1) -- his wealth -- and the slope of a tangent at a point on the curve represents the marginal

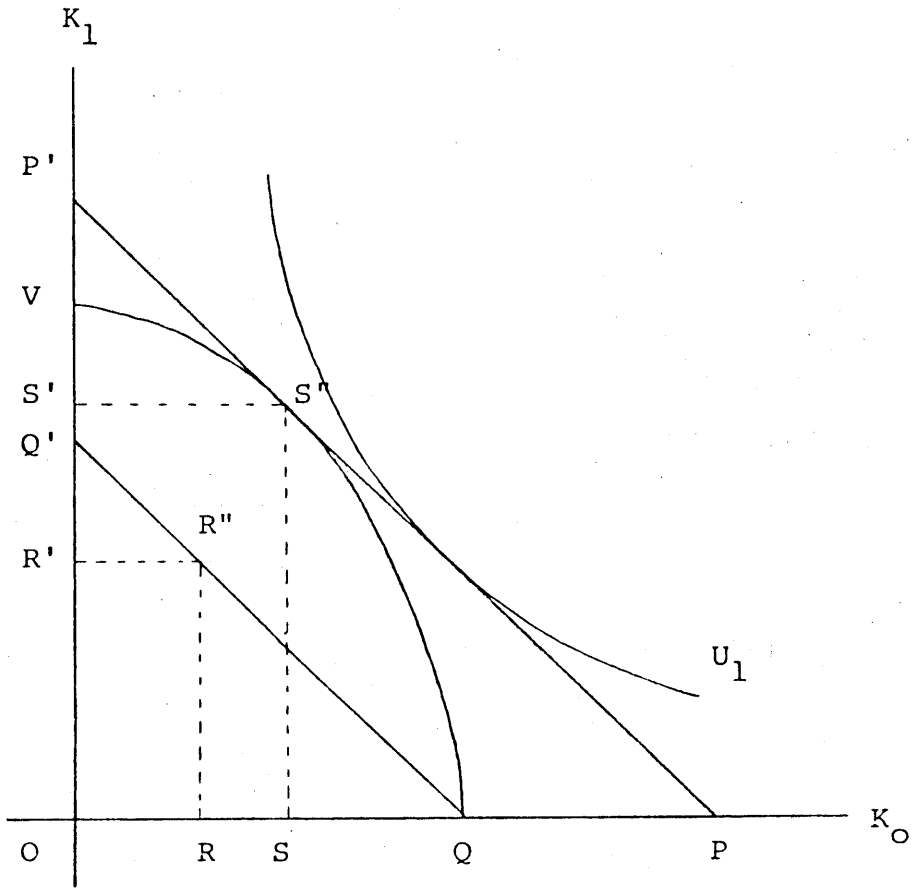

FIGURE 1

rate of return on investment of today's consumption into production. An individual will borrow money until he gets to point Q then start to invest today's cash into a production opportunity, since he can get more future consumption by investing until he gets to point S" than he can get by lending in the capital market. At point S" the marginal rate of return on investment equals the rate of interest. It is at this point that he can reach his highest wealth. Beyond point S" he can not get more return than from the capital market. Thus, once he gets the wealth corresponding to the point S" -- S for today and S' for tomorrow's consumption -- he should start borrowing and lending so that he can get to the point where he can satisfy his preference for consumption today vs. consumption tomorrow. Graphically, this is the point where the highest possible indifference curve of his utility touches the capital market line PP'.

In summary, to arrive at the optimal investment-consumption decision an individual who seeks to maximize his utility can follow this two step strategy: first, maximize his wealth through investing to a production opportunity; the more the wealth, the higher the utility. Second, from the optimal production point, borrow or lend along the capital market line to achieve the point of maximum utility.

The implication of this economic solution to the NPV rule is straightforward: the intercepts of the capital market lines with the K_0 axis give the present value of an individual's wealth, since it gives the maximum amount he can spend today through the capital market transaction. Given market interest rate i, the intercept can be expressed, in general, as $K_0 + \frac{K_1}{1 + i}$, which is equal to formula for present value if i is the appropriate discount rate. The NPV of investment is the difference between the present value at initial wealth and the present value of terminal wealth which is, in this example, PO - QO = PQ. When the capital market line touches the production frontiers at the point S" the NPV is maximized, since beyond this point the present value of wealth starts to decrease. This decrease suggests any further projects will have negative NPVs. Therefore, investing up to the optimal point is actually equivalent to accepting all projects whose NPVs are positive. In this way, using the NPV can help an individual to achieve his highest possible utility.

Although this analysis is based on the assumption of a perfectly competitive capital market with certainty and restricted to two periods of time, a similar analysis is said to hold under uncertainty and over any number of time periods. Moreover, the assumption of a perfectly

competitive capital market is plausible since research work indicates, in general, that the capital market functions fairly well.[3]

Fisher's solution also demonstrates the important point that the capital investment decision criterion has nothing to do with investors' preferences for current vs. future consumptions. This separation of investment and consumption decisions enables investors to hire professional managers or analysts and ask them to increase the market value of their wealth. This task will be done by adopting investment opportunities with positive NPVs regardless of an investor's specific time preference.

On the other hand, an investor does not need to know production technology nor the optimal investment mix of how much to invest today. He only has to choose the inter-temporal consumption pattern according to his own time preference.

Consequently, we can say, (1) the NPV method can offer investment criteria that are optimal in the sense of maximizing an investor's utility in most circumstances,[4] and (2) the NPV method permits decentralized decision making since it can be used by a manager or analyst regardless of an investor's time preference or utility function.

2. Social Cost Benefit Analysis

Social Cost Benefit Analysis (SCBA) was developed as a response to the needs of public sector decision makers for an explicit and rational method of evaluating public projects in order to arrive at the optimal investment decisions. Although the process is similar to the NPV method, SCBA measures the costs and benefits of a project from society's point of view rather than a private investor's point of view. The objective of SCBA is to guide decisions so that resources can be allocated for production and consumption in a way that maximizes "social welfare."

The analysis will proceed as follows:

1. Identify all real benefits and costs to society brought about by a project.
2. Measure them in monetary terms by using prices which reflect social values of goods and services. Use "shadow prices" whenever necessary; take into account externalities properly.
3. Choose an appropriate discount rate and find the NPV of benefit-cost stream.
4. Under no capital constrainst;
   - Accept any project if NPV is positive.

   Under capital constraints;
   - Accept projects with the highest $\frac{NPV}{COST}$ ratio until funds become exhausted.

2.1 Economic rationale of Social Cost-Benefit Analysis

The above description raises the question of what "social welfare" means and whether SCBA can really help us to maximize it. Welfare economics concerns the impact of economic activities on social welfare, where social welfare is considered to be a function of individual utilities. In general,

$$SW = [U_1, U_2, \ldots, U_i, \ldots, U_p]$$

where U_i: utility of ith individual

$i = 1, \ldots, P$

U_i is a function of the ith individual's consumption.

The formulation of a social welfare function depends on the judgment of how to relate an individual's utility to the social welfare. One of the important concepts of welfare economics, called Pareto's criterion, assumed that interpersonal comparisons of utility are impossible. By this criterion we will unanimously support a project if someone gains and nobody loses. If society reaches a state where no one can be better off without someone else being worse off, no more improvement of social welfare can be achieved. This ultimate social state is defined as "Pareto Optimality." This concept has the advantage of being free from any value judgment.

However, often in the real world some people gain from a project while others lose. Thus, faced with this situation, we need a way of making judgments that goes beyond Pareto's criterion.

One attempt to ease this impractical nature of Pareto's criterion is called Hicks-Kaldor compensation principle, which says a social state y is socially preferable to a social state x if those who gain from the more from x to y can compensate those who lose yet still keep some gains for themselves. The idea of "Pareto Optimality" appears to be preserved because the losers can remain as well off as before by compensation while gainers are obviously better off. "It is just this principle which underlies Cost Benefit analysis"[5] since if the project has net benefits, i.e. the monetary value of benefits exceeds costs, the social state can be improved because the gainers can hypothetically compensate the losers and still have some gains left over. So far so good, but a problem arises if compensation will not be paid. We analysts or decision makers then have to compare the utility of gainers with the utility of losers in order to judge whether a social state will really be improved or not. Then, if gains exceed losses we have to provide the mechanism to redistribute the gains so as to compensate the losses. Otherwise, SCBA may or may not maximize social welfare.

What SCBA actually does is to add up the monetary value of benefits and costs of a project regardless who gets and who loses. This process makes the implicit assumption that the marginal utility of income is equal for any individual in the society, or equivalently, the prevailing income/wealth distribution is fair. Thus each additional $1 is equally valuable to everybody. This assumption may not be acceptable, since the marginal utility of income might depend on one's wealth and people in the society do not possess the same amount of wealth. Furthermore, SCBA does not say anything about the mechanism for benefits redistribution. Consequently, SCBA may not be helpful for maximizing social welfare since it does not handle distributional problems properly.

On the other hand, SCBA can be helpful for achieving higher economic efficiency. As Fisher's solution suggests, to accept all projects with positive NPV of benefit-cost stream will insure that society can increase its wealth to the higher level. However, SCBA needs to use the real social value of goods and services rather than the market prices. By adjusting the distortions of market prices and correctly measuring externalities, goods and services must be valued so that their prices are exactly equal to their marginal costs to the society as well as to their marginal benefits to the society. It is argued that

under this ideal price structure with a competitive economy, the output will be maximized, the input will be minimized and the economy will be reaching to the equilibrium with efficiency property, where "you can't make any one man better off without hurting some other man."[6] The SCBA method appears to help us reach this Pareto Efficiency Optimality but in a limited sense.[7]

In summary, it is uncertain whether SCBA can help us achieve improvements in social welfare according to Pareto's criterion because the assumption of the current income/ wealth distribution being fair may not be correct. On the other hand, it appears SCBA can help society to achieve more wealth through more efficient resource allocation, if it uses prices correctly reflecting social value. The problem remains that social welfare considerations and economic efficiency may conflict.

One way to handle this possible conflict is to set some distributional weights depending on who gets and who loses, in other words, depending on each individual's marginal utility of income. If the poor will get the benefits, we will assign higher weights since the poor likely have higher marginal utility of income than the rich. However, it may not be easy to identify who will gain and who will lose and furthermore, there is no accurate method to measure one's marginal utility of

income and hence weights to be used. These methodological problems raise the question whether it is worthwhile to sacrifice economic efficiency for this somewhat arbitrary weights assignments method.

This paper agrees with Mishan's argument in that a benefit-cost analysis should be strictly limited to consideration of economic efficiency; economists should not try to qualify the essentially ethical and political trade-offs relating to income distribution. By the same token, benefit-cost analysis should not be the sole criterion for making decisions about government investments.[8] Income/wealth distribution problems should be analyzed separately by other methods, since the choice between economic efficiency and fair income/wealth distribution is essentially a matter of an individual's value judgment and analytical methods should not be biased by any value judgments. It should be a decision maker who makes a value judgment.

Consequently, it is suggested that SCBA can be helpful to achieve higher economic efficiency, but is not appropriate to handle income/wealth distribution problems.

2.2 Benefit and Cost Measurement

It has been pointed out that SCBA should use the prices which correctly reflect the real social value of resources. Real social value of resources cannot always be represented by market prices, specifically, government intervention (e.g., tax, price control), imperfect competition (e.g., monopoly), unemployment of resources, and externalities lead to divergences between market prices and real costs and benefits to society. It is also important to distinguish between "real" costs and benefits vs. "transfer" or "distributional" payments. SCBA only takes "real" costs and benefits into account.

A. Shadow Prices

Shadow prices, defined as the opportunity costs of economic resources used in a project should be used in cases where market prices do not reflect true costs of the resources due to government actions, monopoly or unemployment of resources. For example, if ferry rates are set well above the marginal costs of providing the ferry service because of monopoly, the benefit of a bridge construction project which will eliminate the ferry business is thus not the payment to the ferry service that consumers have had to pay. The real cost saving to the society is the marginal cost of the ferry services. Monopoly rent

which is the difference between the market rate and the marginal cost of the ferry service, should be excluded from the calculation because it is not a payment for a real resource but a transfer payment. Generally, tax payments or subsidies are also considered as transfer payments, not as real costs. Hence, all output should be valued without including taxes and subsidies.[9]

Serious unemployment in an economy with rigid wage rates will serve as another example of shadow prices. In this case, the shadow price or opportunity cost of labor might be considered to be zero, since without the project a worker might not be hired and might produce nothing.

B. Externalities

The existence of externalities may be the critical issue of SCBA, since externalities often account for the basic difference between private and public project evaluation. An externality will be said to exist whenever

a) economic activity in the form of production or consumption affects the production or utility levels of other producers or consumers.

b) the effect is unpriced or uncompensated.[10]

Externalities of a project, whether positive, such as reduction in road congestion due to the opening of a new subway, or negative such as increase in pollutants

in river water due to a chemical plant construction are normally not considered in private project evaluations because they are not priced. This is the major source of divergence between private costs and social costs.

The distinction between technological externalities and pecuniary externalities as discussed by McKean is very important. Technological externalities occur when the production functions of the affected producer or the utility function of the affected consumers, is altered. They reflect real gains or losses in terms of physical production or an individual's utility. On the other hand, pecuniary externalities reflect only transfers from one section of the economy to another via changes in relative prices. An example of pecuniary externalities is when the improvement of a road leads to greater profitability of the garages and restaurants on that road, employment of more labor by them, etc. In general, this will not be an additional benefit to be credited to the road investment, even if the extra profitability, etc., of the garages on one road is not offset by lower profitability at garages on other roads which are now less used as a result of the traffic diversion. Any net difference in profitability is simply a reflection of the benefits of more journeys than before and it would be double counting if these were included, too.[11] It is usually argued that only

technological externalities are relevant to a cost benefit analysis, and that the purely transfer or distributional items should be eliminated from the evaluation.

C. Valuation of Non-Market Items

Externalities

It is argued that externalities arise because of the failure to define and enforce property rights of certain goods and services. Free goods, like air, are an example. By this argument, the valuation of externalities can be resolved by a definition and enforcement of property rights. The "compensation equivalent" concept assumes the producer has the property rights to consume. Then the price of externalities corresponds to the willingness of consumers to pay for stopping a negative effects. The "equivalent valuation" concept, on the other hand, assumes that the consumers initially have the property rights of natural environments. Thus the price quoted must be the compensation which consumers would require in exchange for giving permission for the negative effects to be produced. The equivalent valuation tends to exceed the compensation equivalent.

Public Good

Theoretically the value of a public good can be measured by the consumer's willingness to pay for it. However, its two characteristics

1. Non-excludability (nobody can be excluded)
2. Non-rivalry in consumption (everybody can consume without expense of other consumers)

give people an economic rationale not to reveal their true preferences. For example, they will profit by appearing to dislike pollution more than they really do, or they will understate preferences for positive externalities of public goods to reduce their payments (the "free rider" problem). Thus it seems fair to say that no clear-cut procedure exists to guide the cost-benefit analysis in the evaluation of public good.[12]

Intangibles

Some costs and benefits (such as the visual effect of new buildings) can not be quantified, and others although they can be quantified, can not be valued in monetary terms (e.g., a reduction in crime rate due to an urban redevelopment). Such costs and benefits have been called intangible costs and benefits. One possible approach may be to try to guess the value of intangibles from the money people who will have to pay for goods

which seem to have equal value to them, e.g., the attempt to value the public education program by the price of private education. Consumer questionnaires about willingness to pay for intangibles may be helpful but the questionnaires can be notoriously unreliable.[13]

Whenever benefits can not be valued in any way, it is still useful to compare the costs of alternative ways of providing the same benefits. This is called cost-effectiveness analysis and is regularly used in defense, public health and other fields. The real danger to avoid is ignoring gains and losses simply because they can not be valued. To make important policy decisions on only the dollar amounts that can be computed, just because they are the only dollar amounts, would be most dangerous. The under-estimation of the most truly distinctive benefits of the program might be crucial.[14]

D. Non-Marginal Changes

When the projects are large enough to affect market prices the benefits accruing from investment can not be measured by multiplying the additional quantities of output either by the old or the new price. The old price would give an over-estimate and the new price an under-estimate. What we should measure is the increase in consumer surplus with a demand curve. If we assume

that the marginal utility of money remains unchanged and (in other words, the demand curve does not shift), the demand curve is linear, an average of before and after prices will be the correct measure of the benefit.[15]

In practice, when project life is long a difficulty arises because change in population or income will cause shifts in the demand curve at the same time that price-reducing investment projects also influence movements along the demand curve. Although measurement may be very difficult, it is very important conceptually to distinguish the effects caused by income and population changes from the benefits caused by projects.

E. Second Benefits

Suppose there is an irrigation project which results in an increase in wheat production. The direct or primary benefits are measured as the value of the increase in grain output less the associated increase in farmers' costs. The question is whether we should count "secondary benefits" such as the value added in processing wheat into flour, flour into bread, etc. The answer is that in a properly functioning price mechanism, the market demand for wheat is a derived demand and so reflects the value of extra bread, etc. As long as the market prices reflect true marginal

social costs, we only have to worry about secondary benefits when the market price does not exist or diverge from the social value. Ohterwise, we will double-count the benefits.

In summary, the SCBA will help us achieve more wealth and economic efficiency by forcing us to use the real social value of goods and services rather than imperfect market prices. It has been shown how to adjust the distorted market prices and how to value non-market benefits and costs. The danger of double-counting of benefits has also been illustrated. It is pointed out that SCBA can also guide us to a state of greater social welfare . Only if we assume that the current income/wealth distribution is fair, and that a marginal utility of income is equal for everybody. However, if we disagree with this value judgement, we have to make a trade-off between economic efficiency and social welfare, and SCBA will not be a great help.

3. Economic Impact Assessment

3.1. Environmental Impact Assessment

Whenever a project is likely to have significant effects on the human environment, an Environmental Impact Assessment is called for to measure various impacts of a project on a local community so that a local government can evaluate the project in a comprehensive way.

In general, the impacts are classified as follows: traffic impacts, economic impacts, visual impacts, air quality impacts, noise level impacts, demographic impacts, and public utilities impacts. Each of these impacts is analyzed, then the result is presented to a decision maker. Looking at the respective analytical results, the decision maker will determine the relative value of each of the different impacts, judge trade-offs among different impacts, and then make a final decision.

This decision-making process is by no means easy and simple since the decision maker has to compare, for example, increased tax revenues with a decreased noise level and determine desirable trade-offs between the two impacts. The greatest difficulty arises when he compares several impacts with one another. Although using the Environmental Impact Assessment method may be one way to consider project's externalities, it is too difficult practically for a decision maker to arrive at a rational and consistent decision rather than a subjective and inconsistent one. Consequently, a decision maker generally considers economic impacts as more significant than the others, since they are measurable in monetary terms and they have direct impacts on the financial position of a local government.

3.2 Economic Impact Assessment

Economic Impact Assessment (EIA) measures incremental tax revenues created by a project and public outlays spent for it. Normally, this analysis should be confined to those costs funded by property taxes, excluding those paid by excise taxes, revenue sharing, state aid, etc., and comparing those costs with revenues derived from property taxes.[16] The incremental jobs created (e.g., construction jobs) and their multiplier effects on a local economy are measured separately. Although it is not a decisive rule, the more the net tax revenues or "tax surplus", the better.

Economic Rational of Economic Impact Assessment

The concept underlying EIA is naive. EIA assumes that both a local government and its constituents benefit from accepting any projects which have greater tax flows than project costs, since this enables the local government to provide better public services without increasing tax rates.

A local government is very concerned about losing people and industries. Therefore, competing with other local governements, it tries to attract as many decent habitants and industries as possible by providing better public services and amenities at relatively low tax rates.

There are two problems. First, Economic Impact Assessment considers solely the impacts in a local government's own jurisdiction. This implies that a project which creates positive net revenues in one jurisdiction at the expense of social costs in other jurisdictions should be undertaken. In other words, the creation of "external diseconomy" might be encouraged. From the point of view of society as a whole, all benefits and costs have to be considered, regardless of local jurisdiction; hence EIA can lead to inefficient resource allocations. For example, suppose that a project will create a small increase in property values in one jurisdiction, but at the same time will create an enormous decrease in property values in other jurisdictions. The project obviously should not be accepted from society's point of view since it will not have a positive NPV of benefits, but using EIA the local government will accept it. As another example, the job creation and its multiplier effect are real social gains only if there exists unemployment of labor. In a full-employment economy, to create one more job actually means to displace one job elsewhere in the economy and so the multiplier effect will be negligible. Thus, members of one jurisdiction find themselves seriously affected by public actions in another jurisdiction and vice versa,

and at last, everybody may find themselves worse off. This represents inefficient resource allocation.

The second problem is whether the rule of tax surplus is of economic significance. The answer may be no, since tax revenues are not a real benefit although they may partly reflect the real benefits capitalized in property values. Hence, it is hard to put any economic significance on the rule that tax revenues from a project have to exceed the outlays for it.

In summary, although Economic Impact Assessment is often done by many local governments, its economic rationale is questionable. If local governments are really concerned about the welfare of their constituency, they all have to agree that every government should consider inter-jurisdictional external effects of their public actions. Furthermore, the evaluation of economic impacts is only one part of total project evaluation. The other impacts reflecting externalities should be considered simultaneously. However, it should be noted that the mere exhibition of various impact results only confuses a decision maker.

CHAPTER III

DISCOUNT RATE

We feel that today's $1.00 is not as valuable as $1.00 one year later, even in real terms. When costs and benefits occur at different points in time, we have to discount them and find the present value of that benefits and costs stream. The choice of discount rates is very critical to project evaluations since decisions are often sensitive to discount rates. Starting from private discount rates, we will proceed to a more controversial issue -- public and social discount rates.

1. Private Risk Adjusted Discount Rate

The NPV method can help a private investor fulfill his ultimate goal -- to maximize his utility through maximizing his wealth. This is shown in Chapter II. Now we will examine how to find the appropriate discount rate to use.

As the Fisher's solution has shown, in a perfect capital market without uncertainty, only one marginal rate of return on investment exists in equilibrium.

Moreover, this rate is also equal to the interest rate which represents an individual's time preference. Hence, it is obvious this rate is appropriate for the discount rate.

However, in the real world of uncertainty and an imperfect capital market, things are not so simple. The major difference is due to the introduction of risk to investment problems. We can actually observe various rates of return on investment depending on the risk characteristics of the investments. The individual's time preference will be expressed as a risk-free interest rate which can be approximated by the rate of long-term government bonds. However, this rate is absolutely not equal to other rates of return on risky investments.

Current finance theory holds that there exists an optimal portfolio investment strategy[17] based on an individual's utility with respect to risk. The extension of this theory suggests an equilibrium will be achieved through the capital market mechanism with respect to risk-return trade-offs. In other words, an investment project with a particular risk characteristic will be priced so as to correspond to the one expected rate of return in equilibrium. This rate, the required after-tax expected rate of return on the investment, is an appropriate discount rate since it correctly reflects the opportunity cost of capital for the investment.

This risk-return trade-off in equilibrium is depicted by the Capital Asset Pricing Model (CAPM).

$$r_k = i + \beta_k (r_m - i)$$

r_k: required expected rate or return on security k

i: risk-free interest rate

r_m: expected rate of return on market portfolio

β_k: "market sensitivity" which measures the "sensitivity" of the returns on security k to the returns on the market portfolio

r_k is called the risk adjusted discount rate of security k, β_k can be considered as a measure of risk of security k, but it only reflects "systematic" risk of security k. The distinction between systematic and unsystematic risk is very important. Unsystematic risk is not correlated with the market while systematic risk is. Unsystematic risk can be eliminated by diversification of an investment portfolio since if you invest in various securities with various risk characteristics, the random nature of unsystematic risks will cause each of them to wash-out. Therefore, assuming investors can diversify their investments without any constraints, only the systematic risks of securities are relevant.

Although the CAPM was developed through observing the stock market, we can also use this model with some

modifications to find an appropriate discount rate for investment projects. First, it is necessary to identify the risk characteristics of a project and find the company whose business seems to bear a similar risk to the project being considered. Then the β of that company's stock can be found from the stock market data. One problem that arises is that stock β reflects not only the business risk caused by what the company is doing, but also the financial risk caused by the way the company is financed. As we might expect, the higher the debt, the higher the financial risk. Hence the next step is to separate business risks and financial risks. The formula is as follows:

$$\beta_{ASSET} = \beta_{EQUITY} \frac{\text{Equity}}{\text{Equity} + (1 - T)\ \text{Debt}}$$

where

$$\beta_{EQUITY} = \beta_{STOCK}$$

T = corporate income tax rate.

In other words, β_{ASSET} measures the business risk only. β_{ASSET} is the β_{STOCK} of the company if it is 100% equity financed. It is this β_{ASSET} which is relevant for evaluating the project. Thus it should be plugged

into the CAPM formula to find the appropriate risk-adjusted discount rate for the project. In this way it is recommended first to evaluate the project using business risk only, then to consider financing strategy. Finally, we should pay attention to a limitation of the CAPM, that is, it essentially depicts the relation which holds over two-periods of time, assuming a perfect capital market. However, it can give a fair approximation of the appropriate discount rate in most circumstances.[18]

2. Public and Social Discount Rates

There seems no dominant position among economists about public and social discount rates. Further, the concepts themselves are not well-defined. In this paper, "public discount rates" will be used in the same sense as "public sector discount rates" which means the discount rate to be used for public investment projects by the public sector. On the other hand, "social discount rates" means the discount rate to be applied to evaluate any projects -- either public or private -- from society's point of view. This definition is very useful because (1) there is a large amount of literature about "public sector discount rates" but not about "social discount rates", and (2) the distinction between the two will be consistent with the distinction between social and public

sector point of view. First we will review the literature of public sector discount rates, then we will discuss social discount rates.

Review of the Literature

There seem to be four candidates for public sector discount rates: Social Time Preference Rate, Private Risk-Adjusted Discount Rate, Social Opportunity Cost of Capital and Marglin's Discount Rate.

2.1 Social Time Preference Rate

The Social Time Preference Rate (STPR) is considered as the rate in which society exhibits a preference for present benefits over future benefits that are certain. Since the benefits are represented by the changes in consumption brought about by projects, the STPR can be said to be an articulation by the society concerning the relative value of a future year's consumption relative to this year's consumption. Therefore, the proponents of the STPR argue this is the discount rate to apply to the society's future benefits, hence, the public sector should accept projects which will be justified when discounted by this rate. It is a very straightforward argument. However, two problems with this approach are pointed out in the literature. The first involves

measuring the STPR and the second involves the efficiency of the resource allocation. They will be examined next.

Market Interest Rate

Remember the Fisher's solution discussed in Chapter II where, in the equilibrium, the market interest rate (in real terms) is equal to the optimal marginal rate of return on investment as well as to the tangent of the indifference curve. So in this little world, the market interest rate is equal to the rate of social time preference. In the complex real world, the after-tax interest rate on long-term government bonds may be a good indicator of the STPR, since this rate reflects individuals' willingness to make risk-free loans, and hence, their time preferences. However, this is a subject of controversy.

First, individuals may not express their true time preferences concerning future consumption in the market. They tend to be myopic, as Pigou argued, and they may underestimate the pleasure which future consumption will give them.[19] Furthermore, their preferences expressed as individuals may not be the same as their preferences expressed when they see themselves as part of a society. Thus it is probable that society as a whole may have a lower rate of time preference than the observed market rates which reflect individuals' myopia.[20]

Secondly, there is a question whether we should consider a project's effects on the welfare of future generations. Most economists would say no, on the grounds that cost-benefit analysis should be democratic.[21] However, if one believes cost-benefit analysis should be based on what is right, it is difficult to think of any ethical justification for ignoring future generations. It seems reasonable to use a lower discount rate than the market interest rate to take into account the welfare of future generations, especially when we evaluate a project which will result in irreversible externalities such as the destruction of a beautiful recreational area.

Social Inter-temporal Utility Function

Based on the assumption that we can draw a social indifference curve of the utility of inter-temporal consumption U(c), and that the principle of diminishing marginal utility of consumption holds, it is argued that (1) the future benefits to society have to be discounted since in the future society is likely to have higher income/wealth; (2) it will be possible to estimate the STPR directly if the rate of growth of consumption and the elasticity of the marginal utility of consumption with respect to consumption are known.[22] However, this approach may not be reliable, since (1) it seems extremely

difficult to find the value of the elasticity of consumption; (2) it assumes the possibility of inter-personal comparisons of utility.

Consequently, we examined the two main alternative approaches for measuring the STPR. Since the second approach does not seem practical, we will take the market interest rate as a starting point for a measure of the STPR. Both "myopic" and "future generation" arguments suggest downward adjustment to the market interest rate.

Impact on Efficient Resource Allocation

It is shown that the STPR can be approximated by the after-tax market interest rate on risk-free long-term government bonds. In Fisher's model the STPR also equals the marginal rate of return on investment. However, in reality, the existence of personal/corporate income tax and risk requires private before-tax rates of return on investment significantly higher than the market risk-free interest rate. This fact raises the question whether there will occur over-investment in lower return projects at the expense of higher return private projects if the public sector uses the STPR or at risk-free market interest rate as a discount rate which is significantly lower than the private before-tax rates of return. If it occurs, it will bring about inefficient resource

allocation. This argument leads us to the second position supporting the usage of the private discount rate.

2.2. Private Risk-Adjusted Discount Rate

The above "inefficiency" argument suggests that it will be necessary to use the private discount rate for public investment evaluations to avoid inefficiency. Whenever capital constraints exist this position has the strong case. It has another attractiveness in that it takes the risk of a project into account. Hirshleifer argues that in perfect capital markets investments are discounted with respect to both time and risk, and that the discount rates obtaining in these markets should be used to evaluate public investment projects.[23] This is a strong statement that the public sector has to consider the risks of projects in the same way as the private sector does.

Concerning risk, Samuelson and Vickerey, opposing Hirshleifer's view, argue that the government invests in a greater number of diverse projects and is able to "pool" risks to a much greater extent than private investors. Therefore, the government should ignore uncertainty and behave as if it were indifferent to risk.[24]

The other view of risk, raised by Arrow and Lind,[25] argues that when the risks associated with a public investment are publicly borne, the total cost of risk-bearing is insignificant, and that, therefore, the government should ignore uncertainty in evaluating public investments.

Conflicts among different views to risk need to be discussed further.

2.3 Risk and Public Sector Investment Problem

In this paper, the "society" is assumed to be a collection of individual members, and thus to have a similar attitude toward risk as an individual (i.e. is a risk-averse expected utility maximizer). From this point of view, Hirshleifer's view seems most acceptable although the view by Arrow and Lind seems correct as an observation. Actually individuals are not very concerned about risk-return characteristics of public projects and few people may think of tax payments as an investment for future benefits. However, it is not ethical to argue that the public sector can neglect individuals' risk-return preferences because they are not concerned about the risks of public investment projects. Suppose the society faces the choice between two projects with the same expected return, but different

risks. If all members of the society agree to choose the one with less risk, the society should choose the same one. This choice will increase each individual's utility, and hence, social welfare.

Thus, it seems appropriate to use private risk-adjusted discount rates for public project evaluation, since the private risk-adjusted discount rate is determined so that it reflects individuals' risk-return preferences correctly, and hence, it can help individuals reach right investment decisions which, in general, will give them the highest utility.

The view by Samuelson and Vickerey is correct only if all the risks can be eliminated by diversification. However, it has been shown that systematic risks cannot be eliminated through the diversifications within an economy. Even a government, unless investing in outside economies, may not be able to diversify systematic risks away. Consequently, it is suggested that the Capital Asset Pricing Model which measures only systematic risks to find a projects' discount rate also seems appropriate to use in public investment evaluation.

Although it is shown that the public sector should evaluate the risk factor in the same way as the private sector there remains one problem. That is, the private discount rate may not be appropriate as a social discount

rate since the private economy does not use the prices which reflect the true social value of goods and services. Hence, the social discount rates may look significantly different from the discount rates in the private market. For example, suppose a private industry drains pollutants into a river without paying. Real social costs have to include the cost of this negative externality and including these costs may affect the industry's business risk significantly and thus may affect its discount rate.

Finally, it should be noted that discount rates to be used by the public sector should be after-tax private risk-adjusted discount rates, since they are the only rates which will reflect the risk characteristics of cash flows generated by projects. When we want to calculate the present value of a public project, we simply discount its before-tax cash flow by an after-tax discount rate which reflects the risk of the project. When we want to know the after-tax present value of this project, which is the value to the private sector, we should adjust the cash flow as if taxes are paid but should not double the after-tax discount rates and use this doubled rate as a before-tax discount rate. To adjust discount rates is generally incorrect except that a cash flow is perpetual and uniform.

2.4 Social Opportunity Cost of Capital

The social opportunity cost of capital (SOCC) is considered to be the cost of capital for financing public investments. Depending on the assumptions made about the level of capital constraints and the source of funds, the social opportunity cost of capital takes differenct values:

1. If the public sector can accept all projects which should be done because of no capital constraints, the SOCC is 1.

Since the public sector does not face any capital constraints on investments, the public investment projects do not displace any private projects which could yield at (P) before-tax rate of return. They just displace current consumption. So only the stream of benefits (consumption generated) in the future will be discounted at the rate which reflects the social time preference (r).

$$NPV = \frac{B}{r} - I$$

where B = perpetual benefit stream

I = initial investment

2. If there are serious capital constraints, the SOCC is $(\frac{P}{r})$.

In this case it is fair to assume that public investments will displace the same amount of private

investments which would have a rate of return (P). The SOCC is the present value of this foregone rate of return to society for perpetuity ($\frac{P}{r}$).

$$NPV = \frac{B}{r} - I \frac{P}{r}$$

If we only want to know if NPV > 0 or not, the formula may change to

$$\frac{r}{P} \quad NPV = \frac{B}{P} - 1$$

where P can be regarded as a discount rate.

3. (The most general case.) If some portions of private investment will be displaced, the SOCC is

$$\theta \quad \frac{P}{r} + (1 - \theta)$$

where θ is the rate of displacement of private investments whether by taxation or borrowing. In the case of tax financing θ will be a marginal propensity of savings and in the case of borrowing θ will be approximately 1.

$$NPV = \frac{B}{r} - I \quad \left(\theta \frac{P}{r} + (1 - \theta)\right)$$

This SOCC approach, used by some economists (Marglin, etc.) and practiced by many governments, is essentially analogous to the "company's cost of capital" method in financial analyses, which measures the costs of financing

to a firm and uses it as a discount rate to evaluate a company's projects. The cost of financing is a weighted average of a long-term debt interest rate and a required rate of return on equity. However, the "company's cost of capital" method may lead a company to wrong investment decisions, since this method does not consider the risk of a project.

It can give an appropriate discount rate only for a project where risk characteristics are exactly the same as a company's business as well as financial risk. Eventually the company may be undertaking poor performance high-risk projects while rejecting super low-risk projects.

The correct procedure is to follow the rule shown in the previous section. In short, calculate the required expected rate of return by the CAPM and use it as a discount rate. The cost of financing has nothing to do with the business risk and it should be assessed separately from the project evaluation.

Consequently, although the SOCC measures the opportunity cost of capital for public investments in an acceptable way, using it as a discount rate will result in undertaking many projects with a high expected rate of return but also a high risk and giving up many good projects with a relatively low expected rate of return but a minimal risk. This is obviously not desirable for the society.

2.5 Marglin's Discount Rates

This position rejects the notion that individual preferences as revealed by market behavior are significant for government investment decisions. Marglin argues that market-determined rates of investment and interest, even rates determined in a competitive market, need have no normative significance, and that the optimal level of investment for an economy is the level at which the marginal productivity of investment equals the marginal social rate of discount incorporating external effects.[26] Assuming the imperfect market mechanism, this position asserts that government should set the public sector discount rate so that the economy can achieve the optimal level of investment with respect to the national policy. One such procedure, suggested by Marglin, would be to set national objectives concerning the desired rate of growth and to infer from this the appropriate rate of discount, which is the social rate of discount.

Although attractive in that it attempts to realize the optimal economy, this position is criticized both as authoritarian and impractical by Preset and Turvey.[27] They argue that Marglin's discount rate is based on the assumptions that (1) the capital market mechanism is extremely imperfect, (2) individuals are myopic, thus their preferences are of no normative significance,

(3) society is more than a collection of individuals and has an existence and interests apart from those of individual members, (4) the government has a superior ability to find the real need and preference of the society, and (5) the risk of a project is irrelevant. Since none of the assumptions seem acceptable, the criticism by Prest and Turvey sounds reasonable.

2.6 Social Discount Rates

As we have seen, there are four positions about how to determine appropriate discount rates for public investments projects. Some of them can be termed as "public sector discount rates" since projects are implicitly assumed to be undertaken by the public sector. On the other hand, "social discount rates" means the discount rates to be used for evaluation of projects -- either public or private -- from society's point of view.

Social Discount Rate

Social discount rates will be appropriate for the social cost benefit analysis, since in both cases socity's point of view matters. From society's point of view it does not matter who undertakes a project -- the public sector or the private sector -- but it matters how efficiently resources are allocated.

This efficiency issue brings us back to the question of the Social Time Preference Rate vs. the Private Risk-Adjusted Discount Rate. It has been suggested that the private discount rate can help avoid the potential inefficient resource allocation resulting from using the STPR. However, one problem has been pointed out, that is, the private discount rate may not be adequate because of the distortion in the market prices and externalities. Consequently, to achieve the optimal efficiency we need the social risk-adjusted discount rate as well as the true social value of benefits and costs. If you use the market prices and discount them by the private risk-adjusted discount rate, this will bring about an old problem: economic efficiency vs. social welfare. Many benefits from welfare programs do not have market prices and hence the benefits are underestimated. To apply the private discount rate for this benefits stream will worsen the underestimation. Therefore using the private discount rate implies a value judgment which prefers more economic efficiency to more social welfare.

How to measure the social risk-adjusted discount rate poses a difficult problem. In the scope of this paper, we cannot expect to do more than point out that the social risk adjusted discount rate must be more than the social time preference rate, depending on the risk

of a project, but it may or may not be the same as the private risk-adjusted discount rate. The difference between the social and private risk-adjusted discount rate for a project will depend on the extent to which the project reflects the true social value of costs and benefits.

Public Sector Discount Rate

The public sector discount rate is considered to be an appropriate discount rate for public investment project evaluation. In the case of a project done by the government, the public sector discount rate is equal to the social sector discount rate, since we can assume the government should be concerned about the society as a whole. However inadequacy of the social cost of capital and the Marglin's discount rate should be noted.

In the case of a project done by a local government, since a local government cannot be said to be as responsible for society as a whole, we might need the different rate from the social discount rate. As discussed in Chapter II, a local government is primarily concerned about the welfare of its constituency. It is competing with other local governments for people and industries by improving its public services and amenities. This has been the justification for thinking its budget

surplus important. Alhtough it may not be desirable, in practice a local government measures costs and benefits by the market prices.

These characteristics of a local government suggest that it use the private risk-adjusted discount rate, since it will give the higher economic efficiency. Furthermore, it is likely to be true that the local taxpayers are very much influenced by the return from a local government; because they always can move to a better locality in terms of rate of return on their investment (i.e. local public services vs. tax payment). This taxpayers-local government relation is exactly analogous to shareholders-private firm relation. Consequently, using the private risk-adjusted discount rates, is again suggested.

CHAPTER IV

APPLICATION TO AN URBAN REDEVELOPMENT PROJECT

Urban redevelopment is an area where the public sector and the private sector interact intensively with each other. Within the public sector there are two different interests, represented by a local government (or a city) and the State/Federal government. We are to apply the previous three project evaluation methods to an urban redevelopment project and examine how they result in different evaluations and how their difference affects the decision making processes.

In this chapter, specific analytical models for an urban redevelopment project are introduced with some modifications to the general models presented before. In the next chapter a case study is presented to show how to actually apply the specific analytical models.

1. Private Project Evaluation to an Urban Redevelopment Project

1-1. Characteristics of Real Estate Investments

A real estate investment, in general, has the following characteristics:

- Project life is usually very long.
- A large amount of loan financing is available (e.g. mortgages). Thus an equity investment in a project is usually a very small portion of the total investment necessary, which is called a "leveraged" equity position.
- Large tax losses raised by excess depreciation and interest payment will be available.
- Every real estate investment has a unique nature.
- Return from real estate investment is generally considered to be less volatile than common stocks.[28]
- Sophisticated investment analysis is rarely used.

The availability of large tax losses is the most distinctive, and often attractive, characteristics of a real estate investment. The contribution of tax losses can sometimes be much larger, hence more important than one of after-tax cash flows from operations. Hence

in order to fully utilize large tax losses and a leveraged equity position, various forms of financing packages and ownerships have been devised.

A typical proforma cash flow statement of a real estate investment looks like as follows. This is called "set-up."

Set-up

	Gross Rentals
+	Other Incomes
	Gross Revenue
-	Vacancies
	Effective Gross
-	Operating Expenses
-	Property Tax
	Free & Clear Cash Flow
-	Debt Services
	Before-Tax Cash Flow

1-2. Adjusted Present Value Method

From a real estate developer's point of view, it is necessary to analyze properly the effects of complex financial arrangements. This complexity of financial considerations is one of the most distinctive features of

real estate development projects. The revised version of the Net Present Value method, called the Adjusted Present Value method (APV), can give us a straightforward approach to analyzing the interactions of financing and investment decisions. Based on the principle of value-additivity, the APV method essentially separates the cash flow depending on the risk profile of each cash stream, then adds them up after discounting with the appropriate discount rates. First, this method starts by estimating a project's "base case" value as an all equity financed case, and then adjusts the project's base case NPV to account for the project's financial side effects such as the interest tax shield and the value of any subsidizing loans.[29]

$$\begin{matrix}\text{Project}\\ \text{APV}\end{matrix} = \begin{matrix}\text{Base Case}\\ \text{NPV}\end{matrix} + \begin{matrix}\text{Present Value of}\\ \text{Financing Side Effects}\end{matrix}$$

where:

Base Case NPV is the after-tax cash flow when a project is assumed to be all equity financed, thus, discounted by β asset (see Chap. III).

Present value of Financing Side-Effects consists of the present value of the interest tax shield, the subsidizing loans, etc., each disounted by the borrowing interest rate since they are as risky as interest payments.

The APV method can be said to be the best so far devised to evaluate a project with a complex financial arrangement, since the APV method enables us to handle the interaction between financing and investment decisions in a straightforward fashion. That is, one first focusses only on the business risk of a project and determine its basic viability. Then one considers financing strategy and finds the present value of financing side effects. There is no formula unfortunately for a single-adjusted discount rate that will correctly reflect the financing and investment decision interaction.

2. The Application of Social Cost Benefit Analysis to an Urban Redevelopment Project

Social Cost Benefit Analysis requires us to identify real (not just distributional) social costs and benefits brought about by a project and to measure them in terms of real social values. In the case of an urban redevelopment project, there seem to be three main sources of benefits: (1) increased land value of the site, (2) positive externalities (e.g., increased land values of nearby property, and reduction in social costs), (3) benefits from improvements (e.g., buildings, streets, etc.). On the other hand, there seem also to be three

categories of costs: (1) resource costs for improvements, (2) the value of existing improvements that are demolished, (3) negative externalities (e.g. traffic congestion).

The main benefit from redevelopment is considered to be increased land value of the site. However, it is not easy to measure correctly the benefit of the project, since the increase in the land value comes from three sources. The first is the "internalization of externalities", which implies the land value on the project site will increase due to the increased productivity of the site resulting from re-assembly of the land. For example, an urban redevelopment can provide a large site by assembling small fragmented parcels of land. It will open up new additional productive opportunities for the site which were previously prevented by fragmented land use. This is a real net benefit.

The second source of increased value is changes in relative prices of property caused by changes in the supply of property. For example, if an urban redevelopment project eliminates slum houses and supplies high-middle income houses, the supply of slum houses decreases. This results in the increase in the price of slum houses. Consequently, the total of the effects may be canceled

out within an economy. This is a distributional effect (sometimes called as "locational effect") and one of the pecuniary effects discussed in Chapter II, which is irrelevant to social cost benefit analysis.

The third comes from the increase in population and income which cause land value increase. Since an urban redevelopment project takes a long time from its planning stage to its implementation, the population and income effect may be significant. Not to subtract the increase in land value due to this population and income effect will overstate the benefits of the project.

Positive externalities take the form of (1) increased land values of nearby property and (2) reduction in social costs. Typical urban redevelopment projects remove slum or blighted areas and replace them with high-quality buildings. This improves the nieghborhood for nearby property and enhances its productivity and value. This is one of technological externalities reflecting real benefits and "agglomeration effect" will be another example of this sort. Reduction in social costs brought by eliminating slum or undesirable land usage is the other form of positive externalities. Decrease in crime rates, decrease in fire hazards and improvement in health hazards are major items to be counted.

As to benefits from improvements, there are two conflicting views. The first one, proposed by Rothenberg, assumes that (1) the strict full-employment and competitive economy and (2) movable resources (i.e., any resources other than land) allocated to a project are desplacing alternative resource uses in the same product sector of the economy (e.g., a housing sector, and office building sector, etc.). The resources spent for constructing improvements on a site are considered to be movable resources thus deplacing alternative uses. The assumption of the full-employment and competitive economy implies that, at least within the same sector, the marginal productivity of capital must be reduced to become unique and if resources are used, they will yield exactly this marginal productivity of capital since the displaced alternative resource uses could have yield at this rate elsewhere, and simultaneously, the competition must have eliminated any alternative uses with higher yield. This is the opportunity cost of capital in this sector of the economy. Consequently, it is argued that the resources used for improvements will not produce any net benefits since that benefits should be offset by the opportunity cost of the capital displaced elsewhere. Hence, Rothenberg argues both benefits and

costs of improvements are irrelevant and any net benefits will be capitalized on land.

The other view relaxes Rothenberg's second assumption, allowing the inter-sectoral resource transfer as well as disequilibrium due to imperfect competition. Now, the marginal productivity of capital is not necessarily unique since it will be quite different from one sector to the other partly depending on risk characteristics. Therefore the benefits and costs of improvements come into the calculation. However, there are serious difficulties to find the necessary data. By definition, the benefits of improvements can be measured by the consumers willingness to pay. Therefore the rent payments can be an indicator of the benefits of improvements but, as we have seen already, the market prices are poor indicators of real social value of resources. Rather, real social values should be measured and discounted by social risk-adjusted discount rates. Hence, it is recommended to use social (risk-adjusted) discount rates so as to capitalize the rent. Furthermore, the benefits of public improvements need to be measured although it is pointed out that no successful methods have ever found.

Finally, the assumption of full-employment economy allows us to exclude such benefits as a shadow price of

labor, job/employment creation and multiplier effects.

ACCOUNTING FRAMEWORK

Rothenberg's Model

[Benefits]

1. Increase in land value on site less locational and income/population effects.
2. Increase in land value on neighborhood less locational and income/population effects.
3. Reduction in social costs.

[Costs]

1. Value of existing improvements to be demolished.
2. Negative externalities.

Alternative Model

[Benefits]

1. Capitalized rent for land and building.
2. Increase in land value on neighborhood less locational and income/population effects.
3. Benefits from public improvements (e.g., streets, sewage systems, parks, etc.).
4. Reduction in social costs.

[Costs]

1. Costs of land acquisition and administration of a project.

2. Costs of building construction.
3. Costs of public improvements.
4. Value of existing improvements to be demolished.
5. Negative externalities.

3. The Application of Economic Impact Assessment to an Urban Redevelopment Project

Applicaiton of the Economic Impact Assessment to an urban redevelopment project is straightforward.

1. Figure out required public costs for land acuisition, demolition, and construction of improvements. Financial costs for debt financing and tax loss from demolition of existing improvements are also costs.
2. Estimate the increase in property value after completion of a project or the rent of office, retail, residential and hotel, etc., when percentage rent is used to calculate the property tax.[30] Apply appropriate tax rates to find after-project tax revenues. The disposition price to a developer also needs to be estimated.
3. Calculate the number of construction and other jobs generated and find the multiplier effect on the local economy. This is considered additional

CHAPTER V

A CASE STUDY -- A NUMERICAL EXAMPLE

An urban redevelopment project -- PARK PLAZA Urban Renewal Project in downtown Boston will be analyzed by the three project evaluation methods with numerical calculations. Sensitivity analysis in terms of different discount rate assuptions as well as other policy variables are done to see the implications of different assumptions for the decision making process.

It should be noted, however, that this case study is not intended as a rigorous empirical application of the methods suggested in this paper. The difficulties to obtain necessary data make it impossible to arrive at definite conclusions. As an illustrative exercise, it is intended to provide the general directions of how to calculate necessary numbers and how to interpret numerical results.

1. PARK PLAZA Urban Renewal Project

PARK PLAZA Urban Renewal Project in downtown Boston is one of the largest urban redevelopment projects planned by the Boston Redevelopment Authority(B.R.A.). Aiming at the

revitalization of underutilized downtown area where the spread of blight and erosion of property value can be observed, this project has a comprehensive development plan, including new residential, office, retail, entertainment, and hotel development. (See Appendix 1 for the summary description of the project.) As a case project, we will choose a private office development on the Arlington-Hadassah sub-parcel, assuming that we were examining the project at the end of 1975.

SUMMARY DATA

(Unless otherwise noted, the data used in this section are from Park Plaza Urban Renewal Project/ Final Supplemental Impact Report: The Report, Sept. 1976, by the B.R.A.)

Arlington-Hadassah Sub-Parcel	65,407 S.F. 12.4% of Total Site
Disposition Price	$5,201,000
Office Building	570,000 S.F.
Office	515,000 S.F. 46% of Total Office
(Net Rentable S.F. = 87% of Gross S.F.= 448,050 S.F.)	
Retail	55,000 S.F. 35% of Total Retail

Development Cost

Office	$74/Net Rentable S.F.	x 448,050	= 33,155,700
Retail	$63/N.R.S.F.	x 55,000	= 3,465,000
			$ 36,620,700

$74/N.R.S.F. and $63/N.R.S.F. both consist of

$8/N.R.S.F. of land cost, construction costs, debt service and real estate taxes during construction period, administration, etc.

Revenue (per Net Rentable Square Footage)

	Office	Retail
Gross Rent	$12.00	$12.00
Vacancy	(.60)	(1.20)
Effective Gross Rent	11.40	10.80
Operating Expenses	(2.40)	(1.60)
Real Estate Taxes	(2.60)	(2.70)
Free and Clear Cash Flow	6.40	6.50

2. Private Project Evaluation (The APV Method)

We will evaluate the project from a private real estate develper's point of view.

2-1. Estimation of a Risk-Adjusted Discount Rate

Assuming that a developer's main business is an office development and his stock β = .98, Debt/Debt + Equity = 15%[31] and corporate income tax = 48%,

$$\beta_{Project} = \beta_{Stock} \left(\frac{Equity}{Equity + (1 - .48)\ Debt}\right) = .98 \times .92 = .90$$

Historical data (1926-74) of rates of return by Ibbotson and Sinquefield suggests average annual rate of return (real) of Treasury bills (risk-free rate) equals .2%[32]

and of common stock over treasury bill return (risk premium) equals 8.6%. Using the Capital Asset Pricing Model, the risk-adjusted discount rate is:

$$r_{Project} = i + \beta_{Project}(r_M - i) = .2\% + .9(8.6\%) = 8\%$$

2-2. APV Method

BASE CASE NPV consists of operating cash flow NPV, Depreciation Tax Shield and Present Value of Resale.

$$\text{PROJECT APV} = \text{BASE CASE NPV} + \text{Interest Tax Shield}$$

$$= [\text{Operating Cash Flow NPV} + \text{Depreciation Tax Shield} + \text{Present Value of Resale}]$$

$$+ \text{Interest Tax Shield}$$

OPERATING CASH FLOW NPV can be found by (1) calculating after-tax but before depreciation and debt service operating cash flow discounted by $r_{Project}$, (2) then subtracting initial costs. Life of the office building is assumed to be 40 years.

After-Tax but Before Depreciation and Debt Serice Cash Flow

$$= \$6.40/\text{N.R.S.F.} \times (1 - .48) = \$3.33/\text{N.R.S.F.}$$

$$\text{OPERATING CASH FLOW NPV(Office)} = -74/\text{N.R.S.F.} + \sum_{t}^{40} \frac{3.33}{t(1 + .03)^t}$$

$$= -74 + 39.71 = -34.29/\text{N.R.S.F.}$$

considered to be as risky as interest payments, the discount rate can also be approximated by the mortgage interest rate. 10% nominal is chosen.

INTEREST TAX SHIELD can be found by (1) finding out each year's interest payment i_t, (2) calculating the present value of interest payment stream, and (3) multiplying (marginal) corporate income tax rate. Assume: mortgage loan is \$51/N.R.S.F. which is 80% of capitalized Free & Clear Cash Flow at 10% capitalized rate; interest rate is 9.5% nominal; and repayment term is 30 years.[33]

$$\text{INTEREST TAX SHIELD} = \sum_{t}^{30} \frac{.48 i_t}{(1 + .10)^t} = 17.62/\text{N.R.S.F.}$$

RESALE VALUE is calculated based on the assumption that (1) the building will be sold at the same price as the current depreciable base (\$66/N.R.S.F.), and (2) capital gain tax ratio is 35%.

$$\text{RESALE VALUE} = \frac{66 \times (1 - .35)}{(1 + .10)^{40}} = .94/\text{N.R.S.F.}$$

$$\text{PROJECT APV(Office)} = [\text{Operating Cash Flow NPV} + \text{Depreciation Tax Shield} + \text{Present Value of Resale} + \text{Interest Tax Shield}]$$

$$= -34.29 + 8.64 + 17.62 + .94 = -7.09/\text{N.R.S.F.}$$

By the same procedure:

$$\text{PROJECT APV(Retail)} = -22.69 + 7.2 + 17.95 + .78 = 3.24/\text{N.R.S.F.}$$

Consequently,

APV of Office Development = -7.09/N.R.S.F. x 448,050

= $ -3,176,674

APV of Retail Development = 3.24/N.R.S.F. x 55,000

= 178,200

TOTAL	$ -2,998,474

It is amazing to find that this project would cost a developer about three million deficit.

2-3. Sensitivity Analysis

If $r_{Project} > 6.76\%$, PROJECT APV < 0

$r_{Project} < 6.76\%$, PROJECT APV > 0

Other variables being equal, $r_{Project}$ (= 6.76%) corresponds to $\beta_{Project}$(= .76). Hence, if this project is less risky than β = .76, PROJECT APV becomes positive.

It may be concluded that this project is not attractive from a private developer's point of view, since the assumption that the business risk of office development is higher than β = .76 seems reasonable. However, it should be pointed out that we use real rates to discount cash flow so that we do not have to consider

DEPRECIATION TAX SHIELD is the present value of the corporate income tax saved by depreciation since depreciation is tax deductable. This cash flow has different risk characteristics from the operating cash flow, that is, the only risk associated with this cash flow is the one that a firm cannot make use of it. However, in the real estate business, investors can make use of depreciation tax shields even if a firm cannot. Consequently, this cash flow involves only a small risk and an appropriate discount rate can be approximated by the mortgage interest rate. 10% nominal is chosen as a discount rate. Depreciation tax shield can be calculated by (1) figuring out each year's depreciation D_t, (2) calculating the present value of the depreciation stream, and (3) multiplying (marginal) corporate income tax rate. Assume: 150% declining balance method over 40 years; depreciable basis is \$66/N.R.S.F. which is \$73/N.R.S.F. less land cost \$8/N.R.S.F.

$$\text{DEPRECIATION TAX SHIELD} = \sum_{t}^{49} \frac{.48D_t}{(1 + .10)^t} = 8.64/\text{N.R.S.F.}$$

INTEREST TAX SHIELD is the present value of the corporate income tax saved by interest payments because interest is tax deductable. Since this cash flow can be

effects of inflation. However, the value of real estate often rises more than the rate of inflation, which gives investors extra cash flows. The preceding analysis does not take this fact into account; thus, the result should be a conservative figure.

3. Social Cost-Benefit Analysis

Due to the difficulty of obtaining necessary data, the analysis is simplified. The following are the assumptions introduced:

(1) Benefits from improvements will not be counted as Rothenberg does not. All the benefits are assumed to be capitalized on the land.

(2) Income/population effects and locational effects on property value are negligible.

(3) Costs and benefits from public improvements will be canceled out with each other.

(4) Positive and negative externalities will be canceled out with each other.

Under these assumptions, benefits is the capitalized rent for only land; costs consist of building construction and the value of existing improvements to be demolished.

[COSTS]

The cost figures, $74/N.R.S.F. for office and $63/

N.R.S.F. for retail, include property taxes during construction periods, $2.20/N.R.S.F. and 2.40/N.R.S.F., [34] respectively. Since the land cost is $8/N.R.S.F. the real capital costs are $63.8/N.R.S.F. and $52.6/N.R.S.F.

Office	63.8/N.R.S.F. x 448,080 =	28,585,590
Retail	52.6/N.R.S.F. x 55,000 =	2,893,000
SUB-TOTAL		31,478,590
Existing Improvements Demolished		967,000
		32,445,590

[BENEFITS]

Effective gross rent for the land and building is $11.40/N.R.S.F. for office and $10.80/N.R.S.F. for retail. These figures include operating expenses, $2.40/N.R.S.F. and $1.50/N.R.S.F., and property taxes, $2.60/N.R.S.F. and $2.70/N.R.S.F., respectively. Since, in general, tax payments are not considered as real costs and benefits, the benefits to society depend on the following assumptions:

(1) If property taxes are born by occupants/consumers, the real benefit = 11.40 - 2.40 - 2.60 = 6.40/N.R.S.F. for office and 6.50/N.R.S.F. for retail.

(2) If property taxes are born by property owners, the real benefit = 11.40 - 2.40 = 9.00/N.R.S.F.

for office and 9.2/N.R.S.F. for retail.

Traditionally, it is believed that a tax on real estate improvements is shifted forward to occupiers. However, it is now controversial.[35]

In order to capitalize the benefit, we have to choose discount rates. As it is suggested, social discount rate should be between after-tax private risk-adjusted discount rate and the social time preference. To achieve as high economic efficiency as the private sector does, after-tax private discount rate should be used for adjusted cash flows, or only in case of perpetual and uniform cash flows, doubled after-tax discount rate can be used for unadjusted cash flow. Since real estate generates a perpetual stream of cash flows, we can use 8% x 2 = 16% to get after tax present value of the project, assuming corporate income tax is approximately 50%. The STPR can be approximated by the historical after-tax rate of return (1926-1974) on long term government bonds which is 1.3%(real).

CAPITALIZED VALUE (OFFICE)

Benefit		$6.40	$9.0
Double Rate	16%	40	56.25
After-tax Discount Rate	8%	80	112.5
Social Time Preference	1.3%	492	692
Social Cost		63.8	63.8

SENSITIVITY ANALYSIS

We will examine whether benefits less capital costs exceed the initial land price, i.e., the disposition price of $5,201,000. If the benefit is $6.40, the discount rate of 10.24% equates the land value (benefit) and the land cost (cost). If the benefit is $9.00, the discount rate of 14.40% equates the cost and the benefit. Consequently, if the benefit is $9, the benefit exceeds the cost in most circumstances. If the benefit is $6.4, the project will be justified if the discount rate is assumed to be lower than 10.24% without taxes. If the STPR is used as a discount rate, both $9 and $6.4 cases will be justified, while this project is infeasible under both cases if the public sector has to be as efficient as the private sector. Since the project is justified at 8% risk-adjusted discount rate which is appropriate for this project, and the social discount rate is suggested to be lower than the private rate, it may be concluded that the benefit is likely to exceed the cost from society point of view.

Furthermore, if positive externalities, such as the reduction in crime rates and the real increase in land value on nearby property, exceed negative externalities, such as serious traffic congestions and increased noise level, the project becomes worth more.

4-4 Economic Impact Assessment

Assuming that disposition price of land to a developer is set so that it will be equal to costs of land acquisition and administration of a project, and that the increase in land value in nearby property will be canceled out by the decrease in land value elsewhere within a local economy, the benefit is the increased property tax revenues on the site which is the difference between new property tax revenues and the previous property tax revenues. The costs are the one of constructing public improvements (e.g. parks, streets, and plazas,etc.), and the increase in public services (e.g. fire protection).

[BENEFITS]

Property taxes are 23% and 25% of the effective gross rent of the new office and retail, respectively.[36]

Office	23% x 11.40/N.R.S.F. = 2.6/N.R.S.F. x 448,056	
		= 1,164,930
Retail	25% x 10.80/N.R.S.F. = 2.7/N.R.S.F. x 55,000	
		= 148,500
Total Anual Property Tax		1,313,430

The property tax revenues before the project needs to be figured out and subtracted from the above figure to find

net increase in property tax revenues. The assessed value of the property on Arlington/Hadassah in 1974 is equal to $2,076,000 including land and buildings. Property tax rate is 196.7/1000.

Annual Foregone Tax Revenues = 2,076,000 x 196.7/1000

= 408,349

The Net Increase in Property Tax Revenues (Annual)

= 1,313,430 - 408,349 = 905,081

[COSTS]

The total cost of public investments amounts to 5,440,000. The proportional allocation of the total cost to this office building is done according to the share of this building's square footage to the total development square footage, which is 25%.

The Share of Public Improvements

= 5,440,000 x 25% = 1,360,000

The cost of public services are also proportionally allocated according to the share of this building's square footage to the total development square footage of each use, which is 46% and 35% for office use and retail use, respectively.

The Share of Public Service Costs (Annual)

Office	1,071,370 x 46% =	492,798
Retail	381,775 x 35% =	133,621
Total		626,419

BENEFITS	Property Tax Revenues	905,081	(Annual)
COSTS	Public Improvements	1,360,000	
	Public Services	626,419	(Annual)

To find if the property brings positive NPV of benefits, we will compare one time cost of 1,360,000 with annual flow of benefit: 905,081 - 626,419 = 278,662. Capitalized value of the annual cash flow is the present value of perpetual equity. In this case, the public sector discount rate, which must be as high as the private sector, can be approximated by the double after-tax discount rate.

	BENEFIT	COST
Private Discount Rate 16%	1,741,637	1,360,000
NPV of the benefit		391,637

SENSITIVITY ANALYSIS

If discount rate = 20,5%, then NPV of the benefit = 0.

If the cost of public improvements is financed at 7% over 20 years, as is assumed in the Report, annual debt service = 128,370,

$$NPV = \frac{(278,662 - 128,370)}{(1 - .16)^{t}} + \frac{1}{(1 + .16)^{20}} \times \frac{278,662}{.16}$$

$$= 891,057 + 89,998 = 980,555$$

The net benefit becomes very large. Consequently, it is obvious that this project should be realized from the city of Boston point of view.

TAX BREAK

Although the property tax rates are set at 23% and 25% of the effective gross rent of the new office and retail, respectively, this assumes a tax break with Proposition 121A. If we use the current effective rate of 7% at the market value, city's tax revenues are:

7% x 74/N.R.S.F. x 448,050	=	2,320,899
7% x 63/N.R.S.F. x 55,000	=	242,550
		2,563,449
		- 1,313,430
		1,250,019

This suggests that the city actually subsidizes 1.25 million to the private developer but it is still not enough to change project's feasibility from the private developer's point of view.

ADDITIONAL BENEFIT

The construction jobs which will be generated by this building over three years is estimated by the proportional allocation of total construction jobs of each use.

(Million of $)

	Office	Retail	Public Improvement	Total
Annual Payroll	1.01	.56	.2	1.77
Multiplier Effect	1.58	.18	.33	2.09

Since income taxes are levied by the State and Federal governments but not by the city of Boston, this multiplier effect on the local economy may not be a direct benefit from the local government point of view.

$$\text{PV of Multiplier Effect} = \frac{2.09}{3} \sum_{1}^{3} \frac{1}{(1 + .013)^{t}}$$

$$= 2.04 \text{ million}$$

where discount rate must be the Social Time Preference since multiplier effect will create consumptions but not investments.

4-5. Implications on Decision Making Processes

Clearly, our analysis concludes that this office development project, one of PARK PLAZA Urban Renewal Project, is not feasible from a private developer's point of view, although it is a wonderful project from the society and the city of Boston point of view.[37] This conclusion is quite insensitive to the choice of discount rates. This is an unfortunate situation since the society and a local government will miss the opportunity where they get substantial benefits. From a private developer's point of view, there is no point to accept this project which will cost him three million. It is to this sort of problem that this paper is trying to show the way to

get around.

SOLUTION 1

If the city decides to subsidize the developer, the project will be undertaken.

The NPV of the Developer = -2,998,474 + 2,998,474 = 0

The Society: No Change

The city needs to raise $2,998,474 since the total cost to the city becomes $4,358,474. The discount rate which will give NPV = 0 is 6.4%. The city is now considering the debt finance at 7% over 20 years; therefore, it seems reasonable to expect that the city will use the discount rate higher than 7%. Consequently, this solution will not work. It suggests that that "zero-sum" relation exists between the city and the private developer, that is, one's gain means the other's loss. This is a common observation in the real world. The city and the private developer often spend a lot of their time and money in a futile negotiation process, leading nowhere because of the zero-sum relation between each other. Now we will introduce the view from the society.

SOLUTION 2

If the private developer can be subsidized three million dollars, the project will be undertaken. City of

Boston can subsidize up to $980,555 -- the subsidy which the State/Federal Government can provide depending on the assumptions about discount rates. If we assume the appropriate rate is 8% risk-adjusted discount rate, the net social benefits are 8.8 million for the benefit of $6.4/N.R.S.F. and 25.2 million for the benefit of $9/N.R.S.F. These net benefits are enough to encourage the private developer to undertake the project, solving the problem between the city and the developer.

As is shown, the State/Federal subsidy which represents the redistribution of social benefits can effectively solve conflicts between the city and the developer, resulting in everybody's better off. The secret of this mechanism lies in that the problems between the city and the developer are essentially distributional and, hence, the results of the social cost benefit analysis will not be affected by these problems. As long as the society can obtain positive social benefits from a project, it is always possible to pump the benefits into the negotiation process between the city and the developer so that they can settle conflicts. However, it should be noted that the amount of the State/Federal subsidy has to be equal to the difference between the city's gain and the developer's loss. Otherwise, both of the city and the

developer might obtain excess gain which results in an unfair income distribution.

The society may not always gain and if it loses, it is a different story. Suppose this office development project will bring the positive NPV for both the city and the developer. However, it causes a terrible traffic jam in Boston and simultaneously causes the displacement of a suburban office park. The social cost benefit analysis may reveal substantial social costs incurred by this project. In this case, the project should not be accepted.

In summary, we have seen how a project can be assessed differently depending on the point of view. The case study suggests that the problems which appear almost impossible to be settled between the city and the private developer can be effectively solved by taking account of the society point of view. Also the danger of neglecting the society point of view has been pointed out. To reach right decisions, it therefore seems necessary to understand all of the three project evaluation methods. Finally, it should be noted that this illustrative case study is by no means complete, since non-market items (i.e. externalities, intangibles and public goods) are not included in the calculations despite that these non-market items may explain the major differences between the social value

and the private market prices of resources. However, to do so is beyond the scope of this paper since it is extremely difficult to measure these items. If we can obtain the necessary data, our analysis will be more accurate and significant, but the general directions of the process to be followed and the interpretation of numerical results should be the same as introduced in this chapter.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Based on the observation that project evaluation methods differ depending on the point of view, the central concern of this paper has been how the different evaluation methods lead to the different results and what the implication of the different evaluation results will be to the decision making process about a project which involves intensive interactions between the private sector and the public sector. Three distinctive project valuation methods are identified: Net Present Value method, Social Cost Benefit Analysis, and Economic Impact Assessment.

The NPV method, often used by private firms, enables them to achieve the most efficient resource allocation to realize the firms's maximum market value, and thereby help firms' shareholders reach their maximum utility. The social cost benefit analysis representing society point of veiw can also help society/economy approach to the optimal level of economic efficiency. However, different from the NPV method, it is pointed out that

the economic efficiency maximum does not necessarily coincide with the society's utility maximum -- i.e., "social welfare" maximum due to income/wealth distribution problems. This paper agrees to the position that the social cost benefit analysis should be confined to consideration of economic efficiency and income/wealth distribution problems should be handled separatly by other analytical methods. It is because that the choice between economic efficiency and fair income/wealth distribution is a matter of an individual's value judgement and analytical methods should be free from any value judgements. Unlike the previous two methods, it is agreed, Economic Impact Assessment method does not have the rationale on economic principles. Although it is sure that a local government can improve its financial position by accepting the "tax surplus" rule, it is not at all sure if the rule can help its consistency achieve higher utility, since an "external diseconomy" of one public action by a local government may hurt another locality seriously and vice versa, eventually making everybody worse off. This is a source of sub-optimality. Therefore, this analytical method should not be considered significant and should be re-examined carefully in the light of economic principles.

The choice of discount rates are critical in any

project evaluation methods, since evaluation results are often sensitive to the value of discount rates. The current finance theory has developed a rational methodology to find the value of expected rates of return on risky investments, which is called the Capital Asset Pricing Model. The well functioning capital market enables the model to provide fairly accurate estimate of discount rates for risky projects. The value of discount rate depends on risk characteristics of projects.

While the discount rates for the private sector can be estimated reasonably well by this finance methodology, the discount rates for the public sector are subjected to economists' controversy. The extensive review of literature has revealed the appropriate discount rates from the society point of view, therefore for the social cost benefit analysis, should lie somewhere between private discount rates and the Social Time Preference Rate. This "social discount rates" are considered to be risk-adjusted discounted rates when goods and services including non-market items such as externalities, intangibles and public goods are priced so as to reflect their true social value. No attempts have been made to estimate "social discount rates"; but it must be considerably lower than the private risk-adjusted rates. On the other hand, the

Economic Impact Assessment method requires "public sector discount rates" which are suggested to be the same as the private risk-adjusted discount rates. Determined in this way, discount rates work to help efficient resource allocation be realized.

An urban redevelopment project is chosen as an example to actually apply the three evaluation methods since it usually involves intensive interaction among private developers, a local government, and the society represented by the State/Federal government. However, three types of difficulties are revealed. At first, there exists no satisfactory methodology to measure non-market items (externalities, intangibles, and public goods) although these items often account for the difference between the private project evaluation and the social cost benefit analysis. Second, no attempts have ever been made to measure the "socail discount rates". Finally, even if measurable, some necessary data are not recorded or hard to obtain. The increase in land value only due to a project is an example of data difficult to obtain.

Consequently, the case study of PARK PLAZA Urban Renewal Project in downtown Boston is merely an illustrative exercise. The numbers calculated are of

little significance. However, the case study provides not only the general directions of analytical procedures to be followed for each of three project evaluation methods, but also very interesting analytical results. That is, it is suggested that there exist "zero-sum" relations between a private developer and a local government who, in reality, interacts intensively with each other in the decision making or negotiation process of an urban redevelopment project. It is because of this "zero-sum" relations which the negotiation process is always tough and sometimes futile. Also important is that this zero-sum relation has nothing to do with the results of the Social Cost Benefit Analysis. Hence, when a project will not generate enough benefits to satisfy both a private developer and a local government, this project will definitely be rejected at least by one party. However, if the Social Cost Benefit Analysis shows large positive benefits, the project should be undertaken from the society point of view and will be undertaken by pumping the excess social benefits to the negotiation process between the two. This pumping process will be called as State/Federal grant and subsidy.

On the other hand, it is also suggested that there is a possibility that a project which is not justified

by the Social Cost Benefit Analysis will be accepted by the two, and there seems to be no effective means to prevent them from accepting the project. This may serve as another example of inappropriate aspects of the Economic Impact Assessment method from the society point of view.

This interesting findings suggest number of things. First, to understand the basis of the Social Cost Benefit Analysis as well as the Economic Impact Assessment method will help a private firm predict the public sector decision makings with great accuracy. It not only reduces the risk of a project associated with the public sector decision makings, thereby reduces time and money spent in negotiation processes, but also ecnourages a private firm to undertake more projects which will be socially justified, since they are less risky in a sense that the public sector will not interfere to them. It will also open up the opportunity to undertake a project which seems terrible from a private point of view but will be justified socially. The State/Federal grant or subsidy can change the terrible outlook to the bright one.

Secondly, a local government has to understand the serious problems of its practice -- Economic Impact Assessment. It should be realized that "tax surplus" rule

will not only ruin the desirable projects for the society but also will make even its constituency worse off by the accumulation of "external diseconomies" from public actions. If it seriously considers maximizing its constituency's utility to be its ultimate objectives, it should adjust the rule.

Finally, it will be necessary to train managers, planners, analysts or economists who can understand the basis of all the project evaluation methods. Since they can see the probable results of different evaluation methods, they will not commit silly mistakes of accepting a bad project and rejecting a good project from the society point of view. Thus, they may be able to help the society approach to the better welfare state, simultaneously encouraging the private sector to participate in this process.

FOOTNOTES

1. "A perfect capital market" is a competitive, frictionless and free-entry market.

2. Hirshleifer, J., "On the Theory of Optimal Investment Decision," in S. Myers (ed.), Modern Developments in Financial Management (Illinois: Dryden Press, 1976), p. 305.

3. Brealey, Richard and Myers, Stewart, Principles of Corporate Finance, (New York: McGraw Hill, publication planned for 1980), Ch. 2, p. 19.

4. Strictly speaking, the NPV rule fails to give correct answers only for certain cases which combine the difficulties of non-independent projects and absence of a perfect capital market. Hirshleifer, op. cit., p. 305.

5. Dasgupto, Ajii K. and Pearce, D.W., Cost-Benefit Analysis: Theory and Practice (London: MacMillan, 1974), p. 57.

6. Samuelson, P. Anthony, Economics (McGraw Hill, 1976), Ch. 32, p. 639.

7. The Pareto Efficiency Optimality will be achieved if all prices throughout the economy are priced correctly from society's point of view. Hence, even if an SCBA uses the correct social prices, it may not be sure whether the economy will be directed to the right way because private sector may not use the social prices. This is called the "second best" problem.

8. President and Fellows of Harvard College, Notes on Benefit Cost Analysis (Cambridge: Kennedy School of Government, 9-278-716, 1976), p. 2.

9. Dasgupta, op. cit., p. 107.

10. Ibid., p. 137.

11. Prest, A. R. and Turvey, R., "The Main Questions," in R. Layard (ed.), Cost Benefit Analysis (Penguin Books, 1977), p. 76.

12. Dasgupta, op. cit., p. 135.

13. Ibid., p. 114.

14. Rothenberg, J., "Urban Renewal Programs," in R. Dorfman (ed.), Measuring Benefits of Government Investments, Brookings Institute, Washington, 1965.

15. Strictly speaking, this is true only for final product. Prest, A. R. and Turvey, R., op. cit., p. 80.

16. Herr, Philip; Slatter, G.; and Blum, R., Evaluating Development Impacts (Environmental Impact Assessment Project Laboratory of Architecture and Planning, MIT, 1978), p. 65.

17. This strategy is called "efficient portfolio theory" (Markowitz, 1959).

18. The CAPM may give an incorrect discount rate when the discount rate will change drastically in different time periods. For more information, see Bready and Myers, op. cit., Ch. 9.

19. Layard, R., "Cost-Benefit Analysis" in R. Layard (ed.), Cost-Benefit Analysis (Penguin Books, 1977), p. 36.

20. Dasgupta, op. cit., p. 138.

21. Layard, op. cit., p. 39.

22. Ibid., p. 41.

23. Arrow, K. J. and Lind, R. C., "Uncertainty and the Evaluation of Public Investment Decisions" in R. Layard (ed.), Cost-Benefit Analysis (Penguin Books), 1977, p. 338.

24. Ibid., p. 336.

25. Ibid., p. 337.

26. Marglin, S. A., "The Opportunity Costs of Public Investment" in R. Layard (ed.), Cost-Benefit Analysis (Penguin Books, 1977), p. 284.

27. Prest and Turvey, op. cit., p. 89.

28. Friedman, Harris, "Real Estate Investment and Portfolio Theory," Journal of Financial and Quantitative Analysis (March, 1971), p. 867.

29. Brealy and Myers, op. cit., Ch. 30, p. 2.

30. This percentage rent taxation is permitted by Proposition 121A of Massachusetts Statutory.

31. Perini Corporation (Boston) has β = .98, debt ratio = 15%.

32. In 1975, nominal interest rate of T-bill was 7% but rate of inflation was 9%, implying -2% real risk-free rate. However, it is unlikely investors expect -2% ex-ante, so historical 12% is used.

33. Supplemental Environmental Impact Report on Park Plaza Urban Renewal Project, prepared by B.R.A., p. 478.

34. Ibid., p. 477.

35. Break, George, "The Incidental and Economic Effects of Taxation," in The Economics of Public Finance (Washington, D.C.: Brookings Institute, 1974), p. 186.

36. Proposition 121A allows this treatment. Effective tax rate of normal taxation is 7% of market value.

37. This may be the reason why the City of Boston cannot find a private developer yet.

APPENDIX

FIGURE 1

Total Site	528,420 s.f.	
		Investment
Total Development	2,265,000 s.f.	$155,453,000
Retail	155,000	778,850
Hotel	335,000	30,385,900
Residential	300,000	16,558,350
Office	1,115,000	82,151,900
Parking	360,000	8,012,000

Time Span: 1977 -- 1983

Appendix, p. 95.