PROJECT APPRAISAL, A BIBLIOGRAPHIC REVIEW

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I.   INTRODUCTION

Project evaluation or project appraisal has experienced a growing
interest from both scholars and practitioners in recent years, particu-
larly after the Second World War. This is attributed by Prest and
Turvey (14) to the growth of large investment projects and to the ex-
panding role of government in the economic life of most countries.
Still more important is the increased interest in planning in developing
countries, and the role played by the international financing institu-
tions such as the Interamerican Development Bank, the World Bank, USAID,
etc. These agencies, particularly the first two, have had a major impact
on the advancement of applied work on project appraisal.

Several approaches to project appraisal have been developed from
the activities of these agencies, Universities, and particularly water
projects in the U.S. It started with cost benefit analysis using market
prices; then shadow prices were introduced always with the purpose to
maximize the GDP. Lately a distribution or equity objective has been
included along with other government objectives. Therefore attempts
have been made to develop methodologies that would include these other
objectives as well as the growth of GDP.

The purpose of the paper is to introduce the basic concepts be-
hind each approach in order to better understand their differences and
similarities as well as their practicability.

Chapter II introduces Cost-Benefit analysis, its main components
and the different approaches to project evaluation.

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In subsequent chapters the approaches are reduced to what is felt to be the minimum necessary to understand them.

Finally, chapter VII presents a brief summary and discussion of the methodologies. This is done for the purpose of clarifying the approaches, to view their applicability, and what information each requires.

II.   COST-BENEFITS ANALYSIS

1. Definition

Cost-Benefit analysis (C-B) is a way of evaluating projects,
policies or other actions, usually of the Public Sector, with regard
to their contribution to predetermined objectives. As defined by
Prest and Turvey, "Cost Benefit analysis is a practical way of assessing
the desirability of projects where it is important to take a large view
or a wide view" (14). In other words C-B analysis tries to forecast
into the future as well as across economic, social or regional groups.

The term "projects" in that definition must be interpreted in
the broadest way since C-B analysis is also an useful tool for evaluating
policies and other actions of the public sector, or of the private
sector, when an assessment of the impact on society as a whole is
intended.

The need for a C-B analysis stems from the fact that a country
is faced with the problem of allocating scarce resources. Mishan
points out (12) that C-B analysis can answer any of the three following
questions.

a) should all the proposed investments be undertaken?

b) if funds are limited, which ones should be undertaken?

c) at which level should the plant (project) operate and what
combinations of outputs should it produce?

Mishan further points out that this allocative function of C-B
is not done through a profitability rationale because what counts as

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benefits for some counts as costs to others, therefore we should take
society as a whole. That is, the investment criterion should include
interests of all members of society.

There is another reason for the use of this approach, particu-
larly in developing countries. When there is a divergence of the
economy from the required conditions of perfect competition, the market
price and market supply and demand are not good proxies for social
costs and benefits.

2. Approaches to Cost-Benefit Analysis

Given the goals, or the objective function that they intend to
maximize, the different C-B analysis approaches can be classified as:

a. the traditional C-B approach.

b. the social C-B approach.

Ward (20) proposes a third category, "multi objective C-B
approach", but I believe that social C-B encompasses both Ward's
social C-B and Multiobjective approaches, since it maximizes an
objective function with more than one objective.

a. The traditional C-B analysis approach

Historically this is the first school developed in the area of
project evaluation. The main characteristic is that its objective
function is national income, thus this approach measures the contribution
of the project to the growth of national income. For this reason tradi-
tional C-B analysis is also called the "efficiency" approach since it
tries to maximize the contribution to national income to have an
"efficient" economy, according to the definition of the goal.

Traditional C-B analysis can use either market prices or shadow prices, depending on the author. Wekstein (21), for example, maintains that market prices should be used and that it is better to change the market conditions rather than "inventing new prices for special purposes". Other authors, belonging to the traditional school such as Mishan (11), Gittinger (1) and Harberger (3), advocate the use of shadow prices on the ground that perfect competition conditions are not met and prices should reflect costs and benefits to society as a whole.

The importance of Weckstein's position is the recognition that market conditions can be changed which implies there is no single set of efficient institutions and actions. Efficiency depends on the given set of institutions and property rights distribution of each society.

At the same time, since it is politically very difficult, if not impossible, to change market conditions, Weckstein's approach could be another argument to maintain the status-quo.

The traditional approach is the only approach used by all international lending institutions in their regular appraisals.

b. Social C-B analysis

All the approaches to project appraisal that include more than just the contribution to income, such as equity, regional distribution, etc. in their objective function are included in this category.

There are three landmarks in social C-B analysis, the UNIDO Manual (18), called hereafter UNIDO, the Little Mirrlees Manual (9), called hereon L-M and the Squire-Van der Tak Manual (16), hereupon called S-VT. Of the three, L-M and S-VT have received the most attention by agencies such as the World Bank and the Interamerican Development Bank, but only on study basis, not on their day to day appraisals.

As mentioned before, the common characteristics of all these methodologies are that they aim at the maximization of a multiobjective function and the use of shadow prices to value the benefits and costs of the project, and of weights to include distributional objectives.

3. General Aspects of Cost-Benefit Analysis

C-B analysis is an aid to decision making, or better, as Williams put it, ". . . the objective of C-B analysis is to assist choice" (Williams, 22).

This quotation implies that we should not expect more from C-B than it can provide. It would give a definite answer to the question of allocation only if all the prices used corresponded to an optimum situation. Since this is not the case, C-B analysis can only give an aid to answer the questions presented above.

a. The objective function

As Prest and Turvey (14) point out, C-B analysis is a technique that relies on the existence of a series of decisions, many of them political in character. In other words C-B analysis requires the definition of the objective function, since costs and benefits must be defined from it. Costs will include all actions that subtract from the objective function and benefits will be all actions that add to it.

"The distinction between benefits and costs is simply one of sign" (UNIDO, 18). A cost is a forgone benefit. It can be seen, therefore, that the definition of the objective function is an essential prerequisite to C-B analysis.

In the case of the traditional C-B analysis, the objective function is national income if all financing comes from domestic

sources and benefits go to national residents, or the gross national
product when the above assumptions are not met.

In the case of social C-B, the objective function will not
differ much with each school. In the case of UNIDO (18) the objective
function is global consumption which includes income distribution,
growth, employment, self sufficiency and what the authors called
"meritorious needs". L-M (9) present a similar objective function,
and so does S-VT (16) with minor variations. The main difference with
UNIDO is in the units of measurement as will be shown in the following
chapters.

b. The numeraire

Closely related to the definition of the objective function is
the concept of numeraire.

Irrespective of what is maximized (since we are dealing with
different categories of costs and benefits) there is a need to express
them all in terms of a common denominator or unit of measure. That
is the numeraire, a yardstick with which to measure different costs
and benefits, how many units of that yardstick are needed to get some
other good. The numeraire can be dollars, or any other unit, as will
be seen when different approaches are presented.

c. Investment criteria or measures of profitability

Since the costs and benefits of a project occur at different
points in time through the life of the project, it is necessary to
present the information for a given point in time in order to compare
different projects. Therefore costs and benefits are discounted to
year 0 of the project which is the moment immediately before the pro-
ject's initiation.

Given the scope of the paper all the possible measures of a project's value are not discussed, rather the three most commonly used measures, the Net Present Value (NPV), the Internal Rate of Return (IRR), and benefit-cost ratios (b/c) are presented.

i. The IRR

By definition the IRR is the discount rate that will make the present discounted value of future net benefits equal to zero or,

$$\sum_{t=o}^{N} \frac{B_t - C_t}{(1 + \rho)^t} = 0$$

Where ρ = IRR

B_t = Benefits in year t

C_t = Costs in year t

The selection criterion when using the IRR is to compare it with the opportunity cost of capital. If it is larger then the project is accepted; if not, then the project is rejected.

The main advantage of the IRR is that it gives a single "internal" figure about the merits of the project [Harberger (3), Mishan (4)].

The same authors dismiss the use of the IRR on two grounds. First, given that the solution of the IRR is a polynominal, if along the stream of net benefits there are large negative values after a stream of positives, so that the time profile looks like Figure 1, there will be more than one solution and therefore a non-unique value is obtained. Second, even when a unique value could be obtained, if evaluating two competing projects, the IRR might lead to selection of the wrong project. In this case estimation of the IRR of the marginal investment is preferred, i.e., the difference between the net benefits of both projects.
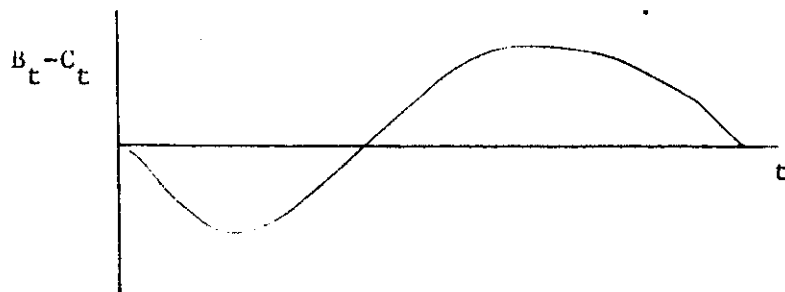
Figure 1

The first argument, although theoretically sound, may not be a problem in practice. First it is very unlikely to find projects with such a time-profile and second, even with such profiles, because of the discounting, the negative values in the future would have to be of a relatively high magnitude to render an ambiguous answer.

On practical grounds, Gittinger (1) contends that with the exception of natural resources projects, it has been impossible to find such a problem with the agricultural projects presented to the World Bank for financing.

The second argument, although true, is not strong enough to dismiss the use of the IRR, since through the evaluation of the differential cash flow the problem can be circumvented.

In summary, my position is that the IRR is a useful tool of project evaluation when used carefully.

ii. The NPV

The net present value is actually the net present discounted value of a stream of net benefits. Since it does not present the problems mentioned for the IRR, Mishan and Harberger recommend its use.

$$NPV = \sum_{t=1}^{N} \frac{B_t - C_t}{(1 + i)^t}$$

But the NPV criterion presents two problems. A major one is that the ranking of a project through these criterion depends on the value of discount rate used [Mishan (11), L-M (9), Gittinger (1), Harberger (3)]. In Figure 2, there is a graph of the NPV of two projects for different discount rates.

Figure 2
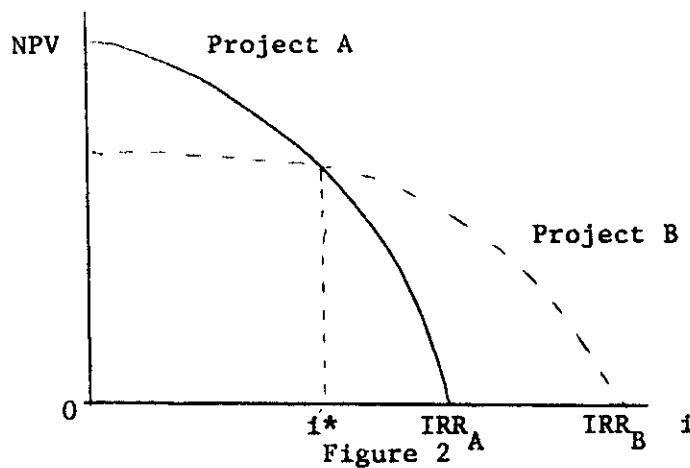
From the graph presented it can be seen that the ranking of projects is dependent on the discount rate selected. If we choose a discount rate below i*, project A would be selected, but if the discount rate were higher than i* then project B would be selected. In this case the ranking given by the IRR would be the same as the ranking given by the NPV.

The second issue is that the NPV does not tell anything about how close the project is to the margin of acceptability [L-M (9)]. Two projects with the same NPV, one of them might be a large project with the IRR just above the discount rate (or opportunity cost of capital) while the other might be a small project with a high IRR.

iii. Which measure of project worth should be used?

The discussion presented above is an endless one in the C-B analysis literature. In most of the literature on C-B analysis the basic question of property rights, of whose interests count, has not been addressed.

As Schmid (15) points out, we are in the business of optimization of what?

This question has been neglected in spite of its importance in determining the investment criteria. Schmid (15) presents two questions, raised by Eckstein, that affect the choice of investment criteria. First, what are the budget constraints? Do they apply only to the initial capital investment or to the operating and maintenance costs, or to both?

The other question refers to reinvestments of benefits. If they are reinvested, what criterion should be followed? Also, whose reinvestment opportunities are relevant?

Schmid (15) proposes following the opportunity cost criterion and immediately raises the question "whose opportunity costs"?

Why is it so important to determine constraints and reinvestment criteria?

Constraints will determine what ratio to use in ranking projects. For example, if capital investment is the constraint then the relevant ratio to use would be:

$$\frac{B - OC}{K}$$

Where

B = benefits

OC = Operating costs

K = Investment capital

But if operating costs were also a constraint then the appropriate ratio would become:

$$\frac{B}{K + OC}$$

As can be seen, what is considered limiting is used in the denominator.

For example, in L.D.C.'s where foreign currency is considered one of the main constraints to development, these costs should be used in the denominator.

It is surprising how international lending institutions, whose philosophy is that foreign currency is the bottleneck to development, do not use such indexes in their appraisals.

Not only operating costs, or investment costs, can be considered but also different types of capital that government might want to maximize can be put in the denominator, such as federal capital, regional, or local capital.

The use of the net present value (NPV) criterion means accepting all sources of capital as equal and operating costs as not limiting.

d. Shadow prices

The three main categories of costs discussed in the literature are labor, exchange rates and investment costs. Their choice is related to the fact that they are usually farthest away from their social opportunity cost and at the same time of all project costs those categories most affect project outcome. Although not a cost per se, the selection of the discount rate, a closely related concept, is critical.

Although there is nearly unanimous consensus on the need for
shadow pricing in project appraisal, there are substantial differences
regarding their use and meaning. Should they reflect a "perfect
competition" situation or simply what is most likely to happen in the
future? Should they represent corrections for externalities not
accounted for in the market price? Should they include equity con-
siderations?

The traditional approach accepts the need of shadow price on
the ground that nominal prices may not reflect opportunity costs,
Harberger (3) Mishan (11), Prest (14).

Weckstein (21), on the other hand, argues that although market
prices might be distorted, the distortion that might be introduced by
the use of shadow prices could be even worse than the use of market
prices. His main argument is that there is a risk, as indeed there is,
of fracturing the economy since each evaluating agency might set its
own set of shadow prices, and projects might be rejected (accepted)
just because they happened to be in the wrong (right) agency for
appraisal.

The social cost-benefit approach, L-M (9), S-VT (16), UNIDO (18),
as opposed to the traditional approach does not try to estimate prices
that would exist in a "distortion-free" economy but rather the prices
that best reflect their contribution to the country's social objectives.

According to L-M (9), the basic requirements for both prices to
coincide are:

- Full employment of resources

- Perfect competition conditions

- Marginality

- Neglect of income distribution, that is, benefits, or costs,
  should be considered the same whether they accrue to a high
  income person or to a low income person.

- Discount rate at which a firm borrows is the same as the
  discount rate at which society discounts the future.

- No externalities.

There are three main types of shadow prices (Weckstein, 21):
First, those estimated from linear programming models, which the author
considers to be the ones to which the name properly applies, second,
shadow prices that use world commodity prices as accounting units and
third, shadow prices based on ad hoc judgements of acceptability of
market prices. As mentioned before, Weckstein rejects them all.[1]

To follow Weckstein's classification, the traditional approach
would fall in the latter category, L-M and S-VT would be in the second.
Since the Weckstein article was written before the UNIDO contribution
was published there is no mention of UNIDO shadow pricing, but I believe
that UNIDO would need a new category since global consumption measured
in local currency does not fit in any of the categories presented by
Weckstein.

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[1]See Weckstein, op. cit., pp. 477-487.

III. TRADITIONAL C-B APPROACH

The traditional approach, usually called "efficiency" approach is so named due to the fact that its goal is to maximize income, whether national or gross, regardless of the equity problem, whether inter or intratemporal. It is only interested in "efficiency" matters, not social ones.

In this paper the "efficiency" nomenclature is rejected because it is misleading. All methods are efficient with respect to the goals established, so while the traditional approach might be efficient with respect to maximizing national income, the social approaches are efficient with respect to maximizing other goals besides national income, such as equity.

The rationale of the traditional approach is that countries should try to maximize total income through projects and subsequently redistribute, if desired, through other means (e.g., fiscal policy).

Prest and Turvey (14) argue that income distribution effects cannot be disregarded when evaluating projects. However, these considerations are not explicitly included in the prices used to evaluate projects, unless the government establishes an explicit pricing policy with equity objectives before the project is completed.

The numeraire, or accounting unit, is always a unit of national currency.

I. Discount Rate

The choice of the discount rate raises many problems from the standpoint of determining its actual significance and later in determining a single value for it.

One possibility would be to employ the market interest rate, but both Mishan (11) and Harberger (3) dismiss its use for two main reasons: first, there is no unique market interest rate, and second even if there were it would be underestimating the opportunity cost of capital because this rate does not reflect the taxes paid and the external benefits that private sector investment might have.

Among the advocates of the traditional C-B approach there seems to be consensus that the best discount rate to use is the opportunity cost of capital before taxes, Harberger (3), Mishan (11), Stockfisch (17).

The argument is that if government should take money away from the private sector it should receive for that money a return at least as high as in the private sector, before taxes.

Harberger acknowledges an exception to this rule, when the public sector funds are small and can be exhausted within it, on projects that present a higher yield than in the private sector. In this case Harberger suggests using the interest rate that would allow the selection of projects to just exhaust the available funds.

Harberger (3) also advocates the use of a changing discount rate through time on the grounds that "through the adoption of superior techniques there might be a shift in the production function that would more than outweight the downward pressure on the marginal productivity of capital stemming from the effects of increased capital intensity of production".

In this case the general form would be

$$NPV = (Bo - Co) + \sum_{i=1}^{n} \frac{(B_i - C_i)}{\prod_{t=1}^{i} (1 + r_t)}$$

Where

Bo = Benefits in year 0

Co = Costs in year 0

B_i = Benefits in year i

C_i = Costs in year i

r_t = Discount rate that varies through time

This formula allows for different values of the discount rate, as many as the number of years of the project.

Two questions are raised with respect to this estimate of the NPV. First, how is the value of the discount rate determined for each year? Is it worth the effort? The point is that to project the value of "r" already introduces much uncertainty, therefore unprecised values, to use such a formula would not add, in practice, much to project appraisal. Second, and related with the above, to estimate the NPV with such a formula is complicated where computerized facilities are not available and tables and a hand calculator are used. Therefore a careful assessment should be made whether it is worth the effort to use an "accurate" NPV formula and at the same time an inaccurate "r".

2. Labor

Within the traditional C-B analysis there are two main approaches to shadow price labor: the opportunity cost approach, that Ward (20) divides into the MP of the worker in agriculture approach and the foregone output in agriculture, and the supply price approach.

The rationale for the opportunity cost approach is very simple.
The shadow price of labor is the foregone output of the worker employed
by the project. In many underdeveloped countries, it is argued, this
foregone product is close to zero since usually, through a chain re-
action, in the last instance the worker will be pulled out of the agri-
cultural sector where most likely his marginal product will be close to,
if not equal to, zero.

Harberger disputes this argument and maintains that even in
countries with apparently high unemployment, the opportunity cost of
labor is not even close to zero. He advocates the use of a "supply
price", that is, the minimum wage required by an unemployed worker to
accept the job. He proposes that such a supply price is given by the
wages of what he calls the "unprotected sector". That is the sector
with no government regulation favoring labor and no unionized labor.

Harberger's proposition is in accordance with the "Chicago
School", the "free market" system provides the correct allocation of
resources. But the point is that there is no such a thing as "free"
market, in fact no market would exist without regulations. Therefore
the problem is, once again, whose interests counted when the regulations
were established? Is the existing property rights distribution the one
desired and hence to be taken into account in our project evaluation?
For Harberger, the answer is yes.

3. Foreign Exchange

There are basically two approaches to determine the shadow
price of foreign exchange: First, it should reflect the equilibrium
value of the exchange rate, or second, it should reflect what is

likely to happen. Harberger maintains that since foreign exchange can
be put to various uses, the estimate of a single shadow rate requires
the estimate of the likely pattern in which incremental dollars would
be distributed over different categories of goods. The procedure
assumes that there will be no change in the price received by exporters
for foreign currency.

IV.   THE UNIDO APPROACH

The UNIDO approach to C-B was developed after the judgment that commercial and social benefits do not coincide because:

1. The price in the market is influenced by the distribution of wealth.

2. Externalities not accounted for in the market.

3. Consumer surplus.

4. Time value of money.

Furthermore, the traditional approach is rejected because of externalities judged to run the wrong way and equity considerations that, as we have seen, are not taken into account by it. Therefore, there is a need for a "social" approach that would consider equity and re-direct externalities.

Why re-direct externalities? Because, as Schmid (15) states, "in any situation of scarcity there is interdependence as one person's choice and use of a resource affects the options open to others." That is to say, every time there is interaction between two or more people there will be a situation of dependency, therefore externalities will exist.

The main objectives considered by the UNIDO approach are:

1. <u>Aggregate consumption in terms of per capita consumption.</u> This objective presents certain measurement problems, there is the problem of aggregating different goods, the problem of aggregating the

level of consumption of different persons and the problem of aggregating through time.

2. The <u>income distribution objective</u>, is included through weighting factors which should be a product of the policy process. The authors of the manual claim that it can only come from the project selection process.

3. The <u>employment level</u>, which might be a goal per se or a means to achieve the equity end.

4. <u>Self sufficiency</u>, usually the variable used as a proxy to it is the balance of payments.

5. Finally the authors also consider what they call "<u>merit wants</u>", which are those objectives that are not determined by individuals as consumers. The employment level and self sufficiency would be examples of merit wants that might differ from the levels otherwise obtained.

Merit wants are determined, according to UNIDO, by the government. At this point it is important to expand on two basic assumptions that the UNIDO methodology relies upon.

First, the government is the true representative of the needs and wants of the people of a country. Therefore, government decisions are always made in the best interest of people.

Second, the whole "social" approach is based on a model of planning that seems unrealistic at this point in time. UNIDO's model envisions a planning system where the political authorities are in constant interaction with the Central Planning Office (CPO), that in its turn will estimate and give to project planners all the shadow

prices and parameters needed to carry out the social appraisal. When

all projects are appraised by different organizations using the same

set of values they are sent to the CPO where they choose those that

are within some acceptable range and are sent to the decision makers

in order for them to finally choose the projects to be implemented.

That this model is too idealistic for the situation that exists in

most countries is argued later.

The numeraire used by UNIDO is aggregate consumption measured

in terms of domestic currency.

The UNIDO approach differentiates between two different sets

of values that are important in project appraisal, weights and shadow

prices. Weights are national parameters that actually reflect value

judgments such as income distribution, merit wants or any other goal

that government might set. Shadow prices, a term reserved for invest-

ment, labor and foreign exchange, do not need any explicit value judge-

ments beyond the ones introduced in the determination of weights.

In other words, every classification or estimate of categories

implies a $\overset{a}{\underset{\wedge}{v}}$lue judgement, but the difference that UNIDO makes between

shadow prices and weights is that the former do not need any explicit

judgement while the latter do.

By stating that shadow pricing does not need any "explicit" value

judgement it is meant that by using market value to estimate shadow

prices the market information is accepted. Therefore a value judgement

has been made, implicitly, with respect to the market, and the insti-

tutions and property rights that characterize that market.

1. The Rate of Discount

The rate of discount is defined in UNIDO as the rate at which the weight on aggregate consumption falls over time.

$$B* = Bo + V_1B_1 + \ldots\ldots + V_t \ B_t$$

$B*$ = net total benefits

B_t = net benefits in year t

V_t = weight factor in year t

Because of ignorance about the future which does not justify a more sophisticated approach, the authors assume a constant decrease of weights over time, therefore,

$$\frac{V_t - V_{t-1}}{V_{t-1}} = constant$$

By denoting

$$\frac{V_t - V_{t-1}}{V_{t-1}} = (1 + i) \quad and$$

through a series of transformations (UNIDO, 19) the following is obtained:

$$B* = \sum_{t = 0}^{T} \frac{B_t}{(1 + i)^t} \qquad (1)$$

Where (i) is the social rate of discount.

Equation (1) happens to be the same as the familiar NPV formula since B_t represents net benefits for year t. The difference between them is the significance of i. The question then becomes, "how can the rate of discount be determined"?

One possibility, according to UNIDO, could be to determine this rate from the preferences revealed in the market place. This approach

is based on the assumption that market prices, in this case the cost of borrowing money, are a good indication of preferences of individuals who happen to be rational economic participants. This possibility is readily dismissed by UNIDO on three grounds. First, there cannot be rationality on intertemporal decisions since individuals have no previous personal experience. The model of revealed preferences works when no intertemporal decisions are considered since consumers adjust their marginal rates of substitution through a trial and error process. This, obviously, cannot be accomplished in intertemporal decisions. Second, since households, as small saving units, have no control over their savings decision, they spend as much as they can of their income. A third reason for rejecting the market as a source for determining the discount rate is the existence of externalities.

Another possibility is to view the discount rate as the marginal productivity of capital. UNIDO prove the argument is valid only when we are dealing with a two period model and the total volume of investment is fixed independently of project choice in the public sector.

If these two conditions are not met, it is necessary for government to place a value judgement on the relative value of benefits and costs through time. In this event, for example, the social discount rate (i) is defined as:

$$i = - \text{(elasticity of marginal utility)} \times (\text{rate of growth of per capita consumption})$$

where the elasticity of MU measures the percentage in marginal utility with a one percent change in the rate of growth of per capital consumption. The social discount rate decreases through time based on two assumptions:

a. that the per capita consumption will rise over time.

b. the marginal utility of consumption diminishes with each

additional unit consumed.

Although the per capita consumption rate of growth can be esti-

mated from a well developed plan, the other component of the formula

(the elasticity of marginal utility) cannot. Therefore the social

discount rate is treated as an unknown of project evaluation. For that

purpose UNIDO recommends estimation of (i) such that,

$$\sum_{t=0}^{T} \frac{B_t}{(1 + i)^t} = 0$$

This is actually the internal rate of return. The important

difference with respect to the concept attached to the IRR is that in

this case it is not a measure of the intrinsic merit of the project to

be compared with the rate of return of private projects or any other

rates of discount. It is meant to be an indication to the policy

makers of what the implications of the decision taken will be. According

to UNIDO, this process will prepare the ground for explicit value judge-

ments in the (distant) future on the relevant discount rate.

2. The Social Value of Investment[1]

As it was previously shown, the marginal productivity of capital

plays no direct role in the determination of the social discount rate

but it does play a major role with respect to the opportunity costs.

In the simplest case the opportunity cost of capital equals the

nominal cost (Ko) times q/i.

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[1] For a full explanation on the derivation of formulae see UNIDO,
op. cit., pp. 175-177.

$$\text{opp. cost } \dot{K} = (q/i) \, Ko$$

Where   q = marginal productivity of capital

    i = social rate of discount

   Ko = nominal cost of investment

so

$$p^{inv} = \frac{q}{i}$$

p^{inv} = shadow price of investment

From the above formula it can be seen that the opportunity cost is not only a function of the productivity of capital alone but also of the social discount rate.

When reinvestment is introduced the shadow price of investment is:

$$p^{inv} = \sum_{T=1}^{\infty} \frac{(1-s) \, q \, A_t}{(1 + i)^t}$$

Where s = marginal propensity to invest

   A^t = accumulated investment in year t

or

$$p^{inv} = \frac{(1 - s) \, q}{i - s \, q} \qquad\qquad (2)$$

In equation (2) the shadow price of investment is presented as the quotient between the consumption generated out of the marginal productivity of capital and the social discount rate corrected for reinvestment (sq).

The point here is that the higher the consumption generated, $(1-s)q$, the higher the shadow price of investment would be. Another aspect to highlight is the need to estimate the marginal propensity to

invest and the marginal productivity of capital for the economy as a whole.

An additional complication arises when one considers that resources are drawn from both consumption and investment. In this case the opportunity cost would be

$$p^{inv} + (1 - s) = \frac{(1 - s)i}{1 - sq}$$

Here we have to estimate the source of the resources. As in the case of s and q, these are part of the information that the C.P.O. has to provide project planners.

Finally, if we introduce the difference between private investment and government investment and we consider the reinvestment of benefits, equation (1) is than transformed into,

$$B* = (a^{Pri}\, p^{Pri} + a^{gov}\, p^{gov} + a^{con}) \sum_{t=1}^{T} \frac{B_t}{(1 + i)^t} - Ko$$

Where

> a = distribution of benefits between government (gov), private investment (pri) or consumption (con).

This formula assumes that the distributional weights (a) remain constant over time. This is not a very realistic assumption since the future policy to be followed by the government will be affected by the earnings of current projects. These policies will also affect the earnings and costs to the other sectors, i.e., the a's.

This formula also leads us back to the question of whose discount rate should count?

Again we are in the much neglected area of property rights in project evaluation in developing countries.

3. Labor

Although the direct opportunity cost of employment in terms of aggregate consumption might be zero, there is an indirect opportunity cost that depends on marginal propensities to consume those who are paying for labor (government or private sector), of the newly employed and on the shadow price of investment. It is also possible that a higher weight might be attached to the consumption of those newly employed relative to more prosperous members of society.

In summary there are three components of the shadow price of labor: the direct opportunity costs, the indirect cost, and the redistribution of income.

The direct opportunity cost of labor is the social value of the marginal product foregone by adding a worker to the project. The indirect cost refers to the reallocation of resources in favour of consumption (given by $[(1 - s^{cap}) + s^{cap} p^{cap}]$ w) since we are increasing employment. Finally, if there is a redistribution objective, weights might be included in the estimate of shadow wage rates, v.

So the final formulation of the shadow wage rate (W*) is

$$W^* = [1 + v^{cap}] \; [(1 - s^{cap}) + s^{cap} p^{cap}] \; w + [1 + v^{wkr}] \; [z + (s^{cap} p^{wkr} - 1)w]$$

v^{cap}
$\qquad$ redistribution premiums $\qquad\qquad\qquad\qquad$ (3)
v^{wkr}

z = direct opportunity cost of labor

w = relevant wage for industrial projects in the public sector

The expression $[(1 - s^{cap}) + s^{cap} p^{cap}]$ w represents the effects of employment on capitalists' consumption, while $[z + (s^{cap} p^{wkr} - 1)w]$ represents the effect on workers' consumption.

It can be seen in (3) that if government is indifferent to distribution

$$v^{cap} = v^{wkr}.$$

However, if there is a government that strongly favors redistribution it may consider capitalists' consumption without value at the margin, therefore,

$$v^{cap} = -1$$

and equation (3) is reduced to,

$$W* = (1 + {}^{wkr}) [Z + (S^{cap} P^{wkr} -1)W]$$

4. Foreign Exchange

Foreign exchange can be viewed in two different ways, as a way to improve aggregate consumption or as a "merit want", that is, an end in itself.

The estimate proposed in UNIDO is to multiply the ratio of the market clearing price over the CIF price or FOB price (according to whether it is an import or an export) times the marginal foreign exchange allocation to that good. In other words

$$P^F = \sum_{i=1}^{n} f_i \frac{P_i^D}{P_i^{cif}} + \sum_{1=n+1}^{nth} X_i \frac{P_i^D}{P_i^{Fob}}$$

Where

P^F = shadow price of foreign exchange

f_i = fraction of foreign exchange allocated to the ith of n commodities at the margin

P_i^D = domestic market clearing price

P_i^{cif} = cif price, in domestic currency, using the official rate

X_i = domestic currency amount by which exports fall in response to earnings of foreign exchange

P_i^{Fob} = Fob price at the official rate of exchange

As can be seen from the formula, the shadow price of foreign exchange is not the optimal one but rather one based on actual and projected trade policies which are accepted as desirable.

An important consideration of the authors with respect to the value of foreign exchange is that the rate of investment, or capital formation, is not constrained by the balance of international payments but rather by institutional and political constraints. Thus, the allocation vector f_i, includes only consumer goods.

If foreign exchange were a merit want then the procedure suggested by UNIDO is to estimate the slope of the "foreign exchange feasibility frontier". Since this is not a very practical procedure the authors suggest the use of the bottom-up procedure, that is, several designs of the project that would then allow the decision maker to choose and the project designer to find out the decision maker's preferences after the choice is made.[1]

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[1]For details see UNIDO, op. cit., pp. 225-229.

V.   THE LITTLE-MIRRLEES APPROACH

As in the case of UNIDO, L-M based their manual (9) on the fact
that market prices are not a good signaling mechanism. Actual expendi-
tures and actual receipts are not a good measure of social costs and
social benefits, respectively, and as in the UNIDO case this is attributed
to unemployed resources, imperfect competition, unequal income distribu-
tion, externalities, etc.

The objective function of the L-M approach is also global con-
sumption along with equity objectives and other "policy" objectives
that government might set.

The numeraire, or yardstick, with which they propose to measure
the contribution of the project to these objectives is "uncommitted
government income measured in terms of foreign exchange". Also as in
the case of UNIDO, the shadow prices to be estimated with the L-M
approach are the ones reflecting a most probable situation and not an
optimal situation.

The reason to choose that numeraire according to the authors
is mainly to provide governments with a unit of measure that they are
used to working with and therefore understand.

The manual differentiates between traded and non-traded goods.
Traded goods are those where domestic production and consumption is
unaffected by increased demand or supply of the good. A good is wholly
non-traded if imports and exports are unaffected. Obviously, in the

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real world there is no such clear cut difference. Therefore the L-M manual classifies commodities as either traded or non-traded even if they do not fit perfectly into any of these categories, except when the value of the commodity is important for the Present Social Value of the project, or when there is doubt whether trade or domestic economy will suffer the most, or when a change in classification would change significantly the value of the commodity in question.

The accounting prices of traded goods are estimated by taking the CIF price of an imported commodity and adding the port-to-user-cost treating them according to the classification used. For an exported good the procedure is similar, only this time the F.O.B. prices would be used and the producer-to-port-expenses subtracted. For non-traded commodities L-M suggest the use of the Marginal Social Cost of the resources required to produce an extra unit of the commodity and the benefit of supplying an extra unit of the commodity evaluated at shadow prices, as the Marginal Social Benefit.

1. The Rate of Discount

The social rate of discount or accounting rate of interest (ARI) as L-M call it, is defined as the discount rate that would allow just the number of projects which would exhaust investible funds at hand. The approach suggested by L-M is a very "practical" one. As they state it:

> The best guide to the proper choice of the ARI is experience. If more projects look acceptable, than there are investible funds available, the ARI should be adjusted upwards; and if too little looks promising, the adjustment should go the other way.[1]

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[1] L-M op. cit., pp. 296.

They do recognize though, the use of models could also help in determining the ARI although since they need simplified data, L-M recommend that figures be checked by planners since they have more information, that would help qualify the results of the model.

There are two questions arising from these suggestions, first, how is the amount of investible funds decided and second, what are "acceptable" projects?

The answers that L-M gives to these questions are very vague. They only mention that government has a certain amount of funds left, after discounting its needs for other expenses, available for investment in different projects. To the second question they give no answer. Again, we are faced here with the property rights question and whose interests count. Like the other approaches to C-B analysis, L-M do not address this problem and several questions are therefore left unanswered.

Related to this concept of ARI, L-M define the Consumption Rate of Interest (CRI) as "the rate at which future consumption ought to be discounted to make it the equivalent in value of present consumption".[1]

It is the same concept as UNIDO's social rate of discount. Again, there is no indication of whose consumption counts in order to compare it with future consumption.

As L-M point out the CRI implies a value judgement about the welfare of future generations in relation with this generation, but doesn't ARI also imply a value judgement, and for that matter all decisions taken during project appraisal?

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[1]L-M op. cit., pp. 49.

2. Private Sector Investment

In order to determine the costs of private sector investment L-M first define consumption and savings of the capitalists as

$$consumption = (I - G) (P_t - rI)$$

$$savings = G(P_t - rI)$$

where

I = capital cost of the project to private capitalists

r = the rate of return at which investors would, on average, have invested their funds elsewhere

P_t = gross profit of the project in year t_i less taxes liabilities, less depreciation allowances sufficient to leave investors with wealth I at the end of the project

G = proportion of capitalist's income saved

As in all social C-B analysis a capitalist's consumption is considered to be worth much less than a worker's or peasant's consumption for the very simple reason that the capitalist is already consuming several times as much as the worker or the peasant. Therefore, L-M conclude, the consumption of a capitalist arising from a project, at accounting prices, should be considered as a cost.

Investments by small farmers or small entrepreneurs has to be treated differently since their normal level of consumption is much lower. They might not be able to borrow easily and therefore they might finance investments out of consumption.

If the latter were the case, profits should be counted as benefits to the extent relevant to the group in question.

The way proposed to value private investment is to determine its opportunity cost, that is the present social value (PSV) of the same resources used in other investments.

Since there are several different opportunities, L-M suggest that the project appraiser should evaluate each case to find out the relevant alternative use.

3. Labor

According to their classification of goods and services into traded and non-traded, labor is treated as a non-traded good.

The shadow wage rate under the L-M approach has two main components, the marginal product of labor (MPL) and the extra consumption generated by employment.

The MPL is the loss of production that arises from withdrawing a man from agriculture if the remaining agricultural workers do not work harder. If such were not the case, that is, if the remaining people work harder, there would be an extra cost since there would be the disutility of the extra work.

As can be seen the shadow wage rate (SWR) will be equal to the MPL only when there is no increase in consumption.

A general formula for SWR presented by L-M for the organized sector is

$$SWR = [C + d - c + L \frac{\partial C}{\partial L}] - [V(C) - V(a) - v(a)(a-m) + v(c) L \frac{\partial C}{\partial L}]$$

Where

c = consumption of the wage earner

d = transport cost allowance

e = employment premium

$L \dfrac{\partial C}{\partial L}$ = effect of increased employment or wage earners' consumption

V(c) = utility of consumption at level c

V(a) = utility of consumption at level a

v(a) = consumption weights for people at consumption level (a)

v(c) = consumption weights for people at consumption level (c)

m = marginal productivity of the wage earner

a = previous average consumption of those who moved into

employment in the organized sector

The first part of the formula shows the additional resources devoted to consumption, all variables are self explanatory, except for e, employment premium. Actually it is just an allowance for any savings in government expenditures due to the creation of employment such as unemployment relief programs, crime prevention (if it is correlated with unemployment), etc.

The second half of the formula represents the benefits of creating a new job.

Since L-M, as in UNIDO, consider project appraisal within a planning system that would provide the analyst with the information needed, most of the information required to estimate the SWR is, in theory, readily available to the project planner. In practice this is doubtful. The problem is in the estimating of the marginal productivity of the wage earners. An approximation to it could be made using data on total agricultural production and the labor force involved in it.

For practical purpose L-M suggest the estimate of a wage conversion factor k defined as

$$k = \frac{SWR}{\text{market wage rate}}$$

Through this conversion factor L-M avoids the problem of having to estimate SWR for each category of labor within the project. This is a very common procedure found in the so called social approach, after a series of high powered formulae have been described, they recommend that in practice, the analyst resort to shortcuts of this type.

In general for the unorganized sector, such as small businesses or rural labor, L-M suggests not that labor costs should not be estimated separately but to take the farm or small business as a whole, i.e. to estimate the benefits of consumption instead of estimating the SWR.

4. Foreign Exchange

Since foreign exchange in the hands of government is the numeraire proposed, the shadow price of foreign exchange presents a different problem as in UNIDO. In this case, as pointed out previously, the problem is in valuing traded and non-traded goods at world prices.

They advocate the use of a conversion factor. In short the procedure is to value traded goods at their border prices and to split non-traded goods into traded and non-traded components so as to arrive at a final division of traded goods and unskilled labor that can be valued in the way proposed.

VI.   THE SQUIRE-VAN DER TAK APPROACH

The S-VT approach to C-B analysis is a more practical modifica-
tion of the L-M approach.

The objective function, or social welfare function as S-VT call
it, is defined as consumption with consideration of equity aspects of
it, that is, interpersonal and intertemporal distribution.

The numeraire chosen is the freely available public sector
income of constant purchasing power, measured in units of convertible
currency. They base their choice on the fact that uncommitted income
is more valuable than income that has already been committed and that a
numeraire, to be useful has to be constant over time. As can be seen
the accounting unit is the same as the one chosen by L-M.

1.   The Rate of Discount

The discount rate is defined, in general, as the rate of fall
in the value of the numeraire over time, therefore the rate of discount
in this approach (ARI) is the rate of fall in the value of uncommitted
public income measured in convertible foreign exchange.

As in the L-M approach S-VT propose that the ARI should be chosen
so as to just exhaust the available resources available for public
investments. Therefore ARI is the rate of return of the marginal in-
vestment in the public sector.

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So

$$ARI = q - h$$

where

q = marginal productivity of capital

h = distributional impact

It can be readily seen that only if the entire benefits accrue
to the government or if the costs and benefits going to the private
sector offset each other will the ARI equal the marginal product.[1]

Throughout the manual, S-VT systematically connect the "efficiency"
prices, in this case q, with the distributional impact, h, in this case
representing the increase in private consumption.

Where do we get h from? S-VT provide different formulae to
estimate this impact, trying to present an "objective" method. In the
end we are back to our original criticism, there is no analysis of the
decision making process, and whose interests count.

2. Investment

S-VT in their approach do not estimate the opportunity cost
of investment explicitly but through one of their distributional
weights. What they propose to do is to estimate the overall economic
value of a marginal rise in consumption (Wc) and the overall economic
value of foreign exchange earnings of the government (Wg) thus defining
the social value of private consumption (ω).

$$\omega = \frac{Wc}{Wg} = \frac{d}{v}$$

_____

[1] For a detailed derivation and explanation of weights see
Squire-Van der Tak, op. cit., chs. 6-7.

where

    Wc = value of a unit of private consumption

    Wg = value of public income

    d = value of private sector consumption at consumption level

        c relative to that at the average level of consumption

$$d = Wc/\overline{Wc}$$

    v = value of the numeraire relative to private sector consump-

        tion at the average level of consumption $v = Wg/\overline{Wc}$

In order to clarify we shall expand a little on the meaning of
d and v. Another way of putting d is:

$$d = (\frac{\overline{c}}{c})^{\mu}$$

where

    μ = elasticity of marginal utility of extra consumption

The formula gives the relation of welfare levels at the average level of
consumption $(\overline{C})$ and at level (C).

    If the government is indifferent towards equity $\frac{\overline{C}}{C} = 1$.

    If the government wishes to benefit the poorer people then the
relationship is set higher than 1.

v can be viewed as the shadow price of public investment,

$$v = \frac{q}{i\beta}$$

where

    q = marginal product of capital at border prices

    i = consumption rate of interest

    β = consumption conversion factor to real resources

β is defined as the value of consumption at domestic prices
if one more unit of foreign exchange is committed to consumption.
A β for each income group should be estimated. S-VT suggests that one
for rich and one for poor should suffice. Again, the shortcut, but
what is rich and what is poor? To make things simpler they assume that
few, if any, non-tradeables will enter the pattern of consumption so
β is no other thing but the relation between the value of imports and
exports at border prices over the value of imports and exports at
domestic prices.

If government wants to increase redistribution, higher values
of d will be used since it would increase its relative value with
respect to the shadow price of public investment (v).

3. Labor

According to S-VT the shadow price of labor, or shadow wage
rate (SWR) has three components, the foregone marginal product of the
worker in his previous job (m), the disutility of effort, or supply
price (∅) and changes in income, or net social cost of increased
consumption.

A general formula for the SWR would then be

$$SWR = m\alpha + (w-m)(\beta - d/v) + w-m)\emptyset ed/v$$

m = MP in worker's previous employment

α = conversion factor for output, therefore (mα) is the labor's
foregone MP at accounting prices

(w-m) = increase in MP

d/v = value of private sector consumption relative to the numeraire,
so (w-m) (β d/v) represents the net social cost of increased
consumption

$\emptyset$ = ratio of social to private evaluation of the disutility of effort

e = ratio of the wage earner's own evaluation of the disutility of effort to his additional income, so the whole final expression represents the social costs of reduced leisure.

We will not explore all the possibilities but it should be noticed that from the formula there can be analyzed different implications of critical values of the parameters.[1]

For example, if $(d/v) = \beta$ (that is government is indifferent to the distribution of income between private and public sector), and the $\emptyset = 0$ (disutility of effort is zero) the SWR = mα, or the classical estimate of labor's costs being the same as the foregone MP.

Another interesting case is when $\emptyset = 0$ and d and v are set equal to specific values according to distribution and growth objectives. In such case

$$SWR = m\alpha + (w-m) \quad (\beta-d/v)$$

In this case the SWR will be higher the more important the growth objective (v) is, and smaller the higher the equity objective is.

4. Foreign Exchange

Although similar to the L-M approach, the S-VT method is far more practical since it only goes through one breakdown into traded and non-traded goods and unskilled labor. Then, through conversion factors specific to groups, such as

$$\beta = \frac{M + X}{M(1+tm) + X(1-tx)}$$

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[1]The reader is referred to S-VT, op. cit., pp. 83-85.

where

M = imports (CIF)

X = exports (FOB)

tm = tax (subsidies) on imports

tx = tax (subsidies) on exports

or through a standard conversion factor they estimate the equivalent
world market prices for all the remaining goods and services, instead
of estimating it for each good or service. Again S-VT are taking a
shortcut.

VII.   SUMMARY AND CONCLUSIONS

In most of the literature on project appraisal, particularly
those specifically written for developing countries such as L-M, UNIDO,
S-VT and Harberger's papers, there is no discussion of the basic, and
probably most important issue of cost-benefit analysis, that is whose
interests count in determining the goals of society (or goal function).
In all the literature it is agreed that the estimate of shadow prices
is subordinated to the chosen goal function, and the setting of it is
considered as given by the government.

The traditional approach is considered more objective by its
advocates because they say it does not require any value judgement from
decision makers or project appraisers. They use the information avail-
able from the market place, but the use of market information itself
implies a value judgement by accepting the distribution of wealth and
property rights that the market implies. This stand is misleading in
the sense that it poses as "objective" when in fact it isn't. Worst
of all, an implicit choice that is being made which makes it more
difficult for people unaware of these aspects to realize what these
choices imply.

On the other hand, the social approaches require explicit defini-
tion, explicit choices of distributional weights, that mean an explicit
choice of whose interests count. This is a welcome contribution since
it makes those choices seen and known by everyone and therefore amenable

analysis. On the other hand, because of the model of decision making and planning used, particularly by L-M and UNIDO, the door is left open for very arbitrary decisions by planning agencies with little participation by others. These approaches are giving a theoretical support to the use of subjective criteria of few, passing as objective.

Related to this point it should be noticed that the three social approaches reviewed in this paper, view government as the true custodian of society's interest. This view, although very sound for democratic societies, does not hold for autocratic governments that are more the rule than the exception in underdeveloped countries. The same, in fact, is true for the traditional approach where market information is accepted when its supporting structure has been imposed and not freely chosen through a democratic process.

Even accepting the social approach position, there is a further complication, i.e., how are planners going to estimate the weights needed to put together a multiobjective function for the social C-B approach? L-M and UNIDO suggest that weights are to be estimated in the future from past decisions, since those decisions will show the decision makers' set of weights.

I find two major flaws in the argument, the first is that even if decision making about a project followed such a rational procedure of evaluation of different alternatives and then the choice of the best, it cannot be expected that choices will be systematic without contradiction with one another. There are time lags between decisions, there are changes in the persons that make the decisions, there are changes of persons that make the decisions and even changes of

circumstances beyond the control of the decision maker. Therefore it is difficult to foresee a discovery of a rational set of weights determined through a time consuming process.

In summary what the approach suggests is that what has been done in the past will continue to be done in the future, without changes. We reject that notion. The second flaw I see in the argument is the fact that the decision making process is not carried out in the manner presented or assumed in most planning manuals. Usually the decision to carry out a certain project comes even before the design and evaluation of different projects or alternatives are made. Usually the implementation decision for a project includes locations and other determinants that leave little room for the project planner other than to try to design the best alternative possible, given the decision taken a priori. Under these circumstances maybe a better approach would be a cost-effectiveness analysis recognizing the fact that most of the time the project analyst is acting after a decision has been taken, trying only to minimize costs.

On the other hand the traditional approach to C-B analysis accepts the market as the ultimate determinant of the benefits and costs of a project. This approach is correct if the distribution of wealth were considered optimal, if the market presented the required conditions of perfect competition, and if perfect competition accounted for externalities, as defined in this paper, that is the desired direction of the effects of one person's decision on other.

The rationale of the traditional approach is the Pareto optimum concept of welfare and Hicks' concept of compensated demand curve.

Regardless of who wins or who losses with the action to be taken, if winners have enough surplus as to compensate lossers in order to put them in their original indifference curve, and still have some extra surplus for distribution, then society has moved into a new (higher) Pareto optimum, no matter if the compensation to lossers never takes place.

Actually in order for the assumptions to hold it is required that transactions be costless and that compensation be made in one payment in a lump sum fashion.

In practice this is impossible; first, because no transfer of money is costless and, second, even if it were there are so many political and social constraints that it makes it impossible. A third flaw of this welfare theory, as Graaf (2) points out, is that of possible reversibility of the compensation. Under certain circumstances lossers could profitably bribe the gainers, so they would oppose the changes.

So the traditional approach, with all its appeal because it does not require explicit choices does not stand a rigorous analysis.

My criticism to the social approach to C-B analysis is not to the approach itself but rather to the fact that they haven't looked into the first step of decision making as to how it is done, by whom, and whose interests actually count. I think that this is a much neglected field in underdeveloped countries and, as long as it is not addressed in the planning literature, I am afraid, again, that we might be giving support to a process that might have the opposite end result than the one originally intended, e.g., equity.

The social approach addresses the equity problem and demands explicit decisions. But since it does not address the decision making process in underdeveloped countries, they are giving a theoretical support to rulers who do not necessarily represent the interests of the majority. Under these circumstances choosing an appropriate set of weights, projects without equity considerations can be accepted. These projects will have a social "facade" that will leave some deluded and others happy and everything as it was before.

1. The Objective Function and Numeraire

The main difference is between the traditional approach and the social approaches. The objective function of the efficiency approach is the investment of GDP, or GNP. In the case of the social approaches the objective function is aggregated consumption. The differences between the social approaches lie in the unit of measurement used, the UNIDO guidelines use aggregate consumption measured at domestic prices while the L-M and S-VT approach uses uncommitted social income measured at border prices.

This difference in numeraire of the social approaches implies a difference in emphasis of what is believed are the main constraints to that goal function in underdeveloped countries.

For UNIDO, the main constraint to the goal is the level of consumption for different income groups, so equity considerations are emphasized and their numeraire is consumption. L-M and S-VT, on the other hand, assume that savings are the main constraint for achieving higher levels of consumption in underdeveloped countries. Therefore

they favor those projects that would leave the largest amount of income for investment in the hands of government.

An important assumption they make is that there is an optimal resource allocation through the world market.

That assumption is based on the fact that each country usually is a price taker in the international market, therefore, for the purpose of evaluating benefits for them, a world market price introduces less distortions than resorting to internal markets.

As can be seen we are back again into the "perfect competition" model, this time at the international level. The same questions raised in relation to internal market come to mind with respect to international markets. Is the given distribution of wealth among countries and optimal one? Isn't in international trade and international relations where "externalities" are felt the most?

2. The Rate of Discount

The rate of discount in project evaluation is where more differences and arguments exist among approaches, as Prest and Turvey point out. Even in front of a single discount rate there is no agreement as to what meaning to attach to it.

The supporters of the traditional approach agree upon the fact that the relevant rate of discount is the opportunity cost of capital or the marginal efficiency of investment before corporate taxes. The question is how to estimate such a rate of discount since there is no unique return to capital. Stockfisch (16) proposed an average of the returns to different sectors of the economy.

The problem with this approach, that while it is appealing to the unaware observer for its "objectivity", is that of determining, or better, choosing which rate of discount to use. Should it be a simple average, or better a weighted average? If the latter is chosen, what weight should it be used? Related to the weighting problem, when a new sector investment have a higher return than the previous investments in the sector, which weight should we choose?

Once again we are facing a problem of value judgements. Whose rights should be weighted more heavily? It is surprising how most of the people who have dealt with the rate of return within the traditional approach did not realize that they were taking an implicit stand before trying to prove their point "objectively".

In the social approach to C-B analysis the discount rate, or accounting rate of interest (ARI) is defined as the rate of fall in the value of the numeraire, be it consumption or uncommitted social income in the hands of government. The three approaches discussed here include in their estimate of the ARI both the marginal productivity of capital and distributional impacts that include the elasticities of marginal utility. The three of them agree that the requirement of value judgements with respect to the distributional impact component is unavoidable.

Having stated this they go on, assuming the explicit value judgements will eventually be done. Practitioners who have attempted to apply some of these approaches have resorted to estimate the marginal productivity of capital [see IDB (6)]. Therefore in practice they are close to the traditional approach.

It can be seen that the social C-B approach raises as many questions as the traditional approach does, without giving many practical answers.

3. Shadow Price of Investment

In the traditional approach the shadow price of investment is used as the discount rate [Harberger (3), Stockfisch (17)].

In the social approaches the shadow price of investment is actually estimated in order to then value labor. Each of them values consumption of the private sector, relative to the numeraire: UNIDO calls it price of investment, L-M calls it consumption and saving and S-VT estimate it under ω. That is the value of private sector consumption at a given level c relative to the numeraire.

To estimate them, the three methodologies require the marginal propensity to consume, the marginal product of capital and some kind of a rate of discount. The S-VT approach requires knowledge of the elasticity of marginal utility of extra consumption.

The UNIDO and L-M approach appear somewhat easier to apply because the estimate of μ, in the S-VT approach is, for the time being an impossible task.

As usual when we come through this type of parameters cost cannot be estimated, the analyst is suggested to guess different values to either present the decision maker with alternative choices, or the analyst himself choose what he believes is the most correct value.

Under UNIDO and L-M planning models, these values would be given by the Central Planning Office, and would have been derived from well designed plans and/or previous political decisions.

In practice, again, it is more likely that each analyst would use its own guess, making comparison among alternatives an irrelevant exercise.

4. Shadow Price of Labor

According to Ward (19) there are three major approaches to
shadow pricing labor: The opportunity cost approach, the supply price
approach and the social cost of labor approach.

The opportunity cost approach advocates the use of the foregone
product in the previous job [Gittinger (1)], while the supply price
of labor approach, maintains that the correct shadow price of labor is
given by its supply price, that is the minimum amount of money required
to get an unemployed person to accept a job. The supply price then
includes the foregone product, if any, the cost of the job created by
the project, in terms of reallocation, higher living costs, etc. and
the possible disutility of effort that might entail the shift to the
new job.

I feel that the so-called supply price approach is similar to
the opportunity cost approach, except that the former entails more than
just the foregone product of labor but also the "opportunity cost" of
leisure.

Of the three social methodologies reviewed, S-VT is the only
one to share Harberger's view with respect to shadow pricing labor.

Finally, UNIDO and L-M, propose the use of what Ward has termed
the social cost of labor approach.

As it was shown in the respective chapters the estimate of the
SWR by both UNIDO and L-M incorporates not only the foregone output
but also the increase in consumption by project labor and the value of
consumption relative to savings.

The concepts behind both shadow wage rates are similar their main
differences being in magnitude because of the difference in numeraire.

Although theoretically better, the social approaches demand for
information makes them less attractive than Harberger's supply price.
But what does it mean to use the supply price as the shadow wage rate?
No other thing than to say that the existing equity distribution and
property rights are the desired ones. Although Harberger's argument
favoring the use of supply price (3), in which a worker will not take a
job unless a minimum wage is offered, is quite convincing I cannot help
but to wonder if in societies with an enormous rate of unemployment,
with little, if any social security, it is valid to think that unemployed
workers are that "free to choose". It seems to me that the alternative
presented to them is more "free to starve".

Finally, I do not agree with Harberger's concern that literature
on project appraisal should consider wages in a developing economy to
increase over time. In theory that is correct, but in practice, to
just consider that wages will keep up with the increase in product
prices, it is being overly optimistic, at least for Latin American
countries.

5. Shadow Price of Foreign Exchange

On this aspect is where the difference in numeraire is more
evident. The UNIDO approach as well as Harberger's proposition consider
the likely pattern of imports and exports and determine a shadow ex-
change rate taking into account domestic and foreign prices of the
commodity in question.

L-M and S-VT advocate a more complicated methodology, i.e.
divide commodities into traded and non-traded, the former are valued at
Fob or Cif prices and the latter are divided again in traded and non-traded

in several rounds until we are left only with traded goods and labor.
S-VT stop after the first round and convert standard conversion factors
(SCF).

These SCF are used as a shortcut, in order to avoid the work
involved in estimating round after round of dividing between traded
and non-traded goods.

The L-M proposition of dividing goods in traded and non-traded
and then repeating the operation until we get just traded goods and
unskilled labor is so effort demanding for the accuracy one can get that
L-M themselves recommend the use of a SCF similar to the one proposed
by S-VT as a shortcut. In practice then, we should get the same answer
with both methods.

6. Conclusions

The main conclusion I would draw from our discussion is that
most of the literature surveyed neglects the way institutions and
property rights determine society's performance. I think this aspect
deserves much more attention than it has received so far, particularly
in undeveloped countries. A more thorough study of public choice and
performance should produce a better model of development planning, more
in accordance with the realities of these countries. For example, to
expect a conversation between the planner and the decision makers like
the one presented by UNIDO (18) is a delusion.

A second point I consider of the utmost importance is that all
approaches to C-B analysis use the same model of project choice. Given
a certain budget (determined by the authority) all projects are analyzed,
and ranked (through ratios, NPV or IRR) and then a choice is made among

those higher in the rank. Is this the way project selection is made? I do not think so. More likely is that the authority will just choose a project, even location, and then the task of the project analyst comes in, hopefully to design the most effective way to achieve the end of the project determined by the decision maker. So a more realistic and honest approach would be a cost-effectiveness analysis rather than C-B. I believe that the subject deserves much more attention and hopefully a more realistic, and therefore useful, model could be worked out.

Comparing in general the social C-B approaches with the traditional approach, the latter is easier to apply since its objective function includes just one objective, therefore there is no explicit value judgement involved. All it requires is an implicit value judgement accepting the market information.

There still are some valuation problems, but with a few assumptions, always within the neoclassical model and without challenging the status quo, a solution can be easily reached.

The social approaches, because of their multiobjective function are more difficult to implement. The conflicting objectives need the specification of weights in order to incorporate them into the function and be able to work with them. This implies that for the system to work there is a need for explicit choice of governments on subjects that will arouse political objections, either from the groups with easier access to power, therefore blocking any results contrary to their interests, or from groups that because they might be numerous will either jeopardize reelection of officials (if they are elected,

that is) or will endanger social tranquility. Therefore it doesn't seem very likely that most governments will explicitly present their choices with regard to equity aspects. The use of the "objective" information stemming from the market arouses less resistance from the uninitiated groups in the area of public choice.

For these reasons, in the foreseeable future I do not believe we can expect a social C-B analysis approach working as envisioned by their authors.

I do agree, though, with Williams (22) that we shouldn't use criticisms of new developments and stick to the old practices that have proven to be unsuited for societal goals other than growth.

Of the three social approaches, S-VT seems the most practical of them all, and we agree with L-M criticism on the UNIDO numeraire, that is that by definition different units of it should have equal value, but in UNIDO's case, consumption does not have equal value for different income groups. On the use of international prices I agree with L-M and S-VT only if the goals of the country is to maximize foreign exchange earnings.

Finally, it should be emphasized that the use of the social approach does not mean that equity goals will be achieved or pursued. It all depends on the choices of weights and shadow prices made. It also must be remembered that because this approach is embedded in several technical formulas, some of the policy matters may appear more as a technical issue and become the exclusive prerogative of planners rather than some kind of a dialogue of all parts of the political process.

In summary, the social approaches to C-B analysis are a welcome contribution to the discipline and have the advantage of making explicit what in the traditional approach is implicit, i.e. value judgements. Advances are being made in order to make them practical, but for the reasons outlined in this paper they are very difficult to apply. Attempts to apply them have required assumptions and estimates that place them closer to the traditional approach. The social approach to C-B analysis will not be more widely used until more research is done on public choice in developing countries and a more practical theory of planning is developed.

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