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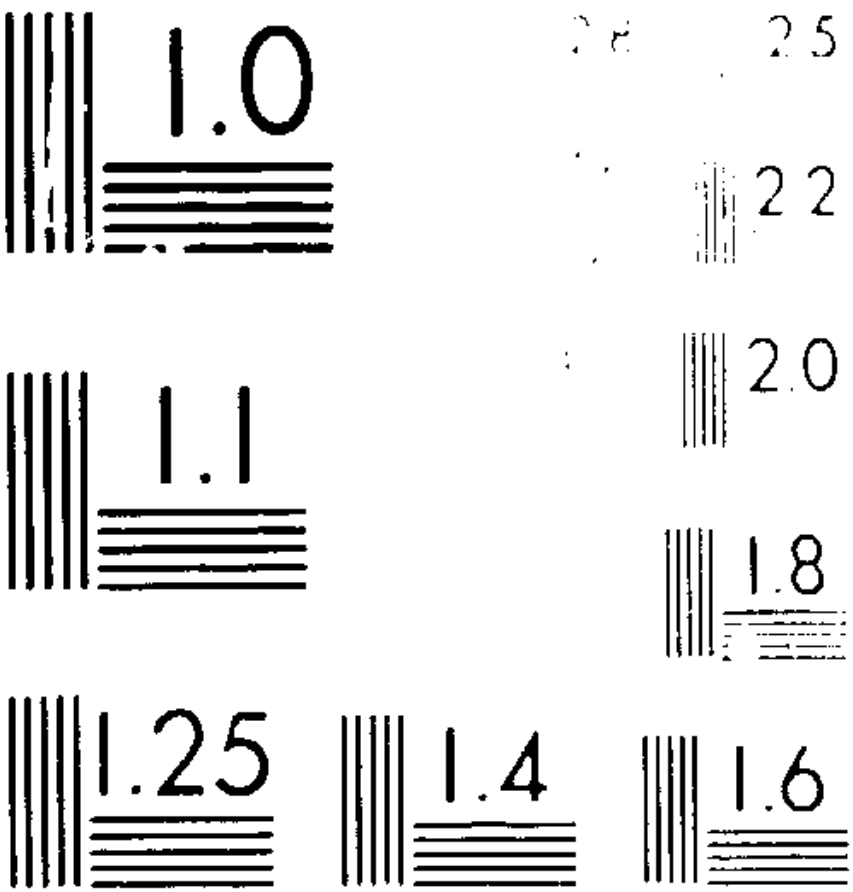
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org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# COST-BENEFIT ANALYSIS FOR PROJECT EVALUATION AND STRUCTURAL CHANGES IN A DEVELOPING ECONOMY *

by

A. Bhaduri**

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** UNIDO Consultant

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CONTENTS

## INTRODUCTION

The present paper is divided into five sections. The first two sections (sections I and II) introduce the reader in a rather summary manner to the standard discussion of various investment criteria (and can be avoided by those who are already familiar with it). Section III takes up some of the issues underlying the inadequacy of social cost-benefit analysis in terms of existing economic theory. Section IV draws out the practical implications of the theoretical arguments of the preceding sections. Section V presents a summary of the central issues that have to be faced in financing investment projects in developing countries, particularly in the field of industry.

## I. UNCERTAINTY AND INVESTMENT DECISIONS

Uncertainty is the most pervasive fact of economic life. It affects all economic decisions to greater or lesser extent, but perhaps its critical influence is most strongly felt in the field of investment decisions. Long-lived investment in durable capital goods or construction of projects whose life will stretch considerably into the future essentially involves economic decisions that cannot but seriously take into account an uncertain future. Consequently, a theory of investment decisions has to be based upon specified intellectual conventions for dealing with uncertainty.[1/]

Although there are various stylized assumptions to deal with the problem of risk and to a lesser extent with the problem of uncertainty, it is a well-known proposition that there cannot be a unique or single

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1/ The fact that dealing with genuine "uncertainty" as opposed to "risk" (where calculations on the basis of probability distribution may make some sense) is not based upon logic but on conventions, was forcefully argued by J.M. Keynes. See his "Fundamental Concepts and Ideas in the General Theory", Quarterly Journal of Economics, Vol.51, pp.209-223 (1937).

decision criterion to deal with uncertainty.[2/] For the very attitude towards and evaluation of the nature of uncertainty begin to affect such decision rules themselves.[3/]

Under these circumstances, it is hardly surprising that the number of investment criteria as well as the actual practice of business in making investment decisions do not follow any single rule. Among other differences, each decision-maker in this field also has to devise more or less his own method to deal with uncertainty. Given the serious influence of uncertainty on investment decisions as well as the fact that no "fool-proof" or unique "rational" method of dealing with it can be presumed, it will then be simply dogmatic to presume that certain investment criteria are invariably "right" and rational procedures while other are wrong or irrational. Indeed, it must be recognized that investment criteria in an uncertain environment have, at best, the status of "rules-of-thumb". They necessarily imply "bounded" rather than "perfect" rationality, based upon incomplete and inadequate information characterizing an uncertain world.[4/]

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2/ M. Friedman and L.J. Savage "The Utility Analysis of Choices Involving Risk", Journal of Political Economy, Vol.56, pp.279-304 (1948). Also, K.J. Arrow and M. Kurz, Public Investment, the Rate of Return and Optimal Fiscal Policy, Baltimore, 1970.

3/ Hence, the usual literature makes distinction between degrees of risk aversion and risk-taking in arriving at formal rules. All this, of course, is based upon the calculus of "expected utility maximization" and does not reckon with the problem of uncertainty of the type emphasized by Keynes.

4/ See H.A. Simon "Rational Decision-making in Business Organizations", American Economic Review, Vol.69, pp.493-513 (1979).

## II. ALTERNATIVE INVESTMENT CRITERIA

In actual practice of private business, perhaps the simplest and most widely used decision rule is the so-called "pay off period" criterion. In its simplest version, it typically implies having a rough estimate of the flow of annual gross profits (i.e. gross value added inclusive of depreciation minus wage and salary bill) from an investment project and then calculating the number of years that will be needed to recover the original investment cost through annual profit flows. Thus, if the annual gross profit is estimated at a steady flow of say $80,000, then the implied pay off period for capital cost is simply ($80,000 ÷ $20,000) = 4 years. For whatever reason, if the business firm has decided on a subjective pay off period not exceeding say 3 years, then the above calculations would indicate the project with an estimated 4-year pay off period to be commercially unacceptable from business point of view, on ground that the project has far too long a pay off period. Instead, with a subjective pay off period of say 5 years, the same project may be considered as commercially acceptable or viable. Symbolically, this could be simply represented as

$$\sum_{t=1}^{T} R_t \geq K \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

for commercial viability, where $R_t$ = gross profit during time t (t = 1 indicating the first year of operation of the project).
K = total investment cost of the project; and
T = the "subjectively decided" pay off period.

In the simpler case of a more or less steady estimated flow of gross profits (as in our above arithmetical example), the above formula (1) reduces to a simpler condition

$$TR \geq K$$

or

$$\frac{R}{K} \geq \frac{1}{T} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where $R_t = R_{t+1} = \ldots\ldots\ldots = R$, a steady flow of gross profit.

It would be immediately noticed that on the left-hand side of relation (2), we have nothing but gross annual profit divided by the capital cost of the project, i.e. the gross rate of profit. The right-hand side on the other hand is also a pure number per unit of time (e.g. if the subjective pay off period is 3 years, then $\frac{1}{T}$ = 1/3 or 33.3 per cent per year). Having the same dimension as the rate of profit or the rate of interest 1/T can then be interpreted as the subjective rate of interest or discount. Thus, it is immediately recognizable from (2) that the pay off period criterion essentially boils down to a comparison between the expected rate of gross profit (R/K) from a project and the subjective rate of interest or discount implied by the inverse of the (maximum acceptable) pay off period (1/T).[5/] On this basis, as relation (2) above indicates, a project becomes commercially viable or acceptable only when the gross rate of profit does not fall short of the discount or interest rate (1/T).

In this context, it should be recognized that the widely used criterion of recoupment period in socialist economies bears some resemblance to the earlier discussed pay off period criterion, precisely when the above two questions are more explicitly faced.[6/]

The recoupment period criterion looks at two investment "variants" for producing a given output (say thermal versus hydroelectric power). Since the variant or project with a higher capital cost will typically have a lower level of operating cost (otherwise it need not be considered as eligible), an investment decision rule based upon the relative advantage

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5/ For private business, if the cost of borrowing is given as the interest rate $\bar{i}$, then $1/i = T$, where T is the maximum period allowed for "paying off" capital cost. As subsequent discussion will show, the concept is far less clear, even for private business, if firms have some own funds for reinvestment.

6/ The clearest formulation of the modified concept of the recoupment period is due to M. Kalecki and M. Rakowski "Generalized Formula of the Efficiency of Investment" translated into English in A. Nove and A. Zauberman (ed.), Studies in the theory of reproduction and prices: problems of economic theory and practice in Poland (Warsaw, Polish Scientific Publishers, 1964). See also A. Bhaduri "An Aspect of Project Selection: Durability versus Construction Period", Economic Journal, Vol.78, pp.344-348 (1968).

of saving in annual operating cost weighed against the relative disadvantage of higher capital expenditure can be worked out. Thus, if the total installation or capital cost of a thermal power unit is say $2.5 million and that of a hydroelectric unit (of roughly same capacity) is $3.0 million, while the annual operating cost of the latter variant, i.e. of the hydroelectric plant, is less by say $0.10 million per year, then evidently to recoup the additional capital cost of $0.5 million associated with the hydroelectric unit through savings in terms of its lower annual operating cost (of $0.10 million), it will take ($0.5 million -:- $0.10 million per year) = 5 years. If the specified recoupment period exceeds 5 years, then the more investment-intensive hydroelectric unit will qualify, but not otherwise. In symbols we may represent this calculation as follows:

If the capital cost of variant 1(hydroelectric unit) exceeds that of variant 2 (thermal unit), i.e. $K_1 > K_2$, then the associated annual operating cost $M_1$ of variant 1 must be less than that of variant 2, i.e. $M_2 > M_1$.[7/] Hence, the recoupment period is defined as

$$- \frac{(K_1 - K_2)}{(M_1 - M_2)} = \frac{(K_1 - K_2)}{(M_2 - M_1)} = \frac{\triangle K}{\triangle M} \leqslant T_r \quad \ldots\ldots\ldots (3)$$

where the specified recoupment period $T_r$ in above formula (3) is to be distinguished from the pay off period T in earlier formula (1) or (2).

Elementary micro-economic theory may be invoked to see the essential logic behind the recoupment criterion, on the simplifying assumption that operating cost consists almost exclusively of wage cost. Thus, the saving in operating cost is viewed mostly as saving of labour (at given wage rate) to be balanced against the higher capital cost. Carrying out elementary

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7/ Unless a project with a higher capital cost also has lowering operating cost (other things assumed to be equal), it will not be eligible in general. This provides the rationale of the recoupment criterion.

operation for minimizing annual cost, annual total cost = iK + wL which is at a minimum (first order condition) if

$$i\triangle K + w.\triangle L = 0$$

or $$-\frac{\triangle K}{w.\triangle L} = \frac{1}{i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

where, at the wage rate w, the total labour saving ($-w.\triangle L$) balances additional investment cost $\triangle K$. Since under our simplifying assumption this saving of labour cost is equivalent to saving in total operating cost in (3), i.e.

$$-w.\triangle L = -(K_1 - K_2) = \triangle M \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(5).$$

Now (4) and (5) can be combined in view of (3) to obtain

$$\frac{\triangle K}{w(-\triangle L)} = \frac{\triangle K}{\triangle M} \lesseqgtr T_r = \frac{1}{i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

where i = the rate of interest. Therefore, as is evident from (6), the criterion of the recoupment period can be interpreted in conventional ways as balancing the marginal rate of substitution between labour and investment in accordance with the relative price ratio of interest to wage rate where the inverse of the recoupment period ($1/T_r$) is nothing but the rate of interest (i).

In so far as private and micro-economic investment decisions are concerned, there is then a unifying element in both the "capitalistic" criterion of pay off period and the "socialist" criterion of the recoupment period. For the inverse of the relevant time period (for pay off or recoupment) suggests a capital charge or interest rate which, to a private investor, is the cost of borrowing finance. On the other hand, in a self-financed project, the rate of interest can also be seen as the opportunity cost of not investing that finance elsewhere in the economy (e.g. in time deposits of banks), i.e. as the "opportunity cost" of not lending outside. A unique rate of interest presumes a coincidence between this cost of borrowing and the return on lending as a condition of equilibrium. But, in effect, this also tends to blur the distinction between the rate of interest (as the cost of borrowing finance) and the rate of expected profit on fresh investments (through reinvestment rather than lending). While borrowing and lending rate of finance may be assumed to be more or less the same at the margin under competitive conditions, it seems far

more questionable not to distinguish between expected profit rate and the rate of interest in the context of the actual business world.

Leaving aside this difficulty, once the rate of interest is specified, the corresponding pay off or the recoupment period gets implicitly determined (being the inverse of the relevant period), and it serves no further purpose to carry that excess baggage. The criterion of the internal rate of return now emerges where annual investment costs and gross profits are looked at as negative and positive streams respectively so that looking over the entire (given) life of a project including its construction period we obtain a discounted stream of costs and profits. Thus, discounting from the current period base (t = 0) we have the discounted value of the project

$$V = -\sum_{t=0}^{a} x_t(1+i)^{-t} + \sum_{t=a+1}^{a+b} x_t(1+i)^{-t} \quad \ldots\ldots\ldots\ldots (7)$$

where $x_t$ = costs or profits at time t, where a minus sign indicates costs and a plus sign indicates benefits. Thus, the first expression on the right-hand side of (7) is discounted costs while the second expression is discounted profits.[8/] We could now find the rate of interest at which the project just breaks even, i.e. that value of i = n for which V = 0 in (7)[9/].

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8/ We are making the simplifying assumption that up to end of construction period t = a, the project has costs, while from t = a + i to the end of its life, t = a+b, the project makes profits. This is a simplifying assumption on two counts: (a) it rules out the problem of multiple internal rates of return and (b) assumes service life not to be a choice variable. Indeed, the two aspects are related through what is known as the "truncation problem" in technical literature. See K.J. Arrow and D. Levari "Uniqueness of the Internal Rate of Return with Variable Life Time of Investment", Economic Journal, Vol.79, pp.560-566 (1969).

9/ See previous footnote 8 on the uniqueness of the internal rate of return.

This n defines the internal rate of return associated with a project where we could arrange more to less desirable projects in accordance with their ranking on the basis of the computed internal rate of return. And the internal rate of return calculation yields a decision criterion for investment when we presume an autonomously given interest rate (as cost of finance) so that all projects with an internal rate of return exceeding that autonomously given interest rate broadly qualify as being economically viable.[10/]

But if an autonomously given rate of interest has to be incorporated into the decision rule for investment, then it appears more sensible to introduce this explicitly into the calculations to result in the present value criterion for investment decisions. Then our earlier equation (7) may be reinterpreted where V now captures the present value of a project with some specific value $i = \bar{I}$ ascribed to the calculation. And so long as V is positive, the project may be assumed to be economically viable.

It should be noted here that although the underlying formalism is almost identical for internal rate of return as well as present value calculation, the latter procedure has a decided advantage in so far as it shows the absolute level benefit in the form of present value (V) as opposed to the former which only shows relative benefit as the per cent difference between the internal rate (n) and the actual rate of interest ($\bar{I}$).. Thus, the internal rate of return criterion carries no information about the scale of investment and consequently no information regarding the absolute level of benefit ensuing from a project which can often be considered a drawback. Indeed, given the total budget for an investment plan, it seems important to bring explicitly into consideration the absolute scale of investment associated with each project so that the total investment budget is neither under- or over-utilized to any significant extent.[11/]

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10/ This was also the basis of the Keynesian "marginal efficiency of capital" schedule.

11/ See "Guidelines for Project Evaluation", United Nations (Sales no. E.72.II.B.11), Chapter 2 for fuller exposition.

## III. PRIVATE TO SOCIAL COSTS AND BENEFITS: THEORETICAL PROBLEMS

The so-called theory of social cost-benefit analysis of primarily public projects derives its basic inspiration from the conceptual framework of present value calculations.[12/] The basic idea is simple and appealing at first sight: the formal framework of present value calculation is maintained, but some of the crucial parameters (like interest and/or discount rate, wage rate, price of foreign exchange etc.) are recomputed to reflect their relative social scarcity rather than what may appear to a private investor as their relative scarcity in terms of wrong signalling of prices by the market. In other words, social cost-benefit analysis suggests a procedure for systematic intervention in the resource allocative role of an imperfectly functioning market through suitable choice of projects. Indeed, one could go even a step beyond this narrower concept of only efficiency in resource allocation and suggest a procedure for project selection that will also enhance distributive justice. Broadly speaking, in its more ambitious role, social cost-benefit analysis is a theory of intervention in the market mechanism in order to improve both efficiency in resource use and the pattern of income distribution in an economy.[13/]

From the point of view of economic theory, this procedure for at least partially correcting the malfunctioning of the market - either on allocative or on distributive ground or both - through suitable selection of projects may justifiably appear to be intellectually unsatisfactory for several reasons. The fundamental intellectual reason in this regard

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12/ Thus, of the various investment criteria discussed above, social cost-benefit analysis chooses the "present value" approach. This has good analytical justification, but it should also be remembered that it requires far more information than say the "pay off period". Not surprisingly then, its greater analytical appeal is at the cost of having a larger information base which a private businessman may not find worth bothering about.

13/ See UNIDO Guidelines, op.cit.

is the duality relation between quantities and prices under certain assumptions.[14/] Thus, the concept of accounting or shadow prices in contrast to market or actually observed prices is not a concept that can be defined independently of the output programme. Given any efficient output configuration at a point of time or a series of such configurations over time, the associated shadow prices emerge as duals to an efficient output configuration. Consequently, by presupposing a set of "correct" shadow prices for project evaluation, one implicitly also presupposes simultaneously an efficient output programme for which those prices are the relevant and "correct" supporting prices. Intuitively, one could perhaps see the broad outlines of the above somewhat technical argument by means of a simple illustration. Imagine a typical developing economy with substantial unemployment in "open" and/or in "disguised" form. We may also imagine an efficient output configuration which would employ all this labour more effectively in various lines of activity. Conventional wisdom of shadow pricing of labour will now claim that real wages will have to be considerably lower with reference to that full employment output configuration notionally imagined.[15/] Therefore, in evaluating projects one should use shadow price of labour that is below its market wage rate.

Theoretically, the problem arises because any change in the output programme brought about through selecting new projects will imply simultaneously a different system of dual or accounting prices. We may call this the "problem of perturbation": perturbation of the output path

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14/ Basically assumptions that ensure that the production set is "convex" so that its supporting "hyperplane" at any point contain the relevant information of dual prices. See E. Malinvaud "Capital Accumulation and the Efficient Allocation of Resources", Econometrica, Vol.21, pp.233-268 (1953) and also E. Malinvaud "The Analogy Between Atemporal and Intertemporal Theories of Resource Allocation", Review of Economic Studies, Vol.28, pp.143-160 (1960).

15/ Assuming diminishing return to a factor, a larger volume of employment will be associated with a lower "marginal product of labour" in terms of conventional production function construction of neo-classical variety.

implies perturbation of the associated price path and vice versa. The problem is then two-fold:

(a) First, every output change through selecting new projects results in corresponding change in dual prices. This, in turn, implies that a more or less continuous scheme of revision of shadow prices is needed in so far as this affects the reference configuration of efficient output path from which these shadow prices dual variables are derived.[16/]

(b) Secondly, the shadow prices relate to a notional efficient output configuration, but there is no guarantee in general that by actually using shadow prices that are associated with that notional output configuration, one will be able to converge gradually towards it. In other words, there is no guarantee that the notional output configuration has the required property of dynamic stability with respect to piecemeal use of shadow prices in selecting public project.

This problem of stability of output path with respect to parametric use of shadow prices in project selection looks far more formidable when one further recognizes the serious underplaying of the problems of effective demand in usual social cost-benefit analysis.

As the earlier illustration may be used to indicate, much of the usual discussion on shadow pricing, particularly of labour is highly ambiguous, because it does not clearly distinguish between a market clearing price at which demand and supply are equal and the dual prices (or more crudely, marginal products of a factor of production) associated with an efficient

16/ The logical puzzle here is: If the project is so "marginal" that dual prices are not expected to change significantly then it is perhaps not worth bothering about through such elaborate calculations. On the other hand, if the project is "big" or non-marginal then the corresponding change in dual prices need not at all be "second order small" and continuous revision of prices are needed.

output configuration. There is simply no reason to presuppose that the market clearing price, particularly of labour, should necessarily be lower compared to the existing market wage rate. For, as we were taught by Keynes over the "wage cut controversy" in the 1930s, the aggregate demand curve for labour itself gets affected by variations in real wage rate through its influence on the level of effective demand. Thus, a lower real wage rate, justified on shadow price calculation of the social scarcity of labour, may entail a level of effective demand for wage goods which does not match its supply in the actual markets resulting in widening divergence between market clearing price of wage goods and its postulated price level in cost-benefit analysis, affecting in turn the real wage rate obtained in actual markets. To elaborate this point further, imagine that the procedure of social cost-benefit analysis leads to choosing of a set of labour-intensive projects. The total wage bill associated with this investment programme may then become so large as to outstrip the actual supply of wage goods and wage goods' prices may begin to rise. If this leads to more than proportional rise in money wage rate, the real wage rate in the market may actually increase leading to further rise in the effective demand for wage goods and thus strengthen the disequilibrium process. On the other hand, if the money wage rate rises less than proportionately, the real wage rate actually falls through time, where a sufficient fall in the real wage rate may create the opposite Keynesian problem of effective demand. Thus, in either case, a reasonably smooth traverse to the notional output configuration (from which the original shadow prices were derived) may not be ensured. Indeed, the whole theory of shadow pricing begins to make sense only when the whole problem of Keynesian effective demand and aggregate imbalance between demand supply is assumed away. Consequently, it cannot be taken for granted that use of shadow prices associated with notional output configuration will generate continuous matching of aggregate demand and supply to make a traverse towards it possible. And to assume away altogether this problem of effective demand and market clearance in a developing economy requires far more detailed examination than the literature on social cost-benefit analysis would usually have us believe.

We may then summarize the theoretical objections to using present value criterion on the basis of accounting prices - the so-called technique of social cost-benefit analysis - under three rather broad heads.

(a) Formally, accounting prices are dual to the primal programme of efficient output configuration. Thus, one (output) implies the other (price). Consequently, any perturbation of that notional output path through choice of new projects generally implies simultaneous perturbation of dual prices, necessitating more or less continuous revision of the relevant shadow prices.

(b) The efficient output configuration with reference to which the dual or shadow prices are derived need not be dynamically stable. This broadly means that there is no guarantee that the use of shadow prices associated with any notional efficient output configuration will actually enable us to gradually converge towards it. Thus, by using shadow prices, we may not actually be able to get towards the kind of resource utilization pattern that those shadow prices entail because the market imbalance between aggregate demand and supply may result in actual prices that lead to divergence away from the notionally postulated output configuration implied by the shadow price calculations.

(c) The seriousness of the above problem is heavily underestimated in the entire social cost-benefit literature, because of its implied postulate that the Keynesian problem of effective demand is of no consequence in developing economies. For, if the effective demand problem is reckoned with seriously, it will be immediately seen that any widely used procedure for project selection will affect the level of public (and also private) investment and hence the level of effective demand through the multiplier mechanism. With such possible variations in the level of effective demand, it is not in the least clear how "convergence" to any desired output pattern (entailed by the shadow prices used) can be taken for granted. Through its exclusive preoccupation on "supply constraints" the social cost-benefit literature has, perhaps quite unjustifiably, assumed away altogether actually operative "demand constraints" on growth in a developing economy.

## IV. PRACTICAL PROBLEMS OF SOCIAL COST-BENEFIT ANALYSIS

In terms of our preceding discussion, it is then clearly arguable that the theoretical foundations of social cost-benefit analysis are not altogether secure. Its appeal then must lie not in the theoretical tightness of the argument, but in its practical value as a working rule based upon approximations. Thus, it may be claimed (often as an article of faith without adequate justification) that although in theory dual prices are simultaneously implied by the efficient output programme and they may vary in accordance with variations in output, in practice the crucial parametric shadow prices of labour, foreign exchange etc. are fairly stable, i.e. they are relatively insensitive to "marginal" variations in output programme. Such an assumption, if approximately valid, will allow one to delink variations in shadow prices from output variations through choice of projects. This will also correspond to the broad framework of a "partial equilibrium analysis" where the shadow prices can be taken as given and invariant with respect to the list of projects chosen.[17/]

But this sort of a justification begs a fundamental question in so far as co-ordination of investment activities are concerned. In its starkest simplicity, the problem can be posed as follows: the social cost-benefit analysis does not have any control over what types of goods are to be produced. Consider, for example, a programme of producing more food against setting up another steel mill. While the physical outputs of the two programmes are entirely non-comparable, social cost-benefit analysis will like to have us believe that their "social benefits" are comparable magnitudes through prices. But because their physical outputs are so different, a programme for producing more food as a part of a larger co-ordinated investment programme in irrigation, fertilizer etc. may be eligible. On the other hand, it may make far less sense to have a steel mill and the rest of the investment programme in irrigation, fertilizer etc. While this is common sense, it is clear that blind reliance on calculating social benefits and costs may lead one to completely uncoordinated investment programmes, precisely because it is not concerned with what commodities are produced.

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17/ See UNIDO Guidelines op.cit., p.232 for passing reference to this point.

A little reflection will make clear why this problem arises: the crux of the matter is that even social cost-benefit analysis places not too little but too much reliance on the virtues of prices as signals. Otherwise one cannot explain how it can seriously be claimed that the "net social benefits" of entirely different types of projects are comparable without having to worry about the overall composition of output produced. Indeed, this mistake goes back to the origin of present value framework: a capitalist investor does not have to worry about what he produces so long as it can be sold as a commodity in the market to realize profits. Thus, neither the pay off period, nor the internal rate of return nor the present value criterion need to worry about what goods are produced, in so far as such criteria are applied by a private investor. This habit of thought was simply taken over by social cost-benefit analysis along with the analytical framework of present value calculation. Here the contrast with the "recoupment period criterion" used extensively in centrally planned economies is instructive. The recoupment period criterion is used to choose between technological variants for producing a roughly given output so that the overall composition of output determined at the national level may be broadly integrated with the question of selecting the right projects or technology at the level of particular industry. Perhaps the most serious practical defect of social cost-benefit analysis is its failure to appreciate the fact that without some control over the broad physical composition of output (i.e. what to produce), there can simply be no point in any planning or systematic intervention in the market. And yet, nothing in the theory of social cost-benefit analysis ensures this at the practical level.

Indeed, precisely without this control over the overall output composition (which may usually be determined through input-output balancing techniques) it becomes impossible to integrate social cost-benefit analysis into the framework of national planning. On the other hand, it can never be a substitute for usual techniques of national planning, simply because it cannot control the output composition. All this leaves the politico-administrative framework, with which social cost-benefit analysis could be effective, highly ambiguous. Indeed, the information base and skill expected from the project evaluator are too little and too much at the same

time. It is too little because he is supposed to compute net present value from the parametric shadow prices without bothering about the nature of output - whether it is sports car produced in collaboration with a foreign firm or extension of primary health or education services. It is no good saying that each output price can also be "corrected" (e.g. the "shadow price" of a sports car can be considered lower compared to its actual market price), because the technique of social cost benefit is concerned with correcting crucial shadow prices; there is no guideline to say how each price is to be corrected. This also shows the basic paradox of even UNIDO-type cost-benefit analysis: it tries to improve upon existing income distribution without fully realizing that output prices are also reflections of income distribution. Sports car are demanded at even every high price because some people have enough money to buy them. In other words, not to bother about what commodity composition is produced implies also not bothering about a most pervasive effect of income distribution.[18/] And this is precisely what social cost-benefit analysis ends up advocating through giving up control over the output composition.

At the same time, the information base required for social cost-benefit analysis may be too much for two distinct reasons. First, this procedure for project selection may be far too time-consuming so that in the process the overall rate of public investment itself gets lowered. This is a real problem where in many countries long bureaucratic delays in taking decisions on projects are justified under the smoke-screen of social cost-benefit evaluation. Given this very realistic possibility, advocates of social cost-benefit analysis should at least have something to say about the "marginal benefits" of a more elaborate evaluation

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18/ It appears that the UNIDO Guidelines attempts to improve the income distribution through project selection, while it also (rather surprisingly) accepts existing prices for comparing benefits across projects without realizing that prices are also the outcome of a given income distribution. At least one of the authors shows awareness of this fundamental problem facing social cost-benefit analysis. See S.A. Marglin "The Essentials of the UNIDO Approach to Cost- Benefit Analysis" in Hugh Schwartz and Richard Berney (ed.) "Social and Economic Dimensions of Project Evaluation, Washington D.C., 1977, particularly p.209.

procedure weighed against its "marginal costs" in terms of delays and lowering of the rate of investment. Secondly, in terms of practical budgeting, it is often not clear that the required information can be collected and analyzed within a small fraction of the total project cost. It is common sense that only for "large" and "important" projects the entire procedure of selection should be gone through. But the question of how large is the cut-off line or a "staging procedure" where the complexity of the evaluation procedure increases in accordance with the "largeness" of projects, has never even been systematically discussed as an important practical aspect of project evaluation literature.

Ultimately, then the most pernicious influence of social cost-benefit analysis in developing countries depends not on its too little but on its too much reliance on the price mechanism, whether real or shadow. This comes out in a stark form in the OECD manual[19/] advocating the use of international prices (for directly and indirectly traded goods) as the relevant "transformation ratios". In this, there is a complete failure to recognize that:

(a) existing international prices are also shaped by a pattern of income distribution among nations that is unacceptable to most developing countries[20/]; and

(b) the existing international prices represent an economic status quo which the national economic policies of many developing countries must try to break.[21/]

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19/ OECD Manual of Industrial Project Analysis in Developing Countries (Paris, OECD Development Centre, 1968).

20/ i.e. in (the helpful) jargon of "welfare economics", a suboptimal position may be preferred to a (Pareto-) optimal one on ground of income distribution.

21/ See "Industry 2000 - New Perspectives", UNIDO, United Nations (ID/237, (ID/CONF.4/3)) for a broad statement of how industrialization can break the deadlock of existing status quo.

In many ways the reliance on international prices reminds one of the old controversy between free trade versus protectionism. It will be recalled that even if (and it is a big "if") free trade is assumed to lead to a more efficient static allocation of international resources, there is no guarantee that a particular nation or group of nations will not actually be victims of free trade. In other words, better static allocation of international resources may be associated with a still more unfavourable pattern of income distribution among nations in the absence of any reliable international mechanism of resource and income transfer among nations. Under such circumstances, protectionism may be justified to protect national interest of one or a group of nations, both on ground of income and employment maintenance at home[22/] as well as on the ground of trying to shift international income distribution in favour of a particular group of nations. The former ground of maintenance of income and employment level is based upon the Keynesian argument of effective demand which, as we have already seen, the existing literature of resource allocation in general and social cost-benefit analysis in particular pathetically neglects. The latter argument of shift in income distribution gave rise to the literature on "optimum tariff" and provides the necessary justification for poor nations to act unilaterally in a hostile international environment.

While most textbookish discussion on optimum tariff rate has essentially been static in character, i.e. trying to establish how existing income distribution may be improved in favour of a nation, through tariff barrier, for developing economics trying to industrialize the proper argument must be seen as dynamic in character. This was vaguely recognized

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22/ See Cambridge Economic Policy Review, April 1979, no.5, Department of Applied economics, Cambridge, particularly pp.8-9 on this point, justifying a policy of import restriction for Britain on this ground.

in the classical argument for protecting infant industries, but has been totally lost sight of in the so-called social cost-benefit analysis based upon existing international prices (e.g. in the OECD manual). Thus, if a country has easily accessible large deposits of say bauxite or iron-ore, there is no reason why it should not try to set up further processing industries for producing aluminium or steel under protection, provided it can be expected to yield rich dividends over time from some future date. In other words, even if existing international prices show the industry to be economically unviable, it may be dynamically advantageous to a country to pursue this path. To succumb to the "discipline" of existing international prices then essentially boils down to accepting as justified the existing patterns of international income distribution and resource utilization. When the climate of political opinion in developing countries is to make a concerted effort to change this existing pattern through industrialization, the "discipline" of using existing international prices simply provides a smoke-screen to justify and perpetuate an unacceptable economic status quo.

Going beyond the simpler decisions for evaluating industrial project, the thrust of the above argument becomes still more compelling. Two simple illustrations may be used to clinch this argument. Suppose a predominantly agrarian economy wants to become more or less self-sufficient in food production to avoid the political pressures and strings that may be associated with the international politics of food aid. Suppose now that the "marginal cost" of domestic expansion in food production well exceeds the international price (including shipping cost, i.e. f.o.b. price) at which food may be expected to be generally available in the international market. Should the country prevent itself from becoming self-reliant in food by succumbing to the "discipline" of international prices? The answer appears to be in the negative if the political strings and vulnerability associated with securing food in the international market is deemed to be unacceptably high. Indeed, the problem here is deeper than this: accepting international political strings with food may simply mean that the country is also pre-empted from attempting to industrialize

in the longer run and thus lose what we described earlier as dynamic advantages of well thought out protection. By using existing international prices, the country cripples not only its political sovereignty, but also loses economic gains accruable to it over time.

The other example may still be more telling: consider a country trying to develop indigenous technological capability which, in turn, requires starting and protecting some selected modern industries in a co-ordinated manner. The fact that foreign countries can produce these goods more cheaply cannot be of overriding concern, because the dynamic gains over time from a more development domestic technological capability may well outweigh the temporary loss. More important perhaps is the fact that higher technological capability may lead to increasing returns over time in reducing domestic costs and even penetrating export markets, improving negotiating power in technology transfer, generating a domestic base for adapting technology etc. To overlook all these advantages accruing from dynamic increasing returns from greater domestic technological capability and follow the "discipline" of existing international prices by calculating static social costs and benefits at the margin may well turn out to be a disguised ideology of crippling a developing country from ever becoming self-reliant with equal negotiating power in matters of international economics and politics.

## V. CONSIDERATIONS IN EXTERNAL FINANCING OF PUBLIC INVESTMENT PROJECTS

Our preceding analysis suggests that an uncritical reliance on the technique of social cost-benefit analysis can be highly misleading in selecting public investment projects. Indeed, there are far too many unresolved theoretical and practical problems in this area to make social cost-benefit analysis a generally adequate procedure in project selection. Its inadequacies must be clearly recognized and some complementary calculations and procedures have to be developed to overcome those inadequacies. In this context the following major points emerge from our earlier discussion.

(a) The question of macro-economic matching of demand and supply for major items of input and output has to be dealt with somewhat independently of the social cost-benefit procedure. Thus, the implications of choosing a set of projects on the basis of social cost-benefit analysis has to be clearly examined in terms of their impact on overall demand and supply positions in the economy. This is a necessary step that must accompany an investment programme consisting of projects selected through cost-benefit analysis (see section III for elaboration).

(b) The question of what types of commodities are to be produced and which industries are to be assigned priorities in a given context, i.e. the whole question of output composition cannot legitimately be claimed to be decided through social cost-benefit analysis (section IV). The broad output composition has to be independently decided in accordance with national objectives as well as the need for balancing aggregate demand and supply. Social cost-benefit analysis would then have a far more restricted role in determining which method of production is to be used for producing a given commodity. In other words, the choice of industries and the pattern of industrial development of a country cannot be satisfactorily decided through existing techniques of social cost-benefit analysis. However, social

cost-benefit analysis can play the limited role of identifying the best (or least cost) method of production within a given industry. It follows that in financing public investment projects, the external agencies should raise the narrower but sharper question of why this method of producing (say "steel") and not that method; but they should generally desist from asking the wider question of why "steel" and why not fertilizer instead. It must be recognized that the present state of knowledge in social cost-benefit analysis cannot provide a satisfactory answer to the latter type of question (see section IV).

(c) One should try not to apply a uniform standard of rigour in selecting projects for financing irrespective of the scale of the project. Thus, the same elaborate cost-benefit procedure with all the earlier pre-feasibility to feasibility studies need not be insisted upon both for a "small" and a "large" project, particularly in countries which are relatively scarce in such skills. Instead, an attempt should be made to introduce complications by stages in the evaluation procedure, depending roughly on the size of the project. In other words, there should be some notion of "successive approximation" in relation to the information base and size of the project, where for "smaller" projects more approximate methods of evaluation should be acceptable. In the absence of such flexibility in approach, one may indeed end up by encouraging heavy bureaucratization and unnecessary lengthening of the project selection procedure (section IV).

(d) Although use of existing international prices has a superficial appeal of simplicity, it is imperative to realize that they also reflect the existing international pattern of trade and international division of labour. Industrialization of a developing country is often an attempt to break the existing status quo and blind reliance on existing international prices in selecting industrial projects indirectly prevents a developing country

from achieving such structural breaks (section IV). However, this conflict would be far less sharp if the autonomy of a country in deciding its output composition is recognized by the financing agents. But to insist only on the "discipline" international prices without emphasizing at the same time the relative autonomy of a country in deciding its broad output pattern and industry composition is to leave oneself open to the charge of being biased against attempts at structural transformation by a developing country. For it boils down to a support of the status quo in the existing international division of labour which is unacceptable to a developing country.

(e) Attempts at structural transformation are a long process over time and there are significant dynamic "increasing returns" in terms of skill formation, development of technological capability, absorptive capacity etc., particularly in the field of industrial development which accompanies such a process. Without a minimum "critical mass" of investment being steadily sustained over a long period of time, these advantages of dynamic increasing returns cannot generally be expected to accrue to a developing country (section IV). This, in turn, requires the external financial agencies to recognize that it is crucially important to examine and support an overall investment programme over a period of time, rather than isolated projects. The commitment to long-term programme financing is then an essential element of genuine international co-operation where social cost-benefit analysis alone does not provide an adequate basis for reasoned judgment.