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Project Appraisal and Planning Twenty Years On

I. M. D. Little and J. A. Mirrlees

This paper discusses the use and usefulness of social cost-benefit analysis. It briefly recalls the main features of the procedures put forward in the book by the authors and addresses some of the issues that have arisen in theoretical work since the early 1970s, particularly the implications of uncertainty. An analysis of the value of project appraisal under uncertainty is provided. The rise and decline of project appraisal in the World Bank and elsewhere is charted, and reasons are considered. Particular attention is given to the difficulty of using shadow prices and to the institutional environment. It is argued that evidence from analysis of the World Bank's projects is consistent with placing a high value on the process of economic appraisal. The costs of appraisal are noted, as is the need to avoid excessive complexity. The paper argues for the importance of an economic appraisal system and of attending to the incentives that operate in such a system.

In the late 1960s there was considerable development of methods for applying social cost-benefit analysis to investment in developing countries. In the 1970s, these methods began to be applied. From 1974 to 1982 there were massive public sector investment booms in many of the developing countries. It appears that much of this investment yielded little or nothing. Were the methods flawed in principle? Were they ignored? And if so, why? Was the possible effect of project appraisal swamped by unforeseen events that rendered potentially valuable investments useless? We do not provide definitive answers to these questions, but we hope to contribute to their answers by discussing the current state of the theory of project appraisal and the current practice and influence of social cost-benefit analysis, particularly within the World Bank.

I. REFLECTIONS ON THE PRINCIPLES OF PROJECT APPRAISAL

In our book (Little and Mirrlees 1974) we provided a method for social investment decisions. In brief, we proposed the following techniques:

I. M. D. Little is emeritus fellow and J. A. Mirrlees is professor of economics at Nuffield College, Oxford. The title of the paper alludes to that of their book on project appraisal; the paper does not deal with planning directly. The authors wish to acknowledge discussions with economists in the World Bank and with J. D. MacArthur, J. M. Healey, and J. Wilmshurst.

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- Measuring the values of outputs (benefits) and inputs (costs) with shadow prices
- Using border prices as shadow prices for traded inputs and outputs, or—in cases where demand or supply is not independent of price—using the marginal revenue or cost to the country in foreign exchange, as a first approximation
- Where possible, using costs, themselves measured at shadow prices, as shadow prices for nontraded inputs
- Using conversion factors, estimated separately for a number of different broad categories of inputs and outputs, to calculate shadow prices from market prices for most minor inputs and outputs
- Using as shadow wage rates (SWRS) market wage rates discounted by a conversion factor estimated from an overall study of the economy, and depending in particular on a judgment that public income is more valuable at the margin than private income
- In cases where no other rule is applicable, using a standard conversion factor (SCF) to deduce the shadow price from the market price, to be estimated by comparing (domestic) market prices with border prices for traded goods, and others for which a sound estimate of the shadow price is available
- Estimating the private and public parts of the net (social) costs and income of the project, so that private income and costs could be discounted relative to public income and costs, and giving a low weight to private profit income
- Basing the shadow prices used on forecasts of border prices and market prices, not usually on their current values
- Discounting net social profits so calculated by means of an accounting rate of interest (ARI) that is high (or low) enough to be expected to ration investment projects in the whole economy to the funds available—a rate that could well vary over time—but in no case using a discount rate less than the rate available for investment in international capital markets
- Allowing for uncertainty only to the extent that the profitability of the project was expected to be correlated with the general state of the economy
- In the case of large projects, allowing for changes in prices brought about by their introduction, and estimating the incremental value of outputs and inputs by “surplus” calculations
- Converting all external effects of the project to numerical terms by making some estimate of the cost or value in terms of public income and including them directly in the calculation of the present social value of the project.

These features of the method proposed had grown out of wide debate and discussion among economists. Other studies of cost-benefit analysis which reflected that debate in their own way differed in some respects, but there was much in common.¹ We attempted to provide a systematic procedure that would

1. See, for example, the famous UNIDO Guidelines (UNIDO 1972), written by Dasgupta, Marglin, and Sen; work by international trade theorists, much of it presented in Corden (1974); a notable series of studies by Arnold Harberger, collected in Harberger (1972); other work collected or referred to in the useful collection by Layard (1972); and an earlier formulation of our own, Little and Mirrlees (1969).

correct all the important distortions. The method we proposed is not a theoretical ideal. It was intended to be practical, and therefore it simplifies and approximates. Even so, some aspects have been found hard to implement. In later sections we discuss implementation. The present section deals with some aspects of these methods, particularly the more controversial features.

An extensive literature in the last twenty years has subjected the methods, or at least some of the principles embodied in them, to critical analysis.² Arising from that, there are some respects in which expansion, development, or revision of these procedures seems to us to be warranted. But to a large extent we stand by them.

Traded Goods

Much of the literature on methods of social cost-benefit analysis has concentrated on the issue of optimal shadow prices under perfect certainty. Squire (1989), in the *Handbook of Development Economics*, concludes that the literature has shown that the border price principle for traded goods is quite robust.

In the case of a small country, for which border prices are essentially independent of the amounts imported and exported, quite weak assumptions are sufficient to justify the border price principle. When price varies with the amount of trade, it is not exactly right to use marginal revenues and costs. This was pointed out in Little and Mirrlees (1974, p. 229), but it has tended to be neglected. A more extensive treatment has been given in Bhagwati and Srinivasan (1978). The point is that the change in exports, say, affects not only the price received by the country in world markets but also the prices received by domestic producers and paid by domestic consumers, for these prices are generally linked—by taxes, or by the workings of price control systems—to the world price. These changes in market prices involve changes in the welfare of consumers and the actions of producers that ought not to be neglected. The calculations required in principle are similar to those required for the correct pricing of nontraded factors of production. The attractive idea that one could look only to the external environment when estimating shadow prices is not justified—or, at least, it is not exactly justified.

This is only one example of the widespread effects that should in principle be estimated to calculate shadow prices. Although it is reasonable—in the absence of a good applicable model of the economy—to guess that these hard-to-trace effects would not much modify a first approximation based on marginal foreign revenue alone, that is a guess, warranting at least testing in plausible models.

Nontraded Goods

A major simplifying idea behind the shadow pricing methods suggested is that given an estimate of the shadow wage rate and an estimate of the accounting rate of interest, it would be possible to calculate shadow prices for many nontraded

2. Two recent surveys (Drèze and Stern 1987; Squire 1989) give accounts of the literature, particularly on shadow pricing.

goods on the basis of input-output data, describing costs of production. This is based on a general principle that the shadow price for a commodity produced under competitive conditions and constant returns to scale is equal to its average cost, calculated using the shadow prices of the inputs into its production (including labor and capital).³

Granted the often reasonable approximations of constant returns and competitive conditions, this social cost principle seems common sense, but there is a hidden difficulty—one that has struck economists who consider economies in which the number of traded goods appears to exceed the number of nontraded goods and factors—too many equations chasing too few unknowns.

The difficulty can best be brought out by contemplating a strikingly unsatisfactory, but not unrealistic, state of affairs. Suppose that two private producers are producing the same commodity, using only labor as an input, and one of them is more efficient than the other. Suppose also that subsidies are provided to the less efficient, so that in fact both firms operate. Costs of production in the two firms are different, when measured using shadow prices. Therefore, the social cost principle does not give an unambiguous rule for calculating the relationship between output and input shadow prices.

The analysis of Diamond and Mirrlees (1976) assumed that equilibrium was unique. This is a common assumption, but it is not always warranted. In the situation described, we can only say that the appropriate output shadow price depends on what will actually happen when demand for the product changes. Marginal social cost should be calculated, but what that is depends on the shares of the two firms in the change in aggregate output. There is no good reason to expect marginal cost to be equal to average cost in this case.

The main areas in which these considerations are relevant is when import substitution is subsidized or when quantitative controls are used to achieve the same effect. Then the border price principle is correct when trade can be expected to adjust to changed demand. Otherwise, economic theory cannot predict how much domestic production will be allowed to supply. The project appraiser has to guess what will be allowed to happen. The appraiser should also make recommendations about sources of supply and point out the possible impact on the value of the project. The right answer to the project question may not be yes or no, but rather “only if these inputs are imported instead of being produced domestically.”

The social cost rule is incomplete in the sense that it does not enable appraisers to calculate theoretically satisfactory shadow prices for all goods. Sieper (1981) and others have found relatively simple rules that may sometimes be used for calculating the shadow prices for nontraded goods in some of the more difficult cases (for the main results of Sieper's unpublished paper, see Squire 1989). The last resort is to derive the shadow price from the market price by applying a standard conversion factor based on comparisons of shadow and market prices for commodities (such as traded goods) where the shadow price

3. A general theorem with this consequence was proved formally in Diamond and Mirrlees (1976).

has been satisfactorily estimated. Despite the weakness, we believe that our proposals take good care of the major distortions. In the simplest terms, our rules would not permit projects making cars at a greater foreign exchange cost than by direct purchase abroad.

Another aspect of the social cost procedure has drawn comment (see, for example, Srinivasan 1982). It is essential for applying the principle that there be some means of making prior estimates of shadow wage rates and discount rates. We proposed basing these on simple macroeconomic models, and calculations of that kind have been done for one or two countries. (In other cases, estimates of conversion factors for other countries have been used, and the ubiquitous 10 percent accounting rate of interest does not derive from any serious model.) There is no economic theorem that says that the strategic shadow prices calculated in this way are, in some sense, best unbiased estimators; nor is it easy to conceive how such a theorem could be formulated. As with other features of practical welfare economics, the recommendation to use simple macroestimation is essentially intuitive.

Income Differences

The presumption that public income is more valuable than private income has been challenged. That presumption forms the basis for arguments that the shadow wage rate should be a substantial proportion of actual wage rates (after adjusting from market prices to shadow prices for consumption goods).

The reasons for it were, first, that government could use additional revenues for further socially profitable investment to a greater extent than private income earners; second, that there are administrative costs to raising tax revenue; and, third, that raising tax revenue creates distortions. The first consideration is weak for countries in which public income seems to be spent on, or diverted to, many objects of little value. The second is not very large. The third argument, which is emphasized by Squire (1989), seems to need further analysis.

Claims about the cost of public funds in developed countries that are based merely on the existence of distorting taxes are invalid. In any economy there are distorting taxes on labor and commodities. Revenue is rightly raised that way, because discriminating lump-sum taxes are not possible. In many economies there also are elements of the tax system, such as income tax allowances, that approximate a uniform lump-sum subsidy. If that uniform subsidy is at an optimal level, then a public expenditure that brings about equal income increases for a representative sample of people is just as valuable as a project that increases public income by the same amount. That is because one can be transformed into the other, at the margin, without distortion. Projects that augment private incomes, however, generally do so differentially, though not necessarily benefiting the rich more than the poor. Taking the usual view of the relationship between income and welfare, private income changes accruing to those above mean income levels are worth less than public income changes; but in the opposite case, they are worth more.

The above argument may not be very relevant for developing economies,

where scarcely any policy tools approximating a uniform subsidy exist. Typically, a reduction in government income or rise in expenditure would be offset by an increase in the "inflation tax," or, after some delay, by taxes on consumer goods, reductions in other public services, or indeed a cutback in investment. Again, a judgment on the relative value of public and private income turns, in part, on a welfare judgment of the relative value of income to people with different incomes.

When changes accrue to those of average incomes, a useful guide is the Ramsey model of an economy with identical individuals and all government revenue raised by taxes proportional to sales and purchases of commodities (that is, no tax allowances or general subsidies). For such an economy, plausible specifications of consumer preferences yield a 20 to 40 percent premium for public over private income. (One attempt to estimate this for the U.S. economy is Ballard, Shoven, and Whalley 1985.) When private income accrues to those with incomes much above the income of the average taxpayer (often quite a low income level in developing countries), its value relative to public income is correspondingly lower.

Uncertainty

It has been argued that careful project appraisal is worth little when uncertainty about the project and about the environment within which it will operate is great. Project appraisal is costly, and the benefits of better decisions could fail to justify that cost. But it is by no means clear that the benefits of improved decisions are slight in a *very* uncertain environment. We have considered this question and find that there can be a reduction in the value of appraisal because of general uncertainty. But in principle it remains considerable.

One can think of cost-benefit analysis as the elimination of error—not all error, but some of the error implicit in decisions by hunch or apparent financial profitability. A theory of these matters is sketched in the appendix. It is shown, using a plausible simple model, that in the context of project appraisal, we should expect some reduction in the value of appraisal when general uncertainty is greater. A simple rule of thumb for judging the benefit is developed. It says that the value of a system of project appraisal is (at least) 10 percent of the standard deviation of the errors removed by appraisal, multiplied by the ratio of that standard deviation to the standard deviation of errors not removed. In section III below we discuss some evidence suggesting that the ratio of these standard deviations is around unity. The variation in observed rates of return is very great. It is not implausible to suppose that the standard deviation of errors removed by appraisal is at least a quarter of the mean net value of projects. With good appraisal it ought to be much more. On that basis, one can claim that appraisal is worth at least 2 percent of the mean net value of projects appraised.

In our book on project appraisal, we recommended allowing for uncertainty by subtracting from the expected value of net social profitability of the project in any year an amount equal to $A \cdot \text{cov}(P, Y) / E(Y)$, where $\text{cov}(P, Y)$ is the covari-

ance between social profit P and national income Y , $E(Y)$ is the mean expected value of national income, and A is a measure of risk aversion known as the coefficient of relative risk aversion, for which we suggested the value 2. Another way to express this is to suggest that the net value of a project in a year be taken as

$$(1) \quad E(P)(1 - A \cdot r \cdot CVP \cdot CVY)$$

where r is the correlation coefficient between the project's social profits and national income, CVP is the coefficient of variation (ratio of standard deviation to mean) for social profit, and CVY is the coefficient of variation for national income. The justification for these rules is provided in the appendix.

Estimating these correlation coefficients and variances and means is a matter of skill, requiring training, not least in the concepts and judgment of appropriate values in well-specified examples. Frequently there would be very little data to go on. One could use data for similar industries in similar countries where there is more relevant experience. The task is essentially equivalent to the use of "beta coefficients" by financial managers, and it is as hard or easy as that.

Some allowance for uncertainty should be made, though it seldom is. The appropriate allowance can be substantial, especially in the later years of a project. But for most countries, the coefficient of variation for national income is not very large, looking forward for a decade or so, if one may be guided by time series; and therefore in most cases the allowance for uncertainty is not a large adjustment in the value of the project. It should be noted that the allowance could take the form of an increase in the value of the project, if it were negatively correlated with national income.

In our book we also pointed out that allowance should sometimes be made for inflexibility, for the cost of irreversible commitment in projects, though we claimed that such an adjustment should seldom be required. We probably understated the importance of this consideration (see Henry 1974 for an analysis). In a sense, the issue of flexibility is the desirability of continuing appraisal during the life of the project. At the time of initial investment appraisal, the project can develop in many ways; and some projects have more possibilities of development and adjustment than others. The more flexible projects are worth more for that reason. How much more they are worth depends on how much, and when, flexibility is expected to be exercised.

Because of discounting, flexibility that can occur only after decades (as in the choice between projects that are long-lived and ones that are not quite so long-lived) is not likely to be worth a great deal. Flexible response to variations in prices may well be exercised before many years have passed. Granted the great uncertainty in many prices, such flexibility may be of considerable value. The specific rules we listed in our book neither draw attention to this nor provide rules of thumb for evaluating it. In principle, flexibility is already valued in the estimation of expected profit, because the probability distributions of social profit for various more or less flexible projects or programs should have been

compared, allowing for the response of the project to varying circumstances. But project reports seldom if ever allow for responsive alteration in production, such as closing (temporary or permanent) or expansion. They should.

At least they should when it could be important. But this seems to be a difficult and costly task. For a substantial price, consultants will construct a model and do a computer simulation of many alternative futures. It may contain many fairly arbitrary assumptions, and it may ignore shadow pricing, which is likely to be quantitatively even more important. In large projects, where flexibility could be substantial in the first two decades, it may be worth attempting such an analysis, but the appraiser needs to keep close track of just what possibilities are being simulated. This is an area in which it is too easy to make spurious claims which add to the apparent value of the project.

Appraisal Incentives

This last line of thought brings us to the question of the environment within which project appraisal itself may operate. Appraisers—like workers, managers, and politicians—have their incentives, and they may be expected to respond to them. Space allows little systematic discussion here. The obvious difficulty is that appraisers will be judged on the number of “good” projects they find relative to the numbers others find. More and more often, as a system of appraisal operates, the standards on numbers of projects found will be based on past performance, and it will not be surprising if arguments and analysis are shaded to continually increase that number. As we discuss below, such a phenomenon appears to have occurred in the World Bank. We have no doubt it has also occurred elsewhere.

The difficulty is that the obvious basis for incentives—comparison of appraisals with results—is almost impossible to use, because of the great length of time that elapses between initial recommendation and final results. And if comparison is used, the reappraisal process could be corrupted. There are other possibilities: independent reappraisal of randomly selected projects shortly after the original appraisal, or explicit grading of project appraisals by quality, as judged by independent inspectors, paying attention not only to analytical method and conformity to standard procedures but also to checking the empirical basis of the appraisal. If good project appraisal warrants expenditure of resources, as we argue in the appendix and in section IV, so does good appraisal of appraisal. We do not argue for any further levels of appraisal, though that raises an interesting question.

II. THE RISE AND FALL OF COST-BENEFIT ANALYSIS IN THE WORLD BANK AND THE STATE OF THE ART ELSEWHERE

During the 1970s there was a remarkable development of both the methodology and the use of shadow pricing in estimating the true national value of projects in economies in which, primarily because of government taxes and

controls, the allocation of resources was distorted. This happened first because of an increasing realization of the degree of these distortions, and second because of a desire to apply systematic decision procedures where previously there had been haphazard action and arbitrary plans. We would claim that our development of a method by which a set of consistent shadow prices could be estimated had some part in it (Little and Mirrlees 1969; Dasgupta, Marglin, and Sen were also devising guidelines for project appraisal; see UNIDO [U.N. Industrial Development Organization] 1972). Within two or three years most donor agencies and a few developing countries were using some simple version of the methodology. But among donor or lending agencies the methods were most fully used and further developed by the World Bank (the first major demonstration of how to estimate a full set of shadow prices was by Scott; see Scott, MacArthur, and Newbery 1976). The World Bank's own version of the methodology was published in Squire and van der Tak (1974). This methodology incorporated "social" prices whereby consumption was weighted according to the income of the consumer. If such distributional weights were not used, then the shadow prices were (tendentiously) called "efficiency" prices. Efficiency pricing was based on the remarkable and extreme presumption that a dollar's worth of consumption had the same social value to whomsoever it accrued. Efficiency prices were also based on the presumption that all kinds of income and all uses of income were equally valuable. Our book (Little and Mirrlees 1974), which also incorporated distributional weights, was published at about the same time. But it is important to note that Little and Mirrlees (1969), which did not use distributional weights, had not assumed that all *uses* of income were equally valuable. As in UNIDO (1972), investment was presumed to be worth more than consumption. In Little and Mirrlees (1974) the numeraire was changed to uncommitted government income, which was also presumed to be worth more than average consumption.

A battle raged in the World Bank during the 1970s about whether social prices should be used. Formally, the "social price brigade" won, in that guidelines on the use of distributional weights were actually incorporated in the *Operational Manual* in 1980. In practice, we believe, they were hardly ever used except in an experimental manner in a few cases. But aside from this battle, there was a good deal of debate, interest, and research. Guidelines flowed from the Central Projects Department under Warren Baum, which also ran a long series of workshops. With or without distributional weights, a fairly full set of sectoral conversion factors and shadow wage rates was estimated by staff members or consultants for nearly twenty countries. The use of the foreign exchange numeraire became standard practice in the World Bank and remains so.

Multiple conversion factors are an important, indeed essential, feature of the Little-Mirrlees and Squire-van der Tak methodologies. We suppose that they were used for the countries for which they were estimated. Shadow pricing in the World Bank reached its apogee around 1981. Yet, inspection of a sample of completion reports of projects approved in the 1970s suggests that the Squire-

van der Tak system was far from being fully adopted, either intensively or extensively. Many country economists were still unconvinced, either because they were overworked or lazy or because they were genuinely unsure of the usefulness or validity of the system. At the same time, there have always been senior World Bank staff members who have remained suspicious of economic analysis, especially when it conflicts with their hunches about what is good for development—whether it be integrated rural development, afforestation, or steel plants.

In the 1980s there was a decline in the use of shadow pricing at the Bank. In terms of interest, attention, guidance, supervision, and research, the decline is steep. The change in actual working practice may be less dramatic. We say this partly because the Bank, even at the apogee, had been less than thoroughly permeated by the Squire–van der Tak methodology, and partly because it is difficult to describe the present state. This difficulty stems from the fact that there is no longer a Central Projects Department, offering common advice and exercising common quality control over project appraisals. We do not know whether regions now diverge significantly, but we guess probably not (or not yet, anyway).

There have always been sectoral differences, particularly in the case of power (but also telecommunications and water supply), and these remain. The benefit of power is generally taken to be measured by what it is sold for. This must often yield an underestimate of benefit, where tariffs are controlled at low levels. We were told during interviews we conducted at the World Bank in the process of writing this paper that the World Bank's loans are made conditional on tariffs being raised (though such conditions are not always fulfilled) if this is required to show a 10 percent return. In fact we found one appraisal report of a hydroelectric project in which the benefit was reckoned to be the cost of power from a thermal project (based on imported oil); the benefit was thus grossly overestimated, because the World Bank grossly overestimated the future price of oil. We have mentioned this methodological divergence because we return below to the proper appraisal of power and other nontraded goods projects.

However difficult they are to make, some general propositions as to present practice are essential, although we have not made sufficient inquiries to be sure they are altogether correct. We believe the following:

- Social pricing, using distributional weights, has been abandoned.
- No distinction is made between public and private income, or between the uses of income—whether saved or invested.
- Sectoral conversion factors are rarely if ever calculated and used.
- Shadow wage rates are not systematically used or estimated.
- The values of nontraded goods are mostly converted to border values by a single standard conversion factor. To put this in another way, there is seldom if ever any attempt to estimate the actual foreign exchange consequences of using or producing particular nontraded goods. It is also equivalent to saying

that the relative prices of nontraded goods are assumed to be undistorted (except perhaps that taxes may be subtracted).

If the above propositions are correct, they amount to saying that apart from the cutoff economic rate of return, only one shadow price—a standard conversion factor or shadow exchange rate—is used (and it is unclear how this is estimated, or whether it is estimated in the same way for different countries). This is probably not very different from the practice in the 1960s, when shadow exchange rates were used (and even shadow wage rates) when required to make the rate of return good enough. The only important improvement may be some greater use of border prices for tradable goods. It is doubtful whether the World Bank can now be said to have a standard methodology. It is certainly not that of Squire and van der Tak (or of Little and Mirrlees, or even of UNIDO.)⁴

Before speculating about the reasons for this withering, we briefly survey the situation in the regional banks and other donor agencies, and in developing countries. Here, nothing much seems to have changed in the past ten to fifteen years. There was no buildup of interest and development of the methodology similar to that in the World Bank, nor consequently any subsequent withdrawal. Those adopting in the mid-1970s a limited version of Little-Mirrlees, whether directly or following the World Bank, include the Asian Development Bank (ADB), the Inter-American Development Bank (IDB), the Overseas Development Administration (ODA) in the United Kingdom, and the Kreditanstalt für Wiederaufbau in Germany. Japan also claims to follow the World Bank. France and the European Commission still use the “effects method,” despite its errors, as pointed out by Balassa (1976). Other countries seem to follow no particular methodology, or hardly use cost-benefit analysis at all. The Canadians and the British agree, however, that most consultants are familiar with the World Bank methodology and use it (and the British add that they are required to do so).⁵

The IDB is still active in calculating national parameters using input-output methods. Current work apparently includes estimates for Colombia, Panama, and Venezuela. But we do not know what use in practice is made of them. Apart possibly from the IDB, the British ODA seems to be the most persistent upholder of the principles adopted in the mid-1970s. It also appears to be more convinced of the practical value of the methodology than other agencies. A third edition of the ODA's *Appraisal of Projects in Developing Countries* (ODA 1988) retains guidelines for the calculation of sectoral and other conversion factors, for shadow wages, for the incorporation of different values for saving and investment, and for the use of distributive weights. Although the latter two adjust-

4. In a recent Development Assistance Committee review of *Project Appraisal Criteria and Procedures* (Development Assistance Committee, OECD 1987 [87]11), the methodology used by the World Bank is described as being that of Squire and van der Tak. Presumably the World Bank supplied this information, but it seems to be more of a travesty than the truth.

5. These observations are based mainly on Development Assistance Committee, OECD (1987); interviews with the United Kingdom ODA staff; and hearsay (for the ADB and IDB).

ments are rarely used, examples are given of the careful calculation and use of multiple conversion factors.

Information on the state of the art in developing countries is spotty. Chile, partly inspired by Harberger (1972), has a well-developed system of appraisal operating at all government levels. In India, the project appraisal division of the Planning Commission continues to operate, but it appraises only about one-third of public sector projects. Lal (1980) worked out a full set of national parameters, but practice has degenerated to the use of a single shadow exchange rate which never changes. The Development and Project Planning Centre, University of Bradford, has recently on request calculated national parameters for Ethiopia and Jamaica. Work has begun on China and Sri Lanka.⁶ Squire (1989) reports on the basis of information from World Bank staff members that (of twenty-seven countries surveyed) Côte d'Ivoire, Ethiopia, Republic of Korea, Pakistan, Philippines, Sierra Leone, Thailand, and Yugoslavia undertake project appraisals using shadow prices (how rigorously is not clear). Personal information suggests that Malaysia should be added to the positive list.

We here mention some reasons for the rather poor penetration, because they differ from reasons applicable to the World Bank and other lending agencies. Public projects derive from ministries or other agencies with departmental, sectoral, or regional interests (not to speak of personal, monetary, or political interests, which also sometimes intrude). Only the central government and the ministries of planning or finance can at best be expected to look to the national interest. Some conflict is inevitable and essential, because project proponents do not welcome central control, which constrains the extent to which they can make projects serve their own purposes.

Even financial control has proved difficult in many countries, and soft budgeting has resulted in the subsidization of many decentralized agencies. So a central system of project appraisal must always be unpopular, and therefore it needs strong political backing at the highest level. This may be lacking for many reasons, among them the fact that at least until very recently many planners and politicians in developing countries sensed that the methods proposed would conflict with the import-substituting industrialization policies that were at the heart of their development philosophy.

III. SOME REASONS FOR THE DECLINE OF INTEREST IN SHADOW PRICES AND COST-BENEFIT ANALYSIS IN THE WORLD BANK

The decline proclaimed in the title of this section assumes that the general propositions of the previous section are not very far from the truth. If so, it is a shattering indictment, because a shadow price is the marginal effect on social welfare of any quantity change. Shadow prices are fundamental to the evaluation of policy changes, not merely investment projects. This is well recognized in

6. We are indebted to J. D. MacArthur for this information.

the normative theory of taxes and subsidies, but it also applies to the evaluation of quantitative controls—quotas and rationing.

Shadow prices and cost-benefit analysis are inseparable. Sometimes actual prices coincide with their shadow values, as if on the equator in the midday sun. Only then is financial analysis also cost-benefit analysis. For public sector projects and enterprises, a decision has to be made about pricing. A good guideline is to make prices coincide as nearly as possible with their shadows, which requires knowledge of the shadows. Sometimes, however, it is impossible or obviously undesirable to charge at all—for example, in the case of most roads. But the shadows are still required to plan the roads.

It is sometimes argued that the thrust of policy should be to get the prices right, and it is suggested that this is an argument for forgetting about, or at least deemphasizing, shadow prices. To the extent that activities are private, and there is no price or profit control, this is feasible and may be desirable. But in the public sector, or whenever there is public regulation, getting the prices right implies knowing the shadow prices.

*Less Room for Project Analysis? The Growth of Nonproject,
Health, and Education Loans*

Despite the importance of our introductory remarks, cost-benefit analysis and shadow pricing are closely associated with investment projects, in the normal narrow sense of the word *project*. The decline of interest may thus be related partly to the relative decline of project lending. Structural adjustment loans and other nonproject loans—such as those to development finance corporations—account for an increasing proportion of World Bank lending. There may also be no identifiable project in the case of sectoral adjustment loans. In the case of loans for health and education, no economic rate of return (or present value) is estimated; shadow pricing is still relevant for cost effectiveness, but we do not know whether it is used. In a few countries—such as Brazil—World Bank lending now includes almost no projects to which cost-benefit analysis can be applied. Nevertheless, overall, there are still a great many projects, and, furthermore, sectoral adjustment loans also lend themselves to analysis that makes use of shadow prices. The growth of forms of lending other than straight project loans has probably caused a diversion of attention out of proportion to their relative importance.

Institutional Reasons

The World Bank is a relatively unsuitable and unstable institution for time-consuming and dedicated quality control (via technical and economic appraisal at all stages) of the investments it finances.

Ironically, in the 1970s, when the World Bank's Central Projects Department was trying to engineer an improvement in economic analysis, its president, Robert McNamara, was presiding over a huge increase in the volume of lending, which put pressure on country and project staff to get enough projects

approved. There is no doubt that this created tension. When the pressure is on to get the money out, it is not surprising that demands for more complex analysis are unwelcome. Worse than this, project analysts would never get promoted if they were honestly compelled to report unfavorably on several projects. Promotion would come from writing good reports that would help steer the project through the processes of approval, and not from improving projects or improving project selection. Economic rates of return (errs) on projects became more and more optimistic, without justification. No one we have spoken to denies that the incentives facing the staff worked toward a deterioration in the quality of project work or asserts that this was a trivial matter; it is well known as the "McNamara effect." It parallels what was happening in the commercial banks.

The present situation is not very different. The World Bank is again under pressure to lend, because of the debt crisis. The debt crisis has in turn arisen largely because the massive lending from 1974 to 1982 was matched by investments that turned out to have very low or negative returns. Almost all developing countries raised the share of investment in gross national product (GNP) in this period, some by a great deal, and the increase was predominantly in the public sector. The World Bank was not immune from promoting or supporting some very bad investments, for which its own price projections were partly responsible.

The reorganizations of the World Bank in the 1980s have clearly contributed to the decline of cost-benefit analysis. There is now no Central Projects Department to promote common methods and to exercise quality control. Regionalization need not, of itself, have had this result. But it has. There is now no fully independent watchdog over the quality of project work. We have the impression of widespread deterioration. This is not only in economic analysis. Fewer resources are apparently devoted to project work. There is, we are told, less continuity and expertise in project teams than earlier on. Technical, financial, and institutional analysis may all have suffered. Obviously economic analysis would not be immune.

New Concerns

New concerns may have complicated the project analyst's task. There was a new emphasis in the 1970s on projects that would benefit the poor directly. Cost-benefit methods were adapted to make the poverty impact quantifiable and to integrate it into the cost-benefit analysis. That this has been rejected reduces the work load, for it is difficult to trace the beneficiaries of a project and assess their wealth. Yet we gather that for some kinds of projects, the analyst is still expected to do this (only, having done so, the analyst must not apply weights to these differential benefits—it could be argued that this is incurring the costs of the analysis without the benefits). Now the development of women has been added as a project concern. Surely this is an irrelevant consideration in most projects. Then there is the environment. All effects of a project—including on the development of women and the environment—that might seriously affect its

value should always be considered and quantified if possible. But there is a cost to insisting that in all cases the appraiser should be seen to have spent considerable resources on trying to identify kinds of consequences that are unlikely to be of any importance. This is not to say that apparently remote environmental damage may not be large and important. In some areas, the specialist's assessment of these magnitudes is much to be desired.

Sustainability has come to be used in recent years in connection with projects. This is more of a buzzword—probably derived from the environmental lobby—than a genuine concept. It has no merit. Whether a project is sustainable (forever?—or just for a long time?) has nothing to do with whether it is desirable. If unsustainability were really regarded as a reason for rejecting a project, there would be no mining, and no industry. The world would be a very primitive place. In defense of sustainability, it will be said that the concept has drawn attention to some often disregarded reasons for project failure. But it seems much better to detail what these reasons are.⁷

We were told in our discussions with World Bank staff that on occasion the same analyst would give a project a high ERR but would say it was unsustainable. Of course a reason for this could be that sustainability was irrelevant, as with the possibly rapid extraction of an ore body. But this is not what was meant. What was meant was that the same analyst could give a project a high ERR but could also say that it would probably fail (that is, end up with a low ex post return). This could arise because the project analyst, wearing the hat of ERR analyst (rightly), thinks that it is up to him to take account only of limited kinds of risk—for example, that future prices will be worse for the project than predicted, or that agricultural response has been overestimated. The analyst does not, in writing a project report, assess such risks as that the dictator will be shot and the subsequent economic management will be so muddled that a major slump will be unavoidable, or even that the economic administration will deteriorate to the extent that the project will be starved of funds for recurrent costs. He is also probably in no position to assess whether the country is overborrowing or planning more investment than it can possibly handle efficiently.

It appears that the “division” of labor is as it should be. The project appraiser should make it clear which risks have been taken into account and which have not. The appraiser or some other person familiar with the political and macroeconomic situation of the country (or maybe the administration of a sector) may comment that no project in that country (or sector) is at present likely to succeed, whatever the calculated ERR.

Methodological Defects

We have been considering some institutional reasons for the decline of cost-benefit analysis. But cost-benefit analysis, or the World Bank's version of it, may have been its own worst enemy. The methodology may have been unsound. We

7. Sustainability is also described as a “central notion” in the extraordinarily vapid document, *Principles for Project Appraisal*, Development Assistance Committee, OECD (1988).

discussed this in section I of this paper. There was some sniping from theoretical perfectionists over the years. This may have reduced its acceptability, but probably only among those already disposed to attach a high value to comprehensive countrywide planning. Little-Mirrlees methods have stood up to intensive theoretical discussion remarkably well, and on balance the large outpouring of theory consequent on the original publication of Little and Mirrlees (1969) has confirmed the correctness of the authors' original intuitions.

The other way in which the methods could have been self-defeating is that they were too complex, so that the simplifications we have described may have been both inevitable and all to the good. This argument is best examined after reviewing the evidence provided by the World Bank's Operations Evaluation Department (OED). Here, we will remark only that simplification and theoretical soundness are not good bedfellows.

IV. EVIDENCE FROM WORLD BANK DATA ON THE VALUE OF COST-BENEFIT ANALYSIS

The World Bank's annual review of evaluation results for 1988 gives some information on nearly 2,000 projects approved in the period 1968–80 and subsequently evaluated. The World Bank's OED provides original appraisal ERRS and reestimated economic rates of return (RERRS) on more than 1,000 projects approved in the period 1968–80, together with figures for original and completed costs and expected and actual gestation periods. Gerhard Pohl and Dabrarko Mihaljek (1989) have analyzed these OED data, and this section draws on their work.⁸

RERRS are taken from project completion reports usually made by those responsible for the project, which could lead to bias. They will normally allow for known changes in capital cost and any known changes in the mix of inputs and outputs. But actual experience of operation either will be limited to a short period or will be nonexistent. Changes in price predictions also will be fed in. The difference between the ERRS and the RERRS is mainly a difference of expectation. The methodology of the estimation of the ERR will not normally be changed. Obviously, the RERR is very far from being a postmortem ERR.

To the extent that resources permit, the OED conducts an "audit" on top of the project completion report and ranks projects as "satisfactory" or "unsatisfactory". In the case of projects with calculated RERRS, there is in most cases a coincidence of an unsatisfactory rating and a RERR of less than 10 percent. But there are exceptions, in which a project with a high RERR is deemed unsatisfactory. In such cases it is clear that the OED does not believe the RERR. But it does not have the resources to make an independent estimate, so the incredible RERR is recorded.

8. Note that in many cases, the so-called economic rates of return are really modified financial rates of return. That is true for power, telecommunications, water supply (and possibly some other subsectors). It is important to remember this limitation in the following discussion.

Over the years 1968–80, there was a remarkable and continuous rise in appraisal ERRs. They averaged 17 percent in 1968 and 29 percent in 1980. There was no similar trend in average RERRs for projects approved in that period, which, apart from the years 1970 and 1980, were in the range 13 to 17 percent.⁹ As a result, a large gap between ERRs and RERRs has arisen and has excited some attention. It casts some doubt on the objectivity and stability of appraisal, there being no reason to think that investment possibilities were rapidly improving. The rise in appraisal ERRs was common to all regions and sectors but was most marked in Asia and Africa; and sectorally in agriculture and rural development and in transport and tourism. We do not know to what extent the apparent euphoria was genuinely felt, or to what extent it was due to the McNamara effect.

The RERRs of 1968–80 were calculated over the period from 1974 to 1988, with an average lag between approval and reappraisal of nine years. One would expect the RERRs to be importantly affected by the year of reappraisal, particularly by the euphoria that may have continued until mid-1982. After that, the reappraisers' expectations of project performance would surely have been scaled down, in view of the difficulties in which most developing countries found themselves, and all sectors would have been affected. Almost no projects approved before 1971 were evaluated in 1983 or later:

<i>Year of approval</i>	<i>Percentage of projects evaluated after 1982</i>
1971	16
1972	23
1973	35
1974	66
1975	86
1976	90
1977	92
1978	96
1979	98
1980	98

All other things being equal, one would expect, with scaled down expectations and with the rising proportion of reappraisals done after 1982, falling RERRs, especially for the projects approved from 1973 to 1976. The data do show low RERRs (13 percent) for projects approved between 1973 and 1976, but they then rise (to about 16 percent) for the projects with 1977, 1978, and 1979 vintages. We leave the reader with this puzzle. We do not have figures for appraisal ERRs in the 1980s.

9. We have no explanation for the high average RERR of 21 percent in 1970. We distrust the high figure for 1980 (24 percent), because relatively few projects approved in that year have been evaluated, and because there is a tendency for good projects to have short evaluation lags. We do not know how negative rates of return that could approach infinity are reckoned. From Pohl and Mihaljek (1989) it appears they may all be counted as minus 5 percent. In view of this arbitrariness, it would be useful to know the median rates.

The proportion of unsatisfactory projects is of interest, as are average RERRs. As we have seen, an unsatisfactory rating usually coincides with a RERR of less than 10 percent, but not invariably so. The average percentage of unsatisfactory operations among those approved in the period 1968–73 was 15 percent. In the period 1974–79, it was 23 percent. This deterioration occurred in all regions except Europe, the Middle East, and North Africa. It would be of interest to know whether this can be accounted for by a shift to more difficult sectors (agriculture and rural development) and regions (Africa), or whether there was some general deterioration in project identification and appraisal, again possibly resulting from the McNamara effect.

We turn to Pohl and Mihaljek's (1989) analysis. They regress RERRs on a number of independent variables, including ERRs. Except for regional and sectoral dummies, few of these variables are significant. The simplest equation of all, regressing RERR on ERR alone, gives a coefficient of 0.44 for ERR, which is highly significant, explaining 19 percent of the variance. Sectoral dummies for transport and urban projects are significant and raise the yield by 7 to 9 percentage points compared with agriculture. Regional dummies are also significant. Asian projects are better than Europe, the Middle East, North Africa, and Latin America, whereas Sub-Saharan Africa trails badly. But of course project appraisers know which region and what sector they are in. The coefficient for the appraisal ERR is hardly affected.

The essential findings of the analysis, relevant to assessing the benefits of cost-benefit analysis, are that there was an unjustified rise in revealed optimism about project returns in the 1970s; and that the ERR is a highly significant explanatory variable for RERRs, with a coefficient of 0.44, but it explains only about 20 percent of the variance ($R^2 = 0.19$).

The main conclusion drawn by Pohl and Mihaljek (1989, p. 32) is that "cost-benefit and rate of return calculations seem to be most useful in the case of large and capital-intensive investment projects. A sufficiently high minimum rate of return criterion, say 10 percent, will help to screen out large and capital-intensive projects with potentially low rates of return. But further refinements in the methodology, such as allowing for distorted prices resulting from overvalued exchange rates, while intellectually appealing, do not seem to make much difference in practice."

This conclusion is far from clear. Taken literally, it seems to suggest that all shadow pricing is futile and that even financial rates of return should be calculated only for large, capital-intensive projects. Worse, there is nothing in the analysis reported above that has any bearing on the conclusions. There was no analysis relevant to the question of whether refinement of method would improve ERRs (that is, make them better predictors of RERRs), or of whether such improvement would justify its cost.

Pohl and Mihaljek (1989, p. 32) do say that "this was also brought out by an analysis of industrial projects for which both financial and economic rates of return were available. Appraisal of financial rates of return were just as good a

predictor of ex post economic rates of return as ex ante economic rates of return. The adjustments for price distortions seemed to make little difference, at least for projects that had been accepted for World Bank financing.”

For this a statement is hardly enough: supporting evidence needs to be closely considered. It is hard to believe that one can do as well aiming at the wrong target. If so, it seems to be unnecessary to take thought at all. Pohl and Mihaljek's final twelve words should be noted. For industrial projects, the main point of shadow pricing is to spot projects in which financial returns are misleading, say, because of protection. If some of these are successfully rejected, there will be a bias toward some coincidence of financial returns and ERRs.

Taking the figures for pre- and post-project evaluations at face value, it is important to appreciate what the apparently low incidence of association between them is saying. A linear regression of the RERR on the ERR is not appropriate, or at least it is not to be interpreted in the way one might usually interpret a regression coefficient. To interpret the statistical results reported by Pohl and Mihaljek (1989) we need a properly specified underlying model.

A simple plausible model is that the ex ante and ex post estimates of rates of returns are attempts to assess the true value of the project, both subject to additive errors (multiplicative would be better, but Pohl and Mihaljek have used additive, and we are interpreting their results). We can interpret the regression as revealing the value that is common to the two observations. Write C for the common element of the two evaluations. It is subject to errors u and v , independent of one another, and of C . We then have $ERR = C + u$; $RERR = C + v$.

The regression coefficient of the RERR on the ERR is $\text{cov}(RERR, ERR) / \text{var}(ERR)$, where cov is covariance and var is variance. With this additive model, that is equal to $\text{var}(C) / [\text{var}(C) + \text{var}(u)]$. The regression coefficient therefore shows the proportion of total variability that is due to the common element.

At least that would be correct if the error, u , were independent of the common element, C . It is not. The common element is made up of the true value of the project and any source of error common to the two appraisals. Because the worst observations in the first round, having rates of return below 10 percent, are (largely) rejected, there is a negative covariance between the common value and the error u (assuming that the mean return in all projects assessed is above the cutoff value). The regression coefficient is then $\text{var}(C) / [\text{var}(C) + \text{var}(u) + \text{cov}(C, u)]$. This means that the regression coefficient actually underestimates the ratio of the common variance to the error variance.

We are interested in the variance of the true value of the project and the extent to which it seems to be picked up by these observations. We cannot directly tell how much of the common element is the true value and how much is the common sources of error. Because many sources of error (such as utilization estimates and prices) changed greatly between the two evaluations, we believe that the true value is a rather substantial part of the common value. All in all a regression coefficient of 0.44 for ERR, when regressing RERR on ERR alone in Pohl and Mihaljek's simplest equation, suggests that the variance of the true

value of the project may be nearly as large as the variance of error in an evaluation.

The “proportion of the variance explained” in the regression equation is the product of that regression coefficient and the corresponding one for $RERRS$. Even allowing for the selection bias, it appears that errors in the reevaluation may not be much less than errors in the initial evaluation. It should be appreciated that the low proportion of variance explained is in fact a compound of the error magnitude at the two evaluations. It is not surprising that it is as low as 20 percent. That is not in itself evidence of a particularly low common element.

These errors in the project appraisals are substantial, but they are not immense. Taken literally, they are quite good news for the users of project appraisals. We show in the appendix on uncertainty that the value of project appraisal can be measured roughly by taking 10 percent of the standard deviation of true project values, times the ratio of that standard deviation to the standard deviation of measurement errors. If the two standard deviations are of about the same magnitude, as seems to be implied by this data, the value of project appraisal is truly substantial.

Several considerations suggest that the data may considerably understate the precision with which projects can be appraised. First, we should not pay excessive attention to the average divergence. Given the World Bank’s selection methods, it makes no difference if a project yielding 20 percent was appraised at 40 percent. Excessive optimism is likely to be important only if it pushes a bad project over the 10 percent barrier. One would hope that around that level, appraisals would have been done with greater care. We believe that the association between $ERRS$ and $RERRS$ is greater around these low appraisal levels. More generally, the simple model we have used to interpret the data gives too much weight to outliers.

The data suggest some further observations, comparing the World Bank’s experience of evaluations with that of the countries for which they are done. Improving the World Bank’s portfolio may not improve that of the country. There is the problem of fungibility between project funds and the general budget. The value of project aid has often been called into question over the past forty years. Despite this long history, we do not know of any empirical work devoted to ascertaining first what difference is made to a country’s investment by the involvement of donors and lending agencies in project preparation and selection. We do not know how many projects are effectively invented by the World Bank (and whether these were particularly successful or unsuccessful); we do not know what happened to projects the World Bank rejected; and we do not know whether, if carried out, the projects had high or low returns.

It has been repeated ad nauseam that economic appraisal at a late stage very rarely stops a project. It must be applied early on to stop work on the project or to effect improvements in the design of a project that will finally go ahead. If one asks whether such improvements are made—and we have asked this question of a few people in the World Bank, in ODA, and in India’s Project Appraisal Divi-

sion of the Planning Commission—one is always told that they are. But there is no way of assessing the magnitude of this benefit of the appraisal process, which is already incorporated in reported ERRS and helps the borrower even if fungibility were complete.

Thus we do not know to what extent the high average RERRS on World Bank projects are achieved because the World Bank improves projects or invents good projects, and to what extent they come simply from skimming the cream from the country's own proposals (nor do we know whether the World Bank helps the country to achieve a higher-yielding portfolio by convincing it not to go ahead with unpromising ventures the World Bank rejects).

There is a lot we do not know. There is no doubt, however, that the World Bank's average RERR is high for the projects of the 1970s—about 16 percent. Of course, as we have pointed out, RERRS are not true *ex post* rates, which may be significantly lower. Even if the true return is several percentage points lower, it would still be above the real foreign borrowing rate (an ERR calculated using border prices and conversion factors for nontraded goods will be a good approximation to the foreign exchange yield). This is more than one can say for total investment in many, if not most, developing countries. Because almost all did use their borrowing to support or raise the ratio of investment to GNP, there would be no debt crisis if total investment had yielded even half that of the World Bank-financed investments.

India is a country with no debt crisis because it did not borrow commercially until recent years. India engineered no foreign-debt-supported public investment boom, as did many other countries in which the rise in investment was so rapid that it can only have been hastily planned and executed. But, in work in progress, Joshi and Little (1990) have calculated nevertheless that the return on public sector investment in India over the period 1974–75 to 1984–85 was no more than 6 percent.¹⁰ The average RERR (both weighted by size of project and unweighted) over roughly the same period for projects in India was very high, about 23 percent (negative returns arbitrarily put at minus 5 percent).¹¹

This makes India one of the great stars for World Bank-financed investments, although it is not only Joshi and Little who find the returns to investment in India to be low. It is also notable that the apparent high performance of World Bank investments is not attributable to the World Bank having avoided agricul-

10. Joshi and Little's work is a draft chapter, entitled "Macroeconomic Management, Investment and Growth in India, 1960–61 to 1984–85," of a contribution to the World Bank research project on macroeconomic policy and growth. The calculation is made at market, not shadow, prices. Recalculation at shadow prices would raise the yield insofar as the benefits from public sector investments are not reflected in public sector value added. This may be considerable. An offset, however, is that a good deal of public sector industrial value added would be even less than it is if calculated at shadow prices. It should also be noted that similar calculations for total manufacturing investment (public and private) show returns of about 10 percent.

11. The averages are taken over a total of sixty-eight Indian projects evaluated by the OED for the period 1974–87 for which an RERR was calculated. Lipton and Toye (1990) also found an average RERR of about 23 percent on thirty-three projects for which the OED provided them with evaluation documents.

ture, which has low returns in other countries. More than half the projects are agricultural, and even in value terms they amount to about a third of World Bank-financed investment in India, with average returns about as high as in other sectors.

RERRS may be grossly overestimated, the World Bank may be very good at creaming off projects, or the World Bank is very good at creating or improving projects. It is clearly of great importance for World Bank policy to know how much weight to give to these different possibilities. We cannot tell. But if the World Bank is good at discovering and improving projects (and rejecting poor projects in countries with limited alternative sources of finance), then there is a strong case for the World Bank to do all it can to teach countries to improve their selection of investments, or to make its influence felt over a greater value of investments than it actually helps to finance (this should be possible in the case of sectoral loans). But whatever the value of the World Bank's involvement in projects, including economic appraisal, it remains true that cost-benefit analysis would be much more effective if done in the country. It can then be applied to all large projects, and there is no problem of fungibility.

We have very briefly reviewed above what little we know of the use of cost-benefit analysis for public sector investments in developing countries. In most it is nonexistent, and in only a very few is it better than rudimentary. There is, of course, more to planning public sector investment than project appraisal (in Little and Mirrlees 1974 we did try to show how the two can, and should, be integrated). From this wider perspective also it seems that in only a minority of developing countries is there any coherent and rational control over ministries and other public agencies, with the result that far more projects get started than can be financed without interruption.

The World Bank does not seem to have played a leading role in the promotion of rational public investment planning. Yet there would appear to be room for the World Bank to have a considerable beneficial influence. It is surely an essential part of continuous (sustainable) structural adjustment that public sector investments be well chosen. This applies both at the most central level, where intersectoral choices are required, and at sectoral levels, whether or not sectoral adjustment loans are being made.

For the World Bank to have such an influence it must have—and be understood to have—the necessary skills. These include a thorough understanding of cost-benefit analysis and shadow pricing. They also include experience of the control of public expenditure.

The declarations of ignorance in this section suggest the need for research on how far the World Bank's activities improve the productivity of investment in the borrowing countries. Because examination of rejected project proposals and what happened to them is essential, and very many projects need to be examined, a deeper analysis than the OED has the resources for is warranted. A pilot study of one cooperative country (if such can be found) could throw much light on the possible value of a wide-ranging study.

V. THE COSTS OF COST-BENEFIT ANALYSIS

We have discussed the benefits of cost-benefit analysis in general, and of shadow pricing in particular, at some length. What are the costs?

No one suggests that industrial or other "commercial" projects should be approved without even a financial analysis. Nor does anyone suggest that any old road should be approved without a traditional estimate of its benefits in terms of expected vehicle cost savings, time savings, and traffic generation; nor that an irrigation or settlement project be approved without some estimate of the value of the extra crops expected to be produced.

What more is required for an economic rate of return? For traded goods it is now generally accepted that border prices are to be used. But this is little or no extra work, because the future international prices of such goods will be needed in any case for a financial analysis. Otherwise present practice merely involves multiplying some of the rows by the standard conversion factor (SCF), adding up, and recalculating the ERR and present value—a few minutes' work at most for the project analyst on a personal computer. The country economist supplies the SCF. This could take some time if conscientiously done, but, knowing how often it has been "calculated" as 0.8, the economist may get away with this and just write a memo saying "SCF = 0.8."

The benefits, as we have argued above and argue again in the appendix, are immensely greater than the costs of applying these procedures. They would justify much more extensive work, both on national parameters and on the specifics of the individual project. This cost-benefit analysis at least seems to give a very clear answer. It is less easy to generalize about the value of refining the appraisal (as opposed to the use of simplifications and often justifiable shortcuts) and about the loss from cutting short an analysis when important aspects have not been adequately allowed for.

VI. THE TRADE-OFF BETWEEN COMPLEXITY AND RELIABILITY

Here, we comment briefly on the value of refining calculations at both the national and the sectoral or project level.

National Parameters

How sophisticated should be the analysis that goes into the calculation of national parameters, such as discount rates and shadow wage rates? There is no very short answer. Most of the national parameters calculated by the World Bank are out of date. The IDB and the Development and Project Planning Centre, Bradford University, have calculated recent sets for a number of countries, whether for their own use or at the country's request (the introduction of Little and Mirrlees's methods to China with a set of national parameters is still a victim of Tiananmen Square). Where do the priorities lie? Given the World Bank's policy of using a single accounting rate of interest, unvarying by country

and time, there may seem to be little point in estimating this parameter. (The rate is almost always 10 percent, but 12 percent is used for a few cases.) Yet, in theory, variations should be one of the main responses to changing external or exogenous conditions. There is a case for more serious attention to these issues.

The shadow wage rate, or the conversion factor from which it is derived, is a parameter that can vary substantially by region, and for which local information specific to the project should influence the figure used. Here, we consider its estimation at the national level.

Employment is one way in which the benefits of a public sector project “leak” into the private sector. This arises when the increased demand for labor raises wages or when the wage paid is above the supply price of labor. Part of the resultant increased private income is a cost to the economy if, as we have insisted, it is worth less than public income. Given this, the calculation of a shadow wage (the real cost of employing someone) becomes very complicated. It is hard to estimate not only the loss of output elsewhere but also the increase in private income.

Regarding modern sector urban wages, there is a consensus that the shadow wage is probably not very different from the wage paid, despite the presence of a wage gap between the “organized” and “informal” sectors. Given that modern sector projects are also capital-intensive, it is reasonable to assume that the actual wage is as good an approximation of the shadow wage as can be found.

Research in recent years has tended to suggest that rural labor markets, and informal sector markets generally, are active and that the wage paid is probably close to the marginal product. With some large-scale agricultural projects, however, wages in the area may well be raised, with some loss of producers’ surplus and some gain in private incomes. Some agricultural projects have foundered as a result of lack of knowledge of, or enquiry about, labor supply conditions. Such effects as those suggested above certainly need to be investigated, whether or not they are formally used to quantify a shadow wage rate (SWR).

Sectoral Costs and Benefits

Specific conversion factors for the use of important nontraded goods were regarded as an essential part of the Little-Mirrlees or Squire–van der Tak methodologies. But we also need to consider the numeraire value of the outputs of projects in these sectors. We take power as an example, mention transport and construction more briefly, and must bypass the important subject of irrigation for lack of space. Public utilities (defined as public enterprises for whose output little or no charge is made) present special problems.

Power. Perhaps the most important nontraded good is power. The World Bank has power projects in most countries, and power is an input into all other projects—occasionally a very large input.

We have seen that the output of power projects was never normally valued in

the Squire-van der Tak manner. This was reasonable. It would be absurd to calculate an ERR for every power station financed. The ideal procedure is to obtain agreement with the country on an appropriate tariff system. Normally this will be based on long-run marginal cost (LRMC) at accounting prices. When the tariff is in place, demand at those prices must be estimated and should be satisfied (obviously by the least-social-cost mode). Sectoral loans can then be made, and there is no need to calculate a power conversion factor for other projects. There is an equilibrium, and the price is already "right." Unfortunately, things get more complex when there is serious excess supply or demand at a price equal to LRMC (which still needs to be calculated). There may then be a good case for charging less or more than LRMC, as the accounting price diverges from LRMC for several—even many—years. When there is excess demand, as in India, the value of power is its marginal product, not its marginal cost. However, the stipulation of serious excess supply or demand at a price equal to LRMC at least makes it clear whether any investment in power is justified.

Construction and transport. A construction conversion factor may be desirable on the ground that construction enters importantly into many projects, and that it may be very labor-intensive. If the latter is the case, a lot in turn depends on whether SWRS should be used. This could make a construction conversion factor significantly different from (lower than) the SCF.

Construction is of course virtually the only input into road programs, which are a large component of World Bank lending in several countries. Sectoral lending seems to make good sense for roads, where a component of an ongoing program that can be separately and validly assessed may be impossible to identify. As with power, the World Bank may then want to assure itself that road programs are designed and assessed according to its own guidelines (noting that roads are public utilities to the extent that there is little or no cost recovery; see below). It would then and only then be willing to lend on a sectoral, and not a project, basis.

Transport costs also enter into almost all projects. Although transport is nontraded, its use may have quite large foreign exchange implications, making a special conversion factor desirable.

The extent to which multiple conversion factors should be calculated by the World Bank depends on the country (how distorted are the relative prices of nontraded goods?), on the sectoral composition and size of the World Bank's lending programs, and on the extent to which the country itself is willing to adopt good cost-benefit analysis on a sectoral (even if not a countrywide) basis. If a set of consistent conversion factors calculated by input-output procedures is not available, the project analyst can often make a good guess at one that is particularly relevant, by back-of-the-envelope methods.

Public utilities. Public utilities are special. Their costs are (generally) borne by

the public sector, whereas a large part of the benefit accrues to the private sector.¹² A transfer to the private sector occurs when, as often happens with electricity, gas, and water supply, there is no full cost recovery.

We have argued that public income in most developing economies is worth more than private income because of the administrative costs of taxation and the absence of anything even approximating a general lump-sum subsidy, so that taxation is necessarily distorting at the margin in the relevant sense. These considerations are sometimes strengthened when most saving comes through the public budget. The argument for assigning a greater weight to public than private income holds even if no distributional weights are acknowledged. In brief, increasing the public sector deficit is costly, and projects that do increase it should be penalized.

As we have already mentioned, differential weighting of public and private income is ignored in cost-benefit analysis done by the World Bank and other agencies. We would urge that the fiscal effect of all projects should be estimated and included in appraisal reports. As far as possible, this should include indirect effects, such as changes in tax payments by recipients of additional income. If that is done, it will be clear how the present value of a project can depend on the way it is financed. Public utility pricing policy and project appraisal results are inseparable. If, as we suspect, public income can have a much greater value than private income, the impact of pricing on the value of the project could be very substantial. Estimation of the administrative and distortional costs of taxation in developing countries is a matter on which more research would be valuable.

VII. CONCLUSIONS

Social cost-benefit analysis is not as widely, as well, or as effectively practiced as its expected net value might lead one to hope and expect. We have covered, or at least touched on, many aspects of its theory, practice, and effects. We have claimed that much in the rules we collected and prescribed in 1969 and 1974 has survived analytical scrutiny, that these procedures are capable of being used effectively, and that many important aspects of them have been neglected by project evaluators. We have found that the extent to which they are used and have real influence is not great, even in the World Bank. We have examined some of the data appearing to show considerable randomness in the evaluations performed within the World Bank. We went on to consider the bearing of the very considerable uncertainty that has been shown to attend project appraisal upon the value of the appraisal activity itself. We argue that the value is indeed probably diminished by that uncertainty but is nevertheless very large.

In aggregate, much of the investment in developing countries has had very low returns. This is evident in the low growth of many of these countries during the 1980s. Project appraisal is an essential part of the business of avoiding these mistakes in the future. Good project appraisal is done by people with their own

12. This section owes much to Squire (1989).

incentives, within organizations that wittingly or not set these incentives. Both environments of project appraisal, the intellectual and the political-organizational, are keys to the quality of selection overall. This needs to be most seriously considered by those who manage and create these environments.

APPENDIX: UNCERTAINTY AND PROJECT APPRAISAL

The Value of Appraisal

One can regard project appraisal as a reduction in uncertainty, that is to say, acquisition of information. The value of information has been studied in the literature.¹³ Here we apply it to the making of decisions. The process of appraisal is selection among several possibilities, each of uncertain value. Suppose, for example, that there are two projects. Their true values are x and y . Suppose, for definiteness, that $x > y$. Appraisal will yield apparent values $x + A$ and $y + B$, where the random variables A and B are the errors that remain after appraisal. Before appraisal, uncertainty is even greater: their values seem to be $x + A + C$ and $y + B + D$, where C and D are further error terms. Assume that all four error terms have zero mean; that amounts to saying that there is no identifiable bias in the relative evaluations for the two projects.

Without appraisal, the larger of $x + A + C$ and $y + B + D$ determines the choice. The wrong choice (y rather than x) is made if and only if $A + C - B - D < y - x$: that is, writing M for the random variable $(A - B)$ and N for the random variable $(C - D)$, the wrong choice is made when

$$(A-1) \quad M + N < y - x$$

Similarly, if project appraisal is used, the wrong choice is made when

$$(A-2) \quad M < y - x$$

M and N —like A , B , C , and D —have zero means. For simplicity, assume that M and N are independent random variables, with single-peaked density functions (for example, normal or lognormal random variables).

The chance of the wrong choice is less when there is project appraisal because $M + N$ is a more dispersed random variable than M , and $y - x$ is negative—that is, less than the mean of both M and N . We want to estimate the magnitude of the reduced chance of error. Using an expected-utility representation of the value of projects when there is uncertainty, we can write $u(x)$ and $u(y)$ for the utility of the two projects. Then the value of project appraisal is $u(x) - u(y)$ times the reduction in the probability of error.

This reduction in the probability of error is

$$(A-3) \quad P(M + N < y - x) - P(M < y - x)$$

13. See particularly Gould (1974), which studies the influence of greater uncertainty about what is initially unknown on the value of finding out about it. The question of assessing the value of information quantitatively is not considered, nor is the influence of greater ambient uncertainty on the value of information. In the analysis below, we note particularly the importance of this last issue.

where P denotes the probability of the event described. This expression can be written using distribution functions F and G for the random variables M and N ; so the second term in equation A-3 is $F(y - x)$, and the first is

$$(A-4) \quad \int_{-\infty}^{\infty} P(M < y - x - n)g(n)dn \quad \text{or} \quad \int_{-\infty}^{\infty} F(y - x - n)g(n)dn$$

where $g = G'$ is the density function for N . The whole expression A-3 therefore can be written as follows:

$$(A-5) \quad \int_{-\infty}^{\infty} F(y - x - n)g(n)dn - F(y - x)$$

We can get some impression of the magnitude of this expression from an approximation. Suppose that the variance of N is small; call it σ^2 . Then the reduction in the probability of error is approximately

$$(A-6) \quad \frac{1}{2} \sigma^2 F''(y - x) = \frac{1}{2} \sigma^2 f'(y - x)$$

where f is the density function for M . Unfortunately, this is a good approximation only when σ is small relative to the variance of N . The value of this project appraisal is therefore measured roughly by

$$(A-7) \quad \frac{1}{2} \sigma^2 f'(y - x) [u(x) - u(y)]$$

The expression σ^2 measures the information provided by the project appraisal, because it measures the uncertainty that is removed by the appraisal. The expression f' is positive when $x > y$, because we are on the left-hand side of the probability distribution. The expression f' is greatest when $x - y$ is neither close to zero nor very large and when noise—the degree of general uncertainty not removed by appraisal—is small. Reasonably enough, appraisal is not very valuable when the difference between the projects is small, nor is it valuable when the difference is very great (relative to noise). For given projects, the value of the appraisal is also smaller the greater is noise; greater noise means that f increases less steeply to its maximum at $y - x = 0$.

To assess the magnitude of the expected value of doing project appraisal, we can make two more special assumptions: that $u(x)$ is simply x , and that noise is distributed normally with standard deviation τ . Furthermore, we can calculate the maximum value of project appraisal (as $y - x$ varies). This is an upper estimate of the value, but the value is fairly close to its maximum over a substantial range of values.

It is easiest to calculate this maximum for the low σ^2 approximation, equation A-7. The maximum value of equation A-7 is

$$(A-8) \quad 0.147 \frac{\sigma^2}{\tau}$$

where the constant is $1/[\sqrt{(2\pi)e}] = 0.14676$. This actually overstates the maximum. When σ^2 is not small, some mathematical manipulation shows that the value of appraisal is

$$(A-9) \quad (x - y) \left[F\left(\frac{y - x}{\sqrt{r^2 + 1}}\right) - F(y - x) \right] \dots$$

where r is σ/τ , the ratio of the two standard deviations. Numerical calculations of this formula yield the following table of maximum appraisal values as σ/τ varies:

σ/τ	Maximum appraisal value/ σ
0.5	0.069
1.0	0.119
1.5	0.149
2.0	0.164

The maximum occurs at a value of $y - x$ in the middle of the likely range of true values.

The limited evidence available, discussed in section III, suggested that the ratio of the standard deviations might be about unity for the class of appraisals we are interested in, although with competent analysis it ought to be substantially greater than that. This yields a simple yardstick for the value of appraisal as something like 10 percent of its standard deviation—a very substantial amount considering that, even for small investment decisions, the standard deviation for the present value of the project would usually be many millions of dollars.

Allowance for Uncertainty

In Little and Mirrlees (1974), we provided a simple formula for estimating the impact of uncertainty on the value of a project:

$$(A-10) \quad V = E(X) - A \frac{\text{cov}(X, Y)}{E(Y)}$$

where X is the (random) social profit value of the project, Y the (random) level of national income, $E(\)$ denotes the expected value of the indicated variable, $\text{cov}(\)$ the covariance of the two variables, and A is the coefficient of relative risk aversion. The derivation (Little and Mirrlees 1974, section 15.8, p. 331) is only indicated. Although something like the formula is well known in decision theory and the theory of asset values, it may be useful to provide a clearer argument. It will be shown that the project should be undertaken if V in equation A-10 is positive (to a first approximation).

The formula is based on a simplified view of a project and an economy. The value of national income Y to the economy is taken to be $E[u(Y)]$ for a utility function u . A project equivalent to an uncertain change X in national income is worth doing if

$$(A-11) \quad v = E[u(Y + X)] - E[u(Y)] > 0$$

Assume that X is going to be small relative to Y , whatever happens. Granted that, we can approximate both terms in equation A-11 by a Taylor expansion around the expected value of Y , $E(Y)$. We have

$$(A-12) \quad \begin{aligned} u(Y + X) &\approx u[E(Y)] + u'[E(Y)] [Y - E(Y) + X] \\ &\quad + \frac{1}{2} u''[E(Y)] [Y - E(Y) + X]^2 \\ u(Y) &\approx u[E(Y)] [Y - E(Y)] + \frac{1}{2} u''[E(Y)] [Y - E(Y)]^2 \end{aligned}$$

Taking expectations, and writing σ_X^2 and σ_Y^2 for the variances of X and Y , we find that

$$(A-13) \quad \begin{aligned} E[u(Y + X)] &\approx u[E(Y)] + u'[E(Y)]E(X) \\ &\quad + \frac{1}{2} u''[E(Y)]\{\sigma_Y^2 + 2\text{cov}(Y, X) + \sigma_X^2 + [E(X)]^2\} \\ E[u(Y)] &\approx u[E(Y)] + \frac{1}{2} u''[E(Y)]\sigma_Y^2 \end{aligned}$$

After subtraction, we obtain an expression for the increase in expected utility from introducing the project:

$$(A-14) \quad v \approx u'[E(Y)]E(X) + \frac{1}{2} u''[E(Y)]\{\sigma_X^2 + [E(X)]^2 + 2\text{cov}(Y, X)\}$$

These approximations neglect further terms, among which are, for example, a term $1/2u''' \cdot E(X)\sigma_Y^2$. This could well be larger in magnitude than the terms $1/2u''\{[E(X)]^2 + \sigma_X^2\}$, included in equation A-13. But all of these will be small relative to the terms in $E(X)$ and $\text{cov}(Y, X)$. The main part of the approximation therefore reduces to

$$(A-15) \quad v \approx u'[E(Y)]E(X) + u''[E(Y)]\text{cov}(Y, X)$$

The coefficient of relative risk aversion is defined for any expected utility level, y , as

$$(A-16) \quad A(y) \approx \frac{-yu''(y)}{u'(y)}$$

Here, we define A more particularly as the value of the coefficient at $E(Y)$. Then, equation A-16 may be written

$$(A-17) \quad v \approx u'[E(Y)] \left[E(X) - A \frac{\text{cov}(Y, X)}{E(Y)} \right]$$

The right-hand side of equation A-17 is $u'[E(Y)]V$, where V is the expression A-10. Therefore the criterion, do the project if $v > 0$, is approximately the same as the criterion, do it if $V > 0$. This shows the validity of the formula given in equation A-10.

The correlation coefficient r between X and Y is defined by

$$(A-18) \quad \text{cov}(X, Y) = r(\sigma_X \sigma_Y)$$

where σ_X , σ_Y are, by our earlier definition, the standard deviations of X and Y . Therefore, the expression in equation A-14 is also equivalent to the more intuitive form given in equation 1 of section I,

$$(A-19) \quad V \approx u'[E(Y)] E(X) \left\{ 1 - Ar \frac{\sigma_X}{E(X)} \frac{\sigma_Y}{E(Y)} \right\}$$

The expression in braces is a multiplier, applied to the expected value of net profit, to adjust for uncertainty.

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COMMENT ON "PROJECT APPRAISAL AND PLANNING TWENTY YEARS ON,"
BY LITTLE AND MIRRLEES

Lyn Squire

Ian Little and Jim Mirrlees have done an excellent job in putting on paper what I suspect many World Bank staff have already acknowledged at least privately. That is: although the Little-Mirrlees approach to project analysis remains theoretically intact, the World Bank's commitment to its application has clearly declined.

Some may question the extent to which the World Bank ever adopted the approach in practice; others may claim that we are doing a much better job than Little and Mirrlees give us credit for. But for the purposes of my comments I would like to accept their assessment as broadly accurate and ask what we can do to improve matters.

The starting point is the experience of the mid- and late 1970s, when the World Bank was seriously trying to implement the approach. At that time much was made of the idea that it was important not to reduce cost-benefit analysis to a set of cookbook rules. Instead, it was argued, one should set out the broad approach and then rely on the analyst to mold it to the specific circumstances of each project. To be successful this approach to implementation requires two ingredients: enough well-qualified analysts to conduct the appraisals and an environment that encourages such effort. The World Bank had the first but not the second.

Given this circumstance, it may make sense to reconsider the use of some simple rules to at least ensure a minimally acceptable standard of appraisal. In my comments I would like to illustrate this general idea with three examples and in doing so touch on some of the issues Little and Mirrlees have raised.

APPRAISAL OPTIMISM

The first rule concerns appraisal optimism. A few years ago one of the World Bank's senior vice presidents was so upset with his staff's tendency to make overly optimistic projections of disbursements that he decreed that all future disbursement profiles would be based on historical norms. Of course this meant

Lyn Squire is chief of the Country Operations Division for Mexico in the World Bank.

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that for any given project the disbursement profile was never going to be exactly right, but it did inject a very strong dose of realism into disbursement forecasts.

The same principle could be applied to project costs by insisting that cost projections be more closely tied to historical experience. An even simpler rule would be to require that the cost profile and the disbursement profile be consistent. This is not unreasonable, because they are basically the same thing looked at in two different ways. Such a rule would go a long way toward eliminating the gap that has arisen between rates of return calculated at the time of appraisal and those calculated at project completion.

SHADOW PRICING

A second idea is to insist on the use of shadow pricing, but only when it is critical. One simple rule to implement this idea would be to say that staff must present separately the net present value of the stream of tradable costs and benefits and the net present value of the stream of nontradable costs and benefits. Tradables would be valued at border prices and nontradables at domestic prices. The objective then would be to test the sensitivity of the net present value of the whole project to the choice of the standard conversion factor.

If the project remains profitable for a wide range of standard conversion factors, no further effort would be put into shadow pricing. This reflects the fact that we are not interested in the accuracy of the estimated rate of return; all we need to know is that for plausible assumptions the project will pass the accept-reject decision. This is why regressions of project completion rates of return on project appraisal rates of return are not very interesting—they focus on the accuracy of estimation and not on whether we have been successful in selecting good projects.

But if the accept-reject decision does hinge on the choice of the standard conversion factor, then additional shadow pricing would be justified and should be insisted on. It would be appropriate, for example, to require that in such circumstances the bundle of nontradables be disaggregated and individual conversion factors be estimated for the more important items.

PROJECT DESIGN

The third rule has to do with project design. Because appraisal usually occurs late in the project cycle, most of the key decisions on physical design will have been made before project appraisal. But this is not true for the project's financial design. For example, if a project results in a net cost to the public sector but a net benefit overall, the analyst should be required to examine the scope for direct or indirect cost recovery. And this can be done quite late in the project cycle.

This also relates to the question of using different values for private and public income. I am not suggesting that we should estimate such values on a regular basis, but—and this is the third rule—we should insist that the appraisal docu-

ment present the impact of the project on the fiscal budget. In the event that this is negative, the analyst then would be required to explain why cost recovery was not pursued.

SUMMARY

So, to summarize, if we agree with Little and Mirrlees's assessment—and I certainly do—then the real issue becomes what can we do to improve current practice. The three rules I have suggested deal with appraisal optimism, shadow pricing, and project design. I'm sure there are better rules and other issues that need attention, but the general point is that we need to shift from a system in which project evaluation is left to the discretion of project staff to one in which certain procedures have to be followed more or less automatically.

COMMENT ON "PROJECT APPRAISAL AND PLANNING TWENTY YEARS ON,"
BY LITTLE AND MIRRLEES

Ernesto R. Fontaine

It is an honor for me to comment on a paper by Professors Little and Mirrlees, who have had such an enormous influence in a field I consider terribly important for the economic and social development of all nations. It is now accepted that the *quality*, and not merely the *quantity*, of investment is crucial for development—a simple notion that was not emphasized at all in the 1950s and 1960s, when mechanistic growth and "gap" models insisted on the "need" to increase saving and investment ratios through government intervention to achieve greater growth rates. It is clearly understood today that the contribution of capital accumulation to growth can be increased either by increasing the amount of investment—which implies reducing consumption—or by increasing its "real" or economic rate of return (ERR), which implies "getting prices right" for the private sector, being more careful in selecting public projects, and clearly defining the scope and extent of government action in the investment field.

I believe that the work on social or economic project appraisal has been very influential in the "getting prices right" crusade, because it clearly showed how a distorted price system could lead to investment efforts by the private sector that were highly profitable for private investors but that yielded low or negative economic rates of return to the country as a whole, thus contributing very little to growth. Distortions in such situations implied more than static welfare losses—à la triangles—because they also affected the dynamics of growth.

I have read this relevant paper with pleasure—and also with some difficulty, in parts. I really do not have many quarrels with it, although I did find that the authors could have given more credit to others for the "remarkable development of both the methodology and the use of shadow pricing in estimating the true national value of projects." Although Little and Mirrlees do give some credit to Dasgupta, Marglin, and Sen, they should have paid more attention to Arnold C. Harberger for his pioneering work in this field—and certainly more than just a bibliographic reference. I can attest personally to Harberger's influence; he guided my 1958 social evaluation of the sugar beet industry in Chile, a research

Ernesto R. Fontaine is professor of economics at the Catholic University of Chile.

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project that later developed into my doctoral thesis for the University of Chicago. I believe that Edmar Bacha, Lance Taylor, and Danny Schydłowski also merit some credit in the very important development of methodologies for estimating a shadow (social) rate of exchange and its significance for correctly appraising the real contribution of investment projects to growth. Bacha and Taylor did significant work on shadow pricing in Chile in the mid-1960s during their stay at ODEPLAN (Oficina de Planificación Nacional). The institution where I teach, Catholic University of Chile, had also done similar work before that time.

Because I really do not have many quarrels with the substance of the paper, my comments will try to reinforce some of its conclusions and to suggest ways to make its analysis more comprehensive. First, I want to deal with the issue of methodological complexity. I have devoted the larger part of my professional life to preaching and teaching socioeconomic project appraisal at universities and special training programs for public officials in Latin America, and in helping Latin American countries to implement public "preinvestment systems," concentrating on Chile, a real success story, over the last decade. I have had thousands of students—engineers, agronomists, economists, doctors, military officers, business administrators, lawyers, and even veterinarians—working in public enterprises, ministries, municipalities, and central and regional planning offices and handling projects in all phases of the project cycle, from identification to implementation. Bright as these students have been, and rigorous as our eighteen-week full-time lecture course may be, I have found that it is indeed difficult to instill in students even the much more straightforward and natural technique of social pricing à la Harberger. Is it not more natural and straightforward to talk about a shadow rate of exchange, and express everything in pesos, than to become entangled in multiple conversion factors à la Little and Mirrlees? I must therefore wholeheartedly agree with the authors that the complexity of the methodologies they proposed must be an important reason for the decline in their use, even at the World Bank and other lending institutions, where the training and quality of staff are far better than of professionals in most ministries and planning offices in the developing world, with possibly very few exceptions in a handful of public enterprises.

Because I believe that the better is an enemy of the good, and that what is simple and good enough to pick up the biggest sources of distortions is better than applying more sophistication to arrive at more refined results, I predict that for years to come we will not see countries or even well-equipped lending institutions adopting complete models based on methodologies that stress numeraires; distributional weights; different values to pesos devoted to consumption or investment (and for private or public income); and such nonintuitive concepts as standard, construction, or power conversion factors. Also, methodological niceties such as the paper's concern about the "widespread effects that should in principle be estimated to calculate shadow prices" (for example, the authors' case for not using straight border prices when price varies with amount of trade)

may be suitable for journal articles, but they will not be of much consequence to professional practice nor to promoting economic appraisal of projects anywhere. Because I also believe that something is better than nothing, I would not be so hard on efficiency pricing, and I would at least make some reference to the usefulness of applying Harberger's methodology.

Second, I cannot but also agree wholeheartedly with the authors on the need to implement economic appraisals at the early stages of the project cycle, most importantly at the prefeasibility level; I say this because little can be done later to stop really bad projects. But, at the prefeasibility level, data are not that precise, so that very refined and costly methodologies for estimating the precise shadow prices for their economic and social evaluation will not be very productive. Once again, shadow pricing based on very sophisticated methodologies will not be needed to eliminate bad projects that do not stand up to sensitivity analyses at the prefeasibility level.

Third, I must also agree with the authors in rejecting the conclusions of the Pohl and Mihaljek analysis of appraisal economic rates of return and reestimated economic rates of return (RERRS). I have not read their work, but based on the comments by Little and Mirrlees, it appears that Pohl and Mihaljek do not discuss the reasons behind the observed differences between ERRS and RERRS. What were the differences in the corresponding appraisal and reestimated financial rates of return? Were shadow prices wrongly estimated, or were market prices wrongly estimated? Were social or private costs off the mark? If, as is common, the percentage differences between private and social costs do not change dramatically in the absence of big policy changes, the main source of the difference between ERRS and RERRS is not to be found in shadow pricing!

In this matter, the Little and Mirrlees paper itself is also not very careful in the use of words, even though they claim that "shadow pricing and cost-benefit analysis are inseparable." For example, in referring to the decline of cost-benefit analysis due in part to the McNamara effect, they mention a "deterioration in the quality of project work," and, in discussing the problems after the reorganization of the 1980s they mention an "impression of widespread deterioration . . . [in] economic analysis"; that there was "less continuity and expertise in project teams"; that "technical, financial, and institutional analysis all may have suffered"; and that "obviously economic analysis would not be immune." But what is meant by "economic analysis"? Is it only adjusting private values to obtain social or economic values, when private values are estimated by someone other than the economic analyst? Is economic analysis to be blamed for cost overruns in the construction of a dam when these overruns stem from insufficient geological studies, expropriation delays, suppliers' delays of deliveries, lack of good planning, or problems with disbursements? There is only so much a poor economist can do! This is why project teams, composed of economists and technical experts who interact during the entire project cycle, are vital to proper project preparation and implementation; the usual practice of asking an economist at the very last moment to justify the project once its engineering aspects have been

completely defined is fatal for good project work and relevant cost-benefit analysis.

Fourth, I would have liked to have seen a history of the rise and fall of input-output “model building—computer consuming” exercises in planning offices and ministries (especially of those imposed on us by the U.S. government’s Alliance for Progress under the Kennedy administration). Successful planning—such as in Chile over the last decade—concentrates on putting together a coherent public capital budget based on projects and programs that have been appraised at all stages of the project cycle.

Also, I think the paper ought to have included a history of the quite substantial improvements accomplished by the profession in the development of specific techniques and models for both financial and economic analyses in certain sectors, such as ports, roads, electricity, potable water and sewerage, multipurpose water projects, and, most important, the so-called social projects. In this respect, I missed in the Little and Mirrlees paper a section on basic needs, which I believe deserve proper consideration nowadays, even though the topic was, I seem to recall, not mentioned in the authors’ book. In Chile, we have very successfully used “social prices” based on the basic needs approach for the economic appraisal of projects in the social sectors, whose goods and services can easily be focused on the poorer members of our population, thus giving strong economic arguments in favor of devoting public funds to such human-capital-enhancing projects *vis-à-vis* traditional infrastructure and industrial projects.

In this respect, my long and very enriching experience with project appraisals done by reputable consulting firms and accepted by international lending institutions has taught me that the greatest mistakes originate in not paying enough attention to the separability of the projects and to the “with” and “without” project situations, which are the basis for identifying the relevant costs and benefits attributable to the project. In particular, the optimization of the scenario without the project has been neglected. This is especially true of public investment in sectors where it clearly preempts or displaces private investment. Advances in this area have been outstanding, thus avoiding construction of new infrastructures when optimization of present ones has been possible—as has been the case with ports. I have found relatively few mistakes in measuring and valuing (putting a private or social value on) the relevant costs and benefits so identified. Also, I have often found the mistaken use of ERR and expected present value for decisions regarding projects whose benefits increase mainly as a function of time—roads, ports, and potable water. Here, ERR and EPV obviously lead to overinvestment and are not relevant for the proper decision of establishing the best year to start the project. The right number to use in these cases is the “instantaneous internal rate of return,” or the comparison of first-year benefits with “capital costs” of the project.

Fifth, I offer a reflection on the redistributive aspects of projects that do not charge users for the goods and services produced—or that do not charge bene-

ficiaries for the projects' investment costs. These may be of great relevance for understanding the "political economy" of government investment. It is clear that making the beneficiaries pay for the project will help to avoid political pressures to build irrigation dams, roads, or ports, when and where the national interest is not best served, thus constituting an argument that reinforces Little and Mirrlees' presumption that public income may be worth more than private income.

FLOOR DISCUSSION OF THE LITTLE-MIRRLEES PAPER

A World Bank participant questioned the authors about the rejection in their paper of sustainability as a concept without merit. The participant felt that the Hicksian definition of income also incorporates a notion of sustainability, so in rejecting sustainability, were they also discarding the Hicksian definition of income? Or was it just that the authors were impatient with "sustainability" being used as a buzzword?

Another Bank participant drew attention to the use of discount rates that are constant over time and even sometimes across countries. He thought this was a fatal flaw in the implementation of the methodology, at least in the Bank. He also questioned the wisdom of using point estimates of net present value. Would it not be much better—with the availability of microcomputers—to do Monte Carlo simulations on price and technical parameters and get a distribution of net present values?

A participant observed that the prevailing cost-benefit analysis methodology was so complex and needed so many arbitrary assumptions that for a complicated project it was possible to arrive at any arbitrary (and predetermined) rate of return by manipulating the assumptions. It was almost impossible to trace such manipulation; perhaps this accounted for the historical rise in expected rates of return: analysts were getting better at the manipulation.

A Bank participant said that the authors had made the comment that public sector revenues are worth more than private sector income; however, this raises the question of whether the revenues are likely to be used more profitably by the public sector. The participant was also concerned that when major corrections are made in evaluating public investment projects, this may lead to a situation in which the public and private sectors are marching to different price signals. If major corrections need to be made, then one needs to change macroeconomic policy, not make corrections for individual projects through cost-benefit analysis. He agreed with Ernesto Fontaine's (discussant) comment that what is most important to consider is the "without projects" scenario. This scenario can be manipulated to obtain whatever rate of return for a project one wants. Perhaps the solution, as Lyn Squire (discussant) pointed out, was that the Bank should ask its staff to routinely perform an *optimized* scenario without the project.

A Bank participant observed that from his experience, both within and outside the Bank, expending large resources to improve the cost-benefit analysis of individual projects was much less important than addressing the distortions in

This session was chaired by Harris Mule, member of the Council of African Advisers of the World Bank and former permanent secretary in the Ministry of Finance and Planning, Republic of Kenya.

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the economy as a whole. The incentive structure of the economy affected both public sector investments and private investments. The Bank had moved toward adjustment lending precisely to deal with such macroeconomic distortions. However, it seemed to the participant that the situation now had come full cycle—good structural adjustment lending was not easy, either. He felt that on balance there should still be a limit to the resources one devoted to better project analysis if the opportunity cost was resolving or understanding the distortions of the economy as a whole.

Ian Little welcomed Fontaine's comment that cost-benefit analysis is complementary to getting prices right, far from being competitive with this endeavor. He commented that the move to adjustment lending from project lending perhaps happened because policymakers were taught by the difficulty of doing cost-benefit analysis that it might be a better idea to get prices right instead! Little pointed out, however, that irrespective of how much one gets prices right, there are always infrastructural projects for which there is no market, and benefits have to be identified without actual market prices.

Regarding sustainability, Little said his criticism of the concept did not preclude spending to maintain an asset. By and large he accepted the Hicksian definition of income, except that the definition does not deal with cases of changes in expectations or windfalls. Little agreed with the comment that one could always manipulate or fudge a complicated project to make it acceptable; this was a genuine difficulty. Answering the question about the balance between better project analysis and better structural adjustment lending, Little reiterated that he could not see why they should be competitive. He felt that views were divided on this even within the Bank, and after all, three-quarters of Bank lending is still for projects. Little recalled the comment from the conference discussion of the previous day, when it had been observed that the concentration on structural adjustment lending has led to neglect of proper project analysis in the Bank.

Jim Mirrlees said that he also did not see a tension between better project analysis and sounder adjustment lending. Sound project appraisal should in no way preclude price reform and policy reform. Responding to the comments by Squire, Mirrlees said that the general principle of thinking of a series of levels of complexity in project appraisal accorded well with the philosophy of project appraisal stated in their paper.

A Bank participant suggested that the evaluation experience of World Bank projects had not been as dismal as Little and Mirrlees have suggested. More than approximately 70 percent of the completed projects, as audited by the Bank's Operations Evaluation Department, had been successful. Of the failed projects, there appear to be concentrations in Africa and in rural development. It is interesting, Squire remarked, that the focus is always on the marginal cases. Even the analysis by Pohl and Mihaljek quoted by Little and Mirrlees, he noted, shows that the gaps between *ex ante* and *ex post* estimated rates of return are

greatest where the ex ante rates are very high, on the order of 20 or 30 percent or more.

Another participant pointed out that perhaps it was time for the Bank's Economic Development Institute to assess whether it should reestablish itself as a training center for project evaluation and management.

A participant returned to the earlier question about the different valuation of public and private incomes in the Little-Mirrlees framework. He said that whereas many would have had no problem with the proposition twenty years ago, the experience of the intervening years would suggest at least that there is no systematic reason for the higher premium on government income, and much would depend on the government one is dealing with. In many instances one would not put a premium on public income, but in some countries one might.

Mirrlees responded to the public-versus-private-income questions by noting that in cases where the cost of public funds is high, and the waste in using public funds is also very high, then the real question, for the value of public income, is what changes if an additional project generates profits in the public sector. The tendency is to think that public sector profits will not be spent well; and that public sector losses will be financed through an inflation tax. One had to avoid a tendency to think that something coming out of the public purse is very costly and that something going into it is not worth very much. It is not just a matter of the difference between particular governments. One faces a difficult judgment about the balance between public income and expenditures. Mirrlees agreed that in their paper they had focused only on the cost side of public income and not on public expenditures, since it was easier to deal with the cost side.

In concluding the floor discussion, Harris Mule (chair) summarized by noting that engineers, technical people, institutional experts, and management specialists have to be brought in, so that cost-benefit analysis can be integrated into overall project identification, preparation, and appraisal. Within the public sector itself, Mule said that the resource allocation that is subjected to social cost-benefit analysis is a very small component of the total outlays. In many countries, current budget expenditures and small projects in the public sector amount to more than the larger projects to be appraised in detail. In devoting significant resources to the latter, we may not be using resources most effectively. Mule ended the session by thanking the participants and the authors.

