This essay on Shadow Prices for Project Evaluation in Less Developed Countries was written, at our invitation, by Professor Richard S. Weckstein, of Brandeis University, as part of a larger study of resource utilization problems in developing countries on which he is currently engaged. It has been inspired in part by the recent Manual of Industrial Project Analysis in Developing Countries (Volume II) prepared by Ian M. D. Little and James A. Mirrlees for the Development Centre of the OECD. The author wishes to acknowledge the helpful and stimulating discussion of many difficult and controversial issues arising in the use of shadow prices in project analysis during a seminar on this subject held at the World Bank in April 1969 and during a subsequent stay in Oxford. He is particularly grateful to Ian Little for the patience and generosity extended to him as a critic. He alone, however, is responsible for the views expressed here.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>II. PRICE DISTORTIONS IN LESS DEVELOPED COUNTRIES</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>III. A CRITIQUE OF SOME SHADOW PRICE MEASURES</strong></td>
<td>6</td>
</tr>
<tr>
<td>1. Measures of Shadow Prices</td>
<td>7</td>
</tr>
<tr>
<td>Shadow Prices from Linear Programming</td>
<td>7</td>
</tr>
<tr>
<td>Shadow Prices from International Trade Prices</td>
<td>8</td>
</tr>
<tr>
<td>2. Shadow Prices and Persistent Economic Distortions</td>
<td>9</td>
</tr>
<tr>
<td>3. The Effects of Inappropriate Shadow Prices</td>
<td>10</td>
</tr>
<tr>
<td>Shadow Prices and International Trade</td>
<td>10</td>
</tr>
<tr>
<td>Shadow Wages, Employment and Investment</td>
<td>11</td>
</tr>
<tr>
<td><strong>IV. THE USE OF RELEVANT SHADOW PRICES</strong></td>
<td>13</td>
</tr>
<tr>
<td>1. Shadow Prices for Fragmented Markets</td>
<td>14</td>
</tr>
<tr>
<td>2. Examples of Choosing Shadow Prices</td>
<td>16</td>
</tr>
<tr>
<td>Excise Taxes</td>
<td>16</td>
</tr>
<tr>
<td>Import Duties</td>
<td>17</td>
</tr>
<tr>
<td>Private Monopoly</td>
<td>18</td>
</tr>
<tr>
<td>Land Values</td>
<td>19</td>
</tr>
<tr>
<td>Public Monopoly</td>
<td>20</td>
</tr>
<tr>
<td>Wage Rates</td>
<td>20</td>
</tr>
<tr>
<td>Fragmented Grain Markets</td>
<td>22</td>
</tr>
<tr>
<td>Interest Rates</td>
<td>23</td>
</tr>
<tr>
<td>3. Concluding Remarks</td>
<td>25</td>
</tr>
</tbody>
</table>
I. INTRODUCTION

1. Shadow prices are synthetic substitutes for the imperfect natural price products of market economies. They are manufactured to be used in making project choices by governments interested in improving the performance of their economies. Technically they work by giving decision makers more valid information than natural prices give. But these synthetic substitutes can be manufactured in a number of different ways and the quality and usefulness of the products is very sensitive to the process used. In this paper some fundamentally different processes are examined from the point of view of the usefulness of the products to consumer governments. The first step in this evaluation is to diagnose in Part II the weakness of the prices that are produced naturally by less developed market economies. The next step is to rate some of the available synthetic product lines, the shadow prices; this is done in Part III. Finally in Part IV there is a brief and general guide to the use of synthetic prices which focuses on how to avoid the worst pitfalls in using synthetics.

2. All economies use prices to convey information about the social valuation of goods and resources. In some economies prices are cast up by efficiently organized markets and as a result these prices are an unbiased measure of social values. But this may occur only in mythical economies in which a perfect price system operates. The price systems of developed Western societies are more or less satisfactory approximations to this ideal, and highly decentralized decisions concatenate into a socially acceptable whole. In the nature of underdevelopment, however, the quality of market prices for the purpose of guiding otherwise uncoordinated decisions is marred by both systematic biases and random influences with large dispersions. To achieve tolerable results in the over-all total of decentralized decisions in less developed countries seems to require either that the price system generate more valid resource and goods prices, or failing that, a reliable procedure be designed to provide high quality substitute prices usable at least to guide governments' decisions and perhaps also those private decisions that have far-reaching and important effects.

3. The necessity to use shadow prices in less developed countries is compound; it arises from the presence of the imperfections well known in developed market economies plus some additional imperfections that are important in less developed countries, even if they are not unknown in more developed market economies. A list of imperfections of developed economies which are ordinarily responsible for project evaluation errors and which could in principle be rendered less destructive by the use of shadow prices includes the following: the presence of unemployed labor anticipated to persist through much of the life of new investment projects where the market wage of labor exaggerates the real scarcity of labor; the influence of monopoly power over market price, driving prices above or below the competitive equilibrium values; the existence of a non-optimal income distribution and hence a non-optimal distribution of purchasing power which in turn affects the structure of market prices. This particular market imperfection reminds
us of the fact that the critical evaluation of the prices of a market system implies a value premise. In this case it implies the specification of a "good" distribution of income, and there are similar income distribution premises implied in judgments applied to other kinds of imperfections. Furthermore, the replacement of biased prices with shadow prices implies still other value premises.

4. To continue with the list of common price imperfections, there is a broad category of prices that are imperfect because they arise from markets in which contracts are two-party agreements between buyer and seller and omit the interests of third parties either as beneficiaries or as sharers in the burden of the cost. We also include the pricing of "public goods", for which the technical nature of the goods precludes their being priced efficiently without at the same time altering the distribution of income. In addition, the influence of government taxation (and subsidization) biases prices, even though it may be the objective in employing such financial means simply to raise general revenue or to alter the distribution of income.

5. Despite the fact that these influences which render imperfect the information conveyed by prices are common in developed economies, no national administration of industrial investment decisions in advanced countries attempts systematically to compensate for them by the use of shadow prices. Where it is felt that such imperfections produce undesirable results, governments rely on other instruments of control ranging from incentive taxes and subsidies to direct licensing or prohibitions and to undertaking the desired activities by government agencies themselves. The economically more advanced countries may well have abstained from the use of shadow prices to correct the distortions arising from the above market imperfections for reasons having to do with the specific types of imperfections and the general inconclusiveness of arguments favoring the use of shadow prices. But the basis for urging the use of shadow prices on less developed countries is that there are more far-reaching distortions in at least some critically important prices which are especially likely to plague the price systems of such countries. The view one takes of how correctly to establish shadow prices depends on one's understanding of these special weaknesses of the price systems of less developed countries. For this reason it is important to specify in some detail how less developed market systems generate prices that carry spurious information.

II. PRICE DISTORTIONS IN LESS DEVELOPED COUNTRIES

6. In contrast with the price distortions of advanced countries which are doubtful candidates for general correction by shadow prices, the distortions of less advanced countries 1/ are likely to be gross and enduring. Rapid inflation, which is a chronic problem of no advanced country is widespread among the less advanced. Its influence on prices is most importantly concentrated on the international value of the country's own currency because of

the modern convention of maintaining "fixed" exchange rates. The combination of rapid inflation in the less advanced countries and stable prices in advanced countries generally requires spasmodic adjustment of exchange rates that bridge the two sets of prices. During the period preceding depreciation the official currency value is increasingly an exaggeration of the international purchasing power of the currencies of the less developed countries. After depreciation, depending on how far the price change goes, the official currency value may exaggerate, correctly state or understate the international purchasing power of the currency. Because the importance of imports is ordinarily so great to the small specialized economies of the less developed countries, this price distortion permeates most decisions and the consequences are exceedingly destructive to such countries' well-being. The opportunity for using shadow prices to rectify this kind of distortion is apparently attractive.

7. Similarly, there may be a need to apply shadow prices to the wages of labor, in countries in which there is an excess supply of labor in comparison with the means for its productive employment. For, in less developed countries, perhaps quite generally, the wages actually paid employees in industrial establishments may be greater than the value of the marginal product of labor at full employment. Under these circumstances the temptation is great to use a shadow wage, free of the constraints on market wages.

8. The rate of interest it is appropriate to charge for the use of capital or to discount future net returns to compute the present value of those earnings, is generally not the market interest rate which particular projects must actually bear, for the capital markets are so poorly developed and little integrated with one another that these rates can hardly be accepted as measures of the social value of the alternative employments of capital. More specifically to the general circumstances of less developed countries, it is found that the rates of interest on capital flowing to industrial projects from official sources is far below the rates paid on non-industrial projects which are institutionally less favored. The favored rates are furthermore likely to be established without adequate allowance for the common anticipations of inflation that do exert an influence on other rates. These biases convey by price distortions to capital users a harmful inducement to the overuse of capital 1/ which leaves to agencies such as development banks the task of rationing capital. But these agencies and also finance ministries and planning offices must also rely on a discount rate to make interproject comparisons.

9. Finally the problem of price distortions associated with monopoly power in the generally smaller economies of less developed countries may be more serious than in advanced countries and hence warrant corrected prices for investment decisions. And some economies that export specialized commodities are in a position to influence the price of their exports in their favor.

1/ Low rates of interest on capital flowing through official channels can be thought of as a shadow interest rate, which being below the market rate, provides a basis on which government agencies can justify more capital-intensive projects. See footnote on p. 14.
which would frequently justify a national profit maximizing output policy that can be implemented by the application of shadow prices for these exports to control unprofitable expansion of national capacity.

10. It is probably true that this list of market failures would be justification enough for most economists of an effort to implement a shadow price system. Yet the impression this and similar lists gives of the problem of achieving investment choice efficiency in less developed economies is somewhat over-simplified. It suggests that the market defects can be easily categorized, from which it is assumed to follow that the corrections required fall similarly in categories. The facts are, I believe, rather less convenient. The market systems of less developed countries fail in quite a general way as a system to integrate the dispersion of activities. Rather than being unified market economies, these economies are broken into fragments by numerous barriers and by the failure, during the early state of their development, of markets to have spread across the barriers. They are economies made up of many non-competing parts which are misrepresented by general equilibrium models.

11. Within such fractured economies the significance of actual prices will in many cases be highly ambiguous. In functioning market systems we expect to be able to interpret the meaning, say, of the price of an acre of land as a measure of the social sacrifice imposed, its social cost, when that land is used to grow some particular crop. Where the price is either not the result of a market process, or where the market process is arbitrarily circumscribed by legal restrictions or requirements, the substitution relations implicitly required for such social cost judgments probably do not exist.

12. In the market recruitment of inputs for a new project, the ordinary assumption that permits us to accept market prices as the measure of social cost is that the order in which resources are diverted from other activities is at least roughly efficient. That is, the activity from which the resource is withdrawn receives the least-valued contribution of all users of the resource. In general, resource diversion requires highly decentralized decisions even in countries where new projects are chosen by centralized agencies. For this reason where the assumption of efficient resource diversion is unjustified, market prices are unacceptable measures of social cost. In a general way all that can be said about the biases carried by market prices is that if resource diversion is inefficient, market prices will understate social cost. For, if prices measure the value of resources at the margin of their productive employment and they are withdrawn from the more-valued uses, and not from the least-valued uses, the losses will be both greater than they might have been and greater than market prices indicate.1/

1/ To argue that activities do not come within the scope of the price system, or that they are not integrated with one another through continuous markets, is not to say that the individuals of less developed economies are any less "economically" motivated than are individuals in advanced countries. There are reasons to expect that people generally are rational in the sense that they maximize some utility function by so choosing among the alternatives available to them. Nevertheless, in less developed countries the marginal rates of substitution among individuals, and the marginal rates of transformation among producers are far less perfectly brought into equality than in advanced market economies.
12. The less developed a country is, the less likely it is that market price distortions can be removed within any reasonably limited period of time. For advanced countries most of the common price distortions have in fact been brought to tolerable levels. Unemployment is a small fraction of the labor force of almost all advanced countries. Monopoly is effectively countered so that its price distortions are rarely gross, and especially is this the case when the dynamic influence of innovation on market competition is taken into account; monopoly destroying innovation is the process par excellence of economic development. The distribution of income may not conform to the ideal any one of us holds, but the distribution is subject to the effective social control of the polity and it must be unclear how we should alter the distribution by some new means when in fact we have not altered it by the already available means.

13. Even in the most difficult class of value distortions, where important externalities are present, the operation of a flexible market system gives continuous opportunity for the internalization of externalities by changes in the size of business firms to incorporate more or fewer activities within a single administration. Those externalities that cannot be thus internalized are in fact a major basis for the establishment of government intervention. The scope of government is freely changeable in response to these shifting needs, and externalities which appear to be unattended may be a minor subset of the set of all externalities. The main application of shadow prices in advanced economies is in the evaluation of projects which are to be undertaken by government. And the argument for the use of shadow prices there is that by their use such evaluations may be made more satisfactorily than by a political bargaining method of project choice that is simply devoid of systematic evaluation. The use of shadow prices in advanced countries is ironically a step in the direction of increasing reliance on markets. The arguments for shadow prices do not apply to the evaluation of industrial projects undertaken within the private sector.

14. Similar considerations might suggest the limitations of shadow prices in less developed countries as a means to deal with the conventional list of market failures. While the conclusion would be reached with many more reservations, still it would be plausible to hold that the best policy is to eliminate the failures rather than to accommodate to them by a compensatory shadow price system. To illustrate the way such a case might be presented, consider the main points of failure in the OECD list. The distortions introduced by inflation, especially those that spoil the significance of the exchange rate, can certainly be removed by the termination of inflation, and they can be mitigated to some tolerable level by a suitable reduction of the rate of inflation. Whatever the merits of the structuralist case for permitting continuing inflation, we need not conclude that inflation is inherent in the state of being less developed. All we can conclude is that inflation may be less costly than the cost of its control, and the fact is that many less developed countries choose inflation while advanced countries do not.

15. Unemployment comes much closer to being an inherent aspect of being less developed, at least in countries with large populations in comparison with the endowment of resources. Still the bias in the market wage in the modern sector where wages are paid to recruit labor need not necessarily be
distorting. If the market wage is set at the level of per capita income in the non-market sector, there is a sense in which that wage does measure the social cost of employment in the modern sector. Furthermore, if wages are held constant at that level there is an open opportunity for the expansion of the modern sector by transferring labor resources from the non-market sector. Wage distortion becomes a particularly serious problem when the industrial wage rises above this level as a result of perhaps government policy or union power. Then it does become difficult to develop by the increasing use of the available labor resources, for the high wage is an inducement to excessive economies in the employment of labor and it imposes a high cost on expanding employment in the form of increases in current consumption of a minority of the population. Yet there are two things to be said about a situation of inflated industrial wages of this kind. The first is that industrial wages are in principle subject to control, even in less advanced countries. The second is that our judgment of the cost imposed is a matter that implies a value premise with respect to the inter-temporal and the inter-personal distribution of consumption. If the structure of wages in a less developed country were established knowingly through some political process, that result may then convey a kind of legitimacy to the consequences that we cannot lightly ignore.

16. A final distortion of the market system commonly found in less developed countries, that which is associated with export monopoly power, does not require less developed countries to use a shadow price for exports. For a tax can be levied on these exports equal to the difference between the world price and the marginal revenue to the country, with the desired effect on production.

17. Given the market failures of less developed countries, we can choose either to concentrate on the elimination of the distortions, or to offset their influence on the way the economy grows by using a system of shadow prices in project evaluation, or, of course, some combination of the two. Those who choose the second, seem to give little weight to the likelihood of economic reform of a kind that would improve the operation of markets significantly, and they have comparatively greater confidence in the usefulness of special pricing policies in the evaluation of new projects. In opposition to this view we ought to recognize that economic development and the requisite reform go together, perhaps inseparably in the absence of a dominant centralized economic administration. But the point is not only that there is a strong relation between improved markets and development, it is also that in the absence of improved markets there are serious limitations on the improvements in rational choice it is possible to achieve by the use of shadow prices. These limitations will become evident as we discuss the sources and applications of shadow prices.

III. A CRITIQUE OF SOME SHADOW PRICE MEASURES

18. The market weaknesses of less developed countries cannot be quickly changed and there is certainly every need to accommodate to them in the sense that major investment decisions be made as rationally as possible under these
circumstances. To further that objective we ought to seek prices that convey more information and less "noise" than some of those that are generated by undeveloped and imperfect markets. There are a number of distinct alternative methods of generating shadow prices from which to choose. The line that divides the main alternative methods is drawn on the basis of how much it is expected can be achieved in the making of efficient project decisions by the use of shadow prices. The temptation is to find unbiased measures of social cost and gain in prices that approximate the prices that would obtain under conditions of general equilibrium in perfect markets.

1. Measures of Shadow Prices

Shadow Prices from Linear Programming

19. In fact the original use of the term "shadow prices" comes from an analytic abstraction of a natural market process, linear programming, that generates resource-scarcity weights at the same time as it finds an efficient allocation of those resources to satisfy a given objective function. Linear-programming planning models may be constructed for actual economies, and from these shadow prices can be generated. This possibility gives substance to the temptation to find once and for all the very prices that tell us the correct information about social scarcity, no matter what actual prices may be, and no matter what the actual activities of the economy are.

20. But the temptation to use such shadow prices is a delusion. If in fact the results of such a programming model were to become the directives for the actual activities of the economy then, strictly speaking, prices would not be necessary, for the sector allocations would all have been made by the programming simulation and the accompanying shadow prices would merely record the consequent comparative scarcities. If the results of the planning model were interpreted to be merely guidelines to the activities within sector aggregates, and specific projects still had to be selected, the shadow prices generated out of the model would be inapplicable to project evaluation for they would be scarcity measures of resource and activity aggregates where projects must be evaluated in terms of individual resources and goods values. Furthermore, there are severe limitations in such models as actual planning guides relating to the assumption of linearity, the crudity and datedness of the statistical information, the excessive simplicity of the objective function and the arbitrary time horizon during which the objectives are optimized. Even if shadow prices generated from such models could be used for project evaluation they would be far from unbiased.

21. More important than all these objections, however, is the fact that no less developed country (to say nothing of advanced countries) is in fact organized and directed in accordance with such a planning model even in countries in which such models have been constructed. The critical question is, what would the relevance be of shadow prices derived from an optimal planning model to an economy which is not in practice governed in accordance with the model? Is it efficient to employ resources in a project, or to choose new projects on the basis of social costs measured under conditions of "optimally efficient" allocation which is nonetheless fictional? We require second-best pricing here rather than optimal pricing. For in general
in a non-optimal world we may fail to achieve an improvement in the total system by adopting locally a policy that would be optimal if applied universally. Furthermore, the information "optimal" prices convey is likely to be entirely erroneous in a generally non-optimal situation. Actual recourse scarcities, those that result from the way in which resources are being used, are simply different from scarcities under conditions of efficient allocation, and they will not be revealed in the solution to an optimizing planning model.

Shadow Prices from International Trade Prices

22. General equilibrium programming methods are neither correct nor a practical source of shadow prices. An alternative source of optimal prices that is however also feasible is the method proposed in the OECD Manual ... In this proposal world commodity prices are used as proxy prices for project evaluation. For goods that are actually traded internationally, either imported or exported, there is little difficulty in identifying the relevant world prices, for they are either received or paid by the country (tariffs and most export taxes are disregarded). For non-traded goods and resources, the goods are separated into traded and non-traded components, the traded component is valued at world prices, and the non-traded component is again separated and proceed again as with the first separation, eventually summing the world value of traded parts. The value of any residual non-traded part is ascertained from its contribution to some traded good. An exception is made for the value of labor, which is discussed below (page 11 ff.). The rationale supporting this method of valuing resources and goods is that the opportunity cost of a resource in any use whatever is, at the margin, the contribution it makes, or might have made via foreign trade to the balance of payments. In this approach to shadow pricing of resources, the foreign trade sector is not limited to its influence on the exchange rate. Foreign trade is the window through which all internal values are compared with those in the rest of the world.

23. It is an ingenious method, both for its rationale and its feasibility of administration. Yet it is a system of valuation, like the programming model source of shadow prices, that is based on the questionable assumption that individual decisions should always be guided by optimal prices. It assumes that the meaning of cost is foregone opportunity under the ideal circumstances in which any resource could indeed be used to produce for export or substitute for imports. It further assumes that the actual transformations facing all parts of the economy have been brought into marginal equilibrium with world markets. And it assumes that each individual in the country has brought his substitution schedule into equality at the margin with the structure of world prices. Wherever the Manual ... acknowledges that these counterfactual assumptions are unrealistic, it justifies the procedure with the argument that better policies would bring about these circumstances.

24. Even in economies with considerable resource mobility and the capacity to accomplish transformations rapidly, disequilibria persist for long periods, and indeed create the incentives which induce the reallocation of resources to new activities that eventually eliminate the disequilibria.
A pricing policy that anticipates this adjustment process by the establishment of the ultimate equilibrium prices by fiat goes far toward unhinging the entire adjustment mechanism. Ideally marginal cost-price equality should be approached as efficient activity levels are reached, the remaining gaps serving as continuing guides in the feedback control mechanism. This market related mechanism may work poorly or not at all in less developed economies, but it may hinder the establishment of such mechanisms to make project choice immune to continuing local influences by sanctioning the use of prices that remain insensitive to local conditions.

25. The technique proposed in the OECD Manual ... is a little like the method reportedly used to establish trading values among the planned economies of Eastern Europe. For very different reasons, there prices are also unreliable measures of resource and goods value, and whatever use may be made of arbitrary official prices within each country, they are unacceptable as a basis for exchange outside each country. Confronted with ignorance of true internal cost and value, trade negotiators adopt (capitalist) world prices for the purpose of establishing exchange values. Perhaps East European trade is facilitated thereby. But an important distinction needs to be made. The inefficiencies of those economies and the ignorance in which decentralized decisions must be made cannot be rectified by the fiat of using world prices. The prices of the outside world do not measure the marginal rates of production transformation or consumption substitution within the Eastern European countries. In a partial equilibrium sense the export industries and import competitive industries may, in part, adjust to outside prices. But in the nature of those economies, and in the nature of the economies of less developed countries, there is not the further indirect adjustment to frontier activities. The OECD method would bring world prices inside the economies of countries adopting it, to the extent project investments are based on them, which is a step toward a kind of integration with the world economy not actually taken in Eastern Europe where trade, but not production or investment, are apparently affected by trading prices. It is regrettable that the price problems of the Eastern European countries cannot be so easily solved. They could have knowledge of their own scarcities and values without the experience of markets to reveal their values. But it cannot be done.

2. Shadow Prices and Persistent Economic Distortions

26. Misunderstanding about this may be traceable to a difference of view about non-optimal economic activity in less developed countries. There does seem to be some evidence in the Manual ... of a kind of optimism about market failures, that it is limited, accidental and temporary. In an example in which a tire factory investment decision would be viewed favorably if rubber inputs are valued at world prices and unfavorably if domestic prices are used (p.17), it is argued that world prices are the correct basis for decision. The argument against using the higher domestic price is that one error should not be permitted to impose additional errors on the economy. Now if it is to be acknowledged that the high-cost rubber industry is an error, does that mean the supply of domestic rubber to the tire industry will not be expanded when required by further increases in the capacity of the tire industry? If it does not imply this, if rubber production is not to be limited because it is an error,
then the true social cost of rubber is measured by the higher domestic price. If, on the other hand, no such expansion need be expected, and new supplies of rubber would be imported at world prices, then there is no need to continue to protect the domestic price of rubber and the correct policy would permit the actual domestic price to fall to meet import competition. A shadow price would be unnecessary. But failing such an actual price policy, the case for using world prices depends upon the correctness of the second assumption, and it cannot be assumed correct automatically. Furthermore, as a general surmise, it seems rather much to assume that errors are to be acknowledged and rectified in future decisions. There is much experience to suggest that this is not always the way it goes. The circumstances that lead to such "errors" persist. If there were a reliable tendency for developing countries to return to optimal patterns of production, there would be very much less need for shadow prices in the first place. The role of shadow prices is precisely to guide the adjustment to persistent non-optimal situations. This is the second-best proposition again.

27. Inefficient forms of production are not entirely the product of past error, as in the case of the rubber industry, above. Much of the inefficiency of less developed countries is the consequence of the state of underdevelopment itself. It is a prior condition with which we start and it is more or less ubiquitous. It affects the way all resources are used and the way transformations from one kind of production activity to another takes place. It is gratuitous to assume that better policies will in some miraculous way presently rectify the terms on which actual decisions are made.

28. In addition some of the "inefficient" productive activities of less developed countries as well as of advanced countries, are matters of social policy and, being the result of choice and not error, are indeed likely to be highly durable. It is not even clear that it is right to recommend that such policies be corrected. For, many investment choices of the past were made in response to a social distribution preference to benefit a region, a group or an individual, even at the expense of national income which is a summation of unweighted individual incomes. Correctly conceived shadow prices should incorporate a measure of actual domestic preferences. Clearly the prices of the outside world cannot be expected to measure these inside values where there has not been an opportunity for free adjustment of activities to the markets of the world.

3. The Effects of Inappropriate Shadow Prices

Shadow Prices and International Trade

29. The choice of which goods are to be imported and which exported, a critical choice if a country is to benefit from international trade, is sensitive to the way costs are presented for investment decision, that is, the system

1/ How costly an error is this? The value of the loss will depend on the extra consumption of rubber (or tires) induced by using the lower world price of rubber. Given the elasticity of the demand for tires, $e$, the loss would be $L = \frac{1}{2} q [\Delta p / p (e + 1) - 1]$, where $q$ and $p$ are the given domestic values of consumption and price, and $\Delta p$ is the difference between the domestic price and the world price of rubber. If the tires are also exported, the loss is $\Delta p X +$ the domestic loss.
of resource pricing. The fundamental basis for efficient international specialization is the difference in the primary resource scarcities of one country in comparison with the rest of the world. The presence of a comparatively plentiful supply of one type of resource, which is indicated by a relatively low price for it, induces the embodiment of that resource in goods which can be exported profitably into the world market. Frequently the primary resource is only indirectly embodied in an exportable good, by being first embodied in a non-exportable intermediate good the price of which is in turn low because a) its cost of production is low and b) it cannot be exported to the world market. But when this is the route by which a comparatively plentiful factor influences the choice of exports, the low domestic cost of these intermediate goods is the critical price required to generate a profitable supply of exportable goods.

30. Now what is an exportable and what is not is determined by apparent comparative cost, by transportability, and by specific market opportunities. For example, the local price of sugar may remain below the "world price" because sugar is marketed under restrictive marketing conditions. That which is exported is sold at a different price from the local price and the two prices do not necessarily converge. If, under these circumstances, sugar is valued at world prices when it is employed to produce, say, rum, there may be a costly error. For the use of the high world price of sugar in rum production may well indicate that it is unprofitable to export rum. In effect, to use a world price for an ambiguously exportable good imposes, by fiat, an equalization of the price of a comparatively plentiful local factor with the price of the factor in the world market. Through this kind of error a country may be discouraged from entering into world trade on the basis of its fundamental resource strengths.

31. Symmetric errors are possible that would encourage a country to export goods for which its resource endowment is inappropriate by obscuring the locally high cost of production of intermediate goods by the substitution of lower world prices for local prices. Similarly, imports can be perversely selected by shadow prices that make domestic productions appear more expensive than imports. Where there are complex and widespread market imperfections that open up these possibilities the potentiality for social loss is quite real and great care must be taken, as the Manual...recognizes, to avoid the mechanical use of such general rules as using world prices to value "tradable goods."

32. These observations about world trade pitfalls where shadow prices are used should not be interpreted to mean that available market prices will reliably avoid similar trade perversities. They will not. There are no doubt numerous examples of welfare losses occurring under the guidance of market prices, frequently assisted, no doubt by policies misguided in still other ways. However, shadow prices in less developed countries should be sensitive to the market and price anomalies that commonly occur.

Shadow Wages, Employment and Investment

33. In the proposal for the valuation of labor the OECD Manual...attempts to incorporate the values of the economic authorities. The scheme
for the valuation of labor is based on the assumption that the wage paid in industrial employment is higher than the value of the marginal product of labor in traditional agriculture from which expanding industrial employment is supplied. But the lower marginal product is not the measure of the social cost of expanding industrial employment because of the assumption about the way national authorities regard the distribution of present consumption and present investment (future consumption). It is assumed in the Manual ... that the authorities may in some cases prefer to increase future consumption at the expense of present consumption, that they may prefer more rapid economic growth than that which is chosen by individual decisions to save and invest through the market, and that they may lack the instruments to bring the actual ratio of investment to income into equality with their desired ratio. But if a government is unable to prevent a net rise in consumption when a worker is transferred from traditional agriculture to industry, increasing industrial employment raises the ratio of consumption to income even while it increases income. Hence the Manual ... includes in the shadow wage a part of the added consumption as the social cost of industrial employment.

34. Reservations may be held about the assumption of governments' inability to tax to limit consumption increases, but given the assumption, the social cost of industrial employment is higher than the direct loss of output in traditional agriculture and the formulae provide a means for estimating the correct social cost accordingly. This is a proposal for finding a shadow price of labor that accommodates to local circumstances, to the authorities' values, to the structural discrepancy between two sectors and to the fact of limited tax power. It is a means to establish a second-best shadow price rather than one built on the counter-factual assumption of general equilibrium.

35. There is, however, an inconsistency in the argument that arises in connection with the undertaking of selected projects whose social profitability exceeds private profitability on account of a shadow wage below the market wage. Such projects will incur, for at least a part of their labor force, an actual expense in excess of the market value of the labor product, regardless of how profitable the project may appear when valued by shadow prices. This deficit, insofar as it is not offset by contributions to total profit from internal project sources, must be made up by subsidies for which there must be tax counterparts. But the shadow wage is based on the assumption that the government's capacity to tax is practically restricted and hence a desired rate of saving and investment is not achieved. Projects are to be valued, in such circumstances, by the use of an inducement wage rate, but this neglects the necessity to match the investment this evaluation method would justify with added required taxation. It is clear, once the finance side of the argument is recognized, that the extent to which investment may be encouraged by means of shadow wages must be related to the availability of tax revenue and to the value of that revenue in other uses, including the financing of still other investments rather than financing the extra consumption of workers employed at inducement wages. The state of the government's budget is given no place in the calculation of the shadow wage rate, although the general social value of investment and future consumption are taken into account in the OECD Manual ... (Chapters XIII, XIV), a problem ignored in many other pleas for using shadow wages in place of market wages.
36. Setting shadow wages below the market wage would be even less relevant in an economy in which the addition of an industrial job in one industry is accompanied by some contraction of industrial employment somewhere else in the market sector. This would be unfortunate where a large pool of low-productivity workers continues to exist in the traditional sector, but the actual cost of using industrial labor in these circumstances should be reflected in their wage.

37. Such local knowledge cannot be had in advance of direct experience and specific studies made within less developed countries. These studies should focus on resource recruitment and product use associated with projects of the past to discover how the particular economy has actually performed. Resource diversion patterns are not generally planned and are subject only to indirect control. How the controls work must be observed. There may be stable patterns for each country so that once they have been studied for recent historical cases the patterns may be made the basis for establishing resource values in shadow prices. We may, of course, be unlucky and regular patterns may not be revealed so that it will be difficult to anticipate how and from whence resources will be released in future expansions. We may also discover that some countries are much like others, all others or only others that fall into some more or less homogeneous category. With so little knowledge of this kind it is impossible to know what to expect.

38. However much work this may require, the usefulness of shadow prices lies in the information of just this kind encapsulated in them. If we are to employ shadow prices in project evaluation we must acquire the knowledge on which to establish them. There is no need to set prohibitively rigorous standards of accuracy. Much information of this kind would not be worth the cost of obtaining it. Many specific resources are too unimportant for any investment project to warrant much study. Many inputs are actually imported and it is only necessary to agree on a shadow price of foreign exchange to value them. It may even be appropriate to conduct benefit-cost studies to determine what information is worth learning. But the first task is to acquire experience in conducting resource diversion studies and to learn about the general patterns of resource diversion.

IV. THE USE OF RELEVANT SHADOW PRICES

39. Although relevant shadow prices require specific knowledge of the economies in which they are to be applied, they share some of the problems of identifying them, which can usefully be explored in a general way. The most common circumstance that suggests the need to substitute a shadow price for a market price is, as discussed before, the fracturing of markets so that there are two (or more) prices from which to choose. Markets may be fractured by institutional divisions, by the use of taxes, subsidies, import duties, quotas, rationing, the influence of monopoly or monopsony, and price discrimination. To a private firm, for example, the price of an imported good includes the duty. But a government user of such a good may ask whether it should regard the cost of using a unit of the imported good as the c.i.f. price including the duty or, in consideration of the fact that the duty contributes to the government's own
revenue, as simply the c.i.f. price, net of duty? The problem is only slightly more complex if there is also a domestic source of the imported good. A similar problem is raised in choosing a social discount rate for the evaluation of a project by the government. Should it be guided by the cost of capital resources which may be the price of borrowing either at home or abroad? Or should it impose upon its own projects a higher rate closer to the rate applied by private firms which pay a business profit tax? Where direct controls limit imports (or other activities) the market is fractured into a market clearing price that is above the supply price. Should project appraisal use the common market price or is social cost more truly measured by the supply price? These problems are ubiquitous, and we should recall that each of the policies or conditions that has the effect of fracturing markets inevitably distorts an allocation mechanism.

40. As a general caveat, when taxes, subsidies, direct controls, or other protective and revenue instruments are considered, the cost of distortion of resource allocation ought to be weighed with the advantages and other disadvantages. Many of the objectives of such policies can be achieved with minimal distortion to the price system. Much price system distortion and destruction is the outcome of policy choices made in ignorance of the cost of destructiveness to the price system, and once markets have been fractured there is no way to regain all the benefits of a unified price system, even by the judicious application of shadow prices in project choice.

1. Shadow Prices for Fragmented Markets

41. The principle of efficient allocation that bears on these problems, is the Principle of Equal Valuation (PEV).\(^1\) An economy can achieve net gains by transferring resources from low-valued uses to higher-valued uses. Where there are two (or more) prices of a single resource it will, in consequence, be employed in production with similarly different marginal contributions, thus preventing the efficient use of the resource in the economy as a whole. The PEV requires therefore that all classes of users of each resource be charged the same price.

42. This is an important principle and its application will prevent a good deal of mischief,\(^2\) especially the kind of costly mischief that is possible once an economic administration is released from the inhibitions of

---

\(^1\) In the absence of some criterion which would have general applicability based possibly on a desirable intersectoral allocation ratio, or the utility function of governments making project choices, the Paretian standard of efficiency is adopted here.

\(^2\) The separation of interests between the public and an official decision maker is analyzed in Louis de Alessi, "Some Implications of Property Rights Structures for Investment Choices Within the Government," *American Economic Review* LIX, March 1969, pp. 13-24. Insofar as shadow prices are within the discretionary choice set of an official rather than objective data given to him, the choice may be made for the maximization of his welfare function rather than the social welfare function.
market price by the seductiveness of being able to substitute shadow prices. For example, a country with a high-cost, protected rubber industry may find it unprofitable to establish a rubber tire industry unless the project is evaluated with a shadow price for rubber at the c.i.f. price of imported rubber net of duty. That would violate the PEV, and in fact it would be a costly policy if a rubber tire industry were to involve an expansion of the high-cost domestic rubber source. If it were not to be supplied by more home production, but by imports, then it should be asked if rubber tire production is the best use to be made of greater rubber imports? If the PEV is followed, the question will be asked.

43. Now on the other hand prices can be biased in their representation of the actual terms on which resources are available, whether or not such terms themselves are the result of optimal conditions. Moreover, generally such biased prices are coupled with detailed constraints on the adjustments that are made in the form of rationing or the use of other direct controls that partially sterilize the influence of price. In these circumstances we can improve project evaluation by the use of a shadow price that is based on an estimate of social cost and benefit. In this kind of case there is nothing lost in applying a shadow price to the evaluation of a particular project because the rest of the economy has not adjusted to the nominal market price, and in fact equalization of cost and use values is more likely to be achieved by shadow prices applied to specific projects.

44. Frequently the problem which presents itself here is the existence of more than one value of the resource within the economy because there are barriers to equalization. The influence of a tax, monopoly and rationing are all similar in preserving differences in the value of a resource to its user and the cost at the margin to its supplier. Wherever such multiple values arise the correct value with which to calculate social cost is the one (or more than one) that applies to the part of the market from which the sacrifice is made, or to which the benefit goes. Where it is feasible to do so, the shadow price should be a weighted average of the prices actually paid and received where the weights reflect actual quantities. For example, an expansion of electrical generating capacity may draw on fuel oil from new drilling within the country, by contracting the flow of oil to rail transport where coal is competitive and by increasing imports. The cost of oil from each of these sources may be different because of the use of taxes, tariffs and administrative allocations. The differing values sacrificed in the three sources are all relevant, although for practical reasons it may be undesirable to estimate each. But no general rule can tell us which simplifying assumption is best in all cases.

45. The variety of imperfect and fractured markets is large and it will clarify the application of principle to shadow pricing to choose illustrative cases from the main types. In these examples we follow a procedure that can usefully be adopted by the project analyst, consisting of four broad steps to be initiated once it is determined that the market price is not useful for project evaluation and must be replaced by a shadow price. The following examples, however, will include some market prices that can be used for project evaluation, and the point of the discussion will be to distinguish those prices that are usable from those that are not. The first step, a), is to ascertain
whether or not the market imperfection responsible for the unacceptable price
is subject to reform, on the general ground that it is better to change the
market price for all users than to use a substitute price for a single
decision. The evaluation of projects may be expected to provoke useful dis-
cussions of market policy if project analysts are alert to the opportunity.
The question, moreover, is strictly relevant to project evaluation, for the
expectation that market reform may occur in the future ought to be taken into
account in the present evaluation.

46. The second step, b), is applicable in cases in which the unusable
price is not the result of a market imperfection but of some government policy
that affects the price. Before adopting a shadow price it should be ascertained
whether or not the policy can be, or is likely in the future to be, changed.
If both inquiries yield negative results, then we must find a way of accommodat-
ing to not having a single optimum price applicable over the entire economy.
We must choose a sector of the economy, step c), within which to achieve an
efficient allocation. As a rule the object in making such a choice should be
to choose a sector within which there is actual resource mobility, to accept
the natural divisions that already exist in an economy that is imperfectly
integrated. Such divisions may be based on geographic regions among which
labor is relatively immobile, or governmental ministries among which capital
budget allotments are determined according to political preference, etc.
That decision made, the final step, d), is to estimate and adopt a shadow price
that satisfies the PEV within that subsector of the economy and encourages sub-
optimizing allocation within that sector.

2. Examples of Choosing Shadow Prices

Excise Taxes

47. A simple kind of market imperfection is that which is introduced by
the imposition of an excise tax on an intermediate good. The effect is to
destroy the marginal equivalences between producer and user on whom the tax
falls. The project analyst skips step a) of the procedure and surveys the
possibilities in step b) by reference to the canons of good taxation by which
the influence of the tax may be rendered less harmful to efficient resource
use. However, assuming opportunities for market improvement are not present,
step c) indicates that a choice must be made to honor the marginal equivalences
either vertically or horizontally. Suppose we are dealing with the price of
machinery used as inputs in the project being evaluated, and produced in domes-
tic firms. Preservation of the vertical equivalence means to equate the cost
of producing the machinery and its productivity at the margin, while horizontal
equivalence means the equation of the marginal productivity of machinery in all
uses. Inequality vertically means an error in the total quantity of machinery
produced and used, while permitting efficiency in the allocation of the
available supply among alternative uses. The reverse error results from
permitting horizontal inequality. The guidelines suggested above help to
choose the more important equivalence. Where there are many users and where
the choice followed in the present case is not sure to become universal, it
is best to optimize over the uses of machinery rather than within the produc-
tion chain. Then, in step d), the tax is included in the shadow price. But
with this choice there is the unavoidable penalty of violating the marginal-
cost/marginal-productivity equivalence.
48. This treatment of an excise tax is based on the assumption that revenue is the government's tax objective. If in fact the tax rate on machinery is close to the rate on other goods, the argument to include the tax is even stronger, for then its inclusion permits resource use optimization across all the inputs so taxed. That is, it avoids a bias against the use of particular types of inputs that are subject to the evaluation procedure. In the case of a special tax on a particular good intended to discourage its use, such as on a soot-producing fuel, then including the tax is obviously appropriate, for it is intended that the vertical equivalence be violated. Notice that there is a reverse conclusion where the excise is levied on the output of the project being evaluated. Thus optimizing across goods, the price to apply to the output for evaluation should be net of tax, such as would be received from the sale of the good by any other firm whose product is similarly taxed. And again, if the tax is not intended to raise revenue but to control the consumption of the good, it is even more clearly appropriate to adopt the price net of tax.

**Import Duties**

49. Should import duties be included in the price of an input when a project is evaluated? Some tariffs are adopted for revenue and others for protection and we may judge the possibility, under step b), of price reform accordingly. Unusually high rates that protect no domestic industry may be destructive of industry that uses such imports and the best remedy would be to lower the tariff. It is certainly more cumbersome, although in some situations perhaps also more feasible, to evaluate a project without the duty charge and later obtain either a specific duty exemption or an offsetting subsidy. But if the tariff is not set at an unusual level and other industries pay comparable rates on other imports, optimization across industry users of this and other inputs would lead to the conclusion that the correct price of the input should include the duty. The alternative of vertical optimization for a single project and input, the equalization of marginal import cost and input productivity, by excluding the duty, would then require arbitrary and special tax-subsidy transfers and probably would also entail horizontal mis-allocation losses.

50. If the tariff is set to protect a domestic industry that would not be able to survive against open import competition, there is a temptation to omit the duty (or to subtract it from the price of the domestic product) in calculating the prospective yield of a new project so as not to impose the inefficiency of one industry as a penalty on another potentially profitable industry. But the argument is unsound. So long as the protected industry does manage to sell its output to customers who pay the high, protected, price, making an exception of some new prospective industry user would justify an investment with a less productive use for the input than is standard. The situation would be even more costly if it were possible to argue that a number of new industries will be established on the basis of a net-of-duty input price and that therefore there will exist a class of users within which marginal-productivity equivalences will be preserved. For in this case the true domestic marginal cost of the input throughout the new class of industry will exceed its marginal productivity, and the net social loss of the protected input-supplying industry could be greater than the net social benefit in the
new industry, for a possible net national loss. Catastrophic, perhaps, but not extraordinary.

51. If there is excess capacity in the protected industry and it is desired to find new uses for the good, an inducement might be arranged in the form of deducting the tariff in the price used for project evaluation. However, a more flexible price policy would be a more direct means of achieving the objective. But the choice made will determine which industry will require a subsidy. If the protected industry's price is cut, it will require a subsidy, whereas if the input using industry must pay the full price after it has been evaluated with a net-of-tariff cut price, it may have to receive a subsidy. In either case care should be taken to avoid the expansion of social net-loss industries by means of subsidies to the extent and in a way that they can "compete" in the export market and provide benefits to the rest of the world at national expense.

Private Monopoly

52. The presence of monopoly provides both false temptation and genuine opportunity for the application of shadow prices in less developed countries, but not always in equal proportions. If the project being evaluated is expected to exercise some monopoly control over the price it charges for its output, we cannot very well correct for the expected monopoly price by substituting one that would obtain under competitive conditions, for the output will in fact be restricted and the marginal social value of the output will accordingly be greater than the competitive price. If the authorities are aware of the prospect that the investment in question is likely to be operated as a monopoly, they might more appropriately consider policies by which competitive price and output might be achieved. For, if there is monopoly restriction on output there is no effective way to have improved the results by having used hypothetical prices in the investment decision. If a monopoly price is expected to rule, then the consumption of the good will adjust to that price and the monopoly price measures the marginal social benefit of the project even though the marginal social cost is below the benefit.

53. Similarly, in the case of a project the price of whose output will be established by the necessity of competing with a substitute service over which a firm with monopoly power has control, the appropriate service price to use in estimating social benefits must be based on that monopoly price. For example, the benefit from a taxi service to supplement basic urban transport of a city bus system is related to the price and use of the bus system; the higher the bus price, the larger the benefit of an added unit of taxi service. The fact that the bus-service price is set monopolistically is quite incidental to the determination of taxi values. If possible, an analyst might evaluate an expansion of the bus service based on a "competitive" price schedule, as an alternative to an investment in taxis. But if that is rejected and the bus system is to be taken as a datum, then so must the monopoly price. In the evaluation of a taxi service the benefits depend on the alternatives available and it does not matter whether the restriction on alternatives is the consequence of the niggardliness of nature or the restrictions of a monopolist.
54. Where an investment is to contribute to the exports of a country and the country has some degree of monopoly power over the price of the good, then there is an opportunity for applying a shadow product price that differs from the price that is expected to obtain in the market. Under these circumstances the price to an individual or small producer is the world price (plus or minus taxes), whereas the net value of a unit of the product from the point of view of the country is less than that by the amount the price must be lowered to induce the world to accept the new unit. To encourage a correct volume of investment in new capacity to produce the export good, a shadow price equal to the marginal national revenue should be applied in investment valuations. In such uses shadow prices, perhaps implemented by imposing an export tax, are more effective and more economical than is a directly administered restriction on national exports of the good, with or without restrictions on production.

Land Values

55. There is a temptation commonly found irresistible to regard the value of land, especially urban land, as the manifestation of monopoly, and therefore, taking advantage of the possibility of using shadow prices to evaluate projects, to declare the value of land to be nil. This is an ideological error, a class of error in which one familiar element is the Marxian-socialist elimination of land value. Although this particular element is recognized as an error by many economists, there is a surprising amount of confusion about the class. The confusion relates to both the source of high land prices and the consequence of ignoring them. Land prices can, of course, be raised by land-market monopolies, and no doubt that is the best explanation of some interesting examples. Yet it is one of the most reliable predictions that land prices (even discounted for general price level changes) will rise as economic development takes place. The reliability of the forecast stems from the natural limit on good location and the increasing cost of finding suitable substitutes. There is nothing more classically scarce and hence more appropriately tagged with a rising scarcity measure, its price, than is land in choice locations. Given its scarcity, its efficient use is of increasing importance and therefore some method of land valuation is needed. But if the valuation of land is to have an influence on land usage, the prospective land-using projects must be evaluated to the realistic assumption that such projects entail the deprivation of still other project users of valued sites. Generally the market price of land should be honored.

56. A less subtle motive for wishing to be rid of the restraining effect of high land values is the desire to deny the influence of those users responsible for the rise in land prices on the course of economic development. In some specific circumstances it may be the luxury demand for residential sites and in others the demand for land by the private sector that a government may wish to deny. The specific motives vary, and shunting out the influence of market prices can be an effective means of permitting the objectives of the government to dominate over the objectives of others. While no outside expert ought to presume to block an attempt of this kind, it would be a misuse of expertise to provide a spurious intellectual justification, based, say, on the general availability of land and possibility of monopoly restriction, for ignoring market land prices and establishing instead zero, or arbitrarily low, land shadow prices.
Public Monopoly

57. Public monopoly often presents a price policy quite different from private monopoly. Where governments are able to control the price at which its services are supplied, it may be motivated to achieve some specific social objective rather than to maximize its net return. But the diverse objectives of governments as sellers of services implies that those services may be sold at below equilibrium prices, requiring the service to be rationed by a non-price mechanism. Here there is an unambiguous case for using a shadow price in place of the actual price charged to and paid by the user. For prices to which it has been impossible to adjust because of rationing are likely to be equal neither to the marginal cost of production nor the marginal benefit to the user. The outputs of public utilities are commonly "socially" priced and rationed. Water from irrigation works is commonly sold to farmers at arbitrary prices and the amounts they may purchase are also restricted in some arbitrary way.

58. An analyst may contribute to the rational organization of such services by encouraging a reconsideration of the pricing policies of the agencies responsible, step b) of the recommended procedure, before seeking to set a shadow price. But if that attempt fails then step c) requires that a choice be made of the domain over which resource use efficiency is to be achieved. If it is assumed that the resource to be used in the project has a fixed supply either because of the restrictions of nature or policy and there is no possibility for achieving efficiency by assigning more resources to the production of the service, then it will not be possible to equalize costs of the service at the margin with the benefits in the project from the use of the service. In this case, it is better to attempt to equalize marginal benefits among all uses of the given service.

59. To find the correct shadow price we must ascertain the use or uses from which the service is actually to be withdrawn, which ideally will be the least valued ones. But we must be prepared for the possibility that the resource will be diverted from some higher valued use. This is possible, if not most likely, precisely under these circumstances in which prices are not used to allocate the service but rather the resource is assigned by some administrative system. Having discovered which activities are to be deprived of the service we must estimate the value of the service in that use. This is the amount which the user would be just willing to pay to retain the service. It may be possible to approximate this figure by the cost of the next best substitute service, which is likely in fact to replace the service once the new project is constructed. It is apparent that under some operating conditions a potentially profitable project may be rejected when evaluated according to this procedure. Nevertheless, it would be wrong to adopt a less stringent method of setting shadow prices on the inputs in order to put a new project in a more favorable light if in fact it cannot be expected to operate at such low costs. This method of setting shadow prices calls attention to the real basis of an unfavorable evaluation and either prevents the wasteful undertaking or encourages a reform in allocation procedures to reduce the real cost of new projects.

Wage Rates

60. The mispricing of labor in project evaluation can be among the most pernicious of shadow pricing practices. The presence of surplus labor that in
some countries could not be fully employed by almost any set of policies
tempts project evaluators to accomplish by shadow pricing the reform in the
use of labor that has not been accomplished in actual employment practices.
The temptation is made especially plausible, and may in some cases even be
justifiable, by the arbitrary way wages are set in the labor market. This
may happen in cases where either union power or government legislation suc-
cceeds in raising the wages at which labor can be employed to unrealistic
levels, unrealistic, that is, because they encourage labor-saving methods,
and the production of goods that require little labor in their production
although mass unemployment continues to exist. If "high" wages are the pro-
duct of the exercise of arbitrary market power then there is sufficient basis
for using shadow wages to evaluate projects and to deal with the problem of
subsidizing employment that must be paid for at higher market wages. The
problems associated with this policy have been discussed above in Section III.
It is more likely, however, at least in many countries, that wages are set by
non-arbitrary market processes even in the presence of unemployment, and can-
not be regarded simply as the consequence of the exercise of power that is
insensitive to economic circumstances. If this is so then the use of shadow
wages to offset actual wages will neither accomplish the intended improvement
in employment nor guarantee a more efficient selection of projects.

61. In specific situations there are a number of well-established and
fairly well-understood reasons why industrial wages may exceed the marginal
productivity of the labor occupied in subsistence agriculture. Skills and
attitudes of considerable importance in organized wage employment differentiate
the workers of the countryside from workers who have spent years (even) in
"unskilled" jobs. There are transfer costs incurred in recruiting potentially
available labor from subsistence farming. In some places preferences for the
freedom of non-wage employment must be overcome by wage premiums. Attitudes
vary and the willingness to work for wages is far less among some classes,
castes, tribes, generations than among others, yet the wage must rise to over-
come the resistance of the most reluctant among those recruited.1/ In addition
to these restrictions on the supply of labor that occur normally in an open
competitive labor market, there are non-competitive restrictions that are yet
not the gross effects of labor union power or labor legislation. Some skills,
for example, are preempted by custom and expectation by some (tribal) groups,
and the supply of these skills cannot easily be expanded by drawing workers
from other groups. In other cases there are more or less professional tasks
that are restricted to those who qualify by virtue of some specific preparation.
The labor forces of advanced countries are elaborately divided into groups
between which competition is restricted by devices that receive the approbation
of the community, hence it ought not to be surprising that the labor markets of
less advanced countries are similarly structured.

Theory and Practice, ed. G. F. Papanek, Harvard University Press,
Where the wages actually paid in industry are higher than the marginal productivity in subsistence agriculture as a result of any of these phenomena, and not simply the result of arbitrary power in setting wages, it is unclear what, if anything, is the operational meaning of "labor surplus." Wages that respond to these phenomena of preemption, preference, institutional standards, transfer costs, etc., convey information of the actual terms on which labor is made available to industrial employers. In cases of absolute restriction on the supply of a particular kind of skilled labor, the correct wage is that which clears the market for the labor supply, even if we regard the income to such a restricted group as a rent. Efficient allocation of that restricted skill requires that the rent be charged and paid (although it could be taxed away). Setting some lower shadow wage while leaving unchanged the entry restriction, will not expand employment and it will make it more difficult to assign efficiently the available workers to activities. It will also remove one element of relevant discrimination among new projects, their real labor cost.

It is tempting, but incorrect, to argue that where a labor surplus exists, as employees of established firms are diverted into new projects, the ranks of this group can, and generally will, be filled from the open pool of underemployed, and that therefore the real cost of using such workers is the loss of output of the workers who replace the diverted workers, i.e., the marginal product of the subsistence farm workers. Hence the shadow wage, according to the argument, is this marginal product. If in fact the worker group involved is expandable by recruitment from below, the market supply price is likely to reflect the terms on which such replenishment takes place. If the replenishment were costless and the skill differences among early and late comers were unimportant, the supply price would not tend to rise, as it commonly does, when such employment increases. If the wage is conveying information about these transfer costs and skill differences, then the actual industrial wage may be a correct measure of social cost and it should be used in project evaluation.

This is not entirely satisfactory, for it leaves unresolved the waste of artificial restriction, irrelevant standards, the immobility that comes from ignorance, the inequity caused by selfish groups protecting their own petty advantages, the transfer costs that reflect the failure to improve the organization of the entire labor market. All these in turn impose their costs by tilting project selection toward relatively unproductive choices and leaving a legacy of people increasingly incapable of coping with their lives while they remain in the thrall of their traditional economies. Nevertheless, we must distinguish between the usefulness of shadow wages when they correct arbitrary labor pricing, and the harm that can be done by using shadow wages as though they were a panacea for the imperfections that infest the economies of developing countries.

Fragmented Grain Markets

In addition to the barriers that divide the labor markets from one another in less developed countries there are numerous other divisions of importance, such as the divisions frequently found in the grain markets and in the capital markets. The first of these is usually caused by the policies of
local or regional authorities in their effort to achieve security in the provisioning of food grains whenever there is a threat of famine. Under these conditions embargoes on export of grain from "surplus" regions to "deficit" regions invariably create a geographical grain-price structure that raises problems in the evaluation of agricultural investments. Clearly it would be best for the country to avoid such security-oriented local policies by depriving regions of the authority to control internal trade. Failing that, we must consider the possibility that a single anticipated grain price for the entire country may not be optimal, and in addition the location of grain specialization that would be optimal for the country with free arbitrage in grain may be a disaster if there are to be restrictions on grain arbitrage. The correct price expectations on which to make planting decisions are rather complicated, but the surplus regions can easily be encouraged wastefully to over-invest by including in their expectations price levels that are only likely to occur in deficit regions. And deficit regions would underinvest in grain plantings if they neglect the influence of import limitations imposed from without on their expected price. Clearly no single national or, a fortiori, international price will give acceptable guidance.

Interest Rates

66. Comparable divisions are commonly found in the markets for capital, even in advanced countries, and in less developed countries where the capital markets are both less developed and arbitrage among them less effective, the consequent multiplicity of interest rates is even greater. Nevertheless, there is a temptation to seek a single rate to apply to the evaluation of a project, and often a single rate is believed to be applicable throughout the economy. There are, however, two classes of fact that prevent a single rate from being appropriate to all projects or, depending on the desired precision with which projects are to be evaluated, a single rate even being correct for each project taken by itself. The first is that the real capital cost, under conditions of separated capital markets, is not uniform for the totality of investable capital. Or to put it another way, the social cost of the delay of net returns may not be uniform for all components of the benefits and costs. Also the social cost of delayed returns may be different for one project than for another. The second class of fact is that capital in the government's budget may not be allocated so as to equalize the returns among component parts either because of an administrative bias or because that is the policy of the government.

67. It is often necessary for a project to obtain financing from more than one source and at more than one set of terms. Yet we cannot take as the cost of capital the rate that must be paid for the most expensive part of the capital, for the parts are usually not independent and the highest rate is not the marginal cost of capital. If the financing is arranged in a package, as is common, then the average interest rate may be a better measure of capital cost than the highest rate. But that is too simple a version of the capital cost. Project financing may actually cover only the direct expenditures within the firm undertaking the project and the purchased inputs must be financed in the open market by the supplying firms. If, as is likely, these firms lack access to the privileged capital market from which the project is primarily financed, if their credit standing is less excellent, if their market
for capital is local, less well developed and unconnected with favored markets because of capital rationing there, then part of the project must be financed at rates of interest above the rate charged on the part financed directly. Hence to apply the direct financing rate to the valuation of the entire project's net returns will underestimate the true social cost of delay, at least insofar as the social cost of delay is inferred from the market rate of interest. The higher actual rates paid by the suppliers of inputs reflect the higher social costs of the capital sacrifice required for the project. The use of capital paid for at high rates in some local capital market implies the diversion of capital from other local users of the capital who presumably would have paid the higher rate. We cannot suppose that funds will flow into that market from the lower rate markets to make up the loss, for there must be a limit on the supply of such low-priced capital and it must be rationed to the acceptable users. But even if that were not entirely the case, the fact that some such capital does flow to the higher rate markets does not imply that the price will equalize. The local rate, except for the influence of local monopoly, is likely to reflect correctly the terms on which the funds do move from one market to another.

68. These local interest rates are therefore a good measure of social cost, if we disregard the possible importance that should be given to externalities in the evaluation of the social cost of delayed returns. To take account of externalities would carry us in the direction of applying a rate that may be even lower than the market rate of interest in the most favored markets. The case for using such low rates is a speculative argument that if individuals were able to make their decisions to save and invest in contract with the rest of society so they could each know that his decision would be responsible for a major improvement to his eventual heirs, he would prefer to save and invest more than he reveals he would in his individualistic response to the market rate of interest. However, if a low interest rate were accordingly adopted for project evaluation, there would be the necessity either to raise the level of saving by taxation, or to ration too little capital by non-price means. The argument is a justification for an unspecified amount of increased taxation without a test of the correctness of the policy. The relevance of the policy in the present context is that such social rates ought to be applied in a uniform way, not alone to the projects being systematically evaluated, but to projects whose capital source is limited to high interest rate markets as well. Otherwise there is bound to be a significant biasing of the projects undertaken, in favor of large projects, industrial projects, projects financed by foreign funds or government funds, etc. whatever is the basis on which projects are chosen for systematic evaluation and receive the benefit of the social interest rate policy, against all others.

69. Returning, finally, to the objections to a single, all-purpose, shadow rate of discount, the second class of facts referred to above is that governments do not always or even usually, allocate capital resources among the sectors of the economy so as to equalize net returns, and they fail to do this because, given the systems of accounting for net returns, governments adopt policies to favor some sectors over others. Where this is so it is clearly inconsistent with the government's policy to apply a universal discount rate to the net returns of projects in sectors in which otherwise different rates are the rule. This would be more or less obvious if governments' policies with respect to sector allocations of capital were expressed
by specifying different rates of interest to be used in project evaluation and then allowing the amounts of capital to be allocated to implement the policy. But the most common practice is to reverse the sequence, to allocate sums of capital and to allow consequent discrepancies in the net returns. The discrepancies are then not recognized as having been intended. But logically, and practically, the sequence is immaterial and we are bound to infer the intent of governments from either form. Governments wish to favor some sectors over others and this can be done, and is done, by means of discrepant rates of discount. Project evaluation ought to conform to these intentions.

3. Concluding Remarks

70. The use of shadow prices can under some unfortunate circumstances contribute to a further fracturing of an economy and decreasing of efficient project choice. This may happen where a number of agencies each follows its own rules and guidelines in the evaluation of projects, each believing something different about the correct way to establish shadow prices. It would probably be better for all to be bound by a belief in the sanctity of market prices, for at least there would be a good chance then that a project would not be discriminated against simply because it was within the domain of the wrong agency. Fracturing of an economy is particularly likely if outside agencies insist upon following their own price-making rules while inside agencies follow others. Conformity to local practice may be better than being right according to some abstract ideas held in lonely isolation.

71. After the project has been approved and the investment is committed there is the subsequent need to evaluate the performance of the management and to provide appropriate incentives for efficient operation. Where shadow prices have been used in the choice of the project a problem of some interest then arises for the subsequent evaluations. Since projects that are socially profitable when evaluated with shadow prices may be unprofitable against the standard of ordinary market prices, subsidies are required for private firms and deficits must be tolerated in the case of public firms. If the subsidies are paid in relation to the deficit or according to some bargain between enterprise and government not directly related to the shadow price market discrepancy, then the profit-loss incentive to efficient performance is destroyed. Profit maximizing firms will not correctly economize in the use of scarce resources. There is therefore a good deal of importance in the way subsidies are arranged if projects are to be made responsive to changing conditions and if errors are to be discovered and something is to be done about them.

72. In whatever way the subsidies are paid, there is another problem raised by the need for a subsidy, namely, the equity with which it is financed. The need to finance a subsidy by some new tax or other source of revenue will redistribute income, and given the common institutional constraints on the fiscal powers of less developed governments the redistributions available may not include any desirable ones. But we would not be justified in recommending a project on the basis of a benefit-cost evaluation without also weighing the associated redistributions required to finance a necessary project subsidy. Even if it can be shown that the net benefits of the project are sufficiently high to warrant the investment, the expectation of a redistribution of income
can conceivably offset such gains and they must therefore be included in the evaluation. The need to finance a deficit will, in addition to the equity problem, make a new contribution to the biases already present in the price system. This will be difficult to weigh explicitly into the project values or in the balance by which the use of shadow prices is judged, except that we know it must be a cost and not a benefit.

73. We conclude tentatively, that less developed economies have badly distorting price systems that are an inevitable challenge to economic administrators to guide the choice of projects by improved methods. The improvement of natural prices is obviously the prime means by which to gain allocation improvements. But here the best is the enemy of the good and optimal prices that assume a uniform economy subject to general equilibrium analysis will not move us in the right direction. Instead we need specific local knowledge of true scarcity values for the shadow prices we use to replace some bogus natural prices. Finally, the opportunity to create prices is a sharp and potentially dangerous instrument and we must learn the fine art of judicious selection where there are multiple prices, and we must preserve the incentive role of the market system at the same time as we improve its information role.