CHAPTER III Appraisal of Projects; Public Investment

III I Need for a Uniform Method of Determining Priorities

The lack of complete information about all possible projects that may open up advantageous lines of production constitutes, as we have seen, a handicap either to selecting the best projects to be undertaken by government or to inducing private interests to do so. Only projects which are known to private or public investors can be elements of the pattern or program, and it may be that some unknown projects would have been better than some of those chosen. General programming offers a safeguard against such errors, though only a partial one. From it certain general criteria by which to appraise individual projects may be derived. They should fit into the general program. A frequent handicap to selection of the best projects is a lack of uniformity in the criteria applied by the various ministries of the administration or even by the various services and bureaus of a single ministry. This lack may be due to political decisions in the past; or to some preconceived ideas about one type of investment; or to a particularly strong personality among the administrators. It may result in an unjustified preponderance of certain types of projects or preference to certain individual projects. Some countries subsidize agricultural investments, directly or indirectly, for reasons of security. Others think that heavy industries are particularly important for their prestige. Often public investments are not selected sufficiently critically. Sometimes it happens

that a new government does not even complete the projects begun by its predecessor.

All this means waste. And it calls for a uniform method of appraising the projects presented by the various agencies of an administration, whether public or private, industrial, agricultural or commercial, "productive" or "unproductive." To be sure, a completely uniform appraisal will be almost impossible, especially as far as the unmeasurable aspects are concerned. To compare the advantages of an electricity plant with those of a hospital or a school will always be difficult, but at least it can be made clear what increase in material production is sacrificed if a school or hospital is built. A final choice will always have be made, on the basis of all information and on certain subjective valuations, by those who are politically responsible at the highest level. Uniformity can be aimed at only for the measurable aspects; and the results of such an appraisal will have to be taken into account by the policy-makers as one item of information, together with other information, but as a very important item.

To arrive at a satisfactory method of appraisal, one should, first of all, have in mind that investment policy is part of the general policy of the government and that the selection of investment projects cannot be divorced from other decisions. It is the combination of decisions which must be the most efficient avenue to the goal set. This applies in particular to the important realm of tax policy, already discussed, which has an immediate bearing on private investment. Tax policy should be such as to induce private investors to play a part in the general development program. (cf. Section IV 4.)

At the same time, the investment program must fit into the production program for the country as a whole, as estimated by the method of general programming (Chapter II). It should not demand more resources than can possibly be made available, taking account of existing commitments because of works in progress.

Finally, the program should be composed of such projects as would make the maximum contribution to the country's welfare, present

and future. The techniques by which these objectives can be achieved, more or less, will now be described. The test to be applied may in a general way be called the *national welfare test*; if welfare is defined to mean production or consumption, we may also speak of the *national product or consumption test*.

The application of a test for selecting projects does not suggest what measures should be taken to assure that the projects will actually be carried out. These measures are discussed in Chapter IV.

III 2 Simple Methods Sometimes Applicable

The methods to be discussed in this chapter are, as a rule, rather laborious and any feasible simplification would be welcome. There appear to be some such simplifications; one type is here discussed.

Their basis is to be found in the phenomenon of complementarity. Certain facilities will be found necessary because they perform auxiliary functions for more primary objectives. The construction of a road requires provision for its maintenance. The construction of an industrial plant in a remote region requires the construction of a number of dwellings; and certain communications facilities. Once it has been decided to carry out the main projects, the execution of the auxiliary activities has also to be accepted.

Perhaps the most important general examples of this principle are to be found in investments in transportation facilities and in power plants. Both transportation and power are needed in almost every type of production. This probably explains why, as a rule of thumb, derived from past experience, investments in transport facilities are a fairly constant proportion of total investment, amounting to about 20-25 per cent. This applies to countries of differing structure and to periods of different "prime movers" of development: it applies to the era of railway construction as well as to the era of industrial development. Some pertinent data will be found in Annex v 4.

Power production, too, has to keep pace with general production, or more particularly with industrial production as a whole; and accordingly the appraisal of power plants can be based on a proper demand analysis. In economic terms this procedure may be defined by pointing to the low elasticity of demand for power. Nevertheless, although this may be true as a rule, it is not always so and the limits of this complementarity should be kept clearly in mind. In some cases an alternative method of production, requiring less power, may be feasible; and it may well be that in underdeveloped countries a saving on such a capital-intensive item may be very important. Power requirements of individual industries should not, therefore, be calculated on the basis of figures for similar industries in other countries, but should be examined with the object of taking the most appropriate choice among technologies (cf. Section 1v 3).

There are other possible applications of the complementarity test, even where elasticity is in principle higher. Public health facilities offer an example. It is not advisable to apply standards in this field out of line with the general level of welfare. It may well be that the population would rather have more food than certain refinements in the medical sphere. Some reflection of the people's free choice should be preserved, even where the general public interest is paramount.

Thus, although the complementarity test may therefore be of some help in certain well-defined cases, its applicability should not be exaggerated. For a country as a whole, complementarity may apply to transportation and to power investments. For regions to be developed, it will not always be appropriate or possible to apply the test. Or rather, the activities to which transportation facilities and power are complementary cannot themselves be accurately foreseen: total production of the region may still be a highly uncertain entity. This sometimes is the very reason why private investment in transportation and power is not forthcoming and why public investment is the only practical possibility.

III 3 Consequences of Projects

For a complete national welfare or product test to be applied, the first type of data required has to do with the consequences of each project. What additions to national product can be expected? What changes in other aspects of welfare are probable? What additional costs are involved? The answers to these questions first of all require a detailed technical description of the project. This will not be discussed here, since it falls outside the scope of an economic report. For the consequences to be correctly imputed, some economic analysis will also be necessary, however, since there are consequences not immediately visible to the technician. These have sometimes been described as the *indirect* and the *secondary consequences*.

Indirect consequences are those to be expected in the absence of further changes in total national income. They are the adjustments on the supply side required by the projects, and as a rule they will be found in the stages of production vertically related to the new production, i.e., the stages preceding or succeeding the process involved.

Let us consider a project of land reclamation, which will enable a certain region to produce more sugar cane. An indirect consequence of producing more sugar cane may be that more raw sugar will be produced; a second that more refined sugar will be produced; a third, that more refined sugar will be distributed. Should the increased production at each of these stages of industry and trade be ascribed to the land reclamation project? That depends on the circumstances. If there is idle capacity to produce raw sugar from the cane, it is correct to attribute the increased raw sugar production to the reclamation scheme; if there is no such idle capacity, it is not correct. If the country concerned has been importing raw sugar to supplement its own production and refining it, then the refining process should not be imputed to the reclamation scheme. And so on. It should be clear from the foregoing that a careful comparison is needed of (i) the situation created by the execution

of the project, and (ii) the situation that would have existed had the project not been undertaken. For a determination of the consequences, there is required a definite knowledge, or rather estimate, of the development of the economy as a whole. This is why programming must play its part in the procedure.

This statement should, however, be interpreted in a practical way. Too great a degree of perfectionism should be avoided. It is more the approach which matters than every conceivable detail, and above a certain limit the better is the enemy of the good. Sometimes the indirect consequences need not be calculated separately but can be included in the calculation of so-called "accounting prices" (cf. Section III 6).

Secondary consequences consist of the changes in production which are the consequence of the change in national income, both in the short and the longer run, connected with the new production. Such changes do not always occur; in particular they will not if productive factors are already fully employed, even without the new production.

In underdeveloped countries this is often not so, however, and there is therefore a case for considering secondary consequences. It may be, however, that the estimate of secondary consequences must be rough, and that it can be arrived at only by the addition of a figure proportional to income created directly and indirectly (i.e., to primary income derived from the project). In such circumstances the appraisal of projects may also be based on their primary effects only. A more refined—if still rough—estimate of secondary consequences may be made if the proposed project is likely to influence general economic development, e.g., through its effect on savings. This may be the case where the choice is as between a capital-intensive and a labor-intensive project: much less may be saved out of incomes created by the latter, than by the former. Another example of secondary consequences is the influence which may be exerted on government investments because subsidies are needed (cf. Section IV 4).

III 4 The Use of Scarce Factors

The choice of certain projects, together forming a program, out of a larger number of available projects must meet certain conditions. That is to say, not every combination of projects can be eligible. This is also true of the investment "pattern" for the country at large, including private investment.

The most important conditions have to do with the availability of scarce resources. By scarce resources are meant those factors which are indispensable for the program's execution and which are available in limited quantities only. The most obvious example is of course the availability of capital. For the public sector, the total of (i) government revenue after current expenditure, (ii) domestic borrowing, (iii) admissible deficit financing, and (iv) foreign assistance, represents the upper limit of investment. The program cannot go beyond this limit; at the same time it would be unwise not to use, to the fullest extent, the means available. For private and public investment together similar limits can be indicated.

Capital is not the only scarce factor. Land and a number of types of skilled labor, from leaders down to trained workers, are likewise in this category. The investment pattern should be such as to preserve a sufficient quantity of these factors for the consuming sector, and the economy as a whole should, as far as possible, make use of exactly the quantities available. A final example of a factor which is scarce as a general rule, is foreign currency.

For a desirable long-term program, the conditions set by each of these scarce factors are themselves multiple in character. They must be satisfied to a greater or lesser extent in each of a succession of years and in each of a number of regions. This is usually considered the essence of "planning"; the solution of a jig-saw puzzle of considerable complexity. With more or less standard requirements of capital, man-power and foreign exchange by the larger projects, it will be very useful to have available the blueprints of a large number of smaller projects that may fill the lacunae between the big projects.

The elaboration of a stock of blueprints appears to be a useful tool to this end.

Trial and error may be the method employed to find a program which satisfies these conditions. In certain circumstances, this may be a very cumbersome method. It may be simplified by a technique called "the use of accounting prices." Some aspects of this technique are discussed in the next few sections; further details are given in Annex v 3.

III 5 Ultimate Aims Pursued

The conditions set forth in the preceding section do not by themselves define the choice of the projects and their succession in time. It is here that the "test" method has to come in and the criterion for selecting projects has to be applied. The criterion should follow, as will be clear, from the general aims of the government's policy.

The general principle to be followed should be to maximize the contribution of the investment program to the country's well-being. "Well-being" may be taken to mean national income, present and future, with possible corrections for its distribution over social groups or regions. Since these corrections will have to be incidental in most cases, not much can be said about them in a general way. One might conceive of giving a greater "weight" to certain types of incomes, assuming that the marginal value of money is higher for certain income types than for others.

Leaving this for what it is, we will concentrate on the aim of attaining a maximum national product or income, present and future. Alternatively, in order to exclude double counting, we will take a maximum volume of consumption. This in fact excludes double counting, since investment, the other part of national product, is not an end in itself, but meant to increase future consumption. Such a maximum of product or of consumption can only be based on a certain method of comparing future with present values. In

order to do so, we have to choose a certain rate of interest to be applied in the calculations.

It is essential that the maximum refers to total national income, i.e., income to be derived from the programmed sectors as well as from the other sectors. This implies that it is not a matter of indifference whether e.g., a project is chosen which leads to higher savings or one (yielding the same contribution to national income) leading to lower savings. The latter project probably will somewhat depress development in the other sectors, as compared with the former. An interesting example may be the choice between a large industrial plant and a set of cottage industry projects. Both projects may produce the same commodity, say textiles, in the latter case by employing many more workers, who do not save, in the former by employing managers and technicians who do.

When stressing the relevance of total income to be obtained, we also intend to point to the difference that may exist between an appraisal based on private profitability and an appraisal based on a national product or national consumption test.

Private profits may be a misleading indicator. In many cases they will underestimate the contribution to be made; also, other incomes will, as a rule, rise. Thus the income of workers, formerly unemployed, may also rise; this is not included in the private profit calculation. A well-known extreme case is the one of highway construction. Unless a toll is charged for use of the highway, no income at all will be derived by the investors and yet the increase in national product may be considerable. In some cases, on the other hand, private profits will overestimate the advantages to be obtained. For the profits may be gained at the expense of incomes of other enterprises, especially of competitors. Profits may be an inaccurate yard-stick in other respects: they may be based on prices that do not correctly reflect the value of the factors used or of the products.

This too may be exemplified by the choice between a large industrial plant and a set of cottage industries. Let us assume that for the latter project, four times as many workers are needed to produce

the same quantity of textiles as for the former. In the private profit calculation a wage bill will be an item; for the cottage industry project, it will be four times as great as for the large plant. This may well be so high as to preclude any profit. The employment of four times as many workers means a high sacrifice to the employer, since he has to pay the market wage rate. To the country, the sacrifice is much less; it is to be measured by the loss of national product due to the employment of these workers. If the workers have to be withdrawn from other activities this loss is equal to what they would otherwise have produced. But a considerable number of them would have been idle and therefore would have produced nothing. The intrinsic value to the country of a man who would otherwise have been unemployed is very low. And the relevant appraisal of the cottage industry project must be based on these intrinsic values, or, as they will be called, accounting prices rather than market prices.

There are other costs which are not always "correctly" calculated by the private investor, i.e., correctly from the nation's point of view. If the official rate of exchange of the country is lower than the intrinsic value of foreign currency to the country, the costs of imports or the proceeds of exports will also be underestimated. This leads to a too favorable calculation for projects with an import surplus and to a too unfavorable calculation for projects with an export surplus.

For various reasons, therefore, it is in the country's interest to base its appraisal of investment projects on independent or at least revised "tests," considering all the consequences of the projects and applying accounting prices.

The outcome of such tests may be used as an immediate basis for action in the field of public investment projects. In the case of private projects investors will, of course, base their decisions on the outcome of their private calculations.

III 6 The Case for "Accounting Prices"

In the preceding section the concept of accounting prices has twice been alluded to. Since it is going to play an important role in what follows, it will have to be considered in more detail now. The central point to be made is that a number of market prices, particularly those of the "factors of production" (capital, labor, foreign exchange) often diverge from the "intrinsic value" or "accounting prices" that would prevail if (i) the investment pattern under discussion were actually carried out, and (ii) equilibrium existed on the markets just mentioned. In other words, there are two reasons why market prices do not truly reflect "intrinsic values." First, the realization of the investment pattern will itself influence these values, but only after some time, since investment processes are essentially time-consuming. Secondly, there do exist, in underdeveloped countries especially, a number of "fundamental disequilibria." The most important one is the widespread unemployment—open and disguised. A recent estimate for India runs into several tens of millions. The basic reason in all probability is the lack of complementary means of production, i.e., land and capital. Very probably the equilibrium level of wage rates will be considerably less than market wages. On the other hand, equilibrium interest rates probably are much higher than market rates. Some indication of equilibrium interest rates may be derived from (a) the rates at which it would be possible to attract additional capital and (b) the profitability of marginal projects, corrected for risks involved (such as inflation risks). Even if it is difficult to obtain figures of any accuracy, it would be wise to try figures of the order of 10 per cent and over, if only to observe the consequences. As an illustration it may be recalled that in the middle of the 19th century, the long-term bond yield in the United States was 7% to 8% and that similar rates now prevail in a country like Finland.

In a number of countries there is, in addition, a fundamental disequilibrium in the balance of payments only too well-known, and

which it would be rash to ascribe to financial mismanagement only. Here again market rates are different from equilibrium rates.

From this closer consideration of the role to be played by the accounting prices, it may be understood that these prices are the technical instruments to assure the full use, and no more than the full use, of the scarce factors of production available. This indeed is the sense of the phrase "intrinsic value" used to clarify their meaning. They are the prices at which supply is just sufficient to satisfy demand; they represent the value of the marginal product to be obtained with their aid, since projects showing no surplus above the cost, at accounting prices, of the factors used, will be on the margin between acceptance and rejection.

The question may be asked whether it would not be more natural to let market prices find their equilibrium—perhaps by a better economic policy generally—than to apply such artificial concepts as accounting prices and to make the appraisal of investment projects "unduly" complicated. The answer should be that this may be possible for a few markets, such as the foreign exchange market, but that for the others it is impossible. The shifts in intrinsic values to be expected from the realization of the investment pattern, by their very nature, will only take place after the investment is completed, and the fundamental equilibria can be helped only by a prolonged process of investment. Making wages equal to their intrinsic value would mean imposing on the workers a level substantially lower than presently prevails and having the revolution right now.

We have to accept, therefore, that in a number of underdeveloped countries the market price structure is not the correct guide for taking decisions. Some of the implications are considered in Annex v 2, where the consequences as a whole are described.

It will not always be possible, or even desirable, to take the trouble of estimating accounting prices in a more or less exact way. The deviations between market and accounting prices, particularly, due to the first cause—the realization of the investment pattern—may be difficult to ascertain. It may be quite sufficient to make a rough

guess as to the consequences of the second cause, fundamental disequilibrium. Since these consequences are, within certain limits, independent of the size of the program, the corresponding estimate may be made once and for all. It is often instructive to consider the influence exerted on the yield figures by arbitrary changes in accounting prices.

An important practical question is how the realization of the investment pattern can be assured along the lines desired on the basis of the accounting price test. Briefly, the answer is that government agencies are within certain limits free to decide to make an investment even if it does not pay financially, and that they therefore can behave as the accounting prices would require them to. The limits set by their budgets will be discussed in Annex v 3. Private investors, however, can and will do so only if accounting prices can be made a reality to them. This may be done by certain types of subsidy and certain types of taxing, tending to stimulate the use of abundant, and to discourage use of scarce, factors. These measures are discussed in Section IV 4.

III 7 National Product (or Consumption) Test

The procedure recommended may now be summarized. As has been explained in the preceding sections, the national product (or consumption) test of a certain investment project is a calculation of the contribution of that project to present and future national product or consumption.

The calculation must be based on an accurate assessment of the project's consequences, estimated for each of a succession of years, as to value of production and costs. This assessment should include direct as well as indirect consequences and possibly secondary ones.

Values of production as well as costs should be computed on the basis of accounting prices, as to which general instructions should be issued. In countries or regions with structural unemployment,

an accounting price for unskilled labor considerably lower than market wages should be applied. In countries with structural balance of payments difficulties, an accounting exchange rate expressing the intrinsic value of foreign currency should be applied.

The interest rate to be applied should express the real scarcity of capital, to be derived from the marginal yield of projects as well as from marginal rates to be paid for foreign loans.

For practical purposes a procedure may be recommended under which accounting prices are fixed independently of the size of the "pattern" and only reflect the fundamental disequilibrium. Here the projects may be appraised one by one and only those showing a positive contribution to national product would be eligible to be undertaken. The national product test may be corrected for certain effects on income distribution and other elements of welfare not implied in total income, and then be called the national welfare test.

In its most accurate form the test would require a process of trialand-error with different sets of accounting prices, until a pattern is singled out which would make use of whatever scarce factors are available each year and no more, and which, out of the group of similar programs, would make the greatest contribution to national product. This implies that accounting prices are themselves dependent on the size of the "pattern," and is a very complicated process.

III 8 Examples of Application

The application of the national product test, or of the national consumption test, is still in its beginning. It is difficult to give a precise account of this application, since, on the one hand, there is no sharp borderline between the private profit test and the "ideal" national welfare test, and on the other hand, the application of these tests is not always published. As to the first point, it may be observed that there is a whole range of different tests; some public invest-

ments will be appraised on the basis of purely private profit calculations; for others, only a few elements of the national product test will be introduced; in still other cases, more and more of these elements will be found. In judging road projects, for example, the advantages for production and income in other sectors of the economy will as a rule be considered; the application of accounting prices of course represents the most difficult element of the complete test. As we tried to make clear, the mere application of accounting wage and interest rates may, however, be very important to underdeveloped countries and some reasonable guesses can be made about these accounting rates. Even if such guesses are too difficult it still seems possible to try a few alternative values if only to establish that the net advantages of some projects are heavily dependent on the level of accounting prices applied, while others are not. This might be exemplified by some figures from Netherlands' investment projects. The reclamation of the newest "polder" in the Zuiderzee project appears to leave only a very modest surplus if market rates are applied and a considerable one if accounting wage rates of 80% of market rates are used (cf. 111 8 Table 1).

The conclusion to be drawn from these figures is that the execution of this project is more attractive during a period of unemployment than during a normal period.

There may be reasons to make a distinction between labor applied during the investment period and labor applied during the period of operation: they are not the same type of labor. One type may be abundant and the other not. Accordingly, many variations are possible, depending on the situation in which the country finds itself.

Another set of figures may be quoted from a road project in the Netherlands (cf. 111 8 Table 2).

Income to be derived from this project has been presented, to a large extent, as savings on imports and on wages. This has to be interpreted, for the nation as a whole, as a possibility of applying to other production the labor saved by taking a shorter road. The

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111 8 TABLE 1 Capitalized Income and Costs of "East Polder" 1 (fl. mln.)

							No	rmal wage rate	Accounting wage rate $= 0.8 \text{ normal}$
Income:			, • · · · ·		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				Ţ
Home sales	•	•	•	•	•	•	•	I734	1734
Additional exports.									1699
							*****	3433	3433
Costs:									
Imports	•	•	•	•	•	•	•	745	745
Interest	•	•	•	•	•	•	•	170	170
Government services	•	•	•	•	•	•	•	137	137
Wages	•	•	•	•	•	•	•	1769	1425
Entrepreneural income	•	•	•	•	•	•	•	578	462
Total	•	•	•	•	•	•	•	3399	2929
Surplus	•	•	•	•	•	•	•	34	504

¹ These figures are provisional only and have no official status.

III 8 TABLE 2 Income and Costs of a Road Project in the Netherlands (Units: 1000 glds.)

inc									Acco	Accounting Prices (in % of market prices)					
	Imports	*	.,	•	4	•			IOO	130	IOO	130	I30		
	Wages.	•		•	•	•	•	•	100	IOO	75	75	50		
I.	Income	•		•	•	•	•	•	988	I029	825	866	703		
2.	Import	sa	vin	g	•	*	•	•	138	179	138	179	179		
3.	Wages	sa	vec	1	•	•	•		652	652	489	489	326		
4.	Other	•		•	•	•	•	•	198	198	198	198	198		
5.	Costs.	•		•	•	•		•	378	397	329	338	280		
6.	Imports	_		•	•	•	*	•	64	83	64	83	83		
7.	Wages	•		•	•	•	•	•	234	234	175	175	117		
8.	Other									80	80	80	80		
9.	Income/C	ost	•	•	*		•	•	2.61	2.59	2.59	2.56	2.5I		

value to be attached to such labor saving will depend on the situation of the labor market. The proportion of wages to imports appeared to be roughly the same on the income side and on the cost side, with the consequence that relative surplus hardly changed with the application of accounting prices for either wages or foreign currency. Since surpluses in addition were quite considerable, these projects could be recommended under all circumstances.

The test seems particularly appropriate for the selection of projects to be postponed in periods of inflation or of projects to be accelerated or started in slack periods. Even if the test has already been applied it may be useful to assure that application is uniform. It sometimes happens that one government department applies a test taking account of secondary consequences to a considerable extent while other departments do not. Or it may be that secondary consequences are calculated in a period of full employment, when they will clearly not occur.