

Bela Balassa

The 'Effects Method' of Project Evaluation

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Marc Chervel, "The Rationale of the Effects Method: A Reply to Bela Balassa"

and

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THE 'EFFECTS METHOD' OF PROJECT EVALUATION

By BELA BALASSA*

INTRODUCTION

In recent years, much attention has focused on the project evaluation manuals prepared for the OECD Development Centre¹ and for UNIDO², respectively.³ The two manuals have also had several practical applications. In terms of the frequency of applications, however, they are much outnumbered by the applications of the so-called 'effects method' (*méthode des effets*) that is widely used in French-speaking African countries from Algeria to Upper Volta. Yet, the effects method has not been considered in the discussions on project evaluation and it is probably not known to many of the protagonists of the debate.⁴

At the same time, the originators of the effects method, Charles Prou and Marc Chervel claim that, by reason of its simplicity and the attention given to the indirect effects of the project, this method is superior to other methods of project evaluation. Also, the work of Prou and Chervel dominates the French literature on project evaluation in developing countries.⁵

* The author is Professor of Political Economy at the Johns Hopkins University. This paper was written in the framework of the research project in Western Africa he directs in his capacity as Consultant to the World Bank.

¹ I. M. D. Little and J. A. Mirrlees, *Project Appraisal and Planning for Developing Countries, Volume II, Social Cost-Benefit Analysis*, Paris, OECD Development Centre, 1968. A revised edition was published under the title *Project Appraisal and Planning for Developing Countries*, London, Heinemann, 1974.

² Partha Dasgupta, Stephen Marglin, and Amartya Sen, *Guidelines for Project Evaluation*, New York, UNIDO, 1972.

³ Cf. e.g. the 'Symposium on the Little Mirrlees Manual of Industrial Project Analysis in Developing Countries' in *The Bulletin*, February 1972 and several articles on the concept and estimation of the shadow price of foreign exchange in *Oxford Economic Papers*, July 1974.

⁴ The latter statement does not apply to Ian Little who has indicated to me in private conversation that the Little-Mirrlees method had been developed in part as a response to the effects method. However, an analysis of the effects method is not provided either in the original or in the revised version of the Little-Mirrlees manual.

⁵ Cf. Charles Prou and Marc Chervel, *Etablissement des programmes en économie sous-développée, tome 3, l'étude des groupes de projets*, Paris, Dunod, 1970. For a brief summary of the method and practical examples, see M. Chervel, 'Project Evaluation of the "Effects" Method in Developing Countries', M. Chervel, 'Exercise in the Application of the Effects Method', and M. Chervel, M.-T. Courel, and D. Perreau, 'Case Study: Industrial Fishing Complex in an African Port' in *Industrialization and Productivity*, Bulletin No. 20, New York, United Nations, 1974.

The purpose of this paper is to examine the main features of the effects method and to compare it with alternative methods of project evaluation.⁶ This will be done by the use of mathematical formulae, the absence of which has made the interpretation of the effects method difficult. In the discussion, reference will be made to the book by Prou and Chervel as well as to the articles in *Industrialization and Productivity* cited above.⁷ The discussion will proceed by considering the benefits and the costs of a project under the effects method, the criteria of project selection, the use of shadow prices, the treatment of intermediate goods, and the introduction of income distributional considerations.

THE BENEFITS OF THE PROJECT

Under the effects method, the benefits of a project are defined in terms of the increment in domestic value added in the processing activity itself and in the domestic production of its inputs. This involves a comparison of the 'with project' and the 'without project' situation, when the increment in domestic value added is taken to equal changes in domestic incomes (wages, profits, rent and government revenue) associated with the project's implementation and it is further identified with net gains in foreign exchange, expressed in terms of domestic currency at the actual exchange rate.⁸ In the case of import substitution projects, the increment in domestic value added is said to equal the difference between domestic value added in the project and in the production of its inputs, on the one hand, and the net loss in tariff revenue, on the other. For export projects, it is taken to equal domestic value added, with adjustment made for export subsidies or taxes.

The calculation of the benefits of a project involves decomposing the price of the final product into domestic value added and imported inputs used directly in the processing activity and indirectly in the manufacture of domestically-produced inputs. Full decomposition can be done by the use of an input-output table; if such a table has not been prepared, approximations need to be made on the basis of available data on the breakdown of domestically produced inputs into their value added and imported input components (Prou-Chervel, p. 140 ff).

$$p_i^d = \sum_j a_{ji} p_j^d + \sum_m a_{mi} p_m^d + \sum_r a_{ri} p_r^d. \quad (1)$$

Equation (1) expresses the domestic price of the product (p_i^d) in terms of its

⁶ A new entrant is the proposed method for project evaluation in the World Bank described in Herman G. van der Tak and Lyn Squire, *Economic Analysis of Projects*, Bank Staff Working Paper No. 194, Washington, D.C., February 1975.

⁷ All these authors rely on description and on arithmetical examples. Also, alternative methods of project evaluation are compared in purely verbal terms by André Bussery, *Methods of Project Appraisal in Developing Countries*, Paris, Organisation for Economic Cooperation and Development, 1973.

⁸ According to Chervel, the 'total effect [of a project] is equal, in all cases, to the extra value added brought into the economy by the implementation of the project; this extra value added (primary effect) is equal to the gain in foreign exchange' (*op. cit.*, p. 8). It is further proposed 'to adopt a "national" rather than a "domestic" approach and to try to measure the extra value added going to nationals: this can be done simply by subtracting from domestic extra value added the income going to foreigners in the form of wages and profits (which amounts to considering these jobs as imports)' (*Ibid.*, p. 8). And, finally, it is said that 'the extra income created, broken down by recipients (employee, State, entrepreneur) enables a better appraisal to be made of the project' (*Ibid.*, p. 20).

direct input components, when p_j^d , p_m^d , and p_f^d refer to the price of domestically-produced inputs, imported inputs, and primary factors, respectively, and a_{ji} , a_{mi} , and a_{fi} indicate the amounts of these inputs used per unit of output.

The price of domestically-produced inputs is further broken down as in (1) and the process of decomposition continues by going back in the product chain until imported inputs or primary factors are reached. Denoting the total requirements of product j per unit of product i by r_{ji} , the full decomposition of the price of the product can be represented by equation (2).

$$p_i^d = \sum_j \sum_m a_{mj} p_m^d r_{ji} + \sum_j \sum_f a_{fj} p_f^d r_{ji}. \quad (2)$$

Equation (2) shows the domestic value of direct and indirect imported inputs and primary factors. The second term of the equation will thus indicate the remuneration of primary factors used directly and indirectly in the production of the commodity in question and equals direct plus indirect domestic value added per unit of output.

Under the effects method, it is further assumed that the domestic price of the product and of its imported inputs equals the sum of the world market or border price, expressed in domestic currency, plus the tariff or export subsidy (tax). Denoting world market prices expressed in terms of foreign currency by superscript w , the ad valorem tariff (subsidy) by t , and the actual exchange rate in terms of units of domestic currency per foreign currency by c , equation (2) can be transformed into (2a).

$$p_i^w c(1+t_i) = \sum_j \sum_m a_{mj} p_m^w c(1+t_m) r_{ji} + \sum_j \sum_f a_{fj} p_f^d r_{ji}. \quad (2a)$$

Further re-arranging terms, equation (3) will express the benefits of an import-substitution or export project as defined under the effects method.

$$\sum_j \sum_f a_{fj} p_f^d r_{ji} - (p_i^w c t_i - \sum_j \sum_m a_{mj} p_m^w c t_m r_{ji}) = p_i^w c - \sum_j \sum_m a_{mj} p_m^w c r_{ji}. \quad (3)$$

The left-hand side of equation (3) shows the increment in domestic value added, defined as the difference between direct plus indirect domestic value added and the net loss in tariff revenue (i.e. the difference between tariff revenue forgone on the product and the tariff levied on imported inputs used directly and indirectly in its domestic manufacture). In turn, the right-hand side of the equation shows the net gain in foreign exchange (i.e. the difference between the world market price of the product and the world market cost of direct and indirect inputs) in terms of domestic currency. Thus, the benefits of the project, defined in terms of the increment in domestic value added, will necessarily equal the net gain in foreign exchange expressed in domestic currency.

In calculating the net gain in foreign exchange, export products are valued at f.o.b. prices and import-substituting products as well as imported inputs at c.i.f. prices. In turn, the net loss in tariff revenue is calculated under the assumption that an import-substituting project replaces foreign merchandise imported under tariff protection; export subsidies, too, involve a revenue loss while export taxes

represent a gain in revenue. In the following, we will consider an import-substituting project.

The calculation of a project's benefits under the effects method can be illustrated by an example. Assume that the domestic price of an import-substituting product is 540 CFAF, its world market price 8.00 French francs and the exchange rate 50 CFAF to the French franc, the tariff rate being 35 per cent. In turn, the domestic value of direct plus indirect imported inputs per unit of output is 300 CFAF and their world market cost 5.00 French francs, the average rate of tariff on the inputs being 20 per cent. Domestic value added per unit of output will now equal 240 CFAF and the net loss in tariff proceeds due to the replacement of imports by domestic production (the difference between tariff revenue forgone of 140 CFAF and the tariff derived on imported inputs used directly and indirectly in domestic manufacture of 50 CFAF) 90 CFAF. The increment in domestic value added as defined under the effects method (150 CFAF) will thus equal the net gain in foreign exchange expressed in terms of domestic currency (the difference between the domestic currency equivalent of the world market price of the product of 400 CFAF and that of imported inputs of 250 CFAF).

These results follow since the net loss in tariff revenue has been equated to the difference between domestic value added and the domestic currency equivalent of net foreign exchange savings. Such will not be the case if the imports are subject to quantitative restrictions rather than tariffs before their domestic production is undertaken. This is because quantitative import restrictions affect domestic prices, and hence domestic value added, but the substitution of imports for domestic production does not entail a loss of tariff revenue as the scarcity premium under the quota accrues to the recipient of the licences rather than to the government.

The preceding results can be re-established if the loss of quota profits following the replacement of imports by domestic production is treated in the same way as tariff revenue. This can be considered as the logical extension of the effects method since in allowing for the income loss to the original beneficiaries of quota protection, various income recipients are treated in a consistent manner and equality between the increment in domestic value added and the domestic currency value of net foreign exchange savings is assured.

With adjustment made for quota profits, the increment in domestic value added and the domestic currency equivalent of net foreign exchange savings will be equal unless the introduction of domestic production entails higher protection. Most developing countries, however, tend to keep tariffs low on products which are not manufactured domestically and raise tariffs or impose quantitative restrictions when their domestic production is undertaken. It is usually claimed that higher protection is required in order to offset the cost disadvantages of domestic production.

In the event of increased protection at the time domestic manufacturing is undertaken, the equality of the increment in domestic value added and the domestic currency equivalent of foreign exchange savings will no longer hold, since domestic prices will rise as a result. In order to re-establish this equality, one would have to

take account in the calculations of the hypothetical tariff proceeds lost as if the new, higher tariff (or quota) was previously applied. This would entail modifying the comparison of the 'with project' and the 'without project' situation to allow for the higher level of protection under the 'without project' alternative. In this way, adjustment can be made for the income loss to the consumer in the form of higher prices owing to increased protection that entails a transfer from the consumer to the producer.

THE COST OF THE PROJECT: THE LOSS IN TARIFF REVENUE

In identifying the increment in domestic value added with net gains in foreign exchange expressed in terms of domestic prices, the method of project evaluation proposed by Prou and Chervel in fact values the project's benefits in terms of foreign exchange saved through import substitution or earned through exporting. This result is shown in all the examples provided in writings on the effects method, including the case in which traditional production methods are replaced by manufacturing involving the use of modern techniques (Prou and Chervel, pp. 201-4, Chervel, pp. 17-20). Correspondingly, the benefits of the project will be identified below in terms of the net gain in foreign exchange.

The next question is how costs are to be defined, and measured, for the purpose of making benefit-cost calculations. Prou and Chervel consider three possible alternatives: identifying costs with the domestic cost of investment in the project, with the value of imports embodied in the investment, or with the loss in budgetary revenue. They further suggest that the choice among these measures be based on the relative scarcity of domestic resources, foreign exchange, and budgetary receipts. (Prou-Chervel, pp. 222-23, 234-35).

The ratio of the domestic currency value of the net gain in foreign exchange to the net loss in tariff revenue will be the reciprocal of the effective rate of protection, defined as the percentage excess of domestic value added (W) over world market value added (V), if this is interpreted as relating to direct plus indirect value added.⁹ This is shown in equation (4).

$$\begin{aligned}
 ERP &= \frac{W}{V} - 1 = \frac{W - V}{V} \\
 &= \frac{[(P_i^w c(1 + t_i) - \sum_j \sum_m a_{mj} P_m^w c(1 + t_m) r_{ji}) - (P_i^w c - \sum_j \sum_m a_{mj} P_m^w c r_{ji})]}{(P_i^w c - \sum_j \sum_m a_{mj} P_m^w c r_{ji})} \\
 &= \frac{P_i^w c t_i - \sum_j \sum_m a_{mj} P_m^w c t_m r_{ji}}{P_i^w c - \sum_j \sum_m a_{mj} P_m^w c r_{ji}} \quad (4)
 \end{aligned}$$

The denominator of the formula for the effective rate of protection is the domestic currency equivalent of the net gain in foreign exchange and the numerator is the

⁹ I am indebted to M. Gérard Rebois, formerly with the Ministry of Planning in the Ivory Coast and now with the French Ministry of Cooperation, on this point.

net loss in tariff revenue. As domestic value added increases or the gain in foreign exchange declines, the effective rate of protection will rise and the ratio of the domestic currency equivalent of the net gain in foreign exchange to the net loss in tariff revenue decline, so that the project will be considered less desirable, irrespective of whether one or the other measure is used.¹⁰

In the example cited, the effective rate of protection is 0.60 (240/150-1) and the ratio of the domestic currency value of net foreign earnings to the net loss in tariff revenue 1.67 (150/90). Were domestic value added to rise to 300 CFAF or the domestic currency value of net foreign exchange savings decline to 120 CFAF, both the effective rate of protection and the ratio of the domestic currency value of the net gain in foreign exchange to the net loss in tariff revenue would become 1.00, making the project less desirable.¹¹

The ratio of the increment in domestic value added to tariff revenue will not provide an appropriate ranking of alternative projects, however, unless market and shadow prices of primary factors coincide.¹² In that event, the effective rate of protection will equal the domestic resource cost of earning (saving) foreign exchange (DRC) which can be used as a criterion of project selection as noted below.

The DRC measure will be discussed in the following in relation to the principal measure of project evaluation proposed by Prou and Chervel: the ratio of net gain in foreign exchange expressed in terms of domestic currency to the domestic cost of investment¹³ (Chervel, p. 9). This ratio will also be compared to the rate of return to capital (internal rate of return).¹⁴

THE COST OF THE PROJECT: THE DOMESTIC COST OF INVESTMENT

The domestic resource cost of earning foreign exchange and the rate of return on capital criteria represent alternative expressions of the general economic profitability criterion.¹⁵ On the latter criterion, shown in equation (5), the project

¹⁰ The ranking of the projects will not change if we use the ratio of domestic value added (W) to the net loss in tariff revenue ($W - V$) as the criterion of project evaluation as is done in some French-speaking African countries. It can be easily shown that this ratio will equal the ratio of the effective rate of protection plus one to the effective rate of protection itself. Thus,

$$\frac{W}{W-V} = \frac{W}{V} \cdot \frac{V}{W-V}$$

¹¹ In turn, the ratio of domestic value added to the net loss in tariff revenue, 2.67 (240/240-150), will decline to 2.00, making the project less desirable.

¹² In a study of 82 Ivorian industrial firms by Garry Pursell and Terry Monson, undertaken in the framework of the research project in Western Africa directed by the author, the Kendall coefficient of rank correlation between effective protection rates and domestic resource cost coefficients has been estimated at .352.

¹³ This necessitates reinterpreting the above formulas in terms of discounted values. If the flow of revenues and costs are constant over time, their present values can be approximated in dividing annual flows by the discount rate (Cf. Richard Layard, *Cost Benefit Analysis*, Harmondsworth, Middlesex, Penguin, 1974, pp. 45, 66).

¹⁴ We will not consider here the case when costs are defined in terms of the import content of investment as this alternative is given little emphasis in writings on the effects method.

¹⁵ We exclude here cases when the internal rate of return is not uniquely defined because of the existence of more than one crossover over time from profits to losses and vice versa.

will be accepted if the discounted value of profits (R_i) exceeds or is equal to zero, and it will be rejected if this value is negative.

$$R_i = p_i^w c^s - \sum_j \sum_m a_{mj} p_m^w c^s r_{ji} - \sum_j \sum_f a_{fj} p_f^s r_{ji} \geq 0. \quad (5)$$

The evaluation is made in terms of shadow prices: the domestic currency equivalent of world market prices for imports and exports, their opportunity cost in terms of output forgone (denoted by superscript s) for primary factors, and the marginal social valuation of foreign exchange (c^s) for the exchange rate.

Separating the contribution of capital from that of the other primary factors and rearranging terms in equation (5), we express in equation (6a) and (6b) the shadow price of capital or shadow discount rate (r^s) and the rate of return to capital in the project (r_i) respectively:

$$r^s = \frac{p_i^w c^s - \sum_j \sum_m a_{mj} p_m^w c^s r_{ji} - \sum_j \sum_{f \neq k} a_{fj} p_f^s r_{ji} - R_i}{\sum_j \sum_k a_{kj} p_k^s r_{ji}}. \quad (6a)$$

$$r_i = \frac{p_i^w c^s - \sum_j \sum_m a_{mj} p_m^w c^s r_{ji} - \sum_j \sum_{f \neq k} a_{fj} p_f^s r_{ji}}{\sum_j \sum_k a_{kj} p_k^s r_{ji}}. \quad (6b)$$

It is apparent that, if the general economic profitability condition is fulfilled, the rate of return to capital in the project will be no less than the shadow discount rate, so that the project is accepted.¹⁶

In equation (7a), the shadow exchange rate (c^s) has been expressed from the general economic profitability condition while equation (7b) provides the formula for the domestic resource cost of earning foreign exchange in the project (c_1):

$$c^s = \frac{\sum_j \sum_f a_{fj} p_f^s r_{ji} + R_i}{p_i^w - \sum_j \sum_m a_{mj} p_m^w r_{ji}}. \quad (7a)$$

$$c_1 = \frac{\sum_j \sum_f a_{fj} p_f^s r_{ji}}{p_i^w - \sum_j \sum_m a_{mj} p_m^w r_{ji}}. \quad (7b)$$

Again, if the general economic profitability condition is fulfilled, the domestic resource cost of earning foreign exchange in the project will be equal to or less than the shadow exchange rate, and hence the project will be accepted.

In comparing the principal project evaluation criterion under the effects method with the domestic resource cost method, we find that both define the project's benefit in terms of the net gain in foreign exchange but they differ in their evaluation of the costs: the DRC method defines costs in terms of the shadow

¹⁶ In the formulae, no account has been taken of the fact that capital may be embodied in imported goods.

value of domestic resources utilized in the project while under the effects method these are identified with the domestic cost of capital investment.¹⁷ In turn, while both the effects method and the internal rate of return method relate the project's benefits to capital investment, the former identifies these benefits with the net gain in foreign exchange whereas the latter deducts the domestic resource cost of other factors of production expressed in shadow prices from the gain in foreign exchange.

It follows that the principal difference between the effects method and the other two criteria of project appraisal lies in the fact that the effects method makes no allowance for the opportunity cost to the national economy of productive factors other than capital, such as labour and land. In the absence of an adjustment for the opportunity cost of these factors, the effects method will not provide an appropriate criterion for project evaluation. Thus, while the shadow price of foreign exchange and the shadow discount rate serve as a benchmark for accepting or rejecting projects by the use of the domestic resource cost of foreign exchange and the internal rate of return criteria, respectively, there is no suitable benchmark for making decisions on projects under the effects method; nor will this method rank projects according to their economic profitability.¹⁸

The use of the discount rate as a benchmark will be inappropriate because of the neglect of the domestic resource costs of labour and land under the effects method. Accordingly, it is incorrect to argue that subsidies would be warranted in the case when low private profitability is associated with a high ratio of the gain in foreign exchange, expressed in domestic currency, to the cost of investment (Chervel, Courel, Perreau, p. 35). Also, the ranking of projects by this ratio will give rise to a bias, inasmuch as the degree of over-estimation of the project's benefits is positively correlated with the labour- and land-intensity of the project.

One may allow for the opportunity cost of labour and land in two possible ways. Under the first alternative, the project's benefits continue to be identified with net gains in foreign exchange while the opportunity cost of labour and land is added to the cost of capital. In this way, the effects method would be transformed into the domestic resource cost criterion as expressed in equation (7b). Under the second alternative, the opportunity cost of labour and land is deducted from the project's benefits. This adjustment would create a difference between the increment in domestic value added and net gains in foreign exchange, and transform the effects method into the internal rate of return criterion represented in equation (6b).

In either case, adjustment must further be made for the capital embodied in domestically produced inputs used by the project. This can be done by adding the opportunity cost of capital used indirectly to that used directly under the DRC

¹⁷ The reader will also note that the project's benefits are in the numerator of the formula under the effects method and in the denominator of the domestic resource cost formula. And, the former but not the latter expresses the gain in foreign exchange in terms of domestic currency.

¹⁸ In the study of Ivorian industry referred to above, the Kendall rank correlation coefficient has been estimated at .741 and .756 between rankings obtained by using the formula under the effects method, on the one hand, and ranking by the domestic resource cost coefficient and by the internal rate of return on the other.

will be accepted if the discounted value of profits (R_i) exceeds or is equal to zero, and it will be rejected if this value is negative.

$$R_i = p_i^w c^s - \sum_j \sum_m a_{mj} p_m^w c^s r_{ji} - \sum_j \sum_f a_{fj} p_f^s r_{ji} \geq 0. \quad (5)$$

The evaluation is made in terms of shadow prices: the domestic currency equivalent of world market prices for imports and exports, their opportunity cost in terms of output forgone (denoted by superscript s) for primary factors, and the marginal social valuation of foreign exchange (c^s) for the exchange rate.

Separating the contribution of capital from that of the other primary factors and rearranging terms in equation (5), we express in equation (6a) and (6b) the shadow price of capital or shadow discount rate (r^s) and the rate of return to capital in the project (r_1) respectively:

$$r^s = \frac{p_i^w c^s - \sum_j \sum_m a_{mj} p_m^w c^s r_{ji} - \sum_j \sum_{f \neq k} a_{fj} p_f^s r_{ji} - R_i}{\sum_j \sum_k a_{kj} p_k^s r_{ji}}. \quad (6a)$$

$$r_1 = \frac{p_i^w c^s - \sum_j \sum_m a_{mj} p_m^w c^s r_{ji} - \sum_j \sum_{f \neq k} a_{fj} p_f^s r_{ji}}{\sum_j \sum_k a_{kj} p_k^s r_{ji}}. \quad (6b)$$

It is apparent that, if the general economic profitability condition is fulfilled, the rate of return to capital in the project will be no less than the shadow discount rate, so that the project is accepted.¹⁶

In equation (7a), the shadow exchange rate (c^s) has been expressed from the general economic profitability condition while equation (7b) provides the formula for the domestic resource cost of earning foreign exchange in the project (c_1):

$$c^s = \frac{\sum_j \sum_f a_{fj} p_f^s r_{ji} + R_i}{p_i^w - \sum_j \sum_m a_{mj} p_m^w r_{ji}}. \quad (7a)$$

$$c_1 = \frac{\sum_j \sum_f a_{fj} p_f^s r_{ji}}{p_i^w - \sum_j \sum_m a_{mj} p_m^w r_{ji}}. \quad (7b)$$

Again, if the general economic profitability condition is fulfilled, the domestic resource cost of earning foreign exchange in the project will be equal to or less than the shadow exchange rate, and hence the project will be accepted.

In comparing the principal project evaluation criterion under the effects method with the domestic resource cost method, we find that both define the project's benefit in terms of the net gain in foreign exchange but they differ in their evaluation of the costs: the DRC method defines costs in terms of the shadow

¹⁶ In the formulae, no account has been taken of the fact that capital may be embodied in imported goods.

value of domestic resources utilized in the project while under the effects method these are identified with the domestic cost of capital investment.¹⁷ In turn, while both the effects method and the internal rate of return method relate the project's benefits to capital investment, the former identifies these benefits with the net gain in foreign exchange whereas the latter deducts the domestic resource cost of other factors of production expressed in shadow prices from the gain in foreign exchange.

It follows that the principal difference between the effects method and the other two criteria of project appraisal lies in the fact that the effects method makes no allowance for the opportunity cost to the national economy of productive factors other than capital, such as labour and land. In the absence of an adjustment for the opportunity cost of these factors, the effects method will not provide an appropriate criterion for project evaluation. Thus, while the shadow price of foreign exchange and the shadow discount rate serve as a benchmark for accepting or rejecting projects by the use of the domestic resource cost of foreign exchange and the internal rate of return criteria, respectively, there is no suitable benchmark for making decisions on projects under the effects method; nor will this method rank projects according to their economic profitability.¹⁸

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In either case, adjustment must further be made for the capital embodied in domestically produced inputs used by the project. This can be done by adding the opportunity cost of capital used indirectly to that used directly under the DRC.

¹⁷ The reader will also note that the project's benefits are in the numerator of the formula under the effects method and in the denominator of the domestic resource cost formula. And, the former but not the latter expresses the gain in foreign exchange in terms of domestic currency.

¹⁸ In the study of Ivorian industry referred to above, the Kendall rank correlation coefficient has been estimated at .741 and .756 between rankings obtained by using the formula under the effects method, on the one hand, and rankings by the domestic resource cost coefficient and by the internal rate of return on the other.

method and adding the capital involved in manufacturing inputs to that used in processing under the internal rate of return method.

According to Prou and Chervel, such adjustment is not necessary in cases of under-utilization of capacity in the domestic production of inputs (pp. 176, 196). However, it should be recognized that this will be in general a temporary situation as the same products may be eventually demanded by other branches of industry and, ultimately, capital will need to be replaced. In turn, if the new capacity created for the domestic production of a particular input exceeds the needs of the project, one would have to take account of the alternative uses of the input in question.

THE USE OF SHADOW PRICES

In identifying the project's benefits with the net gain in foreign exchange, the product itself as well as its direct and indirect imported inputs are effectively valued at their shadow prices (i.e. world market or border prices). However, Prou and Chervel decry the use of shadow prices for primary factors. They claim that the obstacles to the calculation of these shadow prices are so great that they are in practice not surmountable (p. 3). These obstacles include the problems encountered in calculating shadow prices, the difficulties of explaining their meaning to the decision-makers in developing countries, and the fiscal implications of the use of shadow prices (p. 2).

As a practical example, Prou and Chervel take the case when the shadow price of labour is 30 units and the market wage 100 units, implying a subsidy of 70 units per employee (p. 2). In criticizing the assumption of zero opportunity cost of labour originating in agriculture, they further note that there is a production loss involved because agricultural labour tends to be fully utilized in peak periods (p. 127).

But, as we have seen, the opportunity cost of labour (and land) is in fact taken to be nil under the effects method. This choice is defended on the grounds that there is general under-employment in all labour categories (p. 191). And, while it is noted that one could take account of the loss of output elsewhere in the economy that results from employment in the project, Prou and Chervel claim that 'all things considered, one would soon find, exceptions aside, that this would complicate the reasoning and lead to the loss of objectivity, without appreciably modifying the general aspect of the results or the ranking of the solutions' (p. 192). No evidence is offered in support of this proposition, however, and all calculations are made on the assumption of zero shadow price of labour (and land).

It appears, then, that despite their claims to the contrary, Prou and Chervel are in fact assigning shadow prices to labour and land (since cost is identified with capital, there is no need to use a shadow discount rate for ranking projects). And, the choice of zero shadow prices for labour and land is wholly arbitrary and it is open to the same objections the authors raised against the use of shadow prices in general. At the same time, it involves introducing shadow prices so to speak through the back door as with the project's benefits being defined in terms of the

increment in domestic value added, the policy makers are not apprised that the shadow prices of labour and land have been taken to be nil.

Nor can this assumption be considered realistic in developing countries. Thus, the use of land will involve a cost to the national economy unless it has no alternative uses or there is unutilized cultivable land in the country in question. Skilled, technical, and managerial labour are also in scarce supply in most developing countries. Furthermore, the preliminary results of a study of Ghana, the Ivory Coast, Mali, and Senegal, directed by the present author, show that in these countries unskilled labour, too, has an opportunity cost which in some instances equals its market price.

Nor can the cost of capital be appropriately valued in domestic prices as it is done under the effects method. This is because tariffs, or the tariff-equivalent of quotas, represent an income transfer rather than a real cost. Thus, imported capital goods should be valued at their world market (border) prices.

The use of shadow prices would also have to extend to foreign exchange, the scarcity value of which is not correctly represented by the exchange rate because of the existence of distortions in product and factor markets.¹⁹ While the use of a shadow exchange rate can be avoided if the project's benefits and costs are both expressed in foreign exchange, introducing the opportunity cost of primary factors will make its use necessary in order to convert values expressed in foreign prices into domestic currency (or vice versa).

Nor can the introduction of indirect effects in project appraisal be taken as a substitute for the use of shadow prices as claimed by Prou and Chervel (pp. 1-3), since indirect effects can be considered in project evaluation, irrespective of whether shadow prices are used or not.²⁰ At the same time, questions arise about the appropriateness of allowing for the backward linkages of a project by valuing inputs—tradeables as well as non-tradeables—at their domestic cost of production. This question will be taken up in the following.

THE TREATMENT OF DOMESTICALLY PRODUCED INPUTS

The application of input-output tables for estimating prospective input use in the project assumes that historically-observed relationships between the use of domestically-produced and imported inputs will continue. Expressed differently, the assumption is made that the marginal or incremental input-output coefficients equal the average coefficients observed in input-output statistics.

The same procedure is followed under the effects method in cases when, in the absence of an input-output table, industry data are used to determine the origin of inputs. Thus, it is noted that 'in general, and very exceptional circumstances aside, additional needs are satisfied by domestic production . . .' (Prou-Chervel, p. 177). This conclusion is said to apply even though new investments may be needed to increase the capacity of the domestic production of inputs.

¹⁹ On the estimation of the shadow exchange rate see Bela Balassa, 'Estimating the Shadow Price of Foreign Exchange in Project Appraisal', *Oxford Economic Papers*, July 1974.

²⁰ For a discussion, see Bela Balassa and D. M. Schydrowsky, 'Effective Tariffs, Domestic Cost of Foreign Exchange and the Equilibrium Exchange Rate', *Journal of Political Economy* May-June 1968.

In this connection, distinction needs to be made between tradeable inputs, which can be exported or imported, and non-tradeable inputs, including various services such as commerce, internal transport, electricity, gas, etc., which have to be procured domestically. While the choice between importation and domestic production, or between exportation and domestic use, does not arise in regard to non-tradeables, it must be considered for tradeable inputs.

To begin with, even if tradeable inputs are produced at internationally competitive costs, a spurious gain is shown under the effects method in the event that domestically produced rather than imported inputs are used. This is because foreign exchange savings are augmented thereby, without however making allowance for the opportunity cost of primary factors involved in the domestic manufacture of the inputs.

Making allowance for the opportunity cost of primary factors, as suggested above, would eliminate this spurious gain in cases when tradeable inputs are produced domestically at internationally competitive costs. However, if domestic costs exceed international prices, the method proposed by Prou and Chervel may lead to incorrect decisions on projects. This can be illustrated by an example.

Let us compare two investment projects designed to manufacture precision equipment and clothing, respectively, when steel, the principal input of precision equipment, is produced under protection at costs exceeding the c.i.f. import price while the textile fabrics used in clothing manufacture are imported or are produced domestically at internationally competitive costs.²¹ Assume further that the clothing project appears preferable to the precision-equipment project in terms of economic profitability as defined under (5), when we combine the cost of processing the product and its domestically-produced inputs, but the ranking is reversed if domestically-produced inputs are valued at world market prices.

In the example, the inversion of the ranking is due to the fact that the high cost of domestically-produced steel penalizes the production of precision-equipment while the clothing project benefits from the availability of competitively priced inputs. In taking an historical accident as regards the domestic availability of inputs as given, this procedure may lead to rejecting new industries which suit a country's resource endowment. Thus, the country may not engage in the manufacture of labour-intensive precision equipment which is economically profitable *per se*, because it has earlier established a high-cost steel industry.

Rather than expanding high-cost steel production to provide for the needs of the precision equipment industry, a more appropriate solution would be to import steel. And while this conclusion may be modified in the presence of excess capacity, account would need to be taken of the eventual cost of replacement of the plant.

These considerations indicate the need to make a choice among alternative sources of inputs on the basis of their relative costs. Exceptions to this rule may be made only in cases when the importation of additional inputs is not politically feasible. But, even in this case, calculations should be made to indicate the excess costs involved in using domestically-produced inputs that could be obtained cheaper abroad.

²¹ This example has been taken from the article referred to in the preceding footnote.

Domestically produced tradeable inputs would thus need to be valued at world market (border) prices in project appraisal to reflect the fact that importation is an alternative to the use of domestically-produced inputs in the project. The same considerations apply to inputs for which exportation provides the relevant alternative.²²

With tradeable inputs valued at their world market prices, only non-tradeable inputs will be decomposed into tradeable inputs and primary factors. This involves replacing full decomposition by the use of an input-output table with partial decomposition by the so-called 'semi-input-output' method.²³ Tradeable goods which need to be produced domestically for reasons of political feasibility, although their costs exceed the c.i.f. import price, may be treated as non-tradeables under this method.

SOCIAL *vs* ECONOMIC PROFITABILITY

Thus far, we have used economic profitability as the criterion of project evaluation under the assumption that increases in national income resulting from the implementation of a project are given equal weights, irrespective of the income recipient (wages, profits, rents and government revenue) and the use to which the income is put. The project evaluation manuals prepared for the OECD Development Centre, UNIDO and the World Bank call for making adjustments in the calculations on the basis of income distributional considerations and the effects of the project on government income and savings. With these adjustments, a social profitability criterion is derived, the use of which is recommended for reaching decisions on projects.

Prou and Chervel suggest introducing income distributional considerations by assigning weights to various income recipients, private as well as public, which involves measuring the project's benefits in terms of a weighted sum of the increment in domestic value added. This method is incorrect, however, because it identifies benefits to income recipients with the incomes they derive from the project without considering alternative possibilities open to them.

Correctly defined, the benefits accruing to the income recipients should include only the excess of their remuneration over earnings in alternative occupations. At the same time, the net remuneration of primary factors so defined will not equal their contribution to the increment in domestic value added adjusted for the opportunity cost of factors, unless shadow and market prices coincide.

But even if income distributional effects are correctly defined, introducing these in project evaluation without allowing for their possible impact on savings would bias the results. This is because redistributing incomes may reduce savings, with adverse effects on economic growth. Correspondingly, should one introduce

²² We abstract here from differences between c.i.f. and f.o.b. prices and assume that the country is a 'price taker' in international markets. Should the country affect world market prices through its trading, which may be the case for some export products, the export alternative needs to be evaluated in terms of marginal revenue from exports.

²³ The use of this method was proposed independently by Jan Tinbergen, I. M. D. Little, and Bela Balassa and D. M. Schydrowsky. For references see the article of the latter authors referred to above (p. 354).

income distributional considerations into project appraisal, savings effects would also need to be considered.

It is a different question whether project appraisal should be used in the place of general economic policies to pursue income distributional, savings, government revenue etc. objectives. This issue transcends the scope of this paper and will not be considered here.²⁴

CONCLUSION

The purpose of this paper has been to evaluate critically the so-called effects method of project appraisal, originated by Charles Prou and Marc Chervel and widely used in French-speaking African countries. It has been shown that, with adjustments made for quota profits and increased protection imposed at the time of the project's implementation, the benefits of a project will be defined in terms of the net gain in foreign exchange under the effects method. This involves valuing the product itself, as well as its direct and indirect imported inputs, at their respective shadow prices which are equated to the world market (border) prices.

In turn, defining the projects costs in terms of the net loss in tariff revenue entails valuing primary factors at their market rather than at their shadow prices. And, if costs are identified with the cost of investment, as is the case for the principal criterion of project evaluation under the effects method, zero opportunity cost is assigned to primary factors other than capital. As a result, a bias is introduced in favour of projects that intensively utilize these factors of production.

A further objection to the effects method concerns the assumption that the historically-observed relationship between the use of domestically-produced and imported inputs would continue, so that the possible choice among these sources of tradeable inputs is disregarded and one may be induced to reject industries that suit the country's resource endowment. Finally, the income distributional effects of a project are incorrectly estimated by neglecting earnings in alternative occupations.

In this paper, recommendations have been made for modifying the effects method, by shadow pricing all primary factors and tradeable inputs. With these modifications, the effects method will become equivalent to the domestic resource cost and the internal rate of return methods which provide alternative expressions of the general economic profitability criterion.

*The Johns Hopkins University,
Baltimore, Maryland.*

²⁴ For a discussion, see Bela Balassa, *The Income Distributional Parameter in Project Appraisal*, Washington, D.C., World Bank, March 1976.

THE RATIONALE OF THE EFFECTS METHOD: A REPLY TO BELA BALASSA

By MARC CHERVEL

The essential difference between the effects method and conventional approaches—and in particular that referred to by Bela Balassa—lies not in the shadow pricing of primary factors and tradable input¹ but in the manner in which the problem of project selection is formulated, the theoretical framework underlying the different methods, and the very conception of under-development and of the problems of economic development. This is what makes a reply so difficult. Before considering the differences, analysed minutely in Bela Balassa's paper, it appears necessary first to place the problem in its general context.

I. THE GENERAL CONTEXT OF THE METHODS UNDER CONSIDERATION

1.1 *The Effects Method*

The Effects Method was developed for use in the context of national development planning. Its precise aim was to shed light on problems of project selection at the policy stage when a medium-term sketch of the economy is available (incorporating overall development objectives), a whole series of projects has been prepared, and the precise objectives of development are known, the political authorities will want to determine specifically which projects should be carried out to meet as closely as possible the objectives set.

The selection procedure, like all plan preparation work, is an iterative one. The people most closely involved are the economists at the Central Planning Office responsible for policy, project analysts from the various Commissions of the Plan, and the national political authorities who, starting from a whole array of objectives, refine and specify these over time.

In this context, the economists' task is to give the most specific and meaningful statement possible of a project's impact on the economy and on objectives. The analysis of the 'effects' will therefore entail *simulating the introduction of the project into the economy and comparison of the situations with the project and without it*. The analysis will take as its framework forecasts of domestic demand determined exogenously by the sketch of future economic developments (the sketch will determine values in use).

The effects are then determined with the aid of a number of hypotheses in terms of their impact on foreign trade, their impact on GDP, decomposed to show the increment in income by relevant categories of agents, or income earner, and the savings that it is necessary to mobilise.

The computations and ratios prepared by the economists are not in themselves intended to represent an overall summary of the judgement reached on the project. Their sole purpose, by varying degrees of synthesis, stressing particular constraints

¹ Cf. Bela Balassa, 'The Effects Method of Project Evaluation', *BULLETIN*, November 1976.

or objectives, is to highlight in different ways the decisions needing to be taken at the political level.

1.2 *The Framework for Conventional Cost-Benefit Analysis*

The theoretical framework for the conventional approach is quite different and draws on neoclassical general equilibrium and optimality theory. The claim of the economic analysis is to be a synthetic measure of the project's worth to the economy as a whole. Selection of projects in accordance with the findings of the analysis will then lead to the optimum.² This approach therefore leaves but little scope for the Plan, which is at best a study of overall market prospects.

As long as we remain in the context of developed economies where the main neoclassical assumptions roughly hold and an overall growth objective can be established, the economic analysis of the project can be derived without undue difficulty from the financial analysis of profitability to the entrepreneur.

In the context of underdeveloped economies, on the other hand, the situation is much less straightforward. None of the assumptions of neoclassical theory is in fact borne out, and we find underemployment of factors, wide-ranging and substantial state intervention, structural disequilibria, increasing returns, etc. What is more, the adoption of just one overall growth objective is unconvincing, although this point receives only passing mention in Balassa's paper.

The conventional approach is therefore to construct an *imaginary* general equilibrium situation—quite far removed from the *real* one—on the basis of which the argument and financial-type analysis can be revoked. The essential characteristics of neoclassical cost-benefit analysis are that it is based on a notion of value equated with scarcity (shadow prices, opportunity costs); and that it excludes any kind of consistent planning (the objective function is highly simplified, and the economic computations, when generalized, lead to the optimum).

The analysis is all-inclusive, embodying a full description of the pre-project economy (shadow prices), all objectives (the function to be optimised) and complete rationality (the overall model providing a framework for the economic analysis). Nevertheless, it is claimed that selecting projects in accordance with findings that express this rationality will lead to the optimum position. The function of the economic analysis remains of paramount importance and alone can guide the actions of the authorities.

1.3 *The Essential Differences Between the Economic Analysis Under the Effects Approach and Conventional Methods*

The essential differences stem from the theoretical frameworks underlying the two approaches. We may locate them on two levels: on the level of the background analysis of the economy and on that of the project analysis itself.

Given the planning context of the effects approach, reference is constantly made to concrete analysis of situations: initially, of the project (detailed operating accounts, investment structure, etc.) and of the economy (input-output tables,

² The general approach is the same even when it is more complex, as in the book by L. Squire and H. G. Van der Tak, *Economic Analysis of Projects*.

accounts by branch and sub-branch) and later, of the objectives pursued on the political level (in fact, these are determined gradually during the preparation of the Plan).

In the conventional approach to analysis, constant reference is, by contrast, made to the neoclassical model. As a result, *no distinction is made between the analysis of reality and the interpretation given to it by the theory*. Such is the sway of the theory that, from the very outset, reality will be described in such derogatory terms as market 'imperfections', 'biases', 'distortions', 'non-economic' behaviour, etc. The theory is held to represent the truth ('true' costs, 'true' prices) and even a sublimated form of reality: in the French literature some writers go so far as to describe imaginary costs calculated on theoretical grounds as the 'coûts réels'. Observation of divergencies between theory and reality leads to condemning . . . reality.

To come back to projects, categories of costs and benefits are defined from the outset. It is only afterwards that the problem (secondary) of measurement is posed. For instance, wages are a cost (initial truth). The problem for the appraisal is to measure this cost at its *true* value. As a general proposition, the outcome of not separating analysis from the interpretation given to it in the theoretical framework will be to ensure the precedence of theory over reality. In case of doubt, it is always the theory which will prevail.³ In practice, this leads to systematic neglect of concrete analysis of facts and to the substitution of questionable arguments about productive capacities, the lack of savings, etc, based on abstract concepts like shadow prices.

The second essential difference stems from the acknowledged function of the project analysis itself. In the effects approach, the model of society (and, inter alia, the model of consumption) is both specified and exogenous. The domestic demand vector is determined with some accuracy but elsewhere, in the course of the planning procedure (exogenous determination of values in use). Only this definition of the model of society and of the objectives pursued enables us eventually to label the effects of the project. First of all, these must be identified through concrete analysis. It is only afterwards, during a subsequent phase, that certain effects will be called "costs", and others "benefits".³ In the neoclassical approach, the model of society is endogenous. It is the result of the interactions of the economic agents incorporated in the underlying model.

In the effects approach, the economic analysis of the project merely plays the role of a signpost at certain stages of the national planning procedure,⁵ and it is the latter which is the essential element. In the conventional approach, the reverse occurs; the analysis is essential and the Plan, in the limiting case, is non-existent.

In view of the differences in the type of analysis and the fact that under the effects method background and project analyses are integral parts of planning procedures, it follows that both the content and function of the project analysis look very different under the effects approach and the conventional methods.

³ See § 2.2; § 2.4; § 2.5.

⁴ This is why we feel it is incorrect to present the effects method from the outset through cost and benefit concepts (Bela Balassa *op. cit.* p. 220). It is the effects that come first.

⁵ *Manual of Economic Evaluation of Projects*, Chapter 5, Paris 1976.

The explicit and clear meaning of the analysis of effects leads (or can lead) to the discussions and iterations needed in drawing up a national development plan. The abstractness of the concepts conventionally employed (along with inaccuracies of measurement—these two features evidently being linked) ends up in excessive sophistication, the impossibility of tying in the project with the economic management of the country and, in our view, in the arbitrariness of the technocrat.

II. COMPARISON OF THE APPROACHES AT THE APPRAISAL LEVEL

Despite very real differences of substance between the two approaches, both yield appraisals whose presentation is similar in form. Divergencies between the two, however, are not in our view fortuitous; they are the result of neither 'oversight' nor 'error' and are simply the reflection at the economic appraisal level of the differences of substance indicated in the preceding paragraphs. Bela Balassa's critical comments on the effects method are largely based on these divergencies, although some, as in the case of quantitative import restrictions and shadow prices of land, stem from a misunderstanding than from any substantive difference.

The following paragraphs take up and discuss each of the criticisms in turn, namely:

1. the treatment of quantitative import restrictions and higher tariff protection;
2. the study of the project's impact on domestic production;
3. the treatment of land;
4. the treatment of wages for unskilled labour, and
5. the treatment of wages for skilled labour.

For a more complete account, the reader is referred to the *Manual of Economic Evaluation of Projects*.

2.1 *Quantitative Import Restriction and Higher Tariff Protection*⁶

For an import-substitution project under the effects method, the increment in value added (which may be taken as characterising project benefit) is independent of the possible existence of quotas. Only the distribution of the extra value added between agents may appear different depending on whether or not quotas are imposed.

Starting from the estimated project turnover figure (in domestic prices), the effects enables us to decompose this into direct and indirect imports (import content),⁶ and direct and indirect value added, composed of, e.g. direct and indirect wages, direct and indirect taxes, and direct and indirect entrepreneurial income.

Comparison with the CIF price of the imported alternative enables us to calculate the increment in value added, which is equal to the gain in foreign exchange (CIF imports of the product less direct and indirect imports when the product is produced by the project). The increment in value added is also equal to direct

⁶ Bela Balassa, *op. cit.* pp. 222-3.

⁷ This term has been translated by UNIDO as 'imports included' See bibliography for references.

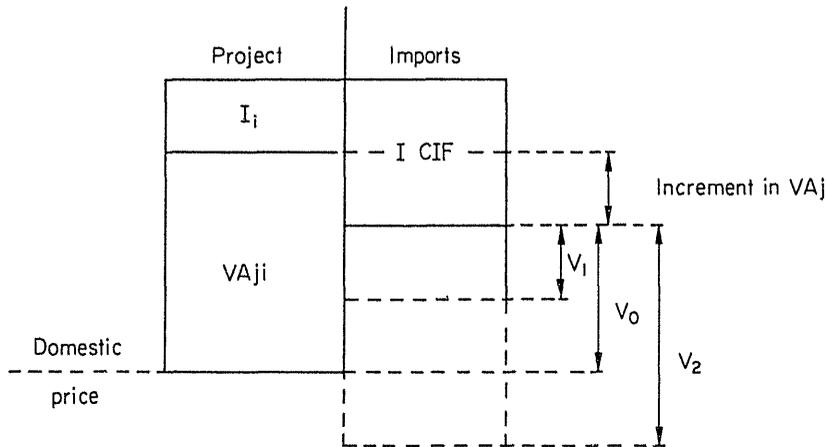


Fig. 1

and indirect value added of the project less what the value added of the imported alternative would be if this were placed on the market at the same price (V_0).

If there are no quotas, we may consider V_0 to represent that the degree of tariff protection which is just sufficient to make the project competitive (the minimum protection to be granted during normal operation). V_0 represents, *ceteris paribus*, exactly the loss of customs receipts to which the Government agrees when it accepts the project. It is then of little importance whether the previous level of tariff protection was V_1 or a prohibitive tariff levied at V_2 . The loss to the state at the domestic price during normal project operation is V_0 (more precisely, it is equal to V_0 less taxes on direct and indirect production).⁸

Even if quotas are in force in the pre-project situation, there is no change in incremental value added; this is still equal to the gain in foreign exchange. Only the distribution of this value added between agents is affected. V_1 constitutes the loss of tariff revenue to the state (instead of V_0 in the preceding case. $V_0 - V_1$ constitutes the loss of revenue either to the previous consumer (if the domestic selling price equalled the CIF import price + V_1), or to traders and middlemen, who had in fact recovered the margin $V_0 - V_1$ (if the domestic selling price equalled the CIF import price + V_0 , as in the case of a black market), or partly to consumers and partly to traders and middlemen (if the domestic price lay between the two).

In either case (higher tariffs or quotas), the increment in value added remains unchanged. For a given project, scheduled production cost and hence for a given volume of sales, the increment in value added is independent of the domestic price.⁹ To determine this increment (overall) in value added, the problem is not so much to determine the equivalent rate of protection (V_0) as to determine the CIF

⁸ It is therefore incorrect to write that, under the effects method, the domestic price is assumed to be equal to the border price plus tariff protection (presumably prior tariff protection)—Bela Balassa, *op. cit.* p. 221.

⁹ It is therefore incorrect to write that in these cases the increase in domestic value added is no longer equal to the gain in foreign exchange, if by 'increase in domestic value added' is meant the increment in value added. Bela Balassa, *op. cit.* p. 222.

price of import alternatives and the direct and indirect imports in domestic production.

2.2 *The Project's Repercussions on Domestic Production*

In the effects approach, the normal procedure is to simulate in actual terms the introduction of the project into the economy, monitoring the repercussions that would effectively occur upstream. This concrete approach stems not from any 'error' but from the very framework adopted (see § 1.3).

In the approach followed by Little and Mirrlees and Bela Balassa, product chains are followed backwards only until an international good is reached, at which point the chain is broken, even when the good is produced locally. Breaking away from reality in this manner is justified by arguments of a theoretical nature. If the economic cost of producing the inputs locally is above the international price (which, in the author's minds, appears implicitly to be the general case), there will be a bias against the project under consideration. In our view, this manner of proceeding is illogical and unrealistic, and leads to erroneous results.

If the production of the input is not 'worthwhile' at country level—let us reason in the framework of an overall development policy—it is not enough to state an intention to use the domestic input but an imported one instead. Logically, we must go further and flatly recommend closing down the factory producing the 'unworthwhile' item. On grounds of realism, too, can we really suppose that a new factory, drawing on inputs for which a local production capacity exists, will be allowed to purchase its needs on the international market, especially when the local capacity is often poorly utilised? And yet such a supposition would arise only because a need had been demonstrated on theoretical grounds.¹⁰ Most important of all, could one really recommend, as logic would have it, that in the light of this same appraisal, the uncompetitive factory should be closed down?

If we are not really in a position to push for such measures, are we to say that developing countries will have to carry the burden of past mishaps in investment programming for all time? It is our view that, if not the theory itself, at least the theoretical approach adopted has led to posing a false problem; a whole set of data has been left out of consideration¹¹ and its inclusion would completely change our understanding of the problem. These data concern the structure and utilization of existing productive capacity in developing countries, and the structure and utilization of the labour supply.

In an underdeveloped country, production is characterized by uneven development between sectors, and underutilization of existing capacity. It is quite evident that the unevenness in sectoral development (excess capacity in some sectors, absence of investment in others) evidence of insufficient interlocking between sectors—rules out expansion through a boosting of expenditure; sectoral bottlenecks, particularly in regard to agricultural production, would be a source of inflation and balance of payments deficits. Despite this, and contrary to what is often asserted,¹²

¹⁰ The demonstration is based on 'economic' costs and not 'actual'.

¹¹ See § 1.3.

¹² L. Squire and H. G. Van der Tak *Economic Analysis of Projects*, p. 23, and Bela Balassa, *op. cit.* p. 227.

existing industrial productive capacity very often remains underutilized on a permanent basis. That underutilization is much more pronounced than in developed countries has been borne out by many surveys.¹³

Even in the case where existing local capacity is saturated, production is generally within the area of increasing returns, and a marginal investment is likely to show a substantial economic benefit (hence, in the effects approach, we reason in terms of sets of related projects).

This underutilization of productive capacities along with the wage considerations expounded in § 2.4 and § 2.5 below, leads to the conclusion that articulating the project within the existing economic structure, far from constituting a burden in the economic analysis, indeed works in the project's favour.¹⁴ The introduction of indirect effects, so conceived, is not in theory specific to the effects method. In practice, however, it is,¹⁵ because other methods do not draw on an actual analysis of the country's productive capacity and opt for the international price of tradables.¹⁶

2.3. *The Utilization of Land*¹⁷

The discussion on this point seems to be the result of a misunderstanding. If land does not appear in the various practical applications of the effects method quoted by Bela Balassa, it is because they concern industrial projects, occupying only a small area for which the agricultural production foregone has simply been ignored.

This would not, of course, be the case for agricultural projects.¹⁸ Reference to the 'without project' situation for determining the increment in value added would result in allowance being made for previous production on the land.¹⁹ For instance the incremental value added from implementing a hydroagricultural project is obtained as the incremental value added obtained from the new production, less the incremental value added of former production now lost. In other words, from the foreign currency gained in connection with the new production (higher exports, lower imports), we deduct the imports (or exports foregone) rendered necessary by virtue of the former production lost.²⁰ Without having recourse to an accounting price for land (a nationwide average?) or a shadow wage (a nationwide average?) we impute to the project the exact corresponding lost in agricultural production.

¹³ See in particular *Industrialization and Productivity* n° 15, UNIDO 1972. Rates of capacity utilization in industry are given for various countries: India 82 per cent; Costa-Rica: 72 per cent; Guatemala: 74 per cent; Honduras: 63 per cent; Nicaragua: 82 per cent; Argentina: 43-88 per cent; Chile: 33-35 per cent.

¹⁴ The full calculations must be made from the production and operating accounts of the project and sub-branches involved, while the input-output table may be used for making approximations (not the reverse). Bela Balassa, *op. cit.*, p. 220.

¹⁵ Bela Balassa, *op. cit.* p. 228.

¹⁶ In this respect, the introduction of mathematical formulae does not clarify the debate and even introduces confusion and a false similarity between the two approaches, in that it is not clearly specified which imports are involved (is it the direct and indirect imports of the effects method or the imaginary imports of tradables?). Bela Balassa, *op. cit.* p. 220ff.

¹⁷ Bela Balassa, *op. cit.* pp. 226, 227.

¹⁸ See for example, the study by E. Kleinmann on the Loukkos Dam, Morocco (1964) or the study by J. Bonnamour on a sugar project (FAO-Agricultural planning course, 1974).

¹⁹ To be precise, the production on the land in the case of the project not taking place.

²⁰ A schematic example of this type is presented in Chapter 6 of the *Manual of Economic Evaluation of Projects*, Ministry of Cooperation, Paris, 1976.

2.4 *The Wages for Unskilled Labour*²¹

In this short paper it is not easy to present a systematic critique of the use of shadow prices for the different factors of production as recommended in Bela Balassa's paper. We will, however, attempt to demonstrate that our rejection of such concepts (and, after all, they are very convenient and thoroughly familiar, at least to development economists) stems neither from ignorance, nor oversight, nor from a concern just to be different. Our rejection of shadow prices is on grounds of substance, and we will attempt to show that it does not lead to erroneous solutions, quite the contrary.

In cost-benefit analysis as recommended for application, the problem of determining shadow prices for factors of production is not a secondary matter. It is the crux of the problem and in fact the dual solution to the primal problem of project selection.²² Treating this problem hastily and disposing of it in a few pages amount to treating the problem of project appraisal and selection in exactly the same manner.

Advocates of the shadow price approach in practice come together in their conclusions, the shadow wage for labour is relatively high (in terms of nominal wages, 0.5, 0.8 or 1.0, and even above 1 in the UNIDO approach). Thus, the divergence between theory and reality does not appear to be too wide. Curiously enough, the convergence in findings covers up sometimes conflicting arguments.

In the Little and Mirrlees and UNIDO manuals, the shadow price of unskilled labour is derived from consideration of two terms: the output foregone and the loss of savings. The output foregone in the previous activity by virtue of the wage-earner being employed in the new project ('m' in Little and Mirrlees's work and 'z' in the UNIDO manual) is considered to be low or negligible. In the case studies contained in these manuals, output foregone is on the whole considered to be zero. The savings loss, on the other hand, involves a high cost. The estimation of this term stems from the following argument: wages are paid to low income groups which consume all their income; these wages could (using different techniques or other projects) have been paid out to the entrepreneur who, by contrast, saves some or all of his income; savings in the country are scarce and hence valuable; and distributing salaries to low income categories therefore entails a high 'economic cost'.

In Bela Balassa's approach, on the other hand, only the first term is to be retained. Yet, following general considerations which are not made explicit²³ the production foregone, equal to the shadow price of labour, is estimated at 0.5, 0.6, 0.8 or even 1, depending on the country.

Each of these conflicting justifications for the same result is debatable. It is quite unrealistic to suppose high production in the earlier, alternative employment (except in very exceptional circumstances). In real terms, there seems to be complete agreement on the importance of urban unemployment (reaching as much as 20 percent of the labour force) and of underemployment in town and country areas

²¹ Bela Balassa, *op. cit.*, pp. 227-8.

²² *Manual of Economic Evaluation of Projects*, Paris 1976, Appendix I.

²³ *Méthodologie de l'étude de l'Afrique de l'Ouest*, pp. 34-7.

alike. One only has to refer to the data on unemployment and underemployment (40 per cent on average of the labour force in developing countries in 1975, or some 300 million persons),²⁴ on living standards (750 million human beings living below the poverty line),²⁵ and on the marginal productivity of labour in agriculture, etc. Raising the problem of the loss of savings at project level seems to us both illogical and erroneous: illogical, because it amounts to assuming that the authorities lack the means of increasing savings directly, when the way the study has been carried out itself supposes that the authorities *do* have means of intervention; and erroneous, because 'no empirical observation proves that a more equal distribution of income would reduce savings'.²⁶

The widely differing results and lack of precision in the determination of shadow wages (despite this being a crucial matter) stems, in our opinion from the vagueness and inconsistency of the arguments discussed above. This in turn stems from the general way in which the problem has been stated: prices are expected to accommodate not only to general economic data but also to development objectives (overall and by category of agent).

If, in the effects method, the value of the shadow wage is not specified, this is neither to be smart nor to mislead the political authorities (who, indeed, are not familiar with the concept) but simply because specification is useless and sometimes impossible. When speaking the primal language²⁷ of the project's effects, of direct plus indirect income and of comparison with the alternative situation without project, it is not always possible to switch to the dual formulation in price terms.

However, in the case of industrial projects (where there is no problem of alternative use for land—§ 2.3), the assumption of generalized underemployment of labour (primal language) corresponds to a zero shadow wage for labour (language of the dual). When compared with the circuitous procedures followed in the conventional methods, this assumption seems justified by virtue of the prevailing economic conditions (underemployment in developing countries, low productivity in the main sectors of the economy, etc) and by the very way in which the problem is stated. This is, at the time of discussions between technicians and politicians, to locate clearly the main options—on rates of investment, income distribution, etc²⁸—which in the conventional forms of analysis are only implicit and hence obscured.

2.5 *The Wages for Skilled Labour*²⁹

On this matter, the arguments and criticisms on Bela Balassa's paper are of the same nature as those for unskilled labour. Hence, we will take up just a few points specific to the category of skilled labour.

As the items concerning skilled labour are generally of lesser importance, the

²⁴ *Employment, Growth and Basic Needs*, report of the Director General of I.L.O. 1976, p. 19.

²⁵ Speech delivered by R. S. MacNamara to the Governors of the World Bank, October 4, 1976.

²⁶ *Employment, Growth and Basic Needs*, p. 25.

²⁷ *Manual of Economic Evaluation of Projects*, Paris, 1976, Appendix I.

²⁸ *Manual of Economic Evaluation of Projects*, Chapter 5, Paris 1976.

²⁹ Bela Balassa, *op. cit.* p. 228.

conventional approaches often content themselves with a general reference to the neoclassical model and to the scarcity of managers for justifying the assumption of a shadow wage equal to the market price (Little and Mirrlees) or above it (UNIDO). In our opinion, a 'zero shadow price' appears as justified for this category of local labour as it is for unskilled labour. Very often, there is under-employment' and a brain drain. It has been estimated that, between 1962 and 1967, over 250,000 highly skilled workmen and members of the professions left developing countries for the developed countries.³⁰ Moreover, even if a bottleneck were to appear in one or other managerial category, the scarcity is not what would determine its price, especially in the medium or long run. In many cases, it is only by in-service training that qualified managers can be trained.

The main thing, then, is not to discriminate against projects using such local labour by counting it as a cost but, instead, to ensure that, for the country as a whole, salaries and working conditions for local managerial staff are such that emigration can be slowed down or halted, and that measures are taken to reorient the country's education and training system so that it can best meet the needs of the national economy.

For calculation of the incremental value added under the effects method, we therefore recommend that the salaries of managers who are nationals be counted in value added, and the salaries paid to non-nationals be counted as imports. The gradual replacement of expatriates by nationals then shows up as an increase in incremental value added.

CONCLUSION

While the criticisms advanced in Bela Balassa's paper have enabled us to clarify our disagreement on certain points, we cannot give our support to his stance. Quite the contrary, the methodology underlying his paper—the one conventionally favoured—appears increasingly inadequate for application to the economic realities of developing countries or to the problem of development, as stated nowadays with increasing clarity. This methodology is reliant on the neoclassical theory, which is under strong challenge as a theory of development, its basis being a framework of assumptions which are notoriously inapplicable in developing countries. It is a methodology which (particularly in the keywords listed in the bibliography) is developed only at a price. Initially, its use almost completely obscures the cardinal features of underdevelopment (sizeable unemployment, underutilization of existing industrial capacity, emigration of nationals with managerial skills, extremely low living standards, problems of income distribution, etc). Subsequently, there is increasing sophistication in an attempt to restore some semblance of reality, but the result of this sophistication is to turn a country's national development problems into matters for foreign experts while nearly 90 per cent of investments are financed by countries themselves.³¹

³⁰ *Employment, Growth and Basic Needs*, 1976, p. 147. A high proportion of these migrants are scientists and engineers.

³¹ Figure from a speech by R. S. MacNamara, President of the World Bank, October 4, 1976.

In contrast to this approach, a sharper awareness of the real problems is emerging, among both countries themselves and the international organizations, with the acknowledgement of the worsening situation of developing countries, which implies, in a sense, the failure of the procedures applied, and the definition of a strategy in down-to-earth terms of *basic needs*. The methodology conventionally favoured makes it impossible to take into account the realities of underdevelopment and cannot dovetail into such a strategy. The neoclassical exercises increasingly look purely academic. The time has perhaps come to bring into question this whole approach to the problem of development. Conformism is no longer enough.

*Groupe de Recherches I.E.D.E.S.—S.E.D.E.S.,
Paris.*

BIBLIOGRAPHY

The foregoing critical note is in response to an article by:

Bela Balassa The 'Effects Method' of Project Evaluation BULLETIN, November 1976.

To us, this paper has the great merit of taking into consideration the effects method, an approach which has been selected by a number of countries and which is somewhat unorthodox in comparison with conventional procedures.

The criticisms forthcoming in our paper thus apply more generally to the conventional methodologies and practices as described in basic works by:

I. Little and J. Mirrlees. *Manual of Industrial Project Analysis in Developing Countries, Volume II, Social Cost-Benefit Analysis*. OECD Development Centre, Paris 1969.

P. Dasgupta, S. Marglin, A. Sen. *Guidelines for Project Evaluation*. UNIDO, 1973.

L. Squire and H. G. Van der Tak. *Economic Analysis of Projects*. A World Bank research publication. John Hopkins University Press, 1975.

Accounts of the effects method have appeared in:

S.E.D.E.S. *Evaluation des effets primaires et secondaires d'un projet industriel dans un pays en voie de développement*. U.N. Industrial Development Centre, 1965. (Paper submitted at the Prague Symposium).

Ch. Prou and M. Chervel. *Etablissement des programmes en économie sous-développée: l'étude des grappes de projets*. Dunod, 1970.

M. Chervel, M. Th. Courel and D. Perreau. 'Project evaluation by the "effects" method in developing countries—Case study: Industrial fishing complex in an African Port'. UNIDO, *Industrialization and Productivity*, n° 20, 1973.

M. Chervel and M. Le Gall. *Manual of Economic Evaluation of Projects*. Ministry of Cooperation, Paris, 1976. (Originally published in French as "Manuel d'Evaluation Economique des Projets": English translation due for publishing during 1977.)

The following papers offer comparisons of the effects method with other methods, of project appraisal:

A. Bussery. 'Méthodes d'appréciation des projets dans les pays les moins développés'. OECD, March 1973. (Revised version in *METRA*, Vol. XII b° 3, 1973).

M. Chervel. 'L'évaluation des projets de production en économie sous-développée—Essai de typologie des méthodes'. *Revue Tiers-Monde* n° 59/60, July/December 1974.

A discussion of this article with John Roberts was published in *Revue Tiers-Monde* n° 64, October/December 1975.

Ch. Prou. 'Les prix de référence de nouveau'. *Annales Economiques* n° 7, Ed. Cujas, 1975. Note for the *OECD meeting on May 30-31, 1972*.

Finally, a discussion on the effects method and the UNIDO method appears in the following series of articles:

A. Bussery. 'Evaluation de la rentabilité économique des projets productifs dans les pays en voie de développement—Etude de cas: Usine sidérurgique'. *METRA*, Vol. IX n° 4 (1970) or UNIDO *Industrialization and Productivity* n° 19, 1972.

U.N.I.D.O. 'Réexamen critique de l'étude de A. Bussery sur un projet de substitution a la production locale aux importations'. UNIDO, *Industrialization and Productivity* n° 21, 1974.

M. Chervel. 'Méthode ONUDI et méthode des effets pour l'évaluation des projets'. IEDES/SEDES. *Methodologie de la Planification* n° 12—*Analyses Critiques des Methodes d'Evaluation*. Ministry of Cooperation, Paris 1977.

THE 'EFFECTS METHOD' OF PROJECT EVALUATION ONCE AGAIN*

By BELA BALASSA†

Mr. Chervel's note¹ contrasts the effects method 'developed for use in the context of national development planning' (1.1) with conventional cost-benefit analysis that 'draws on neoclassical general equilibrium and optimality theory' and 'leaves but little scope for the Plan, which is at best a study of overall market prospects' (1.2). He further claims that 'given the planning context of the effects approach, reference is constantly made to concrete analysis of situations . . . In the conventional approach to analysis, constant reference is, by contrast, made to the neoclassical model. As a result, *no distinction is made between the analysis of reality and the interpretation given to it by the theory*' (1.3; italics in the original). Finally, according to Chervel, 'in the effects approach, the model of society . . . is both specified and exogenous' whereas 'in the neoclassical approach, the model of society is endogenous' (1.3).

The statements establish a false dichotomy between the effects method and 'conventional' cost-benefit analysis. Thus, the cost-benefit analysis of projects also takes the existing 'model of society' as given as it evaluates projects under the policies actually followed; i.e. in a second-best framework. And, in evaluating projects in a second-best framework, cost-benefit analysis does provide a 'concrete analysis of situations'.

Indeed, a careful reading of the relevant contributions will attest to the fact that cost-benefit analysis transcends the neoclassical framework. Thus, while Chervel suggests that under neoclassical assumptions 'the economic analysis of the project can be derived without undue difficulty from the financial analysis of profitability to the entrepreneur' (1.2), the *raison-d'être* of cost-benefit analysis is that financial analysis is not suitable for this purpose. In particular, cost-benefit analysis allows for the fact that in developing countries 'we find underemployment of factors, wide-ranging and substantial state intervention, structural disequilibria' (2.1), which are excluded under the neoclassical assumptions according to Chervel.²

* In this note, reference will be made to my 'The "Effects Method" of Project Evaluation', BULLETIN, November 1976, pp. 219-31, and 'The Methodology of the Western Africa Research Project' (in French translation, *Méthodologie de l'Étude sur l'Afrique de l'Ouest*), World Bank, Washington, D.C., 1976, mimeo (to be cited as the *Methodology*) which are critically examined in Marc Chervel, 'The Rationale of the Effects Method', published in the present issue of the BULLETIN. Reference will also be made to Marc Chervel and Michel Le Gall, 'Manuel d'Evaluation Economique des Projets; La Methode des Effets,' Paris, Ministère de la Coopération, 1976 (to be cited as the *Manuel*) that was published since my original article was written and is repeatedly cited by Chervel.

† Professor of Political Economy, The Johns Hopkins University, and Consultant to the World Bank. This note was written in the framework of a consultant arrangement with the World Bank; it should not be construed, however, as representing the Bank's views. The author acknowledges helpful comments by Wilfred Candler, Marc Chervel, and Ian Little.

¹ 'The Rationale of the Effects Method: a reply to Bela Balassa', BULLETIN, this issue.

² Few contributions to cost-benefit analysis deal with increasing returns (1.2), however. Nor is this considered in writings on the effects method.

This is done by substituting economic analysis for the financial analysis of projects, involving the use of shadow prices in the place of market prices.

Chervel decries the economic analysis of projects by the use of shadow prices, on the grounds that these involve 'condemning reality' by reliance on 'imaginary costs' calculated using 'abstract concepts like shadow prices' (1.3). I find this rather puzzling. Thus, the non-fulfillment of the neoclassical conditions necessarily leads to the conclusion that market prices will not appropriately express the cost of alternatives foregone and hence shadow prices of products and factors have to be used that properly reflect opportunity costs.³ At the same time, the estimation of shadow prices is an empirical matter as is the scope of their application. Thus, the shadow prices of some factors will be unique to the project (e.g. the shadow price of land that has limited alternative uses); others will vary from locality to locality (e.g. the shadow price of labour that depends on the alternatives available to local labour and the possibility of migration); and again others will be determined on the national economy level (e.g. the shadow prices of capital and foreign exchange which can be used in the entire national economy).

Also, in comparing methods of project evaluation utilizing a 'primal' and a 'dual' formulation, when the former is said to correspond to the effects method and the latter to 'conventional' methods of cost-benefit analysis, in the *Manuel* the discussion is carried out in terms of shadow prices (prix de référence). The relevant passage deserves full quotation:

4.3.2. Shadow price of goods and services consumed by the project (directly or indirectly).

Due to—the lack of correspondence of the market price and the shadow price of labour,

—government interventions (tariffs, taxes).

—the abandonment of the hypothesis of perfect competition and the optimal management of other enterprises,

it appears then that one should review the price of goods and services consumed by the project.

The prices to use in estimating the cost of operation of the project, or shadow prices, should measure the 'true' costs for the economy of using each of the goods and services, i.e. in practice

—if the product is imported, the cif price (as the customs duties and taxes do not represent a cost for the collectivity),

—if the product is produced locally, the marginal cost of production, calculated net of taxes and by utilizing shadow prices for labour as well as shadow prices for the different inputs, etc.

³ This is the concept of shadow price used in the *Methodology* which proposes to apply the domestic resource cost of foreign exchange measure to project evaluation. I will not comment here on Chervel's criticism of alternative methods of project evaluation, which introduce income distributional and savings objectives in estimating shadow prices.

This means that we calculate

- as costs, the inputs of the project, valued at the shadow prices thus determined, and
- as benefits, the additional incomes of the different agents involved in providing the inputs used in the project (p. 164).

At the same time, Chervel's claim that 'when speaking the primal language of the project's effects, of direct plus indirect income and of comparison with the alternative situation without project, it is not always possible to switch to the dual formulation in price terms' (2.4), reflects a confusion as to the meaning of these terms and their relevance to project evaluation. If we solve a general equilibrium model, it is immaterial whether this is formulated in terms of primal or dual variables. However, even though one tries to approximate general equilibrium repercussions, project evaluation remains a partial equilibrium exercise where one needs to use shadow prices that, exceptions apart, are given exogenously to the project. In fact, shadow prices are used explicitly, or implicitly, under the effects method.

It follows that, in order to evaluate the relative merits of the effects method and the domestic resource cost method described in the *Methodology* and employed in the Western Africa Research Project, one needs to examine the measurement of benefits and costs under the two methods. This will be done in the following.

THE BENEFITS OF THE PROJECT

Under both the effects method and the domestic resource cost method, the benefits of a project are taken to equal the net gain in foreign exchange, expressed in terms of domestic currency. Thus, in Chervel's diagram (p. 6), the benefits of an import substituting project are expressed as the differences between I CIF (the cif value of imports replaced by domestic production) and I_1 (the cif value of imported inputs used in the project). This further equals the increment in VA_j (value added) in the project that is derived as VA_{j1} (value added in the project) less V_0 (the loss of tariff revenue). In turn, value added in the project is taken to represent the additional incomes of wage earners and entrepreneurs resulting from its implementation. These results can also be expressed in terms of a mathematical formula, which can help to clarify the question of additional incomes referred to above. I will do this by assuming that tradeable inputs are not produced domestically, so as to avoid the charge made by Chervel on p. 9, fn. 5.

Let p_i^d denote the domestic market price of the product i , which further equals the cif import price or shadow price (p_i^s) augmented by the tariff (t), or $p_i^s (1 + t_i)$. In turn, the difference between the domestic market price of the product (p_i^d) and the domestic market cost of imported inputs ($\sum_m a_{mi} p_m^d$) will equal domestic value added in the project, which can be decomposed into labour costs (w^dL) and returns to capital (r^dK).⁴

⁴ For simplicity we have not considered various labour classes and excluded land.

The benefits of the project can now be expressed as in (1).⁵ It is apparent that the net gain in foreign exchange

$$P_i^s - \sum_m a_{mi} P_m^s = [P_i^s(1+t_i) - \sum_m a_{mi} P_m^s(1+t_m)] - (P_i^s t_i - \sum_m a_{mi} P_m^s t_m) \quad (1) \\ = (w^s L + r^s K) - (P_i^s t_i - \sum_m a_{mi} P_m^s t_m)$$

equals the factor incomes derived from the project less the net loss in tariff revenue.

It will be inappropriate, however, to identify value added in the project with additional incomes unless the factors of production have no alternative uses; i.e. their shadow prices are zero. If this is not the case, weighting income claims derived from the project by income distributional weights as suggested in the *Manuel* (p. 90) will be meaningless.⁶

In fact, under the effects method, it is assumed that capital has an opportunity cost while the opportunity cost (shadow price) of labour is generally taken to be zero. This is expressed by the fact that the so-called global criterion used under the effects method identifies the cost of the project with the amount of capital investment (K).⁷ In turn, under the domestic resource cost method, this is equated to the cost of the primary factors at their shadow prices ($w^s L + r^s K$).

Project evaluation criteria under the two approaches are shown by (2) and (3):

$$\frac{P_i^s - \sum_m a_{mi} P_m^s}{K} \quad (2)$$

$$\frac{w^s L + r^s K}{P_i^s - \sum_m a_{mi} P_m^s} \quad (3)$$

Note that under the effects method the benefit of the project appears in the numerator and the costs in the denominator while the opposite is the case under the domestic resource cost approach. We will return to the practical usefulness of these formulae after a consideration of the evaluation of the costs of the project under the two approaches.

THE COSTS OF THE PROJECT

Chervel's claim that my statement, according to which the effects method disregards the opportunity cost of *land*, 'seems to be the result of a misunderstanding' (2.3), is not supported by the *Manuel* where land rent is considered 'as a simple *transfer* on the level of the totality of these agents:

- an expenditure for the entrepreneur
- a receipt of equal amount for the owner of land.

⁵ The formula is provided for a one-period production process: it can be easily reinterpreted in terms of discounted values.

⁶ These conclusions are not affected if we admit the possibility that quantitative import restrictions are imposed or that tariffs are increased at the time of the project's implementation. While Chervel apparently agrees with my interpretation of these cases (2.1), it should be recognized that they were not dealt with in earlier writings on the effects method. And while the case of increases in tariffs is considered in the *Manuel* (p. 69), that of quantitative restrictions is not even raised although it is of considerable importance for developing countries.

⁷ Alternative formulations included involve defining costs in terms of the foreign exchange cost of investment and the loss of tariff. These alternatives are, however, considered inferior to the global criteria.

This means that we calculate

- as costs, the inputs of the project, valued at the shadow prices thus determined, and
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It follows that, in order to evaluate the relative merits of the effects method and the domestic resource cost method described in the *Methodology* and employed in the Western Africa Research Project, one needs to examine the measurement of benefits and costs under the two methods. This will be done in the following.

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The benefits of the project can now be expressed as in (1).⁵ It is apparent that the net gain in foreign exchange

$$\begin{aligned} P_i^s - \sum_m a_{mi} P_m^s &= [P_i^s(1+t_i) - \sum_m a_{mi} P_m^s(1+t_m)] - (P_i^s t_i - \sum_m a_{mi} P_m^s t_m) \\ &= (w^d L + r^d K) - (P_i^s t_i - \sum_m a_{mi} P_m^s t_m) \end{aligned} \quad (1)$$

equals the factor incomes derived from the project less the net loss in tariff revenue.

It will be inappropriate, however, to identify value added in the project with additional incomes unless the factors of production have no alternative uses; i.e. their shadow prices are zero. If this is not the case, weighting income claims derived from the project by income distributional weights as suggested in the *Manuel* (p. 90) will be meaningless.⁶

In fact, under the effects method, it is assumed that capital has an opportunity cost while the opportunity cost (shadow price) of labour is generally taken to be zero. This is expressed by the fact that the so-called global criterion used under the effects method identifies the cost of the project with the amount of capital investment (K).⁷ In turn, under the domestic resource cost method, this is equated to the cost of the primary factors at their shadow prices ($w^s L + r^s K$).

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⁷ Alternative formulations included involve defining costs in terms of the foreign exchange cost of investment and the loss of tariff. These alternatives are, however, considered inferior to the global criteria.

Thus, globally, the expenditure corresponding to the purchase of land disappears' (p. 53; italics in the original).

Nor does Chapter 6 of the *Manuel* cited by Chervel (2.3) introduce the opportunity cost of land. At any rate, one cannot equate this to the 'previous production on the land' as Chervel now suggests (2.3). Rather, adjustments need to be made for the labour and capital that had been used in conjunction with the land.

As regards the shadow price of *unskilled labour*, Chervel submits that:

'in cost-benefit analysis as recommended for application, the problem of determining shadow prices for factors of production is not a secondary matter. It is the crux of the problem and in fact the dual solution to the primal problem of project selection. Treating this problem hastily and disposing of it in a few pages amount to treating the problem of project appraisal and selection in exactly the same manner' (2.4).

In view of this statement, it is surprising to find that the *Manuel* devotes only two sentences to the question of the shadow prices (opportunity cost) of unskilled labour (p. 69), hardly more to the shadow prices of skilled labour and capital, while the shadow price of foreign exchange is not considered at all. By contrast, the estimation of these shadow prices is dealt with on pp. 24-37 of my *Methodology*, which further refers to several papers prepared in the context of the Western Africa Research Project where the derivation of shadow prices is treated more extensively.

At the same time, the statement that 'if, in the effects method, the value of the shadow wage is not specified, this is . . . simply because specification is useless and sometimes impossible' (2.4) conflicts with Appendix I of the *Manuel* referred to by Chervel where it is stated that 'in the framework of generalized underemployment, the effects method corresponds to the use of a zero shadow price for labour (p. 165). The use of zero shadow prices for labour and land is also apparent from the statement according to which '*To the primal problem of the maximization of the incomes of agents, under the constraint of the availability of capital, corresponds the dual problem of the determination of the price of capital*' (p. 160; italics in the original).

Chervel attempts to justify the assumption of zero shadow price for unskilled labour 'by virtue of the prevailing economic conditions (underemployment in developing countries, low productivity in the main sectors of the economy etc.)' (2.4), with further references made to some broad estimates of unemployment and underemployment, living standards, and the marginal productivity of labour in agriculture (2.4). But the opportunity cost of labour does not depend on the living standards of the population, while assuming a zero shadow price for rural unskilled labour would require that the marginal productivity of labour in agriculture was zero. The latter proposition has not received empirical support even for land-scarce countries such as India. *A fortiori* it will not be appropriate for the land-abundant French-speaking African countries, for which the effects method has been designed. In particular, the assumption made in the Western Africa Research Project that in the peak agricultural season the shadow price of labour equals the market price appears justified in these countries.

In postulating the maximization of expected incomes, Harris and Todaro have

shown that a positive shadow price for urban unskilled labour is consistent with the existence of unemployment in the cities.⁹ Moreover, in the cities of Western Africa, the informal sector generally provides alternative employment. Thus, again, assuming a zero shadow price for urban unskilled labour will not be appropriate. At any rate, the shadow price of unskilled labour is an empirical matter, and it cannot be decided on the basis of general considerations.

The same considerations apply to the shadow price of *skilled labour*. According to Chervel:

'A "zero shadow price" appears as justified for this category of local labour as it is for unskilled labour. Very often, there is unemployment in this category, which takes the form of intellectual unemployment and a brain drain . . . Moreover, even if a bottleneck were to appear in one or the other managerial categories, the scarcity is not what would determine the price, especially in the medium or long run. In many cases, it is only by in-service training that qualified managers can be trained' (2.5).

However, instead of a brain drain, the French-speaking African countries import foreign managers, engineers, technicians, and even skilled manual workers in large numbers. In suggesting that allowance be made for the cost of the expatriate but not for that of his African counterpart, Chervel neglects the fact that employing African skilled labour in a project may be at the expense of another activity in the economy, or, alternatively, the latter would hire an expatriate in the place of the African. Finally, the shadow price of skilled labour should reflect the cost of labour formation, which cannot be assumed to take place exclusively within the firm (3.5).

It appears, then, that the assumption of a zero shadow wage for unskilled and for skilled labour, at best, reflects casual empiricism and, at worst, confusion as to definition of the economic costs of a project. In turn, Chervel makes no reference to the shadow price of capital (shadow discount rate) and the shadow price of foreign exchange (shadow exchange rate). Yet, these too have to be considered.

In the *Manuel*, it is correctly stated that 'the discount rate in the economy under consideration . . . will measure the degree of scarcity of the capital available for investment' (p. 88). It is proposed that the discount rate be fixed by the policy makers (p. 92). But while the policy makers determine the amount invested in the public sector and may influence the amount saved, there is no reason to assume that they would set the discount rate so that this would appropriately reflect the opportunity cost of *capital* to the national economy. Thus, the economist cannot forsake his responsibility for estimating the shadow discount rate, taking account of governmental decisions and all other relevant factors.

In calculations made under the effects method, the market *rate of exchange* is used throughout. While at one point the authors of the *Manuel* seem to express unease with the fact that this means evaluating a project in the same way whether it relies on domestically produced or imported machinery (p. 90), the matter is

⁹ Harris, J. R. and M. P. Todaro, 'Migration, Unemployment and Development: A Two-Sector Analysis', *American Economic Review*, March, 1970.

then dropped. Yet, in developing countries, which extensively use tariffs and prohibitive import restrictions, the market rate of exchange will not appropriately express the value of foreign exchange to the national economy, necessitating the use of a (second-best) shadow exchange rate in project evaluation. This is done under the domestic cost approach as well as under alternative approaches of cost-benefit analysis.

Finally, I find Chervel's reasoning as to the treatment of *domestically produced inputs*, rather curious. First of all, rather than 'breaking the product chain' (2.2) whenever an international good is reached, in my paper on the effects method I suggested comparing the domestic cost and the cif import price of tradable inputs. In so doing, I explicitly considered the possibility that 'tradable inputs may be produced domestically at international competitive costs' (p. 229).

The method I have proposed is thus based on cost comparisons which are hardly 'arguments of a theoretical nature' (2.2), but an empirical matter. Moreover, as explained in the *Methodology*, in the Western Africa Research Project alternative calculations have been made adjusting for the extent of capacity utilization.

Cost comparisons have not been made in any of Chervel's writings, the *Manuel* included. And while according to the *Manuel* domestically-produced inputs are valued at marginal costs (p. 164), in practice it is assumed that the use of domestically produced inputs would not involve either capital costs (because capacity is not fully utilized) or labour costs (because the shadow price of labour is assumed to be nil). On these assumptions, it will be socially profitable to use domestically produced rather than imported inputs unless the domestic production of the inputs involves a net foreign exchange loss. While this possibility is not considered by Chervel, it should not be excluded since, under distortions due to protection, the foreign exchange cost of imported inputs and of exports foregone may well exceed the foreign exchange gains due to substituting domestic production for imports.⁹

But are the assumptions made by Chervel realistic? I have earlier examined the question of determining the shadow price of labour and will limit myself to a discussion of capacity utilization here. To begin with, one should consider the case when the actual degree of capacity utilization is a consequence of rational action taken in response to the existing configuration of product and factor prices or it involves building ahead of demand in accordance with long-term profit maximization.

The former possibility was first introduced in a pioneering study by Robin Marris¹⁰ and applied to developing countries by Gordon Winston, who showed that a variety of factors other than lack of demand affect the extent of capacity utilization.¹¹ In turn, to the extent that the underutilization of capacity represents

⁹ The existence of such cases is shown in Bela Balassa, *The Structure of Protection in Developing Countries*, Baltimore, Maryland, Johns Hopkins University Press, 1971, Ch. 3. Similar instances have been observed in French-speaking African countries, such as the Ivory Coast, Mali, and Senegal, in studies undertaken in the framework of the Western Africa Research Project referred to above.

¹⁰ *The Economics of Capital Utilization: A Report on Multiple Shift Work*, Cambridge, Cambridge University Press, 1964.

¹¹ 'Capital Utilization in Economic Development', *Economic Journal*, March 1971, pp. 36-60.

building ahead of demand, the use of the product in question in a new project will eventually necessitate increases in capacity.

At the same time, no evidence is adduced to support Chervel's claim that 'where existing local capacity is saturated, production is generally within the area of increasing returns, and a marginal investment is likely to show substantial economic benefit (2.2); indeed, one would be hard put to provide such evidence. Moreover, even in the case when there is 'genuine' underutilization of capacity, one would need to take account of the cost of eventual replacement.

It should be recalled that I introduce the possibility that in exceptional cases the choice between domestically-produced and imported inputs be made on the basis of non-economic considerations.¹² 'But even in this case, calculations should be made to indicate the excess costs involved in using domestically produced inputs that could be obtained cheaper abroad' (p. 229). This is in order to reduce the danger that 'developing countries will have to carry the burden of past mishaps in investment programming for all time' (2.2)—a possibility Chervel dismisses on the basis of insufficient evidence.

Finally, Chervel confuses decisions on using the product of an existing factory as an input in a new project and closing down the factory. Thus, providing the project with imported inputs is consistent with the continued operation of the factory. As I have explained in the *Methodology*, the closing-down option should be evaluated separately by calculating the short-term domestic resource cost of foreign exchange.

THE USE OF PROJECT EVALUATION CRITERIA

We have seen that the effects method measures the benefits of the project in the same way as the domestic resource cost approach. However, the appraisal of the project's costs under the effects method is objectionable in several respects: (a) the effects method in general assumes that the shadow prices of land and labour are zero; (b) it takes the shadow price of foreign exchange to equal the market exchange rate; and (c) it disregards the possibility that imported inputs may be used in the place of higher-cost domestic inputs.

Chervel appears to minimize the importance of evaluating the costs and the benefits of projects in suggesting that "First of all [the effects of the project] must be identified through concrete analysis. It is only afterwards, during a subsequent phase, that certain effects will be called 'costs', and others 'benefits'" (1.3). He further claims that while 'the economists' task is to give the most specific and meaningful statement of project's impact on the existing economy and on objectives . . . the computations and ratios prepared by the economists are not in themselves intended to represent an overall summary of the judgment reached on the project . . .' (1.1).

All project evaluation methods, and not just the effects method, will examine

¹² This point is also made by Little and Mirrlees whose argument is incorrectly represented in Chervel's statement (Cf. I. M. D. Little and J. A. Mirrlees, *Project Appraisal and Planning for Developing Countries*, London, Heinemann, 1974, pp. 69-70).

the effects of a project on a series of variables. But to do this in an appropriate fashion, one should know from the outset which of these effects are costs and which are benefits. In order to indicate appropriately the project's overall impact on the national economy and on policy objectives, one needs to take account of all the repercussions of the project, including the effects of the withdrawal of the factors of production from other uses, which can be expressed by the shadow prices of factors as well as the differential effects on domestic and imported inputs which necessitates estimating the shadow price of foreign exchange and evaluating the cost of alternative sources of inputs.

Apart from listing the various effects of a project, the economist needs to use shadow pricing to express them in a common unit. For this purpose, use has to be made of project evaluation criteria. While Chervel's note is unclear on the practical use of such criteria under the effects method, this is discussed in the *Manuel*. It is noted there that, given the practical difficulties due to the multiplicity of objectives, 'the implementation of complex planning procedures will be facilitated by the presentation of synthetic criteria characterizing the projects . . .' (p. 169).

Among these criteria, 'it is the global criterion relating the increment in value added to the value of investment that is to play a central role' (p. 119) in project evaluation in the context of planning in physical terms. Thus, it is suggested that the classification of the projects according to this criterion permits 'establishing an initial list of projects, eliminating some, which are judged inferior, and to restart the studies . . . to find new projects of the same type as those that have been retained and to search for more satisfactory variants of those that have not been retained' (p. 120). In turn, while income distributional considerations also enter in a system of indicative planning,¹³ the global criterion is taken to express the economic profitability of projects and it is employed in all practical applications of the effects method whether in the *Manuel* (p. 120) or elsewhere.

Like the effects method, the domestic resource cost method described in the *Methodology* can also be utilized in the framework of a plan.¹⁴ This method will assist the planners to choose among alternative projects by presenting them with calculations that indicate the economic costs and benefits of projects. Now, while the choice made by the planners may be affected by non-economic considerations, they can make a selection among alternatives in full cognizance of the economic costs and benefits involved. The method in question has been employed in this way to analyse projects in the framework of Mali's Five-Year Plan for the period 1974-78 and it is being applied in the Ivory Coast.

World Bank,
Washington, D.C.

¹³ At the same time, as noted above, weighting the income claims derived from the project will not appropriately indicate the income distributional effects of the project, since it does not take account of alternative income-earning opportunities for the factors concerned.

¹⁴ Needless to say, the same conclusion applies to any other 'conventional' method of cost-benefit analysis.

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THE WORLD BANK

Headquarters

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Washington, D.C. 20433 U.S.A.

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75116 Paris, France

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Kokusai Building

1-1 Marunouchi 3-chome

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