Cost-Benefit Evaluation of LDC Industrial Sectors Which Have Foreign Ownership

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This paper describes methods for treating foreign capital (in particular, direct equity investment by foreign firms) in estimating single-period cost-benefit or comparative advantage indicators such as the DRC (Domestic Resource Cost Ratio) and the ERC (Economic Return on Capital). It is assumed that the foreign capital is specific to each activity, meaning that it would not have entered the country without the activity and has no repercussions on the supply of domestic savings or foreign borrowing otherwise available to finance the country's investment budget. The appropriate treatment is then discussed with respect to four sets of indicators:

(1) Long run indicators;

(2) Long run indicators at a specified capacity utilization rate;

(3) Short run (or "closing down") indicators;

(4) Incremental indicators.

It is shown that the presence of the specific foreign capital can make a substantial difference to all these indicators, by comparison with activities in which there is no specific foreign capital invested. These general conclusions are then illustrated with results taken from a larger study of 84 Ivory Coast manufacturing firms.

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Revised July 1981

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Development Research Center

This paper was written as a part of the World Bank research project on economic incentives and integration in West Africa. The project is under the overall direction of Bela Balassa and involves the participation of a team consisting of the author, Geoffrey Shepherd, Dirck Stryker, Terry Monson, Brendan Horton, Scott Pearson and Gerald Nelson. The project has also benefitted from the research assistance at various times of Michele Konings, Louise Alstrom, and Dominique de Crayencour. Dominique de Crayencour was also responsible for developing the original computer program used for the manufacturing sector studies. This program was modified by Jong Yong Lee to take account of the methods described in this paper for decomposing the capital stock and treating foreign capital.

While the methodology has been developed in the framework of the project, I had major responsibility for the methods used for treating foreign factors. In this respect, I would like to acknowledge many helpful discussions with members of the research team, particularly Bela Balassa and Geoffrey Shepherd, and also with Dimitrious Papageorgiou. I am also particularly indebted to Stephen Guisinger, with whom I had discussions some years ago which were the original stimulus for the treatment of capital costs and foreign factors. However, I am entirely responsible for the views expressed in this paper, which are not necessarily shared by the individuals mentioned or by the World Bank.
Introduction

The various effects of direct foreign investment (DFI) have been extensively discussed in the very large literature on multinational corporations,1/ and there is a considerable literature dealing more specifically with its balance of payments effects.2/ The original UNIDO and Little-Mirrlees manuals contained discussions (albeit very brief) of methods for dealing with DFI and the cost of other foreign factors in project evaluation.3/ Little and Mirrlees4/ and Deepak Lal5/ later expanded this discussion and the underlying theory was elaborated by Newbery.6/ The essence of the approach of all these authors is that the financing of a project by direct investment by foreigners is treated in the framework of a general methodology which considers the costs and benefits of the changes in consumption, savings and income associated with

1/ For some references to this literature, see the Oxford Bulletin of Economics and Statistics, Vol. 41, No. 4 (November 1979), Special Issue: "The Multinational Corporation".


4/ I.M.D. Little and J.A. Mirrlees, Project Appraisal for Developing Countries, London, Heinemann, 1974, Ch. 11.


the sources from which the project is financed. In this perspective the foreign financial inflows are treated as benefits and the subsequent outflow as costs, all taken at their full value in terms of the numeraire. Retained profits belonging to foreigners which are reinvested in the project or elsewhere in the host economy are treated as costs or benefits, depending on the social rates of return of the activities which they finance. Any income gains or losses to the foreigners are ignored, since they are presumed to have zero weight from the national point of view.

While the literature of cost-benefit analysis thus contains a fairly well developed conceptual framework for dealing with the sources of project finance, including DFI, there has been less attention paid to the appropriate methods to use in estimating cost-benefit indicators for a relatively large number of firms or activities, usually on the basis of a single year or at most a few years. To my knowledge, the only exception is the work by Page,\(^1\) in which he applies the \(L-M^2\) methodology elaborated by Newbery to a cross section cost-benefit analysis of a sample of Ghanian timber-industry firms, distinguishing foreign, expatriate and three types of Ghanian ownership. In my view Page's original work represents a long delayed, but highly desirable convergence between welfare economics and cost-benefit analysis on the one hand, and on the other, trade-theoretic related empirical estimates of incentive indicators (e.g., effective protection coefficients) and of single-


\(^2\) Little-Mirrlees.
period cost-benefit indicators (e.g., domestic resource cost ratios). These two streams in the economic literature had different starting points and have had separate lines of development, but logically they should be compatible; developments in one area ought to feed into the other and vice versa.

In Part I of this paper I attempt to contribute to this convergence by describing some methods for treating foreign capital in the estimation of a number of variants of cross-section cost-benefit indicators which are frequently used in the empirical evaluation of activities producing traded goods. The simple shadow pricing system which is used and most other aspects of the methodology are well known and are only briefly summarised. The methodology is then illustrated in Part II with some empirical results drawn from a more extended analysis of manufacturing firms in the Ivory Coast.

Before proceeding, it may be useful to briefly summarize the reasons for going to some trouble to elaborate the methodology of cross-section studies when well known project evaluation methods are available. The principal reason is that if the aim is to evaluate a large number of activities "ex post", the data for a full scale evaluation of each activity over time will seldom, if ever, be available, i.e. there is a clear tradeoff between obtaining more data for a series of years and more data for a given year. On the other hand, "ex-ante" evaluations by definition deal with future values which for a variety of reasons -- including the motives or bargaining strategy of project promoters -- are quite unreliable. In this respect it is useful to have a cross-section study of the same or similar activities to put project proposals in perspective. Cross section studies can

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1/ The principal difficulty in making incentive and cost-benefit estimates for a series of years lies in estimating nominal protection for tradeable inputs and outputs, especially when price comparisons are required.
also be useful as background for more detailed sectoral or sub-sector studies, especially if these are intended to provide guidance for government incentive policies.

I. METHODOLOGY

A. General description

The degree of elaboration of a shadow pricing system depends on which distortions in the economic system are to be taken into account and partially offset in the process of project selection. In this paper I use a very simple shadow pricing system in which there are just three interrelated deviations between private and social values. Firstly, given the structure of tariff, tax and other interventions, the opportunity cost of foreign exchange is in general not the same as the market exchange rate. The ratio of the shadow exchange rate to the market exchange rate is indicated by \( e^s \).

Secondly, market wages are not in general equal to the opportunity cost of labor. This is because of import duties and other measures which lead to deviations between the domestic and world prices of traded goods, and minimum wage legislation or trade union pressures which lead to wage differences between sectors or firms which are not the same as would exist in a free labor market. To simplify the exposition of the methodology, in this section I assume that there is just one type of domestic labor: the ratio of its shadow wage to its wage in the sector (manufacturing) being evaluated is indicated by \( l^S \).

Finally, in part because of the first two distortions, and in part due to imperfections and various government interventions in capital markets, market rates of profit and interest rates do not, in general, value future income in terms of present income at its opportunity cost, which is denoted by a shadow discount rate \( r^S \).
Using these three basic shadow prices, costs and benefits are expressed in terms of income valued in domestic shadow prices. This numeraire makes no distinction between different classes of income recipients (e.g. the government and private individuals at varying income levels), nor does it take account of the proportion in which incremental income resulting from an activity is consumed or saved. This does not mean that the existing income distribution and level of saving are considered to be ideal, but simply that deviations between objectives and the existing situation as regards them are assumed to be dealt with by other means (e.g. tax/subsidy policies), and not by adjusting the activities being evaluated. From an expositional point of view, this also has the advantage that it enables us to focus on the difference made to the cost-benefit indicators by the presence of foreign capital. However, with appropriate amendments it would be perfectly possible to incorporate the same basic treatment of foreign capital to be described below, in a more elaborate shadow pricing system, for example, an L-M system including a premium on saving and a system of income distribution weights.

Applying this simple shadow pricing system to single period data, it is possible to calculate various cost-benefit indicators, two of which are used in this paper. The first and best known indicator is a cost-benefit ratio calculated with shadow priced returns to domestic factors of production (land, labor and capital) in the numerator and the shadow value of net output in the denominator. Net output is defined as the difference between the foreign exchange value of output minus the foreign exchange value of traded inputs. This ratio (usually known as the domestic resource cost of foreign exchange or DRC) will then divide the set of activities into economically profitable and economically unprofitable subsets, with activities within each subset ranked, under certain assumptions, according to the cost of earning a
Secondly, an indicator of the economic rate of return (the ERC, or economic return on capital) is calculated by expressing the difference between the shadow value of benefits and costs as a percentage of the shadow value of the capital stock.  

For each indicator mentioned above, there are four basic variants as follows:

1. "Long run" indicators including capital costs and using the observed output and costs of the year surveyed;
2. Hypothetical long run indicators assuming full capacity utilisation;
3. "Short run" indicators showing the economic costs and benefits of continuing to operate the firm rather than closing it down;
4. "Incremental" indicators which omit capital costs and show the costs and benefits of a small expansion of output from existing capital equipment.

As far as I know, the first two variants have been used in previous empirical work, but not variants (3) and (4). The motivation for them is

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1/ As defined, the accept-reject criterion is whether the ratio is less than or greater than one. It is the same as one of the criteria used by Page (op. cit.) except that the numerator and denominator of his ratio are expressed in terms of the L-M border price numeraire. For earlier discussions of the DRC criterion, see Michael Bruno, "The Optimal Selection of Export-Promoting and Import Substituting Projects", in Planning the External Sector: Techniques, Problems and Policies, (United Nations, 1965). See also his article, "Domestic Resource Costs and Effective Protection: Classification and Synthesis", in Journal of Political Economy 80 (1972), pp. 48-62.


3/ In the rest of the paper I refer to firms, although the methods are quite general and could be applied to any economic activity.

fairly obvious from their description. In variant (1) we use observed output and costs and include capital costs in order as far as possible to get an indication of the social costs and benefits of expanding the industry in the long run. In variant (2) we attempt to allow for the fact that some (or all) firms may have relatively high costs because they are operating at less than full capacity. This may be a temporary phenomenon (e.g. newly established firms) or may be a relatively permanent feature of the industry (e.g. protected overcrowded industries). Variant (3) is of interest when variants (1) and/or (2) indicate that it would be economically unprofitable to expand the industry. If this is the case, it may nevertheless be economically profitable for firms to continue operating rather than closing down. Variant (4) attempts to answer a somewhat different question: given that the firm is to continue operating but has spare capacity, what is the incremental cost of a small expansion in its output in relation to the benefits? In general, one would expect these incremental costs to be lower than incremental costs in variant (3), since some overhead costs (e.g. managerial salaries) would not be incurred if the firm were to close down.

B. Specific and non-specific foreign capital

In addition to the shadow prices mentioned previously, it is necessary to introduce a distinction between specific and nonspecific foreign funds. Specific foreign funds are defined as foreign capital inflow -- equity or debt -- which is specific to a particular investment project in the sense that the foreign funds would not enter the country unless that particular project is undertaken, and which do not affect the general borrowing ability of the country. Non-specific (or nationally controlled) foreign funds, on the other hand, are borrowed on the basis of the general creditworthiness of the country, are fungible between alternative investment projects, and constitute
part (together with domestic savings) of the general fund of investible
resources which we assume is fixed for the period being considered. 1/ While
any particular form of foreign borrowing will not usually exactly fit these
definitions in all respects, most fairly clearly belong to one or the other
categories. Thus, direct investment by foreign firms should normally be
treated as specific because the financial flow is typically part of a package
which also includes technical, management, and marketing knowledge without
which the project would not be undertaken. At the same time, the inflow of
equity capital does not usually commit the country to a predictable schedule
of payments of dividends and capital in foreign exchange, and so does not
directly affect the country’s general borrowing ability. The cost of these
specific foreign capital inflows should therefore be treated as a specific
foreign cost in evaluating activities in which this type of investment is
found. On the other hand, if the project is financed by foreign borrowing by
the government itself or guaranteed by the government, there will be an
equivalent reduction in investment elsewhere in the economy which has an
opportunity cost equal to its economic rate of return. This opportunity cost
we take to be equal to the shadow discount rate $r^s$. With sub-optimal
behavior by the government, $r^s$ may exceed or may be less than the actual
interest rate on the non-specific foreign borrowing and, given a distorted
price system, may also exceed the rate of return on the projects which would

1/ Assuming a given inflow of specific foreign funds. To the extent that
incremental specific foreign capital finances the purchase of goods or
services which are taxed or changes factor prices, it may have an
indirect effect on the (non-specific) investment budget. In this paper
(see section D below) we allow for the former indirect effects (which
correspond to an equivalent change in foreign exchange reserves) but not
for the latter.
have been eliminated or cut back in the absence of distortions and with optimising government behavior.

It is clear that the two types of foreign financing discussed above are polar cases and that some forms of foreign borrowing will not easily fit into either category. In particular, private foreign borrowing (e.g. a supplier’s credit) secured on the assets of a particular project but not guaranteed by the government may be specific to the project but at the same time may change the country’s general borrowing ability and the national investment budget. If this is so, the shadow cost of this borrowing would be the interest rate on the loan itself plus or minus the costs or benefits resulting from the induced changes in other projects. However, the remainder of the paper uses only the specific/non-specific dichotomy, in part because it simplifies the exposition and in part because it seems the best approximation to reality in the Ivory Coast case study presented in Part II.1/

C. Shadow pricing capital: no foreign equity or debt

In this section, we assume that the firm is fully domestically owned and that it has no foreign debt financing. Alternatively, we could assume that any foreign financing is non-specific in the sense discussed above. On these assumptions, the treatment of capital costs is relatively straightforward. However, there is the problem that the capital stock is inherited from the past whereas the cost-benefit coefficient is being calculated on the basis of a given year rather than over the whole life of the activity. In the latter case, this problem in principle disappears as inputs into the

1/ Most of the standard works on project evaluation implicitly or explicitly assume that DFI and foreign suppliers' credits are specific in the above sense. Newbery (op. cit., p. 168, fn. 1) recognises the possible interdependence between increases in foreign debt incurred by private firms and the cost of future borrowing by the government, but does not attempt to quantify these effects.
construction of the capital stock are dealt with as they occur and treated in the same manner as any other inputs. That is, imported machinery and imported and exportable materials are valued in foreign exchange at their c.i.f., or f.o.b. prices, the various types of labor entering into the cost of pre-investment studies and construction are separated and appropriately shadow priced, and nontraded inputs into the investment stage (e.g. local transport, commercial services, electricity) are decomposed and shadow priced in the same manner as any other current nontradeable input. In this process import duties and other taxes are separated out and omitted from the stream of economic costs, which will consist of streams of foreign exchange outlays and expenditure on land and various types of labor.

In single year cross section estimates using data on the book value of assets created in the past, the aim is then to find some way of allocating to the year a share of capital costs which will provide a satisfactory indicator of the long run marginal cost of expanding the industry, where costs are measured on an annual basis. If we consider that the object is to estimate a proxy for the result that would be obtained in a complete evaluation over time, by analogy with the latter it is natural to think of a procedure which includes the following steps:

(a) revaluing the capital stock and its components to take account of inflation;
(b) decomposing the inherited capital stock into foreign exchange, land, labor, and tax elements;
(c) using shadow prices to express each component in terms of the numeraire; and
(d) calculating appropriate annuities or annual rental charges to apply to the various components of the capital stock.
If we use the simple shadow pricing system described above, the annual shadow rental charges would be a function of the shadow rate of discount $r^S$ and the estimated economic life and depreciation rate for each of the asset groups distinguished in the analysis. In this procedure it will be noted that the liabilities side of the balance sheet is ignored and, in particular, no account is taken of interest payments to foreign lenders, provided the foreign debt is non-specific. Rather, the division of capital charges between foreign exchange (i.e. traded) and domestic items is based on the nature of the firm's assets rather than its liabilities. The rationale for this procedure can be understood by imagining a firm fully owned and financed by nationals which nevertheless possesses a capital stock including capital equipment imported in the past. This past capital outlay in foreign exchange is in part represented by the current depreciation charge on the equipment, but in addition, at the time it was imported, the foreign exchange reserves of the country were run down by an amount equal to the foreign exchange cost of the capital equipment. If the country is a net foreign borrower with a fixed investment budget, the annual foreign exchange cost is the decline in foreign exchange reserves expressed in domestic shadow prices multiplied by the shadow discount rate $r^S$.

D. Shadow pricing capital: Long run case with foreign capital

In the previous section it was argued that with 100 percent ownership by nationals and no specific foreign debt, the liabilities side of the balance sheet could be ignored, the foreign exchange component of the capital charge then depending on the composition of the capital stock. If the firm is, however, financed wholly or in part by specific foreign equity and/or debt in the sense discussed previously, then the returns to this foreign equity or
debt should be treated explicitly in the cost-benefit analysis. The appropriate treatment can again be best understood by thinking of a lifetime project evaluation of the same firm. In the latter case the stream of foreign exchange benefits would include the initial foreign capital inflow at the time of its occurrence, and the foreign exchange costs would include the border value of capital equipment as well as other foreign exchange expenditure during the construction stage of the project, and the subsequent stream of profit and interest payments to the foreign suppliers of capital. In the cross section case, we only observe the foreign profit or interest outflow, but in order to have a proxy for the capital costs of a similar new investment, we must recognize that in the past there has been both an inflow of foreign capital and a foreign exchange outflow for machinery and other expenses which now form part of the inherited capital stock. Note that this last foreign exchange outlay would have also occurred with 100 percent domestic ownership and financing. Hence, if we ask ourselves what difference is made by the fact of foreign financing which is specific to the project, we have to consider that the initial foreign capital inflow led to a net change in the country's foreign exchange reserves which would not have occurred with domestic financing. This increase in foreign exchange reserves is valued at the shadow discount rate for the economy, since it allows an increase in investment elsewhere in the economy. From this we conclude that there is a foreign exchange cost associated with the specific foreign debt or equity, only if the average return on the foreign equity and debt exceeds the shadow discount rate. If the two rates of return are equal, then the capital charge in a cross section analysis will be unaffected by the fact of foreign ownership or financing, and it will be reduced if the foreign capital suppliers earn less than the shadow rate of discount.
This verbal argument can now be stated more precisely. In doing so, we introduce a distinction between the long run supply price of specific foreign capital ($f^S$) and the actual return in the year studied ($r^M$). This distinction is made because returns to capital in a particular year may or may not be representative of the long run situation as regards the particular industry or firm. Hence, there are two versions of all the cost benefit indicators: an adjusted version in which specific foreign capital is assumed to earn its long run supply price, and a version in which we use the observed return in the survey year, which return may exceed or may be less than the supply price. The supply price of foreign equity is defined as the minimum rate of return which foreigners expect to earn in order to continue supplying equity capital to the country in question in the long run. The long run supply price of specific foreign debt is defined similarly, recalling that we have in mind debt which is tied to specific projects and which does not benefit from government or similar guarantees in the borrowing country.

For simplicity of exposition we make the following assumptions: (1) that the capital stock has been revalued at its replacement cost; and (2) that there are no nontraded inputs and so no indirect capital costs. In this section it is also assumed that depreciation is a current expense which maintains the capital stock in its original physical state.

We also assume in the first instance that there is no specific foreign debt. Then a formula for the shadow cost of capital can be derived as follows (see Table 1 for list of variables).

Using $f^S$:

\[
SRK = e^S [FC(EQ1)f^S - (FC(EQ1) - NAFX)r^S] + l^S \cdot NAL \cdot r^S
\]

\[
= e^S FC(EQ1)(f^S - r^S) + NAFX \cdot r^S + l^S \cdot NAL \cdot r^S 
\] (1)
### Table 1

**EXPLANATION OF VARIABLES**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>Value of net assets (in domestic market prices);</td>
</tr>
<tr>
<td>NAL</td>
<td>Embodied labor;</td>
</tr>
<tr>
<td>NATX</td>
<td>Embodied import duties and taxes;</td>
</tr>
<tr>
<td>NAFX</td>
<td>Embodied foreign exchange;</td>
</tr>
<tr>
<td>EQ1</td>
<td>Equity;</td>
</tr>
<tr>
<td>EQ2</td>
<td>Debt;</td>
</tr>
<tr>
<td>FC</td>
<td>Foreign share of equity (0 ≤ FC ≤ 1);</td>
</tr>
<tr>
<td>l^s</td>
<td>Ratio of shadow to market price of labor;</td>
</tr>
<tr>
<td>e^s</td>
<td>Ratio of shadow to official exchange rate;</td>
</tr>
<tr>
<td>r^s</td>
<td>Shadow discount rate;</td>
</tr>
<tr>
<td>f^s</td>
<td>Supply price of foreign equity;</td>
</tr>
<tr>
<td>f^m</td>
<td>Actual rate of profit of foreign equity;</td>
</tr>
<tr>
<td>FD</td>
<td>Foreign-specific share of debt (0 ≤ FD ≤ 1);</td>
</tr>
<tr>
<td>d^s</td>
<td>Supply price of foreign-specific debt;</td>
</tr>
<tr>
<td>d^m</td>
<td>Actual rate of interest on foreign-specific debt.</td>
</tr>
<tr>
<td>O^w</td>
<td>Value of output in world (border) prices;</td>
</tr>
<tr>
<td>TI^w</td>
<td>Value of tradeable inputs in world (border) prices;</td>
</tr>
<tr>
<td>L</td>
<td>Market cost of labor;</td>
</tr>
<tr>
<td>SL</td>
<td>Shadow cost of labor;</td>
</tr>
<tr>
<td>SNA</td>
<td>Shadow value of net assets;</td>
</tr>
<tr>
<td>SRNAL</td>
<td>Shadow return to labor embodied in net assets;</td>
</tr>
<tr>
<td>SRK</td>
<td>Shadow return to capital;</td>
</tr>
<tr>
<td>OCFP</td>
<td>Observed cost of foreign profits;</td>
</tr>
<tr>
<td>NCFP</td>
<td>Normal cost of foreign profits;</td>
</tr>
<tr>
<td>DRCO</td>
<td>Domestic resource cost coefficient, observed foreign profit;</td>
</tr>
<tr>
<td>DRCA</td>
<td>Domestic resource cost coefficient, adjusted foreign profit;</td>
</tr>
<tr>
<td>ERCO</td>
<td>Economic return on capital, observed foreign profit;</td>
</tr>
<tr>
<td>ERCA</td>
<td>Economic return on capital, adjusted foreign profit.</td>
</tr>
</tbody>
</table>
If $FC = 0$, this reduces to

$$SRK = e^S \cdot NAFX \cdot r^S + l^S \cdot NAL \cdot r^S \cdot (2)$$

Subtracting (2) from (1) leaves $FC(EQ1)(f^s - r^S)$, which is the cost of the foreign equity.

Note that in equation (1) foreign equity may exceed or may be less than embodied foreign exchange. In the former case the foreign exchange cost has to be reduced by that part of foreign equity which pays for embodied taxes and labor. In the latter case the foreign exchange has to be increased by that part of embodied foreign exchange which is financed by nonspecific capital (national equity and/or nonspecific debt). Note also that if $f^S = r^S$, equation (1) reduces to equation (2) even when there is foreign equity. For the observed case, we simply replace $f^S$ with $f^m$ in the above formula.

If some or all of the debt (EQ2) were considered to be specific, the formula would be restated as follows after introducing additional parameters:

$$FD : \text{Foreign-specific share of debt } (0 < FD < 1);$$
$$d^S : \text{Supply price of foreign-specific debt};$$
$$d^m : \text{Actual rate of interest on foreign-specific debt}.$$

$$SRK = e^S \left[ FC(EQ1)f^S + FD(EQ2)d^S - \{ FC(EQ1) + FD(EQ2) - NAFX \} r^S \right] + l^S \cdot NAL \cdot r^S \cdot (3)$$
Considering observed returns to specific capital rather than the supply prices, $f^m$ and $d^m$ would be substituted for $f^S$ and $d^S$ in equation (3).

Expressions (2) and (3) show the capital charge in domestic shadow prices as used in the numerator of the "adjusted" cost-benefit (DRC) ratio. Correspondingly, for the economic return coefficient (ERC) we have:

\[
\text{Shadow value of net assets} \quad \text{SN} = e^S \cdot \text{NAFX} + l^S \cdot \text{NAL}
\]

\[
\text{Cost of foreign capital} \quad = e^S \left[ \text{FC(EQ1)}(f^S - r^S) + \text{FC(EQ2)}(d^S - r^S) \right].
\]

The complete formulas for the cost benefit indicators in which these expressions are included are shown in section H below.

In many countries (particularly LDC's), because of political and other risks, the long run supply price of foreign equity capital will exceed the shadow discount rate (i.e., $f^S > r^S$), and so there will be some cost associated with specific DFI in the adjusted indicators using $f^S$. However, in any particular year there will usually be large variations in actual foreign profit rates, so that for some firms the observed cost-benefit indicators (using $f^m$ rather than $f^S$ in the above expressions) will be considerably less favorable due to high foreign profit rates, whereas the indicators for other foreign firms will be considerably more favorable due to low or negative rates of profit on foreign equity.

E. Shadow pricing with specific foreign capital: long run case at a specified capacity utilisation rate

As mentioned previously, in order to control for differing rates of capacity utilisation which will usually be found in any sample drawn from firms operating in a particular year, it is useful to estimate the cost-benefit indicators on the basis of simulated costs and financial structure at
some common capacity utilisation rate. For firms operating at less than the
specified rate (at less than "full capacity" in the study reported in section
II), it is necessary to estimate or to make some assumptions of the extent to
which the required increase in working capital would be financed by specific
foreign funds. Having done this, however, the method of analysis is identical
to the long run case at the observed output level. The only difference is
that we obtain an indicator of the long run costs and benefits of expanding
the activity on the assumption that the expansion would be by a firm or firms
operating at the specified capacity utilisation rate.

Without foreign ownership, the effect of increased capacity utilisation
would normally improve the cost-benefit indicators, for some firms sub-
stantially. However, with foreign ownership and assuming no change in prices,
the extra profits resulting from lower unit costs belong in part to the
foreign owners, thus partly offsetting the improvement that would otherwise
occur in the "O" cost-benefit indicators. From this point of view, the "A"
(i.e. adjusted) full capacity indicators are of interest, since they
implicitly assume a reduction in incentives (e.g. reduced tariff protection to
output, tariff increases on inputs, reduced credit subsidies, increased profit
taxes, etc.), to the level at which the foreign owners earn a rate of return
equal to the long run supply price of foreign equity. The comparison of these
two indicators then gives some indication of the economic gain to be expected
from reorganizing an industry in such a way that higher levels of capacity
utilisation are achieved with lower incentives.

F. Shadow pricing capital: Short run ("closing down") case with

foreign ownership

As pointed out previously, when the long run indicators are unfavor-
able, it is of interest to ask the question: What are the economic costs and
benefits of continuing to operate the firm rather than closing it down? If the firm is fully owned and financed by nationals, then the calculation of the short run cost-benefit indicators is straightforward, given that an estimate of the value of the firm's assets on closing down can be obtained. Then the incremental shadow cost of continuing to operate will include material and labor costs, the costs of nontradeable inputs, and the opportunity cost of that part of the capital stock which would have a value on closing. This short run cost will generally be lower than the observed long run cost (at actual capacity), since the shadow cost of the capital stock will be lower due to items included in it which would have a zero or low shadow value on closing down. In addition, depreciation charges which are a function of time rather than wear and tear would also be omitted since they are included as a cost in the long run indicators in order to serve as an annualized proxy for the eventual need to replace capital equipment.

However, if the firm is wholly or in part owned by foreigners and/or financed by specific foreign debt, then how the foreigners would be compensated on closing down and liquidation is directly relevant to the incremental costs of continuing to operate the firm. At one extreme, if the foreign equity and debt holders would receive the full present value of the future stream of net profits and/or interest which would accrue to them if the firm continued to operate, then the presence of the specific foreign capital would make no difference to incremental costs. At another extreme, if on closing down the foreign capital were expropriated with no compensation or if the liquidation proceedings resulted in no payment to the foreigners, then all returns to foreign capital, including the foreign share of depreciation provisions made for future replacement, would constitute a relevant incremental cost of continuing to operate the firm. In this case the short run shadow
incremental cost from the national viewpoint may well exceed the long run shadow cost, since the latter allows for the initial inflow of foreign capital as well as the outflows in the form of profits and interest.

From these two extreme examples it is evident that short run cost-benefit indicators for firms with foreign capital cannot be calculated without some assumption regarding the compensation of the foreigners. While national policymakers dealing with individual cases may doubtless be able to closely estimate the compensation and sometimes determine it, in cross section studies there is no alternative to making some plausible assumption in the light of the circumstances in the country being studied. In order to illustrate the method, and also because it is the assumption made in the case study reported in section II, in what follows it is assumed that firms would close down with their existing structure of assets and liabilities and that the owners would recover their capital to the extent that the market value of the assets exceeds the liabilities. In the case study it is assumed that buildings, vehicles, office furniture and equipment, land, inventories and net receivables (trade debtors minus creditors) could be sold for their depreciated market values, but that machinery and equipment and intangible assets such as establishment expenses would have no market value on liquidation. Clearly, these assumptions could be varied and the short run cost-benefit indicators recalculated accordingly.

On these hypotheses, and also assuming for simplicity that all debt is nonspecific, the short run shadow cost of capital (SRKZ) and the short run shadow cost of depreciation (SDZ) are calculated as follows. Firstly,

\[
SRKZ = r^S \cdot SNAZ + e^S \cdot [FC(EQ1)f^S - r^S \cdot FC \cdot (NAZ - EQ2)\alpha ] \\
= r^S \cdot SNAZ + e^S \cdot FC [EQ1 \cdot f^S - r^S \cdot (NAZ - EQ2)\alpha ]
\]

(4)
where

\begin{align*}
\text{NAZ} & \quad : \quad \text{Value of short run net assets (in domestic market prices)}; \\
\text{SNAZ} & \quad : \quad \text{Value of short run net assets (in shadow prices)}; \\
\alpha & \quad : \quad \text{Dummy variable;} \\
\quad & \quad \alpha = 1 \quad \text{when} \quad \text{NAZ} > \text{EQ2} \\
\quad & \quad \alpha = 0 \quad \text{when} \quad \text{NAZ} < \text{EQ2}
\end{align*}

In formula (4), \( r^S \cdot \text{SNAZ} \) is the opportunity cost of the short run assets valued in shadow prices. In the case study, short run assets are all assets excluding machinery and equipment and intangibles. The second term expresses the adjustment for foreign equity. On the one hand, if the firm continues to operate, there is a current cost equal to the return to foreign capital, i.e. \( e^S \cdot \text{FC(EQ1)}f^S \), expressed in domestic shadow prices. The second part of the expression, \( e^S r^S \cdot \text{FC(NAZ - EQ2)} \alpha \), is the annualized cost to the country if the firm is closed down with the existing structure of assets and liabilities. In that case, in the hypothetical liquidation, the market value of the variable assets \( \text{NAZ} \) would be used first to pay off the firm's debt \( \text{EQ2} \). Only the balance \( \text{NAZ} - \text{EQ2} \) would be available to repay the stockholders, and the foreign capital share of the liquidation proceedings is then \( \text{FC(NAZ - EQ2)} \). Repaid to foreign owners and repatriated at the official exchange rate, the annualized cost of the repatriated capital in domestic shadow prices is \( e^S r^S \cdot \text{FC(NAZ - EQ2)} \). Since this cost would be incurred if the firm were liquidated, the incremental cost of continuing to operate the firm is the difference between the total return to foreign capital and the annualized liquidation cost.
It will be noted that in principle it may happen that \( NAZ < EQ2 \), i.e. the assets, could be insufficient to pay off the firm's debt. In this case, without the dummy variable \( a \) and following the formula, the stockholders, including foreign stockholders, would pay in extra capital. Since the foreign share of this payment would constitute a liquidation gain from the national viewpoint, the opportunity cost of continuing to operate the firm instead of liquidating it would, of course, rise, i.e. 

\[-e^{SFC}(NAZ - EQ2)r^S\]

would be positive.

While this may sometimes happen (e.g. partnerships and companies with unlimited liability), it would seem much more plausible to suppose either that the stockholders have limited liability or that in any government-imposed liquidation, no additional capital to pay off debts would be required, even supposing such a requirement could be enforced against foreign stockholders. This is the reason for introducing the dummy variable \( a \) which is zero when the market value of the assets is less than the firm's debt.

Hence, for all cases where \( NAZ < EQ2 \),

\[
SRKZ = r^S SNAZ + e^{SFC}(EQ1)r^S
\]

Note also that if \( EQ2 = 0 \),

\[
SRKZ = r^S SNAZ + e^{SFC} [EQ1 \cdot f^S - r^S \cdot NAZ]
\]

i.e. the cost of the foreign capital depends on the difference between the supply price of foreign capital \( f^S \) and the shadow discount rate \( r^S \), and the difference between the firm's equity and the market value of its assets. If the equity is large relative to the market value of the assets, there would
be a relatively larger cost of foreign capital. However, as the shadow value of variable assets (SNAZ) is likely to be correlated with their market value, this relatively high cost is likely to be associated with a relatively low value of $r^S \cdot \text{SNAZ}$.

Obviously, the lower $f^S$ relative to $r^S$, the lower the cost of foreign capital. It is also possible (though unlikely) that $f^S < r^S$. In this case the cost of the foreign capital could be negative.

If $f^S = r^S$, the expression for the cost of foreign capital becomes

$$e^S \cdot r^S FC \ [EQ1 - (\text{NAZ} - \text{EQ2})\alpha]$$

which with $\alpha = 1$ reduces to

$$e^S \cdot r^S FC \ [EQ - \text{NAZ}] .$$

As regards the treatment of depreciation provisions made for replacement, if equity holders were required to pay in any deficiency in meeting the firm's debts (i.e. leaving out the dummy variable $\alpha$), the appropriate procedure would be to treat the foreign capital share of the total depreciation provision as a variable cost in foreign exchange. The reason for this is easy to see if the provision were invested in a sinking fund accumulated in order to replace the fixed assets. If the firm were liquidated, this fund would be available to meet the firm's debts and increases in it would therefore increase the liquidation proceeds available to pay the firm's debts. If the depreciation provision is invested in the business, as would be more usual, the amount invested reduces the need for
debt financing and thereby also increases the excess (or reduces the deficit) of the liquidation value of the assets in relation to the firm's debts.

Note, however, that if we impose the restriction that the equity holders will not be obliged to pay in capital to meet the firm's debts in the event that \( NAZ < EQ2 \), then the foreign share of the depreciation provision involves no extra cost from the national viewpoint if the market value of the assets would still be insufficient to pay the company's debts even after the latter are reduced by the amount of the provision, i.e. if

\[ NAZ < EQ2 - D \]

where \( D \) is the depreciation provision. However, if

\[ NAZ > EQ2 - D \] but \( NAZ < EQ2 \), then the foreign share of \( (NAZ - (EQ2 - D)) \) would be a relevant short run cost, since continuing to operate the firm would allow the foreign stockholders to recover some of their capital whereas in a subsequent liquidation they would lose all their capital if the firm were to close immediately.

Allowing for these possibilities, the formula for the shadow short run cost depreciation provisions (SDZ) is

\[
SDZ = e^S \cdot FC \beta [NAZ - (EQ2 - D)] - \alpha [NAZ - EQ2]
\]  

(5)

where \( \beta \) is a new dummy variable such that

\[
\beta = 0 \quad \text{when} \quad NAZ < (EQ2 - D)
\]

\[
\beta = 1 \quad \text{when} \quad NAZ > (EQ2 - D)
\]

and \( \alpha \) is defined as before. If \( \alpha = 1 \), then \( \beta = 1 \), and

\[
SD = e^S \cdot FC(D)
\]

If \( \alpha = 0 \) and \( \beta = 1 \),

\[
SD = e^S \cdot FC [NAZ - (EQ2 - D)]
\]
If \( \beta = 0 \), then \( \alpha = 0 \) and \( SD = 0 \).

In calculating the short run cost-benefit indicators, the short run capital and depreciation costs are combined with the other costs and benefits as explained in section H for the long run indicators. In the calculation of the short run economic return on capital, the shadow value of short run assets (SNAZ) is, of course, used as the denominator rather than the shadow value of total assets (SNA). As regards nontradeable inputs, the assumption is made in the case study that the continued existence of the firm would eventually require the replacement of capital used to produce the nontraded inputs, and so the shadow cost of nontraded inputs includes capital charges. This assumption could, of course, be varied if there were long run excess capacity in an industry supplying nontraded inputs.

G. Shadow pricing capital: Incremental case with foreign ownership

Incremental cost-benefit indicators are obviously of general interest when there is unused capacity, and may also be useful when the short-run indicator suggests that it would be economically profitable to close the firm down, but this is precluded for political or other reasons. In the latter circumstance it may be perfectly rational to expand output using existing capacity, because with the closing down option precluded a number of costs which could be avoided on closing become fixed when considering the expansion of output from the existing level. Thus, in the case study it is assumed that all labor costs would be escapable on closing down but some of them (e.g. management and office salaries) would be fixed as regards an increment of output. Similarly, assets such as buildings, vehicles, office furniture and land, which will usually have alternative uses if the firm closes...
down, must be regarded as fixed if we are considering a small expansion (or reduction) of output from the existing level.

With 100 percent domestic ownership and no foreign specific debt, the relevant costs are (in principle) easy to identify. As regards capital, the simplest assumption would be that only working capital varies so that incremental net assets (NAX) would include stocks and net receivables. The shadow capital cost of small changes would then equal NAX valued at shadow prices times the shadow discount rate, i.e. \( r^S \cdot SNAX \). As in the estimation of short run (closing down) indicators, depreciation due to obsolescence (i.e. depreciation which is a function of time and not wear and tear) would be a fixed cost.

With foreign ownership, there is an additional shadow cost equal to total post-tax foreign profits on the additional output. This assumes that there is no increase in foreign equity, i.e. all of the increased stocks and net receivables are assumed to be financed by a corresponding increase in non-specific debt. However, if some of the increased working capital were financed by new foreign specific capital (e.g. the foreign share of reinvested profits), we would need to take account of this capital inflow. The relevant formula is identical to the basic long run case (equation (1)) except that the variables are incremental, as indicated by the addition of "X".

\[
\begin{align*}
NAXL + NAXTX + NAXFX &= NAX = EQ1X + EQ2X \\
SNAX &= e^S \cdot NAXFX + 1^S \cdot NAXL
\end{align*}
\]

1/ "Net receivables" are defined as trade debtors minus trade debtors, and may of course be negative.
Provided $EQIX$ is not zero,

$$SRKX = e^S \{ FC(EQIX) r^S - [FC(EQIX) - NAXFX] r^S \} + l^S \cdot NAXL \cdot r^S . \quad (5a)$$

As previously, if $FC = 0$ this reduces to

$$SRKX = e^S \cdot NAXFX \cdot r^S + l^S \cdot NAXL \cdot r^S$$

$$= r^S \cdot SNAX$$

Also as previously, the cost of the foreign equity is $FC(EQIX)(r^S - r^S)$. Here it is assumed that foreigners participate in the increase in capital in the same proportion as their share of the total capital. In general, since $EQIX$ is likely to be small if it is not zero, a return to foreigners of $r^S$ implies a reduction in government incentives to the incremental output or a price reduction (e.g. lower priced sales in export markets). However, if the incremental sales benefit from normal incentives (e.g. the existing level of tariff protection) and there is no price reduction, the rate of profit on the incremental equity will tend to be quite high, and to the extent that this is shared by the foreign stockholders, the incremental cost-benefit indicators will be considerably less favorable than in the previous case, i.e.

$$FC(EQIX)(r^m - r^S) > FC(EQIX)(r^S - r^S).$$

If $EQIX$ is zero (no increase in equity capital to finance incremental output) and we require a normal rate of foreign profit, then incremental foreign profit will be zero, implying once again a (probably substantial) incentive and/or price reduction on the incremental output. However, if we assume the continuation of existing incentives and prices, $(5a)$ needs to be modified since all the incremental foreign profit is by definition "excess" to the normal long run supply price. Hence, we restate the equation as follows:
where \( \text{FC}(\text{KNX}) \) is the foreign share of total incremental post-tax profit.

The "O" incremental indicators for most firms included in the case study discussed in Part II were calculated in this way.

H. **Summary of the cost-benefit indicators**

At this point it will be useful to set out the cost-benefit indicators incorporating the treatment of foreign factors discussed in the previous sections. For simplicity, we assume no specific foreign debt, no land, no depreciation, only a single category of labor, and no nontraded inputs. In the computer program for the calculations reported in part II, all these omitted variables except specific foreign debt are included.

I. **Long run indicators, observed case**

(a) **Economic return on capital, observed foreign profits (ERCO)**

\[
\text{ERCO} = \left[ e^S (O^w - TI^w) - SL - e^S \cdot \text{OCFP} \right] \frac{100}{\text{SNA}}
\]

\[
= \left[ e^S (O^w - TI^w) - e^S \cdot L - e^S \cdot \text{FC}(\text{EO1})(f^m - r^S) \right] \frac{100}{(e^S \cdot \text{NAL} + e^S \cdot \text{NAFX})}
\]

(b) **Domestic resource cost coefficient, observed foreign profits (DRCO)**

\[
\text{DRCO} = \frac{\text{SRK} + SL}{e^S (O^w - TI^w)}
\]

\[
= \frac{r^S \cdot e^S \cdot \text{NAL} + r^S \cdot e^S \cdot \text{NAFX} + e^S \cdot \text{OCFP} + e^S \cdot L}{e^S (O^w - TI^w)}
\]
(c, d) Long run indicators, adjusted case (ERCA and DRCA)

The formulas are identical except that the observed cost of foreign profits (OCFP) is replaced by the normal cost of foreign profits (NCFP).

2. Long run full capacity indicators

The formulas are as above. The only difference is that estimated full capacity data rather than actual data are used. For these and also for the short run and incremental cases, the "0" versions of the indicators refer to estimated foreign profits on the assumption that there is no change in prices or incentives, including the profit tax rate.

3. Short run ("closing down") indicators

The short run indicators are defined as for the long run case except that short run values (indicated with a Z prefix) of the variables described in Table 1 replace the long run values. Note also that the short run foreign ownership adjustment includes both returns to capital and the foreign share of depreciation provisions, e.g. ZOCFP replaces ZNCFP in the "adjusted" long run formulas where

\[ ZNCFP = FC \left[ EQ1 \cdot f^S - r^S (NAZ - EQ2)a \right] + FC \beta \left[ NAZ - (EQ2 - D) \right] - a[NAZ - EQ2] \]

from equations (4) and (5) in section (F).

4. Incremental indicators

Provided that there is an increase in equity (EQ1X ≠ 0), the formulas are also the same as for the long run except that incremental values of the variables (denoted by an X) are used. However, when there is no increase in equity (EQ1X = 0), we use equation (5b) and the foreign profit cost is FC(KNX), i.e. it is equal to the total incremental foreign profit.
II. CASE STUDY: MANUFACTURING FIRMS IN THE IVORY COAST

A. Introduction

In order to illustrate the methodology for treating foreign capital described above, this section presents some empirical results extracted from a more extensive analysis of data (principally for 1971 or 1972) of 84 manufacturing firms in the Ivory Coast.\footnote{1} Ivory Coast is a good example because since independence in 1960, it has followed a policy of attracting direct investment by foreign firms, as well as foreign entrepreneurs, managers and technical personnel. This policy was successful to the extent that by 1972 over 80 percent of the capital of modern manufacturing firms producing traded goods was foreign owned. This is reflected in a predominant foreign share (87 percent of total equity) in the 84 firm sample, which in turn accounted for about 90 percent of employment in the manufacturing sectors covered (excluding artisans). Since 1972, mainly because of government participation in the equity of new and established firms, the foreign share has declined but in 1979 was still about 70 percent of the capital of these manufacturing sectors.

As the purpose of this paper is to concentrate on the difference made by foreign capital, I will give only a very cursory summary of other aspects of the methodology and shadow pricing procedures. Firstly, non-African expatriate labor (which was extremely important - See Table 2), was treated as an imported input for which there were no domestic substitutes. However, unlike an imported material input, an expatriate worker was considered to be paid for in both foreign exchange (his expenditure on traded

\footnote{1} The study of Ivory Coast manufacturing firms is part of a larger study of industry and agriculture in four West African countries mentioned above. The Ivory Coast manufacturing study was written by the author and Terry Monson.
goods and services - including foreign travel - at border prices, plus savings) and by his consumption of non-traded goods and services. After separately shadow pricing different categories of expatriates, in the aggregate their average salaries plus fringe benefits were estimated to be divided as follows: foreign exchange, 59 percent; non-traded services (labor and land), 18 percent; and taxes (mainly import duties and value added tax on consumer goods), 23 percent. With the central values for the other shadow prices given below, this meant that on average the shadow cost of expatriates was 19.4 percent lower than their cost to the firms employing them.  

Secondly, shadow costs of managerial and technical African employees were assumed to equal their wage plus fringe benefits. Thirdly, all other African labor (including migrants from neighbouring countries) were shadow priced at 65 percent of their cost to the firms, with experiments using 50 percent and 100 percent as lower and upper bounds. Fourthly, a "second best" shadow exchange rate was estimated with a central value 16 percent, and lower and upper bounds 12 and 24 percent above the official exchange rate. Finally, the costs of eleven categories of non-traded inputs were decomposed using summary coefficients.

As regards capital, we used a shadow discount rate of 14.3 percent (central value) with lower and upper bounds of 10.8 and 17.9 percent. Because it was not possible to revalue all the firm-level data to take account of inflation, the cost-benefit analysis used accounting values and the discount rate includes an allowance of about 3 percent for inflation, i.e. the values

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1/ The shadow pricing of expatriate labor and the question of its substitutability for Ivorian labor is discussed in Terry D. Monson and Garry G. Pursell, "The Use of DRCs to Evaluate Indigenisation Programs, The Case of Ivory Coast", Journal of Development Economics 6 (1979), 119-139.
used are equivalent to about 8, 11 and 15 percent in real terms. The principal reason for these relatively high values is the estimate of a high marginal productivity of investment in agriculture. Depreciation was treated as though it were a current expense and decomposed in the same manner as non-traded inputs. Indirect capital costs incorporated in the cost of the non-traded inputs were dealt with by applying estimated coefficients. However, the methodology for treating foreign capital was not carried through to this indirect capital, which was treated as though it were fully Ivorian owned.

All the calculations were done on the basis of no specific foreign debt, as almost all the borrowing of the firms studied was from local banks in the Ivory Coast. At the margin, the banks were in turn principally financed by the government, or by government guaranteed foreign borrowing. Most foreign debt in the accounts of the firms was owed to foreign parent or affiliated companies on current account without interest. Where these funds were financing part of the permanent capital of the firm, all of them or some necessarily arbitrary proportion was included as part of the foreign stockholders equity. On the other hand, all foreign equity investment was treated as specific. Royalties were included as part of the return to foreign equity as nearly all payments appeared to be to parent or affiliated companies. The basic value for the long-run supply price of foreign capital \( f^8 \) was estimated at 15 percent, defined as foreign post-tax profit plus

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1/. Incentive and cost-benefit indicators calculated for 32 of the 84 firms, using revalued asset data, were highly correlated with the indicators for the same group of firms using book values. The aggregate ERCO of the 32 firms was 6.9 percent with book values and 6.5 percent with revalued assets.

2/. In Ivory Coast there is in fact considerable foreign ownership of non-traded activities. However, as non-traded inputs were a small part of the total cost of most of the firms, allowing for it would make only a very small difference to the cost-benefit indicators.
royalties as a percentage of foreign equity. This was considerably lower than the aggregate foreign profit rate of 21.6 percent in the sample (see Table 2), but was considered to be more plausible than a higher estimate because it was based on a larger sample which included more firms with start-up and closing down losses. The aggregate profit rate of the smaller sample was also influenced by the profits of a few large firms which appeared to be earning exceptionally high profits on a long term basis as a result of monopolistic positions in the local market. As this 15 percent supply price exceeded the 14.3 percent discount rate by only a very small margin, the economic cost associated with foreign equity earning its supply price was quite small and the resulting (adjusted) cost-benefit indicators differ very little from the values they would take with no foreign equity. However, as one would expect, experiments with a higher value of 20 percent for $f^S$ gave a significant cost associated with the foreign equity earning its supply price.

B. An Illustration: Indicators for individual firms

In order to illustrate the methodology, Table 2 shows four sets of ERCs for some individual firms with varying levels of foreign ownership. Here, it is interesting to compare the indicators for firm (a) with no foreign equity and firm (b) with an eight percent foreign holding, with the indicators of the firms with majority and complete foreign ownership. First, it can be seen that the "O" and "A" indicators are identical for firm (a) and very similar for firm (b), whereas there is a large divergence between these two indicators for firms with majority foreign capital. Secondly, the "O" indicators for firms (a) and (b) improve at full capacity whereas, except for firm (h), the "O" indicators for the remaining firms worsen. For these firms, the indicators improve at full capacity only if it is assumed that foreign
<table>
<thead>
<tr>
<th>Firm (a)</th>
<th>Foreign Ownership %</th>
<th>Capacity Utilisation Rate (%)</th>
<th>Economic Return Indicators (%)</th>
</tr>
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<tr>
<td></td>
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<td></td>
<td>Actual Capacity (ERC)</td>
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<tr>
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profits are reduced to the hypothetical supply price. Thirdly, for firms (a) and (b) the incremental ERC exceeds the short run ERC, which in turn exceeds the long run ERCs at observed and full capacity. For the remaining firms, XERCA exceeds ZERCA in all cases, but ZERCA is not necessarily more favorable than ERCA or FERCA. Likewise, for some of these firms, XERCE is less favorable than either the corresponding short run or long run indicators, and the short run indicators are, in some cases, less favorable than the long run indicators. These effects are due to the presence of the foreign capital, which means that the normal relationship that one would expect to find between long run, short run and incremental cost-benefit indicators does not necessarily hold.

C. Aggregate cost-benefit indicators

(i) Actual capacity utilisation. Some aggregated cost-benefit indicators for the 84 firms and also for categories classified by foreign ownership are shown in Table 3. For the 84 firms treated as a single firm, both the "O" indicators and the "A" (adjusted) indicators (using a hypothetical long run supply price of foreign equity of 15 percent) are unfavorable. That is, with the observed foreign profit rate of 21.6 percent, the economic return on capital (ERCO) is only 7.9 percent compared with the cut-off shadow discount rate (not adjusted for inflation) of 14.3 percent. Correspondingly, the DRC ratio (DRCO) is 1.23, indicating that the opportunity cost of the factors of production exceeded shadow-priced foreign exchange earnings by 23 percent. The hypothetical elimination of "excess" foreign profits improves the indicators, but they still remain unfavorable, i.e. the ERC increases from 7.9 to 10.8 percent, but is still well below \( r^S \), and the DRC ratio falls from 1.23 to 1.12 but still exceeds the cut-off ratio of unity. As noted above, the cost of foreign equity at a supply price of 15 percent is very small: in
Table 3
AGGREGATE COST-BENEFIT INDICATORS AND OTHER STATISTICS FOR 84 IVORY COAST MANUFACTURING FIRMS CLASSIFIED BY FOREIGN OWNERSHIP

<table>
<thead>
<tr>
<th></th>
<th>All firms</th>
<th>Foreign Ownership %</th>
<th>99-81</th>
<th>80-51</th>
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<tr>
<td>Number of firms</td>
<td>84</td>
<td>60</td>
<td>7</td>
<td>11</td>
<td>6</td>
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<tr>
<td>% of sample employment</td>
<td>100</td>
<td>73.5</td>
<td>5.5</td>
<td>17.6</td>
<td>3.5</td>
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<tr>
<td>% of sample assets (market prices)</td>
<td>100</td>
<td>61.4</td>
<td>9.7</td>
<td>24.7</td>
<td>4.2</td>
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<tr>
<td>Capacity utilisation rate (%)</td>
<td>a/</td>
<td>54</td>
<td>50</td>
<td>55</td>
<td>70</td>
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<tr>
<td>Foreign share of total equity</td>
<td>b/</td>
<td>87</td>
<td>100</td>
<td>89</td>
<td>67</td>
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<tr>
<td>Profit taxes as % of pre-tax profit plus royalties</td>
<td>c/</td>
<td>14.7</td>
<td>15.2</td>
<td>21.6</td>
<td>9.3</td>
</tr>
<tr>
<td>Royalties plus post-tax foreign profits as % of foreign equity</td>
<td>d/</td>
<td>21.6</td>
<td>17.9</td>
<td>29.6</td>
<td>32.5</td>
</tr>
<tr>
<td>Shadow value of net assets per skilled and unskilled African worker (CFAF million)</td>
<td>e/</td>
<td>2.45</td>
<td>1.97</td>
<td>4.69</td>
<td>3.72</td>
</tr>
<tr>
<td>Shares of total factor cost in shadow prices (%)</td>
<td>f/</td>
<td>8.6</td>
<td>3.9</td>
<td>23.9</td>
<td>15.8</td>
</tr>
<tr>
<td>Foreign profit (excess over supply price)</td>
<td>g/</td>
<td>1.0</td>
<td>1.2</td>
<td>1.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Foreign profit (supply price)</td>
<td>h/</td>
<td>40.7</td>
<td>38.8</td>
<td>39.1</td>
<td>44.7</td>
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<tr>
<td>Opportunity cost of capital stock</td>
<td>i/</td>
<td>26.8</td>
<td>30.8</td>
<td>15.0</td>
<td>20.9</td>
</tr>
<tr>
<td>Expatriate labor</td>
<td>j/</td>
<td>22.9</td>
<td>25.3</td>
<td>20.8</td>
<td>17.9</td>
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<tr>
<td>African labor</td>
<td>k/</td>
<td>2.55</td>
<td>1.29</td>
<td>1.41</td>
<td>2.96</td>
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<td>Effective subsidy coefficient</td>
<td>l/</td>
<td>1.55</td>
<td>1.29</td>
<td>1.41</td>
<td>2.96</td>
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<td>DRC ratios</td>
<td>m/</td>
<td>1.12</td>
<td>0.96</td>
<td>0.59</td>
<td>1.22</td>
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<tr>
<td>At actual capacity</td>
<td>n/</td>
<td>1.22</td>
<td>1.00</td>
<td>1.16</td>
<td>2.52</td>
</tr>
<tr>
<td>utilisation</td>
<td>o/</td>
<td>1.12</td>
<td>0.96</td>
<td>0.69</td>
<td>2.12</td>
</tr>
<tr>
<td>At full capacity</td>
<td>p/</td>
<td>1.23</td>
<td>1.14</td>
<td>1.06</td>
<td>1.83</td>
</tr>
<tr>
<td>utilisation</td>
<td>q/</td>
<td>0.99</td>
<td>0.94</td>
<td>0.67</td>
<td>1.41</td>
</tr>
<tr>
<td>Economic Return on Capital (%)</td>
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<td>14.5</td>
<td>9.2</td>
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<tr>
<td>At actual capacity</td>
<td>s/</td>
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<td>15.9</td>
<td>17.9</td>
<td>0.1</td>
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<tr>
<td>utilisation</td>
<td>t/</td>
<td>14.8</td>
<td>16.8</td>
<td>29.5</td>
<td>6.0</td>
</tr>
<tr>
<td>At full capacity</td>
<td>u/</td>
<td>6.1</td>
<td>8.9</td>
<td>11.6</td>
<td>-2.6</td>
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<tr>
<td>utilisation</td>
<td>v/</td>
<td>14.8</td>
<td>16.8</td>
<td>29.5</td>
<td>6.0</td>
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<tr>
<td>Short run (closing down alternative)</td>
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<td>13.8</td>
<td>8.0</td>
<td>-8.2</td>
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<tr>
<td>Incremental</td>
<td>x/</td>
<td>11.2</td>
<td>16.1</td>
<td>19.7</td>
<td>-0.9</td>
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<tr>
<td>XERCA</td>
<td>y/</td>
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<td>48.5</td>
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<tr>
<td>Incremental</td>
<td>c/</td>
<td>36.1</td>
<td>48.5</td>
<td>40.1</td>
<td>13.5</td>
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</table>

Notes: Details of the methodology and data set will be published in a forthcoming book. The firm data is for 1970, 1971 and 1972 except for 1969 or 1973 data used for six firms. All statistics are aggregates, not averages of individual firm statistics. See Table 1 for key to symbols. The basic shadow prices used were: $^5 = 0.65, \text{FC}(EOl)(f^5 - f^8)$. 

- Output as percentage of estimated full capacity output.
- Equity adjusted for non-interest bearing loans from parent companies and in some cases reduced to exclude non-manufacturing activities.
- Royalties included with profits as mainly paid to foreign parent firms. Include technical fees and similar payments.
- In 1971 $US1 = CFAF 278$.
- Effective protection coefficient adjusted by direct and credit subsidies and tax preferences. For a definition of this concept, see Rola Balassa and associates, Development Strategies in Semi-Industrial Countries, Johns Hopkins University Press, 1980 (forthcoming), Chapter I.
fact, with zero cost \((f^s = r^s = .143)\), (equivalent to the case with no foreign equity), the ERC would increase to only 11.2 percent, which is still below the cut-off rate of 14.3 percent. Hence it can be seen that allowing for the economic cost of the foreign equity reduces the aggregate ERC by 3.3 percentage points, but that the ERC would be below the cut-off rate even with zero foreign equity cost.

We now turn to the aggregate indicators for four groups classified by foreign ownership. The first point to notice is that the aggregate foreign profit rates (29.6 percent and 32.5 percent) of the two categories with majority foreign ownership are considerably higher than the foreign profit rates of the 100 percent foreign owned firms (17.9 percent) and the group with zero or minority foreign equity (2.1 percent). Moreover, in the aggregate, the majority owned foreign firms are considerably more capital intensive than the 100 percent foreign firms. Consequently (measured as a percentage of total factor cost in shadow prices), the cost of foreign equity is much more important for these two groups (23.9 percent and 15.8 percent), respectively, than for the 100 percent foreign group (3.9 percent) even though the aggregate foreign equity shares are lower (89 and 67 percent, respectively). For this reason, the elimination of the excess of the foreign profits over the estimated supply price of 15 percent makes a big difference to the cost benefit indicators of these two groups. Thus, the ERCs increase from 9.2 percent to 17.9 percent (99-81 percent foreign group) and from -5.0 percent to 0.1 percent (80-51 percent foreign group). By contrast, there is only a small increase in the ERC of the 100 percent foreign group (from 14.5 to 15.9 percent). As regards the foreign-minority group, the observed foreign profit rate is lower than the shadow discount rate and in the "0" indicators, the difference is treated as a benefit. Accordingly, hypothetically restoring the
foreign profit rate to the level of the long run supply price worsens the cost benefit indicators, but in this case only slightly (i.e. the ERC goes from -7.6 to -8.5 percent) because in the aggregate, the foreign equity share is quite small (15 percent).

(ii) Full capacity utilisation. As shown in Table 3, aggregate capacity utilisation for the sample as a whole (55 percent) is quite low. Given low capacity utilisation, unit costs at full capacity operations would be lower than the observed unit costs, and without foreign ownership the cost-benefit indicators would improve. However, as was the case for individual firms in the aggregate and for the groups with 81 or more percent foreign ownership, the indicators actually worsen at full capacity if it is assumed that there is no intensification of competition, increase in the profit tax rate, or reduction of other government incentives. However, there is a substantial improvement if it is assumed that policy or other changes were such as to reduce the foreign profit rate at full capacity to the level of its long run supply price. But most of this improvement would occur if the same changes were made at observed levels of capacity utilisation: by comparing ERCA and FERCA it can be seen that the potential gains in economic efficiency from full capacity operations alone are quite small, except for the 99-81 and 80-51 percent foreign ownership groups.

(iii) Short run (closing down) indicators

Table 3 also shows the aggregated short run ERC indicators for all firms in the sample and also according to the four categories of foreign ownership discussed above. Of course, it is quite artificial to consider the closing down alternative when the aggregates include efficient firms which one would not wish to close down. Nevertheless, the results can serve to illustrate the effect of the presence of foreign capital in a useful way. In
this regard, it is immediately striking that, except for the group with 50 percent or less foreign ownership, the short run ERCs assuming no change in incentives (ZERCO) are actually less favorable than the basic long run economic rates of return (ERCO). Moreover, if we assume that incentives are reduced, the short run economic return (ZERCA) exceeds the corresponding long-run return (ERCA) by only a very small margin. Indeed, for the 80-51 percent group, the short run return remains slightly less favorable than the corresponding long run return. These results are entirely due to the presence of foreign capital, as without it the short run returns would be higher than the long returns. Comparing the long and short run coefficients for all firms as an example, a number of offsetting influences are at work. On the one hand, the shadow value of the short run assets (SNAZ) was only 68 percent of the shadow value of long run assets due to the assumption of zero market value on closing down for machinery, equipment, and intangibles. Since the border value of sales and tradeable inputs is unaltered, and all current operating costs such as wages are the same, this would tend to increase the short run ERC substantially. Without foreign capital, there would also be no depreciation charges included in short run costs. However, with foreign capital we have to allow for the foreign share of depreciation provisions, the shadow cost of which may exceed the shadow cost of total long run depreciation charges since the returns to the foreigners are entirely in foreign exchange. But most important, the shadow cost of foreign equity may be considerably higher than in the long run case, since (a) in the short run the original inflow of foreign capital is not treated as a benefit, and (b) foreign stockholders may lose heavily on closing down, so that a large part of their post-tax profit becomes a relevant (escapable) cost in foreign exchange from the short run point of view. Because of the assumptions concerning the
closing down process described in Part I of this paper, in the aggregate foreign stockholders would lose 56 percent of their equity on closing down. This then gives a higher shadow cost of foreign equity in the short run than in the long run case, and offsets the lower short run shadow cost of the capital stock. This explains the result that the short run adjusted ERC of 10.9 percent is almost identical to the long run return, and that the short run ERCO (6.5 percent) is lower than the corresponding long run return (7.9 percent). The close similarity between the long and short run ERCs of the firms aggregated by foreign ownership categories is explained by the same set of offsetting factors.

(iv) Incremental indicators

Turning to the incremental "O" indicators, it can be seen that these are less favorable than the corresponding long and short run rates of return and are all of the same sign. Once again this is due to the presence of the foreign equity: without foreign equity and assuming the same price and other government incentives for the increased output, ERCs would be higher due to the exclusion of fixed costs and the relatively low value of incremental assets. However, with foreign capital, a part of this surplus is appropriated in foreign exchange by the foreign owners. In addition, as in the short run case, no allowance is made for the value of the original foreign capital inflow in calculating the shadow cost of the foreign capital. The effect of this is very apparent in the adjusted ERCs which assume that incremental foreign equity earns its long run supply price only. As incremental equity is zero, incremental foreign profit is zero, and as a result, there is no offsetting cost of foreign capital in the cost-benefit calculation. This is the reason for the high incremental XERCAs for all categories except firms controlled by nationals. In the latter case, the improvement as between XERCO
and XERCA is very small, and XERCA remains negative (minus 4.4 percent). The reason for this small improvement is that foreign profits are a relatively small proportion of the total factor cost of this category, and in any event are low. Hence, reducing incremental foreign profits (to zero in this case) does little to improve the incremental ERC.

D. Foreign capital and economic performance

While the results given in Table 3 show that foreign profit rates which substantially exceed the economy-wide shadow rate of discount may considerably reduce the economic return on capital, at this aggregate level the ERCs worsen with increasing ownership by nationals. Thus, in the case with observed foreign profits at actual capacity utilisation, the ERC is 14.5 percent for firms fully owned by foreigners, 9.2 percent for firms with 81-99 percent foreign ownership, minus 5.0 percent for 51-80 percent foreign group, and minus 7.6 percent for firms with minority or zero foreign ownership. As one would expect, the cost-benefit indicators are highly correlated with incentives, relatively inefficient firms requiring and receiving high incentives and vice versa; thus, the effective rates of subsidy is 29 percent for the 100 percent foreign group, 41 percent for the 81-99 percent foreign group, 196 percent for the 51-80 percent foreign group and 774 percent for the foreign-minority group.

These results have been confirmed by extensive multiple regression analysis of the firm-level data using a dummy variable distinguishing firms with more than 70 percent foreign ownership.\(^1\) Other statistically

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\(^1\) Seventy percent foreign ownership was chosen for the dummy variable on the reasoning that less than 30 percent Ivorian ownership would not of itself give Ivorians a significant say in the staffing or policy of the firm, whereas effective foreign control might be somewhat diluted with Ivorian ownership in excess of 30 percent. The detailed regression results will be reported in a forthcoming book.
significant variables and their association with economic performance included: a dummy for firms protected by high international transport costs (positive), a proxy for "X-efficiency" (positive), share of exports to non-preferential markets (positive), capital/labor ratio (negative), size (negative), share of exports to preferential markets (negative), dummy for oligopoly market structure (positive), and capacity utilisation (positive). However, incentives as measured by the ESC indicator (using ln ESC) dominate the regression results when they were included. These results suggest that much of the association of firm characteristics with economic performance was probably principally explained by "made to measure" incentive policies, firms with characteristics associated with poor performance in the Ivory Coast (e.g. poor management, low capacity utilisation, high capital-labor ratios) receiving relatively high incentives while firms with relatively favorable performance characteristics (e.g. good management, export oriented, substantial protection by international transport costs) received relatively low incentives. In this context, foreign ownership, which had a negative (but low) correlation with incentives as measured by the ESC indicator, was a disadvantage in that the government was slightly more inclined to give incentives to firms with a substantial Ivorian (mostly government) share in their equity.

III. CONCLUSIONS

The purpose of this paper has been to describe a methodology for the treatment of foreign capital for cross section cost-benefit studies when there is investment by foreigners which is specific to the particular activity. On the assumption that returns to foreign capital have a zero shadow value from the national point of view, whether the foreign source of finance involves a cost or benefit depends on whether the shadow discount rate for the economy is
lower or higher than the rate of return to the foreign capital. As regards
direct equity investment by foreign firms, for most countries there will be a
cost in the long run, since the supply price of foreign risk capital will
usually exceed the economy wide shadow rate of discount. However, this cost
is only one element among a number which affect the economic profitability of
any particular activity, so that the procedures for treating foreign capital
must be included in a set of more general cost-benefit indicators.

In order to illustrate the methodology, some calculations for a
group of manufacturing firms in the Ivory Coast have been presented. With the
shadow prices used, these calculations show that there is a significant cost
associated with the high level of foreign ownership of the capital stock. But
this does not mean that economic rates of return would be improved by wholly
or partly replacing the foreign equity with local capital. On the contrary,
the evidence from this sample of firms is that economic performance
was positively associated with foreign ownership, thus suggesting that the
often-discussed advantages of direct investment by foreign firms (know-how in
technology, management, access to markets, etc.) outweighed the extra cost
associated with foreign profits. Increases in profit-tax rates may increase
national economic rates of return from the operations of foreign firms which
are intra-marginal in competitive industries, or which for one reason or
another have market power enabling them to earn above normal profits in the
long run.\(^1\) A higher level of profit tax rates than the Ivory Coast average
would also improve the full capacity, short run and full capacity indicators
by diverting some of the benefits from the foreign stockholders to the
government. However, economic performance may not greatly improve in the long

\(^1\) Of course, if possible it would be preferable to deal directly with the
sources (notably government policies) of market power.
run, since foreign investors are obviously concerned with after-tax profits and would adjust their pre-tax profit requirements upwards. First priority for improving performance would appear to be reforms of protection policies (the tariff structure, Q.R's, etc.) since the regression analysis shows that the effective subsidy coefficient was by far the most important determinant of performance, with poor performers apparently needing and receiving high protection and vice versa.

These conclusions are, of course, confined to the Ivory Coast case study and the results might well differ in other countries. Thus, in a country with a low opportunity cost of capital and high supply price for foreign equity (due to perceived political risks, for example), the cost of the foreign financing: \( FC(EQ1)(f^S - r^S) \) may be higher in relation to the efficiency or similar benefits associated with foreign ownership and to this extent, the economic rate of return of foreign owned firms would be lower than in the Ivory Coast.

As pointed out previously, one advantage of the approach taken in this paper is that it enables one to simulate the cost and benefits of alternative policies and to assign priorities. For example, in the Ivory Coast case it would be important to accompany rationalisation policies resulting in higher levels of capacity utilisation, with changes in incentives (e.g. reduced import duties, increased rates of profit tax); otherwise, the foreign owners may capture most of the benefits and, from the Ivory Coast's point of view, economic rates of return may actually decline. There are also clear implications for short run government policies. In particular, firms owned by nationals with unfavorable long-run cost-benefit indicators will tend to have more favorable short run and incremental indicators so that, while their existing fixed capital is still operational, it may be economically
profitable to keep them in production rather than closing them down. However, when there is a substantial foreign equity and the long run cost-benefit indicators are unfavorable, the short run and incremental cost-benefit indicators will also tend to be unfavorable, unless policies having the effect of eliminating or substantially reducing foreign profits on incremental output can be implemented in the event that the firm is not closed down.

Because the bulk of foreign capital in Ivory Coast manufacturing firms is owned by foreign firms or foreign individuals not resident in the Ivory Coast, it seemed appropriate to treat all foreign profits as representing a cost in foreign exchange. At the same time, given free convertibility of the local currency into French francs at a fixed exchange rate, it was assumed that the reinvestment of foreign profits in the country would be a function of the profitability of the investment opportunities rather than the availability of funds in the form of profits on existing activities. Of course, in other countries, neither of these assumptions may be valid. As regards the first, if a part of foreign profits were paid out to foreigners resident in the country, then it would be necessary to decompose their incremental income into taxes, savings, remittances, foreign travel, expenditures on traded goods, and expenditures on non-traded goods, as was done in shadow pricing expatriate labor in this paper. This would mean that this part of foreign profits would have a positive, rather than a zero, shadow value. As regards the second assumption, if the country restricts the remittance of foreign profits, then along the lines suggested by Newbery and Page, it may be plausible to assume that part of these profits would lead to investment which would not otherwise occur. The foreign profits would then

1/ Page (op. cit.) distinguishes foreign from expatriate ownership for this reason.
have a positive or a negative value according to the economic rate of return of the incremental investment they are assumed to cause. Alternatively, if the shadow pricing system were to include a general premium on savings over consumption, foreign profits would again have a positive rather than a zero shadow value. Of course, given the savings premium, adjustments would also need to be made in all the other shadow prices, and in particular, it would be necessary to take account of marginal income taxes and the (possibly relatively high) marginal propensity to save of national owners of capital in valuing incremental income accruing to them from profits.

It would be straightforward to incorporate modifications such as these in general methodologies for cross section studies such as the one presented in this paper. The exact form of the modifications would depend on judgments concerning the relevant opportunity costs and on the shadow pricing system being used. However, the main point to emphasise is the importance of explicitly taking account of foreign ownership. As shown in the Ivory Coast case study, doing so can make a substantial difference to the cost benefit indicators and to the formulation of industrial and other policies.
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