Inducing efficiency in the use of foreign aid: The case for incentive mechanisms

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Online Publication Date: 01 October 1992
To cite this Article: Pietrobelli, Carlo and Scarpa, Carlo (1992) 'Inducing efficiency in the use of foreign aid: The case for incentive mechanisms', Journal of Development Studies, 29:1, 72 - 92
To link to this article: DOI: 10.1080/00220389208422262
URL: http://dx.doi.org/10.1080/00220389208422262
Inducing Efficiency in the Use of Foreign Aid: The Case for Incentive Mechanisms

CARLO PIETROBELLI and CARLO SCARPA

In this article we point out that one of the main problems in foreign aid allocation is the efficient use of these funds: as resources available for foreign aid are intrinsically scarce, their efficient use would be in the interest of donors, and especially recipient countries. The aim of this paper is to show how it is possible to design incentive schemes which, by relating the allocation of aid to the way it is used, may induce the recipient country to use these resources appropriately. We discuss potential benefits and problems of different contractual forms, showing how comparing the performances of different countries may help to design optimal incentive mechanisms. Finally, we illustrate a proposal of performance conditioning of the grant element, which may help in tackling the efficiency problem.

I. INTRODUCTION

Although the issue of efficient allocation of resources has long represented one of the main concerns of economists, the problem of an efficient use of international transfers known as foreign aid, and the concept of efficiency in this context, have rarely received academic attention. This, despite official flows of foreign assistance having become an important structural feature in the international economy, and the acknowledgement of international aid as a scarce resource.

In fact, it is often questioned whether these funds effectively enhance development, and we believe that one of the problems may well be the insufficient effort that some governments in LDCs exercise to use aid efficiently. We use the term 'efficiency' referring to the cost-minimising (and in general social welfare maximising) deployment of foreign aid to

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PUBLISHED BY FRANK CASS, LONDON
reach certain *given* and declared targets (for example support to agriculture, improvement of health care, etc.), and it is far from obvious that LDCs governments actually behave according to these principles. In fact, it is well known that in some cases the political power does not belong to the people, but rather to small groups, and it is no surprise that some governments tend to employ foreign aid in the interest of the dominant group. Thus, it seems relevant to study how and to what extent it is possible to foster a more efficient use of international aid flows, by introducing appropriate incentives schemes.

The object of this article is not to discuss whether or not development assistance should be granted. Rather, its aim is to suggest that it is possible to design appropriate incentive schemes which, by relating the allocation of aid to the way it is used, may induce the recipient country to make efficient use of these resources. In so doing, we are well aware that efficiency is not all that counts when we deal with development aid, and it may be that at times aid should only follow equity considerations. Indeed, these criteria might in some cases be in conflict, for instance when equity suggests help to a very poor country, that may be known as very inefficient or if the objective of aid itself includes equity considerations. However, we believe that an efficient use of a scarce resource is beneficial to everybody, so that efficiency should become at least one possible criterion of aid allocation.¹

The structure of the article is as follows. Section II provides some definitions and quantitative evidence of the international development assistance. The issue of efficiency in the recipients' performance is discussed in section III. A model of efficiency-related aid allocation is presented in sections IV and V, and some of its application are derived in section VI, which contains a proposal for a possible use of this kind of schemes. A few final remarks conclude the study.

II. DEVELOPMENT AID: DEFINITIONS AND QUANTITATIVE ASSESSMENT

The expression ‘foreign aid’ is commonly used to include governmental resource transfers to poor countries for development purposes on concessional terms. The definition of *Official Development Assistance* (*ODA*) is given by the OECD: (i) it has to be given by official agencies, (ii) its main objective must be the promotion of development, and (iii) it has to be given on concessional terms, with a ‘grant element’ of at least 25 per cent. Thus, ODA excludes flows with little concessionality, or other objectives, while *Official Development Finance* (*ODF*) includes financial flows with less concessionality. We will concentrate our attention on ODA, which may take different forms [Cassen, 1989]:

¹
(i) *food and commodity aid*, that adds immediately to consumption in cases of extreme urgency, and it is often used also for developmental purposes;

(ii) *project aid*, that makes a specific asset or piece of technical assistance available to the recipients’

(iii) *programme aid*, given for the benefit of the entire recipient economy or a sector of it, normally accompanied by policy discussion to implement structural adjustment;

(iv) *technical co-operation*; this includes, *inter alia*, assistance to individuals from LDCs in the form of education or training.

Later in the article we shall show to what extent incentive mechanisms can be used to improve efficiency, and how they can be applied to each of these categories. Some evidence on official development assistance is given in Tables 1 and 2. A clear pattern stands out over the last decade: ODA has become the most important amongst the external financial receipts of LDCs. This is due to ODA remaining constant in real terms, with a dramatic fall in private bank lending and export credits, reflecting the debt crisis and private investors’ reduced confidence. In these circumstances, the issue of the efficient use of development assistance is important and deserves careful analysis. We are dealing with the allocation of a remarkable share of world resources, which is a major concern for both industrial and developing countries.

### III. EFFICIENCY AND RECIPIENTS' PERFORMANCE IN AID ALLOCATION

Usual justifications for international aid and its distribution reflect the joint influence of a gamut of political, humanitarian and economic factors, that are often interlinked. This makes the analysis complex and often implicitly biased by the beliefs of the authors. This is one of the reasons why foreign aid has traditionally received only occasional interest in the academic literature. However, it is possible to identify three main areas of analysis.

The first investigates the *reasons for foreign aid*, and its effects. Fundamental contributions in this area are the well-known ‘two-gap’ models.² Within this literature, the only issue of efficiency is related to the choice between trade and aid as alternative ways to achieve economic development. The problem of the efficient use of resources is thus analyzed in a framework substantially different from ours, and the (relative) efficiency of aid depends on whether growth is regarded as constrained by foreign exchange or domestic savings [Streeten, 1972: 430].
FOREIGN AID: THE CASE FOR INCENTIVE MECHANISMS

TABLE 1
TOTAL NET RESOURCE FLOWS TO LDCs

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<tbody>
<tr>
<td>I. OFFICIAL DEVELOPMENT FINANCE</td>
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<tr>
<td>1. OFFICIAL DEVELOPMENT ASSISTANCE</td>
<td>45.2</td>
<td>46.3</td>
<td>61.2</td>
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<tr>
<td>Bilateral</td>
<td>28.5</td>
<td>27.5</td>
<td>37.7</td>
</tr>
<tr>
<td>Multilateral</td>
<td>7.8</td>
<td>7.9</td>
<td>10.3</td>
</tr>
<tr>
<td>2. OTHER ODF</td>
<td>8.9</td>
<td>10.9</td>
<td>13.2</td>
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<tr>
<td>II. EXPORT CREDITS</td>
<td>15.9</td>
<td>4.9</td>
<td>0.6</td>
</tr>
<tr>
<td>III. PRIVATE FLOWS</td>
<td>66.3</td>
<td>36.9</td>
<td>32.2</td>
</tr>
<tr>
<td>1. Direct investments</td>
<td>13.7</td>
<td>9.1</td>
<td>16.8</td>
</tr>
<tr>
<td>2. Bank lending and bonds</td>
<td>48.9</td>
<td>23.7</td>
<td>7.1</td>
</tr>
<tr>
<td>3. Others</td>
<td>3.7</td>
<td>4.1</td>
<td>8.3</td>
</tr>
<tr>
<td>TOTAL NET RESOURCE FLOWS</td>
<td>127.4</td>
<td>88.1</td>
<td>94.1</td>
</tr>
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</table>

(at 1987 prices and exchange rates)

| TOTAL NET RESOURCE FLOWS         | 173.9  | 125.6   | 95.9   |
| ODA                               | 49.4   | 50.5    | 49.0   |


A second area of analysis aims at explaining the past distribution of development assistance, suggesting theoretical and statistical criteria for future aid allocation. Following McKinlay and Little [1977: 58-86], Maizels and Nissanke [1984: 879-900] provide a complete model to explain past aid allocation. They acknowledge that aid allocation may be due to altruism, but also to the donors' self-interest, and try to investigate which hypothesis better explains empirical evidence. Maizels and Nissanke's results confirm that the 'recipient need' model explains relatively better the allocation of per capita multilateral aid flows. However, per capita GNP is positively correlated to the amount of bilateral aid, suggesting that donors may prefer to grant aid to countries
TABLE 2
TOTAL NET RESOURCE FLOWS TO LDCs

(Percentage shares, from current $ billion)

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<tr>
<td>1. OFFICIAL DEVELOPMENT ASSISTANCE</td>
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<tr>
<td>Bilateral</td>
<td>28.5</td>
<td>40.2</td>
<td>51.1</td>
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<tr>
<td>Multilateral</td>
<td>6.1</td>
<td>9.0</td>
<td>11.0</td>
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<tr>
<td>2. OTHER ODF</td>
<td>7.0</td>
<td>12.3</td>
<td>14.0</td>
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<td><strong>II. EXPORT CREDITS</strong></td>
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<tr>
<td></td>
<td>12.5</td>
<td>5.6</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>III. PRIVATE FLOWS</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1. Direct investments</td>
<td>52.0</td>
<td>41.9</td>
<td>34.3</td>
</tr>
<tr>
<td>2. Bank lending and bonds</td>
<td>10.7</td>
<td>10.3</td>
<td>17.9</td>
</tr>
<tr>
<td>3. Others</td>
<td>38.4</td>
<td>26.9</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td>2.9</td>
<td>4.7</td>
<td>8.8</td>
</tr>
<tr>
<td><strong>TOTAL NET RESOURCE FLOWS</strong></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(at 1987 prices and exchange rates)

**Source:** OECD, *Development Cooperation 1988*, Paris.

at higher levels of development and better capacity of aid absorption. As already mentioned, the issues of efficient use of aid and of the provision of incentives to enhance efficiency are not considered in these studies. Another radical branch of literature is based upon the argument that aid represents an intrinsically inefficient allocation of international resources [Lal, 1983; Bauer, 1984: 38–62]. Therefore, the discussion of the 'efficient' distribution of ODA loses its significance in this context.

A third group of contributions investigate normative aspects of aid allocation, providing criteria for the distribution of foreign aid based on the performance of the recipient country. Two papers seem particularly close to our interests. Adelman and Morris [1968: 260–80] use discriminant analysis to distinguish among groups of countries, characterised by
different productivities in the use of aid. However, the use and the construction of certain country performance characteristics variables (especially socio-cultural and political indicators like the extent of urbanization or the character of basic social organisation, or the extent of political stability and of national integration) to rank countries has often little theoretical support, and this weakens their conclusions.

The second paper is Cline and Sargen [1975: 383-91], whose starting point is a criticism to the two-gaps approach. They note that the concept of aid requirement determined according to a gap introduces a negative incentive to the efficient use of foreign assistance, because these gaps depend also on the policies of the recipient governments. Thus, the notion of 'required' aid [Chenery and Bruno, 1962: 79-103] should be replaced by the idea that aid is a scarce resource, whose availability is finite, and which should be used efficiently.3

The important acknowledgement of the role played by economic incentives in foreign assistance is central also in our analysis. However, Cline and Sargen’s recommendation that ‘... the “performance” judgement should be based on measurable economic policies considered to be responsible for growth...' [1975: 384] is not, in our view, completely satisfactory. In general the ‘effort’ of the recipient cannot be observed or perfectly monitored, and many other factors affect a country’s performance: an evaluation of the performance should take into account not only the results achieved, but also these factors.

This short overview of some alternative approaches to development assistance reveals that little attention has been paid to the efficiency in the use of these flows and to the provision of appropriate economic incentives to increase it. This sharply contrasts with the widespread view of inefficiency and heavy bureaucratic costs that characterise the supply of development assistance, and in general its limited impact on Third World economic development.4 Therefore, we turn to a more detailed analysis of this issue.

IV. INCENTIVE TO EFFICIENCY AND THE PROVISION OF FOREIGN AID

When we deal with foreign aid, equity between countries, rather than efficiency is considered the main problem, and here we certainly do not want to deny its relevance. However, the resources available for aid are scarce, and the issue of their efficient allocation becomes very important, because the achievement of the usual goals of foreign aid (for example, economic development) depends to a large extent on the way
it is employed. In our view, the crucial problems with efficiency, often neglected by the literature, are the following:

(a) the country's performance in the use of aid is not completely beyond the country's control, but it depends to a certain extent on the effort the Governments exert. Thus, efficiency is not exogenously given, and a country's behaviour can be an important factor in determining it;
(b) the effort cannot be perfectly monitored or even observed, and the uncertainty of the economic environment is such, that effort cannot be inferred precisely just by observing the results obtained by LDCs.

The remark under (a) points out the necessity to try and enhance efficiency, and thus to consider how the provision of aid should be associated to certain incentive schemes, hopefully able to induce the recipient country to use these resources optimally. However, point (b) stresses one obvious but major difficulty in introducing these schemes: it is not possible to link aid directly to the effort of the recipient country, because the donor is unable to observe it.

In practice, international institutions often tackle the problem of efficiency by splitting the (for example financial) aid into different instalments, and threatening the recipient to interrupt payments if the resources provided so far have not been used 'appropriately'. Although this system may represent an incentive to efficiency, it has a few shortcomings:

— it can operate only with relatively long term programmes, and not for 'once and for all' relationships;
— the interruption of the flow of funds is not always a credible threat: when a large amount of resources has already been invested in a project that can be completed only with further payments, it may be better for the donor to provide them, not to frustrate previous efforts.

Our aim is to use the literature on the economic theory of incentives and contracts in order to show how it is possible to meet the need to provide incentives, also in the presence of unobservable (or 'hidden') actions and avoiding some of the shortcomings of the 'practical' approach just described. To illustrate this possibility, in this section we will use the example of an altruistic international institution, or a developed donor country, wishing to maximise the receiving country's welfare through financial aid. Its counterpart is the government of a LDC, whose utility depends positively on aid inflows, and negatively on its effort to manage the project efficiently. This disutility can be due to
several factors: an objective difficulty in implementing the project, a conflict between the aim of the project and the interests of some political groups within the country, etc.

It is important to stress that, whenever the recipient government receives some 'disutility' from its effort, its objective function no longer coincides with the donor's: the recipient bears a 'cost' which will induce its effort level below the optimal level. In section VI, we will show how the conclusions we reach within this context can be extended to different situations, for example, when the aid is not directly linked to a specific project.

The first, implicit incentive scheme we may consider could be given by the existence of a long term relationship, to analyse as a supergame, where the existing conflict is mitigated by the potential gains from cooperation. If the LDC uses foreign aid in an efficient way, it may hope to receive more in the future, and this may be a sufficient incentive to induce it to behave appropriately.

The main problem with this kind of argument is that in general Governments do not last forever, and may be interested in short-term results (for example, the next elections). Indeed, many governments in LDCs do not operate with a long-term perspective: the uncertainty of the political environment and the inherent fragility of the internal economic and social situation make short run considerations prevail.

Thus, we prefer to investigate the characteristics of incentive mechanisms potentially effective also in the (relatively) short run. The general framework we want to use has been developed in the analysis of the principal–agent relationship, where one individual (the agent) operates on behalf of another individual (the principal) receiving from him a payment. The principal's payoff depends directly on the agent's productivity and on the payment he has to make. Typical applications of this scheme are, for instance, the employer–employee relationship, or the one between the regulator and a firm.

The problem facing the principal is to decide the optimal payment in the presence of a trade-off: obviously, the payment is a cost, but when it is too low the agent may decide to shirk and perhaps to reject the contract. The cause of the incentive problem is the limited observability of the agent's action: this rules out the possibility of making payments conditional on the agent's behaviour, undermining the possibility of writing Pareto-optimal contracts. Holmström [1979: 74–91] shows that the optimal payment must be conditional on the only observable variable, that is, the principal's gross payoff, that may be interpreted as an index of performance. Essential elements of this situation are the following:
— the agent's action (a) is not observable;
— the action cannot be inferred precisely from the agent's output (however defined). This requires the relationship between the principal's gross payoff (\(\pi\)) and action (a) to be stochastic. Thus, we write \(\pi = \pi(a, \epsilon)\) where \(\epsilon\) is a stochastic disturbance, with zero mean and variance \(\sigma^2\);  
— the agent's action (that we will interpret as 'effort') affects positively the principal's net expected payoff (EW) and negatively the agent's expected utility (EU);  
— the agent has a reservation utility level \(U_0\), and he will reject the contract whenever \(EU < U_0\).

It is usually assumed that the principal is risk-neutral, while the agent is risk-averse. This assumption is often reasonable, because agents are typically in a 'weaker' position and are less able to differentiate their sources of income. Furthermore, with a risk-neutral agent the moral hazard problem is trivially solved by shifting all risk on the agent. It is important to stress that, without informational asymmetries, this situation would require the agent to receive a fixed reward, and the principal to bear the whole risk.

With moral hazard we cannot have an optimal risk-sharing: as the payment to the agent must depend on \(\pi\), which has a stochastic element, the incentive problem makes it necessary for the agent to bear some of the risk. The problem can be formalised as follows. The principal chooses the payment \(t\) as a function of the performance index \(\pi\), to maximise his expected payoff; the agent chooses an effort level to maximise his expected utility. Their objective functions are

\[
EW = E\{\pi(a, \epsilon) - t[\pi(a, \epsilon)]\}
\]

and

\[
EU = E\{Y(t[\pi(a, \epsilon)]) - V(a)\}
\]

where \(E\) denotes the expectation, taken with respect to \(\epsilon\). The linearity of \(W\) indicates that the principal is risk-neutral. \(Y\) is the utility the agent derives from his income, \(t\), and risk aversion requires (given \(Yt > 0\)) \(Y_{tt} < 0\). \(V(a)\) denotes the disutility of effort, and the previous considerations lead us to assume \(\pi_a > 0\) and \(V_a > 0\). The stochastic disturbance is defined so that \(\pi_\epsilon > 0\). We also assume \(V_{aa} > 0\), and thus the agent will always choose a finite value of effort.

The principal's maximisation problem is subject to two crucial constraints. The first one is the participation constraint (or individual rationality constraint):

\[
EU \geq U_0
\]
If (3) is violated, the agent will not accept the contract.

The second one is the incentive compatibility constraint, (or incentive constraint), which guarantees that the incentive mechanism is effective. This means that, if \( a^* \) is the effort level preferred by the principal, then the payment mechanism must be designed so that \( a^* \) is utility maximising for the agent. Formally, the incentive must be such that

\[
E\{Y(t[\pi(a^*,\varepsilon)]) - V(a^*)\} \geq E\{Y(t[\pi(a,\varepsilon)]) - V(a)\}
\]

(4)

for each \( a \). A payment schedule that meets this requirement is effective, because it makes it optimal for the agent to choose \( a^* \), the action desired by the principal. In a sense, through an incentive compatible payment schedule, the principal can 'choose' the agent's effort level. Obviously, the choice of \( a^* \) must take into account both its cost (\( t \) is increasing in \( a \)) and its benefit.

Following Holmström, we can characterise the solution to this problem as follows. Let \( F(\pi,a) \) be the distribution function of \( \pi \) (given the distribution of \( \varepsilon \)), while \( f(\pi,a) \) is the density function. As \( \pi \) increases with effort, \( F_\pi(\pi,a) \leq 0 \): increasing effort shifts \( F \) to the right (first order stochastic dominance). The principal maximises (1) taking (3) and (4) as constraints. If \( \phi \) and \( \mu \) are the Lagrange multipliers associated, respectively, to the participation constraint (3) and to the incentive constraint (4), the optimal payment schedule is characterised by:

\[
\frac{W'(\pi - t(\pi))}{Y'} = \phi + \mu \frac{f_\pi(\pi,a)}{f(\pi,a)}
\]

(5)

where \( W' \) and \( Y' \) are the marginal utilities of income for the principal and the agent, respectively. We have to stress that this payment schedule is not Pareto efficient, because the right-hand side is not a constant (that is, because the marginal rates of substitution of the two agents are not always equal). The risk-averse agent shares some of the risk, but still his effort level would be sub-optimal. This deviation from first-best optimality is due to the necessity to force the agent to bear 'excessive' risk as a form of incentive for him to 'work harder'.

It is not difficult to see how this framework can be used to improve the efficiency of the use of foreign aid by LDCs. Let us go back to the previous example of an altruistic international institution, wishing to allocate its aid to a developing country. The donor can be considered a principal, that through aid wants to reach its objective, whose achievement depends on the way the recipient uses that aid. The actions of the LDC's government cannot be perfectly monitored, and only the final outcome is observable. Within this context, the interpretation of the Holmström result can be the following. As long as achieving efficiency is
costly to the LDC's government, the international institution should not give subsidies independently of some suitable measure of the performance. This requires the LDC to bear some of the risk of failure of the project; although other considerations suggest to limit the risk borne by the country, to achieve efficiency some of the aid must be conditional on the success of the project. We will see later how this principle can be translated into more precise suggestions.

The basic model we have referred to so far could be enriched if we want to give a more satisfactory representation of the problem. In particular, most donors give aid to several LDCs at a time, often for projects that share some common features. This may make the incentive problem less stringent, because it becomes possible to design new kinds of contracts, based on a comparison among the countries' performances.

V. THE STRUCTURE OF INCENTIVE CONTRACTS

Indeed, the payment schedule illustrated in (5) depends on the only observable variable, \( \pi \). If the principal and the agent could observe some additional information \( z \), somehow related to effort, it would be easier to identify effort, and the informational problem would be reduced. In this case, Holmström [1979: 74–91] shows that it is possible to reduce the distortion from optimality, as long as \( z \) adds no significant information on effort. Thus taking into account additional, relevant information on, for instance, external conditions that may affect the success of the project, improves the situation of both partners.

The existence of several agents facing similar problems provides such additional information, just because the results obtained by one agent give a signal about the difficulty of the tasks assigned to other agents. Thus, comparing the results achieved by different agents in similar projects helps to tackle the unobservability problem, allowing the principal to design a more efficient payment schedule.

To analyse this situation, we assume that the principal maximises his payoff through the actions of \( n \) agents, carrying out 'similar' projects. The principal's gross payoff obtained through agent \( i \), \( \pi_i \), is a function of this agent's effort and of two random disturbances. The first one, denoted by \( \theta \), indicates the level of difficulty common to all projects. The second one is a specific disturbance \( (\epsilon_i) \), reflecting the particular problems faced by agent \( i \). Following Nalebuff and Stiglitz [1983: 21–43], we assume that the relationship between \( \pi_i \) and effort is\(^{11} \):

\[
\pi_i = \theta a_i + \epsilon_i
\]
We assume that the mean value of $\epsilon_i$ is 0; individual shocks are independent. We assume that the principal is unaware of the exact value of $\theta$, while the agents, who have a more direct working knowledge of the problem, know it before deciding their effort level. The principal does not know $\theta$, and his beliefs are summarised saying that he expects $\theta$ to have mean value 1, and to be distributed with variance $\sigma_\theta$. Although each agent is likely to have better knowledge of $\epsilon_i$ than the principal, we do not introduce this assumption, because this further informational advantage would deviate the attention away from the problem of moral hazard we want to tackle. The principal and each agent, respectively, maximise the following functions:

$$EW = E \left( \sum_i [\pi_i(a_i, \theta, \epsilon_i) - t(\pi_i)] \right) \quad (1')$$

$$EU_i = E \left( Y[t_i(\pi_i)] - V(a_i) \right) \quad (2')$$

To what extent can this formulation be interpreted as a (normative) model of the provision of aid to LDCs? To maximise the LDCs' welfare, the donor transfers resources to local governments (the agents), contributing to the realization of several projects, comparable to each other. As an example, one can think of parallel projects in countries within the same geographical region to develop different industrial sectors. The common disturbance may indicate the difficulty to industrialise the area, while the individual disturbance would synthesise both sector-specific and country-specific problems.

Thus, enforcing efficiency requires an agreement between the institution and each country, linking the aid flow to a measure of its performance, both in absolute terms and maybe relatively to the results achieved by other countries. Thus, we can have three contractual forms: purely individualistic (independent contract), purely relative (tournament) and mixed (mixed contract). The first one links aid flows to individual performance only, while in a 'tournament' the ranking among measures of performances of the different countries is all that matters. Mixed contracts combine these two forms, and base aid provision on absolute individual performances as well as on a comparison across countries. The choice of the contractual form is obviously crucial, and thus we devote the last part of this section to discuss the relative merits and limitations of each alternative.

The first problem is to find under which conditions an independent contract is preferable. Following the previous considerations, neglecting the relative performance of the country with respect to other recipients of aid can be optimal only if other countries' expected performances are unrelated to the one of the country in question: in this case, other
countries' performances give no additional information. Thus, whenever the donor can get some information about the effort made by one country, by comparing its results with the outcome of other projects, the best contract must also take into account what happened in other countries. This condition of independence requires the expected variance of \( \theta \) in the principal's beliefs to be zero (\( \sigma_\theta = 0 \)).

This condition is trivially met when the 'true' model cannot be summarised by (6), that is, when the projects are completely different (there is no common factor, \( \theta \)). This may happen when the specific conditions in which each project takes place are so particular and unique to make any comparison irrelevant. More interesting is the case when the international institution knows perfectly the value of \( \theta \), so that, comparing different countries does not add anything to the institution's knowledge of the situation, because \( \theta \) is the only source of uncertainty. Thus, when there is no unobservable element which is common to several projects, the donor must design an incentive mechanism based on the recipient's performance in the use of aid, neglecting what other countries have been able to do (independent contracts).

However, these conditions look restrictive: whenever there is a common unobservable element, it is convenient to consider relative performance together with absolute performance in evaluating a country's effort. In general, an optimal incentive scheme should thus take into account both criteria, and should be a mixed contract: neither independent contracts, nor tournaments, in general, are optimal.

On the other hand, mixed contracts, as well as independent ones, have a potentially very undesirable feature: the optimal aid flow to each country depends on both unobservable disturbances, and the resulting variability could end up being excessive. This may make a pure tournament a particularly attractive alternative, because this contract is at least able to neutralize the effects of the common uncertainty parameter, \( \theta \). The reason is that \( \theta \) affects all 'competing' countries in the same way, and thus neither the relative performance of each country nor its expected aid inflow would depend on this unobservable parameter.

Nalebuff and Stiglitz emphasise this feature, and show that, although tournaments are not, in general, optimal mechanisms, they have several desirable characteristics. Thus, it seems important to shift our attention to these incentive mechanisms, which provide a particularly useful framework to deal with our problems.

To see more clearly how these schemes might work, let us modify slightly the previous set-up in the following way. Consider \( n = 2 \), so that the donor gives aid to two countries only. The budget constraint of the institution is given by \( A^* \), the total amount of available resources. As
we noted before, this fits well with the idea of finite availability of aid [Cline and Sargen, 1975: 383–91]. The total transfer to each country is $A_i$, so that $A^* = A_1 + A_2$. Each aid flow can be split into two components. The first part of the donor’s funds ($A^E$) is given on the basis of equity arguments, while the second component is to develop a certain project, therefore partly depends on efficiency:

$$A_i = A_i^E + \alpha_i A^*$$

with the obvious restriction $(\alpha_1 + \alpha_2) \leq 1$, and with $\alpha_1 + \alpha_2 = 1$ implying $A_i^E = 0$. We define $t_i = \alpha_i A^*$, and we thus consider the following budget constraint

$$T = t_1 + t_2 = (\alpha_1 + \alpha_2) A^*$$ (7)

The institution’s objective function is:

$$EW = E \{ \pi_1[a_1(t_1), \theta, \varepsilon_1] + \pi_2[a_2(t_2), \theta, \varepsilon_2] \}$$ (8)

which is maximised, subject to the constraint (7). The idea behind this reformulation of the Nalebuff-Stiglitz model is that total amount of resources devoted to aid is often decided before specifying the allocation of funds, and it does not usually depend on the countries’ effort levels. Thus, this can be a stylised representation of the usual procedures followed in the World Bank and in several donor countries.13

Without problems of moral hazard and when the governments’ objective function and the institution’s coincide, the socially ‘ideal’ allocation of the total amount of aid, in the case of symmetric effort, would assign each country the same contribution, denoted by $\bar{t} = \frac{1}{2} T$. The use of a ‘tournament’ structure is justified by the existence of problems of efficiency and moral hazard. As we anticipated, the first advantage of a contractual structure based only on the relative performances of the countries is the extreme simplicity of its basic structure. Introducing a scheme of tournaments would change the distribution of aid as follows:

$$t_i = \bar{t} + x \text{ and } t_j = \bar{t} - x \text{ iff } \pi_i > \pi_j$$ (9)

Of course, $x \leq \bar{t}$, and $x = 0$ iff $\pi_i = \pi_j$. Thus, the ‘ideal’ allocation of aid is distorted, by adding a ‘prize’ or penalty ($x$), which represents the incentive. This prize is awarded to the ‘winner’, that is, the country whose performance index $\pi$ has the higher value. With this structure, we can now analyse the country’s choice of effort.

Considering a symmetric equilibrium, where $a_2 = a_1$, it is easy to show that $a_1$ is increasing in $x$. Quite obviously, the donor can always set $x$ so that the effort levels are optimal, but this requires each country to bear excessive risk; it is possible to show that the optimal prize should be set
to induce the countries to undersupply effort. The reason is that, as the recipients are risk-averse, to induce them to exert the optimal effort is too costly: again, we have a trade-off between risk-sharing and efficiency. Risk-averse countries must bear part of the risk to have an incentive to use it as the institution wishes.

One of the more important aspects of these incentive schemes is that the expected aid inflow, $I$, in a symmetric situation, does not vary with $\theta$, the common stochastic term. This is a very relevant feature, and deserves further attention. Indeed, the main advantage of relative incentive schemes is that unobservable factors (such as $\theta$) affecting the absolute performances of all countries do not directly affect the final outcome. Thus, this kind of mechanism may decrease the variability that aid flows would have, if they were linked to individual performances. In the latter case, when the variability of $\pi_i$ is very large, $\pi_i$, and therefore $t_i$, could well be very low, just because of elements beyond a country’s control. On the contrary, a tournament sets a limit (namely, $x$) to the difference between the average aid flow $t$ and each individual one. When $\pi_i$ may take values within a very wide range, a tournament is preferable to purely independent contracts because of risk-aversion.

With the structure of incentives (9), considering symmetric situations, where the two countries provide the same level of effort, only the country-specific random element remains relevant. In particular, but not only, in this case, its variability plays a crucial role in determining whether a tournament or a set of independent contracts give the optimal incentive mechanism. Two aspects have a particular relevance.

On the one hand, one should consider that a tournament eliminates the uncertainty on aid due to the (expected) variability of $\theta$, and in so doing it increases the relevance of $\sigma_e$ on the actual aid flows. Therefore, it is intuitive that, for tournaments to be preferable to independent contracts, the variance of $\epsilon$ must be smaller than the variability of the component of $\pi_i$ which depends directly on effort. This simply requires that a tournament should not introduce more ‘noise’ than it eliminates.

On the other hand, perhaps surprisingly, a tournament is not optimal also when the variability of the country-specific element is too small. In this case, the relative performance depends almost uniquely on the country’s effort, so that there is a tendency to supply excessive effort. Furthermore, because of this tendency, the optimal prize is very small, so that one country may find it preferable to exert the minimum effort, foregoing the (small) prize, but ‘saving’ in terms of lower effort. Because of this problem (non-convexity of the country’s objective function), tournaments either would induce an excessive drive to efficiency, or would be ineffective.
Two general remarks are in order. In the first place, the incentive mechanism defined in (9) is not the only way to determine $t_i$ on the basis of relative performances, and this basic structure can be easily improved in several respects. In particular, this incentive scheme has the feature that the prize is awarded whenever there is a difference, however small, between the performances of the two countries. This is often undesirable, for a number of reasons. First, $\pi_i$ depends also on random events that may not be observable and are beyond the country’s control (the $\epsilon_i$s). Furthermore, the construction of the indices $\pi_i$ entails some degrees of arbitrariness, and even the measurement of the magnitudes that form the index may not be extremely precise. Thus, it is often preferable to award the prize to a country only if the difference $|\pi_1 - \pi_2|$ is larger than a minimum threshold. This reduces the probability to give the prize just to the luckier country, and could thus be preferable on ethical grounds. Moreover, Nalebuff and Stiglitz show that such modification might improve the contract also from the viewpoint of efficiency, because it reduces the probability to win (and to lose), and thus it reduces the implicit cost of risk-aversion.

Secondly, the effort level of each country will depend on the effort the other country exerts. Therefore, we might look at incentive schemes based on relative performance as a way to make a country ‘compete’ in efficiency with the others. This may be objectionable, because it may be considered as a sort of competition among the poor. However, we have already pointed out that this scheme should not be the general and unique criterion to decide aid allocation, but should only guide the distribution of a part of aid flows, as a complement to other considerations. To the extent that efficiency is indeed a problem, we believe there ought to be some room also to consider a scheme of this kind.

VI. APPLICATIONS OF THE PRESENT MODEL: A PROPOSAL

So far, we have analysed the problem of an altruistic international institution, which distributes aid to developing countries in order to increase their welfare level, while the LDCs are controlled by governments which attach relevance to the ‘effort’ they have to exercise to reach the target of the project at stake. Now, we want to investigate (i) how the schemes previously introduced can be reinterpreted when the donor and the recipient have different objective functions, and (ii) how they can be applied in different cases of aid.

Reality is obviously more complex than any theoretical model can represent: for instance, one may distinguish different cases, depending on whether the donor and the government are ‘altruistic’ or ‘selfish’.
However, this cannot make a difference to the interpretation of the scheme previously outlined. Independently of the donor's objective, the use of incentive mechanisms allows the donor to achieve it more efficiently. Whether the goal itself is objectionable or not is an ethical issue that does not depend on the way the donor wants to pursue it.

An important question when it comes to applications is to determine in which cases incentive schemes may be possible or effective. The answer seems to be negative in the case of food aid, when it is meant as a support given in conditions of emergency, as in this case humanitarian consideration should prevail over the concern for efficiency: as we know, these incentives require the recipient to bear some additional risk, which of course may not be acceptable in these situations. A similar answer should perhaps be given when dealing with direct technical co-operation: although this accounts for a large share of total aid flows, the degrees of freedom in the use of resources are extremely limited, so that their efficient use on behalf of the LDC does not seem to represent a major issue.

As regards programme aid, where the transfer is made to improve overall macroeconomic performance, the main difficulty is represented by the weak links between aid and performance. The objectives are hardly quantifiable, and their accomplishment depends on a long list of variables beyond a country's control. Furthermore, the target of economic growth refers to a long-term horizon which may end up being too vague to allow a sensible application of the schemes previously described. Also in this situation, the conclusion should be rather negative.

Things are different in the case of financial assistance to specific projects, where the use of funds is typically managed by the recipient and efficiency may be a real problem. In this case, the introduction of incentive schemes may, in principle, be extremely useful. In practice, they may be used as follows.

Our point is that funds for these projects should not be provided at a pre-set interest rate. Rather, the amount to be repaid by the recipient and, in turn, the grant element should be made dependent on the efficiency with which the funds have been used, that is, on an appropriate performance index. For instance, the donor may provide funds to country i at an interest rate \( r \) equal to zero if the performance has been completely satisfactory, and positive otherwise, following a formula such as:

\[
    r = g(\pi_i, \ldots) \tag{10}
\]

where the interest rate should be larger, the lower the performance index \( \frac{dg}{d\pi_i} < 0 \).
In this way, the construction of the performance index and the relationship between it and the interest rate (the function $g$) are what should be determined initially. The grant element would thus depend on the recipient's performance, as required by our previous analyses.

Notice that this scheme would help overcome the limitations of the 'practical' approach often used by international institutions, already mentioned in section IV. In particular, it can be applied also to short-term relationships, and the threat is credible, as it is in the donor's interest to require a repayment of its financial contribution.

As we concentrate our attention on relative as well as absolute incentive schemes, we must clarify first how and to what extent one may compare the performances of different projects. The main problem is — quite obviously — the heterogeneity of projects: this is, at the stage of applications, one of the main obstacles.

Actually, it is important to distinguish between two different — although related — types of difficulty. The first one is to summarize the performance of a certain intervention (funded by foreign aid) in an index able to indicate whether the intervention has been successful. The second one is — once having constructed the indices — to compare the results obtained in different countries. Let us illustrate these issues separately.

As regards the former one, we must remember that 'performance' is a multidimensional concept (value added, employment, . . .) which may be evaluated in different ways, depending on which aspects are given greater importance. Thus, it is necessary to summarise all relevant dimensions, and there seems to be no obvious and 'neutral' way to tackle this problem. Attaching weights requires always a political decision on the relative importance of different objectives; for instance, if investment is given a higher weight than the creation of jobs, a project could be considered successful even if unemployment remains high. Intuitively, the degrees of freedom of the political authority are greater in the more complex cases, when we have a large scale project, affecting several dimensions at a time.

These considerations are even more important when comparing different projects developed in different contexts. In this case, we have the additional problem to compare situations in distinct countries, and we believe that the higher the heterogeneity between them, the more difficult it is to set up an 'objective' comparison, and the more important political decisions will be.

It is often useful to distinguish between a case where we compare similar projects in different countries, and one where the recipients are firms within the same country. In the former case, the counterpart of the
donor is a Government, and the same considerations already put forward apply. Again, the concrete specification of the incentives requires a cautious application of the previous principles, as regards the fixing of comparable targets in different countries.

On this point, it may be argued that the difficulties faced by projects carried out in different LDCs will always be somehow similar, as they come from common features of all developing countries, such as a scarce supply of skilled labour, or the limited availability of capital. If one accepts this view, one may also draw the conclusion that incentive schemes based on relative performances have almost unlimited applicability, as projects in LDCs always have common features which render them comparable to one another.

However, comparisons among too heterogeneous projects may be unreliable, as political considerations may end up prevailing over 'economic' arguments. Thus, we have a trade-off between the extent of the field of application of these comparisons and their economic significance: in order to make certain comparisons, one should introduce so many arbitrary considerations, that the target to achieve efficiency in the use of foreign aid could become substantially irrelevant.

The situation may be easier to manage when the recipients are firms operating within the same geographical area. In this case, they are likely to start from comparable initial situations, to have very similar goals and to face very similar problems. Here, constructing performance indices does not seem to be a major problem, and so the application of the usual principal-agent schemes already used in industry regulation would be rather straightforward [Baron, 1989].

Thus, we believe that the incentive schemes we have illustrated may be applied in some interesting situations, although with some caution. The choice between independent incentive schemes (where aid is linked to the absolute performance of one country) and relative ones (where the comparison among different countries is the main basis for the evaluation) depends essentially on the degree of comparability among the different projects funded. In principle, relative incentive schemes may seem preferable, but they often raise the need to introduce arbitrary 'political' considerations in order to make sensible comparisons. To the extent to which this is to be considered a negative feature, independent incentive schemes may be preferred.

VII. CONCLUDING REMARKS

In this article we have argued that, using appropriately contract theory, it is possible to design appropriate incentive mechanisms, such as to
induce developing countries to use efficiently the foreign aid they receive. This seems to be particularly important, as foreign aid is a scarce resource, and many LDCs are still controlled by oligarchic governments, which try to use foreign aid to reach their ‘personal’ goals.

Of course, it is important to repeat that this cannot be considered the unique criterion to distribute foreign aid; however, as an efficient use of this huge amount of resources would be in accordance with the pursuing of the general goal of overall welfare, one should also take into account the suggestions that emerge from the literature we referred to.

final version received January 1992

NOTES

1. An analogous point is made by Besley and Kanbur [1988], as regards poverty alleviation.
2. Chenery and Bruno [1962], and Chenery and Strout [1966].
3. Aid allocation related only to efficiency can lead to the paradox of granting more assistance to more efficient countries, that probably would need it less. The proposal by Cline and Sargen has the advantage of reconciling, to a certain extent, this paradox. Following their approach, a country with high rates of growth gradually receives less assistance, but at any point along the growth path it tends to receive more aid thanks to its performance.
4. See, for example, United Nations [1991], on how ODA has not achieved the proposed goals in the 1980–90 decade.
5. See Axelrod [1984]. A supergame is the repetition of a given situation of conflict ('game') a certain, possibly infinite, number of times. The game, if played only once, would give an inefficient outcome (the one-shot Nash equilibrium), while the repeated nature of the relationship considered in a supergame may induce the agents to avoid such outcome.
6. On this kind of literature, see Hart and Holmström [1988].
7. Here we emphasise the ‘moral hazard’ problems in agency theory (hidden action models), but of course other, important issues emerge when the agent has a hidden characteristic, as analysed typically in the literature on regulation. On these models, see Baron [1989].
8. The results do not change substantially if we relax this assumption, as long as the principal is less risk-averse than the agent.
9. Here we do not consider the technical problems related to the ‘first order approach’, and we refer to Holmström for a careful discussion.
10. See Holmström [1979], for a more detailed discussion.
11. As shown by Nalebuff and Stiglitz [1983], the linearity of $\pi_i$ does not affect the results in a significant way. Relaxing the assumption of additive separability between $\theta_a$ and $\epsilon_i$ can make the analysis much more complex.
12. This has been shown, in slightly different contexts, by Green and Stokey [1983], and Nalebuff and Stiglitz [1983].
13. The following analysis is very close to Nalebuff and Stiglitz [1983], and we refer to this paper for the technical details and the proofs.
REFERENCES


