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USAID POLICY PAPERS - RECURRENT COSTS

The International Rice Research Institute
P.O. Box 933, Manila, Philippines

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Recurrent Cost Problems in Less Developed Countries Executive Summary

Introduction

There is a growing awareness that many of the poorest countries in the world, particularly those located in sub-Saharan Africa, are not allocating adequate budgetary resources to finance the recurrent costs of their present portfolio of development investments. Existing investments are, therefore, becoming unproductive, and future investments are likely to suffer from the same problem. In light of this situation, donors need to review their current policies to determine how to deal with this "recurrent cost problem." This paper analyzes the nature and causes of LDC recurrent cost problems and suggests a set of responses that Missions should consider in order to improve the effectiveness of A.I.D. programs and projects.

Definition

Recurrent, or variable, costs are defined simply as those costs that recur, as opposed to capital, or fixed, costs, which are concentrated at the beginning of a project's life. Thus, in an agricultural research project, the costs of providing the buildings and equipment, as well as the costs of initial training and expatriate expertise are fixed costs, which occur only in the start-up phase of the project. The annual cost of salaries, utilities, maintenance, materials, and replacement of worn-out capital are recurrent costs which continue as long as agricultural research continues to be carried out.

The Nature of the Problem

An LDC government may be unable or unwilling to finance recurrent costs. There is a recurrent cost problem when finance is lacking for variable inputs even when they are more economically profitable than new capital inputs, either private or public. For instance, suppose a dollar spent on repairing a road increases the present value of total output by two dollars, while a dollar spent on a new road or a new factory increases the present value of total output by only \$1.50. Then available resources should be spent repairing the road.¹ If this is not happening, if road repairs are underfinanced even though they are more valuable to the economy than new projects which are being financed, then there is a "recurrent cost" problem.

¹ Economic logic requires that resources be allocated so that the "marginal revenue product" of each activity or use is the same. Streams of revenues and costs over time are measured in "present values," i.e., discounted by a rate which reflects the opportunity costs of capital and the society's rate of time preference.

Why does such a situation occur? Why do governments misallocate resources? The major reasons are poor policy choices, both by the LDC's and, to some extent, by donors.

LDC Policy Failures

LDC policy failures can be grouped into three broad categories:

- (1) Inability to raise adequate revenues;
- (2) Misallocating public resources between capital and recurrent budgets or among expenditure sectors within the recurrent budget, including the over-staffing of central bureaucracies which have a vested interest in the continuation of subsidized programs;
- (3) Project design failures or public policy failures which reduce the likelihood of a project achieving success.

Inability to Raise Revenues. Sometimes, an LDC government's inability to finance recurrent expenditures is a result of its inability to raise sufficient resources, because of, for example, an institutional weakness in its tax system. More often, however, the problem arises from a failure to charge users for government services such as health, education, veterinary services, agricultural extension, transport, and water and sanitation. The failure to charge users for services (and thus the subsidization of those services) is frequently justified on equity grounds. In fact, subsidies, in practice, often tend to be inequitably distributed. For most poor countries, resources are inadequate to provide, for example, free universal extension services, while also pursuing other development objectives. Consequently, these services are provided to a chosen few. If however, charges were imposed for the use of the services, the increase in financial resources would enable the government to distribute these and other services more broadly. Subsidies as a "safety net" may be justifiable if they are carefully targeted at the poor. However, the majority of subsidies are imprudent and ineffective.

Misallocating Public Resources. Even when governments have adequate revenues, they are often allocated badly. At times, certain sectors (e.g., agriculture) are underfinanced because of political pressures to provide revenues to other sectors which are more important politically, though less profitable economically. At times, the cost of government provision of services is too high, either because of excessive salaries for government employees or because of inappropriate technologies. Sometimes, government involvement in activities best left to the private sector (particularly marketing and manufacturing) results in substantial operating losses and consequent drains on the treasury.

Project Design and Public Policy Failures. Projects may be underfinanced because the cost of variable inputs is greater than the returns to these inputs. There are three reasons for this situation occurring. First, the project may have been poorly designed. Second, changes in the external environment may have been poorly anticipated at the design stage and consequently, during implementation, the project becomes unprofitable. Third, government policies, both macroeconomic and sectoral, may inhibit the project's success. Whatever the reasons, failure to provide variable inputs to a project when they have a more profitable use elsewhere is a rational response. The problem being faced in this case is not a recurrent cost problem, but a project design or public policy problem, and the solution is project redesign or policy reform.

Donor Policies

Even where LDC policies are appropriate, donor policies may lead to an overinvestment in new projects and an underfinancing of the recurrent costs of existing projects. This is because donors tend to limit their financing to new investments. For many poor countries, the funds available for new capital projects, because they come largely from concessional assistance, are more plentiful than the funds available for financing the recurrent costs of existing projects which come largely from domestic resources. Thus new roads are built while old ones are not maintained.

This analysis points to four basic responses available to A.I.D., depending on the causes of the recurrent cost problem:

(1) Project design

If design is the cause of the problem, USAID Missions and LDC governments should work to design projects so as to assure that their recurrent cost components are consistent with economic feasibility.

- (a) In countries suffering from a recurrent cost problem, the economic analysis of projects should use prices for government expenditures and revenues that reflect the scarcity value of government resources;
- (b) Projects should be designed, to the extent possible, to maximize the revenues from service charges (and/or contributions in labor and kind) consistent with the capacity of the beneficiaries to pay; and
- (c) Where possible, government activities should be turned over to the market economy. This is generally desirable in all agricultural and industrial productive activities as well as

marketing, distribution, trade and many services.

(2) Policy Reform

In countries where recurrent cost problems are important, recurrent cost issues should constitute a major part of the policy dialogue because of their integral relationship with macroeconomic concerns and the allocation of resources. If LDC policies are the cause of the problem, then Missions should

- (a) attempt to persuade governments to make necessary reforms;
- (b) enlist the support of the donor community for policy reform; and
- (c) provide technical assistance in the form of expertise and training to support reforms, including such areas as fiscal policies and tax administration.

(3) Recurrent Cost Support

If recurrent costs constitute a serious problem and LDC government policies are appropriate and projects designed correctly, or requisite steps are taken to move toward appropriate policies and designs, then Missions should consider funding a portion of recurrent costs of host country projects through a variety of mechanisms at the project, sectoral and macro levels for a period up to ten years, providing the country agrees to shoulder an increasing share of total costs over this period. Policy performance should be monitored closely and periodically to determine whether such assistance should be continued.

It is important to note that direct funding of recurrent costs, either at the project or budget level, is only justifiable under fairly narrow conditions. These conditions, which have been spelled out in this paper include:

- (a) An acceptable policy framework or clear movement toward such a policy framework;
- (b) An assurance that recurrent cost support has higher development impact than new investments;
- (c) An inability of the host country to undertake recurrent cost financing;
- (d) A carefully phased plan exists for shifting the entire burden to the host government.

(4) Reallocation of Assistance

If the host government refuses to take sufficient action on project design and/or policy reform, A.I.D. should seriously consider reducing the level of assistance to the affected sector or country.

The Recurrent Cost Problem in Less Developed Countries

I — Introduction

The past five years have seen a continuation if not worsening of the adverse international economic environment which threatens the ability of the less developed countries to grow at a rate necessary to maintain current levels of economic activity, let alone reduce the level of poverty in which the majority of their populations find themselves. Deteriorating terms of trade brought on by the rise in oil prices together with recession and inflation in the developed market economies has led to stagnation in most of the low income countries of the Third World, and dimmed prospects for future growth.

A 1981 PPC/EA study noted that nineteen out of the twenty-six largest AID recipients are currently undergoing a crisis severe enough to require an IMF standby or Extended Fund Facility agreement.¹ In most cases, such an agreement will require not only improved management of the balance of payments, but a reduction in government expenditures. For low income countries as a group the total standby and EFF agreements have grown from 421 million SDRs in 1977 to 3,382 SDRs in 1980, an eight fold increase. As a result, we can expect that a large number of AID recipients will be finding it increasingly difficult to finance the recurrent costs of their existing development project portfolio, let alone new project starts.

These government budgetary problems can have a devastating effect on AID programs. Roads without maintenance, schools without materials, and clinics without health workers are prevalent enough already. Indications are that these problems are likely to increase rather than diminish. This is particularly distressing for AID, since projects in the sectors of primary concern to the Agency have tended to have high recurrent cost ratios. Table I presents an illustrative summary of the ratio of the annual value of recurrent costs for each dollar of investment ("r" coefficients) over a twenty-year life of project. Note the high recurrent costs of health, education and rural development as compared with those of industry and trunk roads.

As a result of these financial difficulties LDC governments will increasingly be forced to resort to one of the following unhappy choices: (a) shift resources from the capital budget to the recurrent budget; (b) rely increasingly on deficit financing with the consequent inflationary pressures; (c)

¹ Tom Morrison, "Major Macroeconomic Issues in AID countries: Implications of the CDSS Review," June 1981.

TABLE I

Illustrative Summary for the Recurrent Expenditure Implications of Projects as a Proportion of Investment Expenditures^a ("r" Coefficients)

Forestry	0.04
General Agriculture	0.10
Livestock	0.14
Rural Development	0.08 -- 0.43
Agricultural Colleges	0.17
Polytechnics	0.17
Primary Schools	0.06 -- 7.0
Secondary Schools	0.08 -- 0.72
Universities	0.02 -- 0.22
District Hospital	0.11 -- 0.30
General Hospital	0.183
Rural Health Centers	0.27 -- 0.71
Urban Health Centers	0.17
Housing	0.03
Manufacturing	0.01
Feeder Roads	0.06 -- 0.14
Trunk Roads	0.03 -- 0.07

Source: Peter Heller, "The Underfinancing of Recurrent Development Costs," *Finance and Development*, March, 1979.

^a These coefficients are drawn from a very restricted sample of developing countries and are meant to illustrate the variability one can observe across sectors and projects. Example: If a polytechnic school costs \$1 million to construct and equip, on the basis of an "r" coefficient of 0.17, we can estimate that it would cost on average \$170,000 in each subsequent year to pay the teaching staff, to operate the facilities, and to maintain the building.

reduce expenditures on social services and human resource development; or (d) continue to underfinance development projects with the resultant deterioration of services and underutilization of capacity.

There are, of course, other somewhat happier solutions, which may be attempted. These include the improvement of the efficiency of the tax system, reform of economic policies that tend to result in sluggish growth of revenues or rapid growth of expenditures, redesign of projects so as to minimize the recurrent burden, resort to a greater degree to user charges and local financing of development projects, and seek explicit donor financing of recurrent costs. None of these are easy choices, and considerable effort will be necessary both by donors and LDC governments to find solutions. The purpose of this paper is to examine the recurrent cost problem and suggest ways in which AID can respond so as to help LDC's deal with it.

This paper is divided into six sections. The next section discusses definitional problems in addressing recurrent costs. Section III describes the underlying causes of recurrent cost problems.

Section IV is a short discussion of the methodology to be used in identifying recurrent cost problems. The fifth section is the core of the paper and describes the appropriate responses for AID. The final section summarizes the arguments presented. In addition there are two appendixes, the first of which presents the main argument of this paper mathematically, and the second of which demonstrates how the use of shadow prices for government revenues and recurrent costs might affect the choice of projects.

II. Definitional Questions

Before we begin to consider the difficulties involved in identifying, analyzing and solving a recurrent cost problem it would be well to define precisely and clearly the meaning of two key terms: "recurrent costs" and "recurrent cost problems."

Recurrent Costs are simply those costs of development activities which recur. Thus while the capital cost of any given project, be it a school, a road or a dam, is usually incurred over a short time period, from one to five years, the recurrent costs associated with that asset — teachers' salaries, road maintenance, equipment repair — will be maintained over the lifetime of the asset, from twenty to fifty years or more. Thus capital costs are concentrated in the initial period of any development project; recurrent costs are spread out throughout the project's life, and may, in fact, increase in real terms toward the end of the capital asset's life as maintenance becomes more expensive.

If a government were trying to maximize output given a budget constraint, it would normally allocate resources between fixed and variable inputs such that the present value of the marginal product of an extra dollar spent on the fixed input is equal to the present value of the marginal product of an extra dollar spent on the variable input (see Appendix A for proof of this proposition).² Therefore if an extra dollar spent on road maintenance will generate two dollars of additional output while an extra dollar spent on road construction will generate \$1.50 of additional output (which would be the present value of the discounted stream of returns), then clearly the government could do better by shifting resources into maintenance and away from new construction.

A Recurrent Cost Problem is a situation in which the government faces such budget stringency that it is unable to finance the recurrent costs of existing development projects when the stream of

² In order to economize linguistically we will call the present value of the marginal product of an extra dollar spent on an input the stream of returns associated with that input.

returns to the recurrent factor of production is much higher than that of new development projects. The last phrase of the preceding sentence is crucial in defining a recurrent cost problem. Failures to fund school supplies or road maintenance or petrol for extension workers may be a rational response to the discovery that these projects are no longer economically viable, either due to poor design or to a change in circumstances such as relative prices. In such cases these scarce resources might be better used to fund recurrent expenditures in other sectors or locales, or in financing brand new capital projects. When, however, the stream of returns to road maintenance is on the order of two to five times that of new construction and yet road maintenance is not being undertaken while new investments are being made, as was found in a World Bank study in the Sahel,³ then there is undoubtedly a recurrent cost problem.

III. Causes of Recurrent Cost Problems

When a government sets out to promote economic development it has two resources at its disposal — its capital budget and its recurrent budget. In many ways these two resources are substitutes for one another since government resources are, in principle, fungible. There are, however, two restrictions on this general fungibility. There is, in the first place, a technical constraint related to the unidirectional nature of time. A capital expenditure once made can never be converted into a recurrent expenditure ("sunk costs are sunk costs").⁴ On the other hand a proposed recurrent expenditure can always be converted into a proposed capital expenditure. In other words, one can always choose to underfund existing projects in order to make new capital starts; one cannot convert existing capital assets into recurrent financing. Secondly, donor policy, which prohibits, in general, recurrent financing, limits fungibility, especially in the poorest countries which are most dependent on foreign aid for their capital budgets. Thus over any planning horizon a government can choose, within the limits imposed by donors, the degree to which it will invest in new projects, and the degree to which it will finance the variable inputs for existing projects.

³ C.G. Harral and P.E. Fossberg, "Evaluating the Economic Priority of Highway Maintenance," paper presented to the Pan African Conference on Highway Maintenance and Rehabilitation, Accra, 1977.

⁴ It is of course possible to sell certain types of capital, mainly plant and equipment, and use the receipts to finance current expenditures. While this option may not be available to some governments, others, which have embarked on public production of goods better produced by the private sector, could divest themselves of hotels, factories, and the like.

As discussed in the previous section a recurrent cost problem exists when the stream of returns to recurrent expenditures is greater than the stream of return to capital expenditures, or is high relative to the opportunity cost of capital. There are two basic causes for such a problem — donor policy and LDC government policy. We will take each of these up in turn.

A. Donor Policy

The resistance of donors to funding recurrent inputs is a major casual factor of the recurrent cost problem. For a large number of LDC's, foreign assistance and, therefore, government investment funds, are a much more abundant resource than are government recurrent resources. For low income A.I.D. recipients (i.e., those countries with per capita incomes below \$400 in 1978) the average excess of investment over domestic savings is 16.5% of GDP; the level of government expenditures on goods and services for these same countries is 15.5% of GDP. Thus, total net foreign inflows available

for capital accumulation are greater than total domestic government resources available to service the entire recurrent budget. An estimate of the ratios of development assistance to major government expenditures for low income countries is presented in Table II.

Why do donors limit funding to capital costs? The main arguments seem to be related to the following set of premises:

- (1) It is better to provide assistance which is directed toward investment, and thus has growth potential, than toward consumption;
- (2) Funding of recurrent costs is an open-ended commitment which leads to dependence rather than self-reliance on the part of the recipient and which commits the donor to certain activities over a longer run than is politically acceptable.
- (3) The larger the share of total project costs financed by donors the less interest and commitment does the host government have in the projects' success.

Let us examine each of these arguments.

TABLE II

Ratios of Net ODA Receipts to Government Expenditures,
Selected Low Income Countries,^a 1977
(Figures are in percentages)

	Net ODA GDP	ODA Current Expenditure	ODA Capital Expenditure	ODA Total (Government) Expenditures
Burma	2.67%	22.61%	121.36%	17.80%
Chad ^b	17.40	140.30	644.44	115.23
Ethiopia	2.84	17.75	83.53	14.64
Gambia, The	3.53	16.73	26.93	10.60
India	1.04	8.67	45.22	7.27
Kenya	3.67	21.84	73.40	16.83
Lesotho	9.95	53.20	144.20	38.87
Madagascar	2.48	15.70	52.77	12.10
Malawi	8.97	73.41	115.00	44.85
Mali	11.85	70.96	790.00	65.11
Niger	10.97	61.28	274.25	50.09
Pakistan	3.52	27.29	100.57	21.46
Papau New Guinea	17.18	64.57	477.22	56.89
Rwanda ^b	12.83	145.83	278.91	95.75
Senegal	6.45	45.74	358.33	40.57
Sierra Leone	4.13	23.74	114.72	19.67
Somalia ^b	59.08	204.43	757.43	160.98
Sri Lanka	7.01	39.84	127.45	30.35
Sudan	3.80	24.52	35.51	14.50
Tanzania	9.61	48.54	115.78	34.20
Upper Volta ^b	15.17	120.40	561.85	99.15
Zaire	5.40	21.77	79.41	17.09

Source: OECD, *Geographical Distribution of Flows to Developing Countries* (1980), and Tait, Alan and Peter Heller, "International Comparisons of Government Expenditure," IMF, DM '81/53

a) Countries with per capital incomes below \$400 in 1978

b) Countries for which ODA receipts are greater than current expenditures.

1. Investment vs. Consumption in Recurrent Cost Funding

For the accountant the question as to which expenditures are investments and thus belong in the capital account, and which are consumption and thus belong in the current account is a simple one to answer. Any expenditure which purchases something which is not used up in one year is an investment; any expenditure which is used up within the year purchased is consumption. The former expenditures are put in the capital budget, and the latter in the current account. Thus wages which are paid to road builders enter under capital accounts, while wages paid to street cleaners come under current account. However as one probes carefully behind the accounting constructs, a number of anomalies arise.

First, many expenditures classified as "current" are actually new investments. Education is widely interpreted by economists as a process through which "human capital" is developed. Both the student and the state are employing resources to produce an investment which has a very long gestation period. Producing a skilled worker or producing a road are conceptually the same thing, and it may be that the worker's skills are the more productive. Therefore, should not expenditures on education, and to a large extent health, be considered as capital expenditures rather than consumption? The same argument can be raised for investments in agricultural research institutions. Here the end product, knowledge, has an extremely long life, as well as a long gestation period, and, therefore, costs involved in producing new knowledge should be considered as investments. To state the case even more strongly, the services of extension workers, who are involved in transmitting knowledge, are similar to those of teachers. Although with extension work the gestation period may be short, the new skills and techniques learned by farmers, continue to pay off over a long period of time and thus the costs of extension needed to spread these skills and techniques are investments.

Secondly, maintenance of capital goods, either physical or human, is surely a gross investment if not a net investment. Thus road maintenance, or health care (including labor costs and drugs) represent investment expenditures designed to keep the quantity and quality of the capital stock from deteriorating. While they do not produce increments to capital, they operate to maintain the integrity of the capital stock. Replenishment of the working capital of credit institutions is another important example of a gross, though not a net, investment.

Lastly, the one year distinction between current expenditures and capital expenditures is largely a

matter of convention and has no conceptual legitimacy. Any expenditure which provides a stream of services over time is by nature a capital expenditure, and every expenditure which provides services only instantaneously is a current expenditure. The operational question is the length of the instant. The same expenditure can be viewed as a recurrent or a capital cost depending on the point at view. For example, a bowl of rice provides satisfaction for the length of time, a day perhaps, needed to burn off the calories it contains. However, lack of sufficient nutrition may lead to the stunting of physical and mental abilities for a lifetime. If the length of time involved is one year then a vehicle with a three-year life is a capital good; if the standard time period is one month, then fertilizer is a capital good. There is, then, a continuum, with expenditures producing outputs over time, some over long periods of time; others over shorter periods. Any expenditure which produces increases in productivity partakes to some degree in the nature of a capital good. But that "capital-good nature" varies in intensity depending on the length of time that the expenditure continues to provide productivity increases.

What this means is that donors who are willing to provide capital costs of projects, but are reluctant to provide recurrent costs, are suffering from conceptual tunnel vision. The "welfare"/"investment" dichotomy is much less clear-cut than is often perceived. For example, the adage, "Give me a fish and I'll eat today; give me a net and I'll never be hungry," could be converted to: "Give me a fish for the first 15 years of my life and I'll be strong enough and smart enough to build my own nets".

2. Self Reliance vs. Dependency

The capital costs of all projects have a fixed termination date. There is no termination date involved in recurrent costs. If the reason donors shun recurrent costs is that they wish to hold to the idea that development means increasing self-reliance, then the main consideration ought to be the prospects for the LDC to take on all the costs associated with each capital expenditure at some date in the future. Under such a rationale it would make sense to finance recurrent costs if there were a firm expectation that such funding was of a reasonable duration.

Thus, funding the recurrent costs of a research project for a number of years would not be inappropriate if there existed a plan for phasing out this type of assistance. Similarly, macro-level budgetary support of various types—PL 480, cash grants, or C.I.P.'s, also make sense as long as there is a realistic plan to move from this temporary situation to permanent self-reliance. This

is, indeed, the ultimate objective of the entire aid program — development allowed by graduation.

We must, however, be realistic about the time it will take for current low income countries to reach the level of development where they can be graduated. For the poorest LDC's, and it is in these countries where the recurrent cost problem is most severe, there is no prospect for becoming less dependent on aid flows in the near future. If average per capita income is \$200 and a per capita income level of \$1000 is a reasonable threshold for transition to "self-sustained growth," it will take 54 years at 3% per capita growth rates, and 81 years at a more moderate 2% per capital growth rate to reach that level of income. Only ten of thirty-eight low-income countries have exceeded sustained 2% per capita growth in the period 1960-78, and only four have exceeded 3%. While A.I.D., other donors and the countries themselves hope to improve this performance, and we can undoubtedly expect sectoral successes (such as Indian agriculture) in the medium term, nevertheless, if our objective is to graduate countries from dependence on aid we must be prepared for a long-term donor commitment to low income countries.

3. Donor Financing and Host Country Commitment

There is a danger that as donors pick up a larger proportion of the costs, both capital and recurrent, of a given project that LDC governments will be less involved with, and less committed to the success of that project. It would therefore, be useful to plan a phasing out of donor activities and a phasing in of LDC responsibility, both financial and managerial. If the project is successful, then its support by the LDC government is assured. If it is unsuccessful, that support will not be forthcoming.

The critical question is how success is to be defined. Often donors and recipients have very different objectives, and thus the achievement of one set of objectives may mean the failure to achieve a different set. Only when objectives are congruent and projects are perceived by host governments as successful, will the continuation of project activities be assured. This will tend to be the case whether or not LDC governments have committed their resources to the project. In fact, the central objective in requiring LDC's to be involved financially in any project is to cause them to reveal their preferences, since the long run viability of any activity depends on the host government's placing sufficient value on project outputs.

Since LDC resources are scarce, host country agreement to fund a portion of any project suggests host country interest in that project.

However, if LDC's believe that the level of total donor financing is unrelated to a particular project portfolio, they will have no reason to conceal their preferences. In other words if a country believes that the U.S. aid level is to be \$20 million, regardless of whether the money is put into the health or agricultural sectors, then there will be no reason to hide the fact that they would prefer investment in health. There should, therefore, be little difference in donor and host country objectives, and a financial commitment would not increase the degree of host country interest.

However, if LDC's perceive the total level of assistance as being related to the project portfolio, then they would be more likely to accept donor financing of, for example, a population program, even if they have no interest in it, because they expect that it is the population program or nothing. In this case there is little commitment to the project's success.

It would seem, then, that there is some cogency in the requirement that LDC's be obligated to fund some portion of development activities. (As appropriate, local currency generations of PI 480 programs can be used to fulfill the counterpart requirements of A.I.D. projects.) This need not mean that all, or a major portion of, recurrent costs should be the responsibility of recipient countries. In fact, where the objectives of the donor and recipient are disparate, and donors wish to influence LDC governments to move their objectives closer to those of the donor it may be well to finance some portion of project recurrent costs beyond the development phase of the project in order to develop a consistency for project continuation.

B. Recipient Country Policies

Just as recurrent cost problems can be caused by donor policies that limit fungibility, recurrent cost problems are often caused by LDC government policies which create budgetary stringencies or lead to inappropriate projects. We can divide these recipient policy problems into three main areas — government revenues, government expenditures, and project design problems. We will examine each of these in turn.

1. Government Revenues

It is possible that recurrent cost problems are due to the government's inability to raise revenues necessary to fund recurrent expenditures. Domestic revenues can be derived from either general tax receipts or from fees for specific services (i.e., user charges).

(a) Tax Revenues

Most, if not all, LDC's have difficulty mobilizing an economy's resources for the use of the government exchequer. However, there is a wide variety of experience in this respect, and Tait et al

found the Tax/GNP ratio for 1972-76 ranging from 5.37% in Nepal to 37.6% in Iraq.⁵ Much of this difference was due to the structure of the economy (mineral-rich countries finding it much easier to raise revenues). They then calculated International Comparison of Taxation (ICT) indices for a sample of LDC's. These ICT's were arrived at by regressing the tax to GDP ratio against a set of exogenous variables, determining what a normal tax effort at a given per capita income would be (given export earnings and mineral production), and calculating a given country's performance as a percentage of the norm. They then identified those countries whose ICT indices were above normal, as well as those below normal. While the underlying implication which follows from the analysis is that countries below normal should be able to improve their tax performance, one must be very careful about such assertions. In the first place, since we are dealing with norms, it is statistically impossible for every country to be performing well (or badly), even though it is conceptually possible. Thus good performance means only that performance which is better than average. Secondly, the regression equations only explain half of the variance, at a maximum; there may be many other factors, beyond the capacity of the country to affect, which determine its performance. Thirdly, certain variables, such as the export ratio, may be determined by government policy rather than independent of policy as assumed by the model. Lastly, superior tax performance, does not seem to be correlated with GDP growth. Indeed, among those countries with low ICT's are Egypt, Ecuador, Malawi, and Togo, all of which have grown rapidly while among those with high ICT's are Algeria, Benin, Congo, Guyana, Sudan, Upper Volta, Zaire, and Zambia, all of which have stagnated. Indeed the growth rate for the low ICT countries is, on average, one-half percent higher than the medium and high ICT countries. This suggests that how governments use their resources and how their policies affect the private sector are more important than total tax effort in generating economic growth.

Their results, for AID recipients, are presented in Table III.

If the country with a low ICT seems to be confronting a recurrent cost problem, then one recourse might be to increase the ability of the government to raise and collect taxes. In such cases, AID assistance to improve tax administration is an appropriate response.

⁵ Tait et al., "International Comparison of Taxation for Developing Countries, 1972-76" *IMF Staff Papers*, Vol. 26, No. 1 (March, 1979).

(b) User Charges

The general theory of public finance suggests that even in market-oriented economies there is a legitimate role for government provision of certain goods and service. More importantly, it makes sense under certain conditions for these goods to be paid for from general tax revenues rather than from fees paid by users.

The basic question is who is to pay for any particular good or service produced by the government, the taxpayer or the user. If it is to be the taxpayer then that implies a degree of subsidization which has substantial import for recurrent cost considerations. Three arguments have been advanced in the public finance literature for government subsidies or specific taxation (taxes are negative subsidies)—a public goods argument, a merit goods argument, and an equity argument.⁶

(1) Public Goods Rationale

Development projects can be divided conceptually along a continuum measuring the degree to which the outputs partake of the nature of a public good. In economic terms, a public good is a good which cannot efficiently be provided by the private economy, because either (1) there is a great difficulty in excluding "free riders" or (2) there are externalities in consumption of the good. For example, fire protection can be justified on externality grounds as a public good because of the danger that a fire in one dwelling can spread to another (on the other hand, smoke alarms which tend to save lives more readily than property are private goods). City streets tend to be public goods while parking places are not, because of the excessive cost of collection as opposed to the value of the good. In other words, toll booths at every intersection would require a payment by the driver, both in time and money, many times the value of driving that city block.

While there is a continuum from "private" to "public" goods, it might be useful to put goods into three discrete categories—public, private, and mixed. An illustrative grouping is provided in Table IV.

The public goods literature argues that on efficiency grounds, public goods should presumably be totally financed out of public funds, private goods should be totally financed out of user charges, and mixed goods by a combination of both. The basic argument underlying this conclusion is as follows.

In a market system, prices are used as signals to both consumers and producers. For a purely

⁶ See, for example, John G. Head, *Public Goods and Public Welfare* (Duke University Press, Durham, N.C. 1974).

TABLE III
Summary measures of ICT Indices (47 countries)

Low ICT Index (less than 0.89)	Medium ICT Index (0.89-1.09)	High ICT Index (greater than 1.09)
Bangladesh	Burma	Benin
C.A.R.	Burundi	Cameroon
Ecuador	Costa Rica	Congo
Egypt	Dominican Republic	Guinea
El Salvador	Ghana	Guyana
Gambia, The	Jamaica	India
Guatemala	Jordan	Kenya
Honduras	Mali	Morocco
Indonesia	Peru	Pakistan
Liberia	Senegal	Sudan
Malawi	Sierra Leone	Tanzania
Nepal	Sri Lanka	Tunisia
Nicaragua	Swaziland	Upper Volta
Panama	Thailand	Zaire
Philippines	Yemen	Zambia
Rwanda		
Togo		

Source: Tait, et al (1979), op. cit.

TABLE IV
Public vs Private Goods: Who Should Pay?

Public (totally subsidized)	Mixed (partially subsidized)	Private (no subsidy)
National Defense	Communicable Disease	Agricultural Credit
Public Health Measures such as mosquito spraying	Health Care	Agricultural Inputs
	Agricultural Research	Non-Communicable Disease Health Care
	Forestry	Markets
	Energy Research	Irrigation
	Sewerage	
	Family Planning	
	Agricultural Extension	
	Potable Water	
	Education	

private good, there is no divergence between social benefits and costs and the sum of private benefits and costs. Thus market-determined prices can be used as guides to allocate resources among competing uses. The value to society of an extra bag of maize is measured by the market-determined price of maize. A subsidy (or tax) on maize distorts price signals and would lead to either a greater (or lower) consumption of maize than is economically optimal.

Markets are not likely to arise, however, for public goods because of their nature. For example, households are not likely to purchase mosquito-spraying services on a voluntary basis if they live in close proximity to other households who might not purchase such services. The non-purchasing households would obtain some external "free-rider" benefit and, moreover, there would be much less assurance that the total mosquito population had been

eliminated or effectively controlled. Under these circumstances, the private market would tend to provide much less in the way of these services than is socially optimal; namely, total coverage financed by universal fees or tax revenues.

On efficiency grounds, user charges for totally "private" goods, even if produced in the public sector, should be sufficient to cover the costs of production, thus eliminating the need for any recurrent finance out of general revenues. At this level of analysis it makes no difference whether the goods are produced by the government and sold at market prices, or produced and sold on the market by private firms. Since "mixed" goods should be partially subsidized and partially paid for by users, the price of mixed goods would not be sufficient to cover costs and it would therefore be necessary for some measure of recurrent finance. Lastly "public" goods should be totally financed by tax revenues. Again, in each of these

instances, it does not matter conceptually whether the goods are produced by the government directly or by private firms which are then reimbursed by the government for the public portion of their costs, much as the way food stamps are provided in the U.S.

One final note is in order here. In most cases it is inappropriate to involve the government in the provision of, as opposed to the subsidization of, development services which could and should be handled by the private sector. Government enterprises are often run less efficiently than private enterprises. These parastatals are generally insulated from the strictures of the market, by being able to run losses without being forced to cut costs or lower production. Management is frequently accountable to a different incentive structure than profits and losses. The government would be better advised to concentrate on those activities which are purely public or mixed goods, and create an environment conducive to private production of essentially private goods such as fertilizer, credit, or health care which is not related to communicable diseases.⁷ LDC's have been pushed into many of these activities by donors who are then surprised when credit funds become decapitalized and physicians not paid.

(2) Merit Goods Rationale

In the development context it is frequently argued that because of limited information or education, poor people undervalue certain basic commodities including types of health care, potable water, education, and nutritious foods. This argument requires that, to encourage poor people to consume these goods in greater quantities than they otherwise would, the goods must be partially financed by general government revenues.

A similar argument is made on the production side where producers, particularly smallholders, are allegedly reluctant to adopt new technologies which require substantial purchases of modern inputs such as fertilizers, hybrid seeds, and insecticides. The reasons for this reluctance are a natural aversion to risk, plus a limited amount of information on the relationship between new technologies and increased productivity.⁸ The argument is then made that subsidizing modern inputs encourages the adoption of new technologies and is therefore justified.

Both of these merit good arguments maintain that certain goods need to be subsidized for a

fixed period of time until experience changes current preferences. It therefore follows that certain subsidies are justifiable if they are imposed for a limited period of time. In other words, subsidies imposed for merit goods should be accompanied by a timetable for their gradual elimination. The political problem is, of course, that it is much easier to initiate a subsidy program than to eliminate one.

In general, the merit good argument has little merit. Although there is some anecdotal evidence of "non-rational" consumption patterns among the poor, most careful budget studies show that poor people spend a very large portion of their income on "basic needs" goods.⁹ Table V reproduces an EICEL - Brookings study on consumer behavior in ten South American cities. As can be seen low income consumers in South American cities spend upwards of 85% of their incomes on "basic goods." Without clear evidence that consumer preferences are irrational, subsidy programs could lead to misallocations of resources, producing goods of lower value than non-subsidized programs would.

(3) Equity Rationale

In many countries there are large groups of people with incomes so low that they face the ever-present danger of starvation. Governments often find it necessary to provide a safety-net, to insure that the minimum requirements for survival are met. The most efficient means of achieving an income-floor goal is through the use of the fiscal system. Few countries, and fewer LDC's, however, have a fiscal system sufficiently sophisticated to make such a program feasible. Consequently, governments have attempted to alleviate poverty by the direct provision of in-kind goods and services thought to be necessary. While this is clearly a "second best" solution, it may represent the only politically and administratively feasible mechanism for providing the necessary resources to the threatened populations.

The critical problem with subsidies is that they are generally untargetted. The typical policy is universal free primary education, or universal free health care. Food subsidies are often imposed across the board without any clear distinction between those who are able to pay and those who are not.

For example, consider a country with the income distribution and per capita income of India. Assume that tax revenues are 10% of GDP, and that the recurrent cost of development projects that provide services are \$50 per person reached. (India's GNP/capita is \$200). Then tax revenues

⁷ PPC is currently drafting a policy paper on the role of parastatals in development.

⁸ In addition, the weakness of long-term financial markets inhibits the adoption of new technologies because many of these technical packages are associated with negative cash flows during the start-up period.

⁹ See David Wheeler and John Harris, "Recurrent Costs and Basic Needs Strategies," (AID/OTR-G-1733, June, 1980).

TABLE V
Basic Needs Expenditures as Percent of Family Budgets
for the Lowest Income Quartiles (Ten South American Cities)^a

City	Mean Income of Lowest Quartile (\$)	Percent
Bogota, Columbia	1037	89.7
Barranguila, Colombia	1100	88.7
Cali, Colombia	1029	88.6
Medellin, Colombia	1055	87.8
Santiago, Chile	942	85.7
Quito, Ecuador	845	90.5
Quayaquil, Ecuador	896	91.4
Lima, Peru	1161	80.8
Caracas, Venezuela	1602	80.4
Maracaibo, Venezuela	1452	82.0

Source: Wheeler and Harris, op. cit.

^a Relevant definitions are as follows:

"Basic" expenditure categories: Food and beverages; housing; clothing; medical; education.

"non-Basic" expenditure categories: Furnishings and operations; recreation and culture; vehicle operation; public transportation; communication; other consumption (tobacco, personal care, ceremonies); insurance; gifts and transfers; other nonconsumption.

will be \$20 per person, and given the cost of services, only 40% of all people can be reached if taxes are the sole source of finance. If we divide the population into three groups, the upper group (top 20%) the poor (middle 40%) and the abysmally poor (bottom 40%), and then assume that all the upper group get the services with the remaining recipients divided equally among the two poorer groups, we obtain the result of Table VI, i.e., that 100% of the upper class get the service, while 25% of each of the next two groups get the services (sixty percent of the total population are excluded).

Suppose, however we introduce user charges of \$25 for the service (it's half a public good and half a private good). Also assume that every member of the two upper groups is able to pay for the service. If you then provided the service free of charge to the bottom group, you would be able to reach 100% of the upper group, 100% of the middle group, and the same 25% of the bottom group, or 70% of the population. These results are summarized in Table VI below:

While the general level of poverty and tax collection limits the ability of the government to provide the public good to the entire population (the

public good cost, \$50 per person and tax revenues are only \$20 per person) coverage is obviously much broader when user charges are imposed on those groups able to pay.

The equity question is not as simple as it first seems. Referring back to our India example we see that resources are only available to provide public goods to 25% of the poor population. Which twenty-five percent? In the absence of a purely political response the choice is arbitrary. The result is like a lottery. Without user charges, only 25% of the poor population will receive public services and there is no rational way of allocating these services among the poor.

By imposing user charges and distributing services to all of the poor community, more people can benefit, though at a lower level of service. While a development project requiring recurrent finance of fifty dollars per year is not affordable for the whole community, one requiring twenty-five dollars might be. The choice becomes one of giving a few poor a high level of service or giving the many poor a lower level of service.

To be sure there are indivisibilities. It may not be possible to provide everyone with piped water or secondary schools. But improved water supplies,

TABLE VI
An Arithmetic Example of the Effect of User Charges on Service Delivery

	Without User Charges	With User Charges
Cost Per Person	\$50	\$50
Tax Revenue per Person	\$20	\$20
User Charge Fees per Person	0	\$25
Total Coverage	40%	70%
Coverage of Upper Group (P.C.I. = \$500)	100%	100%
Coverage of Middle Group (P.C.I. = \$175)	25%	100%
Coverage of Bottom Group (P.C.I. = \$75)	25%	25%

functional literacy, or primary health care may be affordable for most communities, provided the level of services is consonant with the ability of the poor to pay.

The following general principles apply to the question of subsidies and user charges:

First, that for goods which are purely public in nature, user charges are inappropriate on efficiency grounds, and these goods should be financed by general revenues;

Second, for goods which are partially public, e.g., education, partial financing from general revenues is legitimate, but should be carefully monitored.

Third, subsidies may be appropriate for a limited period of time to induce producers (particularly small farmers) to adopt new technologies.

Fourth, subsidies may be used to alleviate poverty through the provision of goods and services to the poorest in order to meet survival needs. Such subsidies should be limited to the segment of the population whose income needs to be raised, and not be provided across the board;¹⁰ and

Fifth, user charges should be levied on other goods and services provided by government.

2. Government Expenditure Policies

(a) Government Budget Allocations

Even if the government is capable of generating sufficient revenues, there may be recurrent cost problems in development projects, particularly in the health and education sectors, if the government is short-changing these sectors in favor of others. Four principal offenders here are defense expenditures, government enterprises, subsidies of various types, and large prestigious industrial projects. Low income AID recipient governments are spending on recurrent account an average 2.7% of GDP on education, 1% on health, and another 1% on agriculture; whether these are appropriate depends on particular country circumstances. Table VII summarizes available data on budget allocations for these countries.

Alan Tait and Peter Heller of the IMF have developed an "International Expenditure Comparison Index," similar to the "International Comparison of Taxation Index" discussed above. While these comparisons should be treated with even greater caution than that suggested for interpreting the ICT, the results are interesting and in some cases provocative. Table VIII sum-

¹⁰ There are several ways of targeting subsidies. Food subsidies could be limited to those foods preferred by the poor, such as cassava in many countries. Water piped to a house would not be subsidized while community stand pipes could be. There could be subsidies for certain levels of health care but not for others. These complex issues will be discussed in greater depth in a forthcoming policy paper on subsidies.

marizes the results for AID recipients for which these Indices were calculated.

Frequently, a recurrent cost problem in a given sector is an expression of government priorities. Failure to provide school supplies or petrol for extension workers may reflect the government's decision that these activities are less important than subsidizing agricultural inputs or financing a new steel complex. Where requisite steps to meet recurrent costs are not undertaken, A.I.D. should seriously consider reducing the level of assistance to the affected sector. There is little point in developing projects that call for host government resources to be successful, if those resources are not likely to be forthcoming.

(b) Cost of Government Activities

Sometimes government budgets become tight because the costs of producing government goods and services are excessive. This is frequently due to inflated salary schedules, as is particularly the case in much of the Sahel. For example, let us examine primary education in Upper Volta by comparing its situation with that of Burma and Malawi. Burma, with a nominal GNP per capita level similar to Upper Volta's has enrollment levels of 80%, (five times that of Upper Volta) and Malawi with a per capita income level 12.5% higher has enrollment levels of 60% (almost four times that of Upper Volta). How are these countries able to finance the recurrent expenditures and Upper Volta not?

The answer is clear. Upper Volta does every bit as well as Malawi and Burma in generating tax revenue and allocating portions of both government budget and GDP to primary education. The key differences is in per pupil expenditures which are four times that of Malawi and almost seven times that of Burma. Often differences in costs are related to particular resource endowments—either of terrain, population density, or skilled labor. However, in other cases there is no justification for the cost structure of government activities. For example, it has been found that the ratio of public sector wages to the income of a peasant in Mali is approximately twenty to one. In India the ratio is probably closer to six to one. Such a differential may in part be due to the relative shortage of administrative skills, but a larger portion is undoubtedly due to excessive levels of compensation. A clear indicator of the compensation question is whether the private sector or the public sector is exhibiting the greatest shortage of skilled personnel. If the government sector is having difficulty attracting skilled personnel then public wages are not too high. On the other hand if the private sector is having difficulty attracting trained people then government wages may very well be out of line.

TABLE VII
Average Recurrent Government Expenditure
Selectors 1967-1973
(as percent of GDP)

	Agriculture	Education	Health	Total
Bolivia	0.4	3.7	0.8	4.9
Burma	0.9	2.5	1.0	4.4
Burundi	0.6	2.6	0.7	3.9
Cameroon	0.6	2.2	n.a	n.a
Gambia	1.9	2.4	1.7	6.0
Ghana	0.9	3.7	1.1	5.7
Guatemala	0.2	1.7	0.9	2.8
Honduras	0.6	2.8	0.5	3.9
Kenya	1.3	3.3	1.1	5.9
Lesotho	2.3	4.9	2.2	9.4
Liberia	0.4	1.9	1.0	3.4
Malawi	1.2	2.7	1.1	5.0
Mali	0.6	2.4	1.2	4.0
Nepal	0.1	0.3	0.1	0.5
Philippines	0.5	2.4	0.4	3.3
Rwanda	0.4	2.5	0.9	3.8
Senegal	0.9	3.4	1.4	5.7
Somalia	0.8	1.5	1.7	4.0
Sri Lanka	0.6	3.7	1.8	6.1
Sudan	1.7	2.0	1.1	4.9
Swaziland	1.9	3.8	1.7	7.4
Tanzania	1.2	2.7	1.2	5.1
Thailand	0.7	2.2	0.5	3.4
Togo	0.6	1.6	0.8	3.0
Upper Volta	0.5	1.6	0.7	2.8
Zaire	0.2	4.5	0.6	5.3
Zambia	2.7	4.0	1.8	8.5
Mean	0.9	2.7	1.1	4.7

Source: *World Bank Tables, 1976*

Salaries are the main cause of high costs, but inappropriate technologies are also important. A health care sector that is made up of high technology curative hospitals is going to have higher costs per beneficiary than a primary care system. This is true for all sectors from education to rural development to road construction. If costs are out of line on a sectoral basis (due to inappropriate technology) donors should tend to stay out of that sector. If costs are out of line in every sector, then clearly, financing of recurrent costs in any sector would be inappropriate, since it would involve subsidizing those inputs which are priced too high.

3. Macroeconomic Policies

Frequently, recurrent cost problems arise through the failure of government fiscal and monetary policies. For example, an overvalued domestic currency coupled with a government marketing system will destroy a country's fiscal base. In Ghana, for example, where the cedi is overvalued by perhaps 10:1, it is impossible for the government to pay cocoa farmers anything like the true market price. Cocoa production has declined precipitously. This has meant a shortfall

not only in foreign exchange, but also in government revenues.

As noted in the introduction to this paper, the economic crises threatening most LDC's have led to the acceptance of IMF stabilization packages with an attendant austere government budget. Consequently, many countries are going to face a reduction in their ability to finance the recurrent costs of their development portfolio over the near term.

There are many instances where an apparent recurrent cost problem is due to an over-optimistic attitude on the part of government as to what it can achieve. For example, Egypt and Mali are committed to hire every secondary school leaver. This results in an overblown public service and a shortage of manpower in the private sector. The recurrent burdens of such a policy are enormous.

Similarly, governments may be too ambitious in addressing the needs of the population given the resources they have available. Universal primary education may not be appropriate in poor countries with 25% of their population in this age group. The same argument can be advanced for a

TABLE VIII
International Expenditure Comparison Index, 1977:
Functional Categories of Expenditures

	General Public Services	Defense	Education	Health	Agriculture	Transport and Communications
Bangladesh	Low	Low	Low	Average	Average	High
Bolivia	Average	Average	Average	Low	Low	Average
Botswana	Average	Low	High	High	High	n.a.
Burma	Average	High	Low	Low	High	n.a.
Burundi	Low	High	Average	n.a.	Average	n.a.
Cameroon ^a	High	Average	Average	Low	Low	High
Chad	Average	High	Average	Low	Average	Low
Costa Rica	Low	Low	Average	Low	Low	High
Dominican Rep	Low	Low	Low	Average	Average	Low
Ecuador	Low	Average	Average	Low	Average	n.a.
Egypt	Low	Low	High	Average	High	Low
El Salvador	Average	Low	Average	Average	Low	Average
Gambia, The	High	n.a.	Average	High	High	n.a.
Ghana	Average	n.a.	High	Average	Average	Average
Guatemala	Low	Low	n.a.	Low	Low	n.a.
Honduras ^a	High	Low	Average	High	Low	n.a.
Jamaica	Low	Low	High	High	High	Average
Jordan ^b	Average	High	High	High	High	High
Kenya	Low	Average	Average	Average	Average	Average
Lesotho ^c	High	n.a.	High	Average	High	n.a.
Liberia	High	Low	Average	High	Average	Average
Malawi	Average	Low	Average	Low	Average	Low
Mali ^c	Average	High	High	Average	Low	Low
Morocco	High	High	High	Average	n.a.	n.a.
Nepal	Low	Average	Low	n.a.	Average	n.a.
Nicaragua ^a	Low	Low	Low	Low	Low	n.a.
Niger	High	Low	High	Average	Low	Average
Pakistan	Low	High	Low	Low	Low	Average
Panama	High	n.a.	Average	High	Average	Average
Peru	Average	Low	Average	Low	Average	n.a.
Philippines ^c	Average	Average	Low	Low	Average	High
Rwanda	Low	High	Low	Low	Low	High
Senegal ^b	Average	Low	Average	Low	Low	Low
Sierra Leone ^a	Average	Low	Average	Average	Low	Low
Somalia	High	High	High	High	High	Low
Sri Lanka	Low	Low	Average	Average	Average	n.a.
Sudan	Low	Average	Low	Low	High	Average
Swaziland	Average	Low	High	Average	High	n.a.
Tanzania	Average	Average	Average	High	High	Average
Thailand	Low	High	Average	Low	Average	Average
Upper Volta ^c	Average	High	Average	Low	Low	Low
Yemen	Average	High	Low	Low	Low	Average
Zambia	High	n.a.	High	High	High	High

Source: Alan A. Tait and Peter S. Heller, "International Comparisons of Government Expenditures: A Starting Point for Discussion" IMF Discussion Memorandum, DM/81/53, July, 1981.

Each index runs from zero to four hundred. Any value less than 75 was recorded as "Low", values between 75 and 125 were recorded as "Average", and values greater than 125 were recorded as "High".

^a1976 ^b1975 ^c1974 ^d1978 ^e1973

variety of activities, some worthwhile but expensive, others worthless and expensive.

The recurrent cost problem is, thus, often due to inappropriate government policy, and the rational donor response is to endeavor to persuade governments to change the policy, or to develop activities the success of which is not dependent on recurrent financing which will not be forthcoming.

(a) Foreign Exchange Constraints

It is generally, though not universally, true that the recurrent cost problem is manifested through the shortage of foreign exchange to purchase important intermediate inputs into the production of government services. Thus, there is more typically a scarcity of drugs than medical officers, of school supplies, than teachers, and of petrol than extension workers. One indicator of

TABLE IX
Comparative Cost Figures for Upper Volta, Malawi, and Burma

	Upper Volta	Malawi	Burma
Per Capita Income (US\$)	160	180	150
Per Cent of Population between 5 and 14 (%)	25	25	25
Primary Enrollment Rate (%)	16	62	80
Tax/GDP Ratio (%)	11.3	10.1	7.6
Proportion of Govt Exp to Primary Education (%)	8.8	8.5	10.5
Percent of GDP devoted to Primary Education (%)	1.0	0.9	0.8
Per Pupil Expenditures (US\$)	40	10	6
Pupil/Teacher Ratio	46	58	7

country performance in this regard is the ratio of expenditures on other goods and services (largely imported) to expenditures on wages and salaries. The IMF expenditure study referred to above has calculated an international expenditure comparison (IEC) index for both "other goods and services" and "wages and salaries" categories of expenditures. The ratio of these two indices is a useful measure of the degree to which there is apparent underspending on materials and replacement of capital equipment, and thus, a likely foreign exchange constraint. These ratios are presented in Table X.

However, even if the recurrent cost problem manifests itself in terms of a shortage of imported inputs rather than locally financed ones, the analysis and the prescriptions presented thus far in this paper remain valid. A recurrent cost problem is defined as a situation in which the stream of returns to the recurrent imported factor of production is greater than the stream of returns to the fixed imported factor. This situation results from either donor policies or recipient policies, and the situation can be resolved by policy reform.

4. Project Design Failures

Capital under-utilization which is particularly concentrated in one development sector indicates that the return to the host government of recurrent expenditures in that sector is less at the margin than was anticipated in the project design. A basic economic principle is that fixed costs are fixed costs. Once a health center has been built its capital costs are zero. The government must allocate its recurrent resources among a large number of activities, all of which presumably have a quantity of capital attached to them. In the project design the returns to the investment were calculated on the expectation that they would be fully utilized through the provision of complementary variable resources—labor, materials, maintenance, etc. However once in place it makes sense for the government to recalculate the social benefits of its allocation of scarce resources among various activities. The new calculation may differ from

TABLE X: Ratios of IEC Indices for Other Goods and Services to Wages*

	Ratios below one		Ratios greater than or equal to one
Bolivia	0.66	Botswana	1.11
Dominican Republic	0.51	Cameroon	1.06
Guatemala	0.74	Costa Rica	2.76
Liberia	0.69	Egypt	1.03
Mali	0.33	Gambia, The	1.51
Mauritius	0.59	Honduras	1.16
Morocco	0.41	Jamaica	1.31
Rwanda	0.94	Kenya	1.05
Swaziland	0.90	Malawi	2.21
Tunisia	0.97	Nicaragua	1.41
Turkey	0.58	Niger	1.79
Upper Volta	0.25	Panama	1.16
		Paraguay	1.35
		Philippines	1.28
		Senegal	1.12
		Sierra Leone	2.12
		Sri Lanka	1.07
		Sudan	2.91
		Tanzania	1.11
		Thailand	2.41

Source: Alan A. Tait and Peter S. Heller, "International Comparisons of Government Expenditures: A Starting Point for Discussion," IMF/DM/81/53, July, 1981.

*Low ratios imply either (1) the presence of a foreign exchange constraint or (2) high wage structure or (3) both.

the original one due to a number of factors, e.g.:

- (1) government priorities might change
- (2) the original design was faulty
- (3) the values of certain variables such as prices were predicted incorrectly.

If road maintenance is underfinanced, while other sectors are operating with little overt underutilization, then a donor should be very circumspect about getting involved in this sector. At the least it should investigate previous road building projects to determine whether the cause for the underfinancing was a low governmental priority or poor design, and redesign its project accordingly. In general, underutilization confined to a particular sector is *prima facie* evidence that the expected rates of return to investments in that sector were much too optimistic. In such cases the appropriate response is much more careful design in order to insure that

investment decisions anticipate likely responses. In particular, costs of recurrent inputs are often underestimated due to lack of donor co-ordination. For example, if a number of donors are doing projects that require skilled workers for maintenance, the sum of their demands might raise the price of these workers well beyond the levels anticipated.¹¹

Another problem with project design is the tendency to be overly optimistic about the time necessary for a project to move from the development stage to what might be called the operational stage. During the early stages of a project it is expected that project revenues will be low and expenditures high. It is likely that this situation will continue beyond the typical five year implementation period, thus leading to demands on the public fisc.

In the preceding paragraphs project designs were faulted for failing to anticipate changing environments correctly. Often it is the policy environment that is most at fault. This is particularly the case in income generating projects which should never, if designed correctly, be the source of recurrent cost problems. Any investment is expected to generate a positive rate of return. For an income generation project that return should begin being realized even before the development phase of the project is concluded. Such returns should be more than sufficient to cover the recurrent costs of the project. If a farmer or a herder is increasing his income by a greater amount than the costs of the inputs leading to that increase, he should be willing to pay for it. If a project is not designed so as to capture these variable costs then it is poorly designed.

It is true, however, that many projects will not become financially viable immediately, but require a development phase that allows a time for learning how to use new technologies efficiently. Thus the adoption of new technologies, particularly those with substantial capital costs, such as irrigation or animal traction packages, will have negative cash flows in the start-up or development phase. There is, therefore, a need to develop medium and long-term credit institutions which will provide the resources necessary for investment.

(a) Local Participation

Recurrent cost problems, as we have seen, have many causes. Local communities have substantial resources, both in cash and kind, which can be utilized to finance the recurrent and capital costs of development projects.

¹¹ See A. Mead Over, "On the Care and Feeding of a Gift Horse: The Recurrent Cost Problem and Optimal Reduction of Current Inputs," Williams College, Development Studies Program, Research Memorandum, No. 79, Jan. 1981.

In order to mobilize these resources, local communities need to be shown that it is in their interest, that the benefits of the project exceed the costs. Projects which are designed with the participation of local communities are frequently more responsive to local needs and conditions than centrally designed projects and thus are more likely to elicit local support.

Moreover, leaving maintenance and finance to local communities is likely to increase the commitment of the beneficiaries to the project and therefore to insure its sustainability. If it is the local community that is to maintain irrigation ditches rather than a government parastatal, the ditches are more likely to be maintained.

Local communities are also able to mobilize resources in kind and transform them into cash. For example, a water project which saves women's time might be accompanied by a gardening project which converts that time into revenue, part of which could be used to pay for the water.

IV. Recurrent Cost Analysis

There are two somewhat separable issues in recurrent cost analysis—

(1) Is a given country presently suffering from a recurrent cost problem?

(2) Is a given country likely to suffer from a recurrent cost problem in the future? The first question is easy to answer conceptually. Are there sectors or projects where expansion of the use of variable factors of production will generate a stream of returns greater than the stream of returns associated with new capital investments? Is repair of a road more productive than building another one? Is an increase in teachers likely to have a greater impact on education than an increase in schools or is underutilization of capital, as evidenced by shortages of books, health workers, and maintenance, a rational response due to more profitable opportunities for scarce resources in other activities?

Answers to these questions require analytical skill, experience, and judgment. There is no formula which will provide a ready solution. If, however, existing projects are underutilized, while there is great difficulty in demonstrating positive net present value of new projects, then it is likely that a recurrent cost problem exists. This is presumably the case for many AID recipients. Inflationary finance, substantial levels of short-term borrowing, or consistent underfunding of the recurrent costs of development budgets may be signs of a substantial budgetary problem. This budgetary problem is not necessarily identical to a recurrent cost problem, since it includes both revenue and expenditure responses to a deficit. Indeed, it is possible, that a failure to fund the

deficit through compensatory borrowing would be offset by reductions on the expenditure side. Conversely, short-term borrowing may be a sign of the government's intention to avoid expenditure short-falls in adjusting to a deficit.

How does one identify projected deficits? What are the implications of these deficits for recurrent expenditure shortfalls in the future? The place to begin is by dividing expenditure and revenues into broad categories such as is done in Table XI below. Each of these budget categories can then be associated with critical macro variables. By examining past performance, it is possible to relate each of these budget variables to macro-variables, and then, by estimating the future value of the macro-variable one could estimate the future value of the budget variable. Adjustments must be made for changes in policy or exogenous variables such as the exchange rate,

Table XI
Projecting Budget Deficits

Budget	Associated Macro Variable
Revenues	
Direct Taxes	Gross Domestic Product
Import Duties	Imports of dutiable items
Export Duties	Exports of dutiable items
Excise Taxes	Consumption
Profits of Government Enterprises	Gross Domestic Product
Foreign Assistance	Time Trends plus Commitments
Increases in Domestic Borrowing	Gross Domestic Product
Expenditures	
Subsidies	Output of subsidized sectors
Interest and Debt Amortization	Total Debt
Capital Expenditures	Government Plan
Transfers	Gross Domestic Product
General Administrative including defense	Gross Domestic Product
Recurrent Expenditures on Development Projects	Analysis of recurrent costs of Project portfolio

None of this is easy. It may, in many cases, be just as profitable to merely project current trends into the future. Many categories of both revenues and expenditures show remarkable stability. Table XII presents data on temporal variations of key budget categories for a random sample of eight low income AID recipients.

The information in the table was derived from taking the ratio of each budget variable to GDP across each of the seven years and finding the mean and standard deviation of this set of values. If we assume that the random component

of each variable is normally distributed, then one can easily calculate a ninety-five percent confidence interval around the mean. For example, education expenditures in Burma have a value of 18% in the table. This means that in projecting into the future, on the basis of 1967-73 data, ninety five percent of the time the ratio of education expenditure to GDP will be within 18% of the mean value during the 1967-73 period.

There are several items of interest from the table. First, certain countries have much more volatile fiscal behavior than others. Sudan, for example, has a much larger confidence interval for most variables than the average, while Sri Lanka has a much smaller one. For countries such as Sudan a more careful and sophisticated analysis is in order. Secondly, certain expenditure sectors are much less volatile than others, education expenditures being more constant than those in agriculture. Lastly, the totals tend to be less variable than the components. Thus one is more likely to be able to project total revenues than customs duties.

Data like those in Table XII can be used either sectorally or globally. For example, over 1967-73, government revenues in Burundi averaged 10.9% of GDP.

One can expect then, with some confidence, that in 1976, revenues would be somewhere between 9.8 and 12% of GDP (given a confidence interval of 10% of the mean). Of course, if there was a change in tax laws or tax collection procedures these estimates would be less firm. In Burundi, over 1967-73, current expenditures exceeded current revenues in only one year, and that by a mere five percent. Consequently, it is likely that total current expenditures will not be allowed to exceed 12% of GDP in 1976.¹² Therefore if an analysis of the current development portfolio suggests that expenditures well in excess of 12% of GDP are required, there is good reason to expect a recurrent cost problem in the future.

At the sectoral level, there tends to be much greater variation, particularly in the agricultural sector. For Sri Lanka, where agricultural expenditures averaged 0.55% of GDP from 1967-1972, and the confidence interval around that average was 18% , or one-tenth of one percent GDP, the funding of a major rural development program during that period that raised recurrent agricultural expenditures to one percent of GDP, would have required a substantial shift in budget priorities.

¹² While data on current expenditures were not available, government revenues for Burundi during 1976 amounted to 11.4% of GDP, within the projected confidence interval. By 1978 however, current expenditures were 14% of GDP, well in excess of the 12% maximum.

TABLE XII

Variation in Key Budgetary Variables, as a Share of GDP,
Selected Countries, 1967-73
(95% Confidence Intervals around mean value in percentages)

	Burma	Burundi	Honduras	Lesotho	Liberia	Sri Lanka	Sudan	Tanzania	Average
Current Revenues									
Income Tax	54	30	18	36	16	32	92	28	38
Sales Tax	24	23	26	—	76	36	52	62	42
Customs Tax	32	22	10	122	16	36	80	36	44
Other Taxes	22	26	32	32	28	14	—	30	26
Non-tax Revenue	72	22	42	18	50	26	24	36	36
Total	24	10	10	74	12	14	32	18	24
Current Expenditures									
Defense	12	34	62	—	34	58	46	84	48
Agriculture	38	28	24	41	96	18	18	28	34
Education	18	16	20	18	68	4	12	20	22
Health	18	28	34	26	42	14	18	44	28
Other	18	20	24	14	22	10	44	28	22
Total	12	8	16	12	10	12	34	20	16
Foreign Grants	40	44	—	106	34	—	—	182	82
Capital									
Expenditures	22	50	70	56	58	14	30	62	46
Total Expenditures	10	10	26	18	18	10	26	32	18

Source: World Bank, World Tables, 1976.

An exercise of this type represents only the beginning. In order to determine the likelihood of recurrent cost problems in the future, one needs to temper simple projections with a great deal of judgment. Is there a new development plan? Is the plan realistic, and what portion of projected investments are likely to be made and over what time period? What is the expected response of the donor community? Is there likely to be a change in government priorities? In revenue collection or tax laws? What are the best guesses of the rate of growth, over the next five years? Of inflation? What's likely to happen to the terms of trade? How will international price changes effect the government budget? Is there going to be a change in the level and type of subsidization?

Recurrent cost analysis is not a simple procedure. The HIID—CRDE study of recurrent costs in the Sahel required enormous inputs of consultants' time and energies (the seven country study on macroeconomic projections is one thousand pages long).¹³ The procedures outlined above can be used to indicate where a problem is likely to exist. A quantitative investigation of the size of the problem would require a much more detailed study.

V. Solutions to Recurrent Cost Problems

As noted in Section III, recurrent cost problems exist either because of host government policies or donor policies. Solutions to recurrent cost problems require either increasing the share of revenues going to the recurrent cost budget, reducing the level of investment, reducing the recurrent costs attached to each new investment, or increasing general government revenues (only after careful review of the potential negative effects on productivity and capital formation).¹⁴

A. Re-examining the Recurrent Cost Coefficient

Where there is a serious recurrent cost problem, one solution is to re-examine the recurrent cost burdens of the project portfolio. The project mix might be changed in the direction of projects

with a lower level of recurrent costs relative to investment costs than others. However, if projects have been chosen rationally, such that the current project mix represents the "optimal" allocation of investments, any restructuring will reduce the expected long-run rate of growth. What is the appropriate trade-off between overall project productivity and recurrent cost economizing?

The cost-benefit technique for analyzing projects is readily adaptable to answering this question. Any project will affect the government's budget in two ways—through increased costs and increased revenues. The "r" coefficient is defined so as to measure the stream of recurrent expenditures related to a given project. There is, similarly, what we might call a "c" coefficient, or a cost recovery coefficient, which represents the increases in government revenues attributable to the project. While the cost data should be readily available from the project documents, the revenues are more elusive.

User charges make up one element of cost recovery. The second element is the increase in tax revenues, both direct and indirect, generated by the project. For example, if the project increases farmer incomes, then part of that income will be taxed directly, through income taxes or export levies. Another part will be spent on inputs and therefore custom duties or goods which have excise taxes on them. Finally, part of the income is used to purchase locally-produced goods thus multiplying the income, as well as income, excise, and customs taxes. In most LDC's, because of substantial foreign trade leakages, this multiplier is not likely to be very large.

Thus, any project may be expected to generate a stream of economic costs and benefits, a part of which are, respectively, recurrent government expenditures and revenues. If the country has a recurrent cost problem, then government finances are a constraint to profitable investment.

The appropriate procedure then, is to perform an economic analysis using a shadow price for government revenues, just as one uses shadow

¹³ CISS/Club de Sahel, "Recurrent Costs of Development Programs in the Countries of the Sahel."

¹⁴ Assume, for example, that government revenues (GR) are 15% of GDP, that the current capital stock in development projects (KD) is 25% of GDP, that the share of government revenues going to the recurrent budget of the development sectors (RD) is a reasonable 30% of government expenditures, and that, due to the government's concern with directly addressing basic needs, the "r" coefficient, the annual value of recurrent expenditures associated with a dollar's investment, is 0.2. Then under current circumstances, government recurrent resources available for development projects are equal to $RD \times GR$, or 4.5% of GDP. On the other hand demand is greater than the supply and a recurrent cost problem exists if these resources are more productive than new investments. Moreover, if new projects will generate greater recurrent costs than they will tax revenues, such a problem will persist.

There is a simple relationship here. The demand for resources equals $GDP \times KD \times r$. The supply of resources equals $RD \times GR \times GDP$. If there is a recurrent cost problem then:

$$GDP \times KD \times r > RD \times GR \times GDP \quad \text{or} \\ KD \times r > RD \times GR$$

The solution then is to either reduce demand by reducing KD or r, or increase supply by increasing RD or GR. In other words, the available options include reducing the level of investment, reducing the recurrent cost coefficient, increasing the share of revenues going into the recurrent budgets of development projects or increasing general government revenues.

prices for labor and for foreign exchange. Sensitivity analysis might be used to examine a range of shadow prices and determine under which set of assumptions a project design is acceptable. An example of this procedure can be found in Appendix II.

B. Increasing Donor Resources Going to Recurrent Budgets of Development Projects

Clearly, the most direct method for alleviating recurrent cost problems is financing recurrent costs explicitly. An earlier section of this paper argued that one of the causes of the recurrent cost problem is the limitations of fungibility caused by donor policies. Donors have open to them the option of increasing that fungibility by increasing the degree to which they are willing to finance recurrent costs.

In general, outside of counterpart requirements, AID has been willing to finance certain recurrent expenditures only during project development. The recent decision to extend life-of-project funding to ten years makes more realistic the length of time needed for a project to move from the development phase to an ongoing, revenue generating project which will generate as much recurrent finance as it will recurrent expenditures. At this point, the LDC government would be more able and more willing to take over the financing. Any arrangements of this type will need a careful stipulation of the way in which AID resources can be phased out and host country resources phased in. Before AID becomes willing to increase its funding of the recurrent costs of a development activity, in fact, before the Agency makes an investment decision, it should be reasonably certain that policies affecting that activity are not likely to lead to the project's failure. Otherwise countries will be just as ill-prepared to assume the total funding of recurrent costs at the end of year ten as they often are now at the end of year five.

C. Donor Support of Government Sectoral Budgets

Since overall recurrent cost problems are due to either donor or LDC policies, it is first necessary to analyze the problem and determine its causes. Where LDC policies are not the main causes, or where policy reform is possible, AID should be willing to consider providing general support to the recurrent budget. Among the instruments available for providing such support are cash transfers, CIP's, and PL 480 local currency generations. Such program support can be directed at a particular sector or at the macro level.

The first step in such a program is a macro-level analysis of the recurrent cost problem. At the least one would need time series on government

outlays and revenues; an analysis of the government salary and cost structure vis-a-vis the private sector's costs; a discussion of the extent of reliance on user charges, and a discussion of the government's pricing policy for inputs and outputs in the productive sectors where AID is active. Any project paper designed to provide recurrent cost budget relief must be justified in these terms.

Once the causes of the problem have been identified, a recurrent cost budget support program should include a blueprint for policy reform. These policy changes might include a greater reliance on user charges, a reduction in the subsidy level, a shift of government budget resources between sectors, improvement in tax administration,¹⁵ shifting certain activities from the public sector to the private sector, or a change in technologies (For example where government salaries are out of line, it may be appropriate to introduce new personnel categories with training and salaries more in line with the task. Thus, relatively less trained teachers could be used in certain settings, reducing the cost of delivery of education services.)

Lastly, general recurrent cost budget support programs should be, when possible, developed in concert with other donors. The recurrent cost problem is a result of the activities of all donors. Its resolution should involve the concerted action of all donors. Moreover, AID activities in financially strapped LDC's must be planned in concert with other donor activities, since the recurrent cost problem only becomes manifest through the total development program, and not any single portion of it.

It is important to note, that direct funding of recurrent costs, either at the project or budget level, is only justifiable under fairly narrow conditions. These conditions, which have been spelled out in this paper include:

- (1) An acceptable policy framework or movement toward such a policy framework;
- (2) An assurance that recurrent cost support has higher development impact than new investments;
- (3) An inability of the host country to undertake recurrent cost financing;
- (4) A carefully phased plan exists for shifting the entire burden to the host government.

D. Reducing the Level of Donor Support

Where recurrent cost problems are due to LDC government policy, and where that policy is not

¹⁵ AID should be willing, where feasible, to support institutional development in tax administration. Better administration can both alleviate budget pressure and reduce the marginal rate of taxation, thus providing greater incentives for entrepreneurial activity, both domestic and foreign.

likely to change, AID should seriously consider reducing the level of activity in the affected sector, or, if necessary, in the general development program. It makes little sense to invest in programs that are predicated on a given level of recurrent financial support, if that support is unlikely to be forthcoming. AID activities, in such an environment, should be, wherever possible, designed so as to be insulated from government budget problems. Moreover, even small pilot projects are of limited value, if the financial resources are not available to broaden their reach, if they are successful.

VI. Conclusions and Recommendations

We have seen that recurrent cost problems are the result of inappropriate policies on the part of donors or LDC governments. The existence of a recurrent cost problem is *prima facie* evidence of a misallocation of resources.

The recommendations for policy that are suggested by the paper can be divided into five categories: analysis, project design, policy reform, reallocation of assistance, and recurrent cost funding.

A. Analysis

1. In order to argue that a given country is suffering from a recurrent cost problem, Missions must provide evidence (not necessarily quantitative) that indicates that the stream of returns to recurrent financing is greater than that to new investments.
2. In determining whether or not there will be recurrent cost problems in the future, it is necessary to carefully project key *ex ante* budget categories. These include:
 - (a) taxes by various types
 - (b) non-tax revenues
 - (c) foreign assistance
 - (d) expenditure by type
 - (e) transfers and subsidies
 - (f) interest and debt repayment
 - (g) capital expenditures
 - (h) recurrent expenditures implicit in the development plan
3. Analysis should also include some discussion of the causes of the recurrent cost problem. It is necessary therefore to discuss:
 - (a) the efficiency of the tax administration system
 - (b) the degree of subsidization of various programs
 - (c) the allocation of government expenditures by various categories
 - (d) the costs and technologies adopted in producing of government services

(e) the degree to which public sector activities are a drain on, rather than a support of, the economy

(f) the impact of government macro policy on recurrent cost problems

4. All Project papers should analyze the recurrent cost implications of the project.

(B) Project design

If design is the cause of the problem, A.I.D. and LDC governments should work to design projects so as to assure that their recurrent cost components are consistent with economic feasibility.

(1) In countries suffering from a recurrent cost problem, the economic analysis of projects should use prices for government expenditures and revenues that reflect the scarcity value of government resources;

(2) Projects should be designed, to the extent possible, to maximize the revenues from service charges (or contributions of labor or in kind) consistent with the capacity of the beneficiaries to pay; and

(3) Where possible, government activities should be turned over to the market economy. This is generally desirable in all agricultural and industrial productive activities as well as marketing, distribution, trade and many services.

(C) Policy Reform

If LDC policies are the cause of the problem, the Missions should:

- (1) attempt to persuade governments to make necessary reforms;
- (2) enlist the support of the donor community for policy reform; and
- (3) provide technical assistance in the form of expertise and training to support reforms, including such areas as fiscal policies and tax administration.

(D) Recurrent Cost Support

If recurrent costs constitute a serious problem and LDC government policies are appropriate and projects designed correctly, or requisite steps are taken to move toward appropriate policies and designs, then Missions should consider funding a portion of the recurrent costs of host country projects through a variety of mechanisms at the project, sectoral or macro levels for a period up to ten years, providing the country agrees to shoulder an increasing share of total costs over this period. Policy performance should be monitored closely and frequently to determine whether such assistance should be continued.

It is important to note, that direct funding of recurrent costs, either at the project or budget

level, is only justifiable under fairly narrow conditions. These conditions, which have been spelled out in this paper include:

- (a) An acceptable policy framework or clear movement toward such a policy framework;
- (b) An assurance that recurrent cost support has higher development impact than new investments;
- (c) An inability of the host country to undertake recurrent cost financing;

(d) A carefully phased plan exists for shifting the entire burden to the host government.

(E) Reallocation of Assistance

If the host government refuses to take sufficient action on project design and/or policy reform, then AID should seriously consider reducing the level of assistance to the affected sector or country.

APPENDIX I

A Simple Model of Recurrent Cost Disequilibrium

Let

V_t = Quantity of variable input at time t into public production (e.g., labor, materials, etc.)

K_t = Quantity of fixed Input at time t into public production (e.g., building, roads, etc.)

Q_t = Quantity of government services produced at time t (e.g., # of students educated)

R_t = Total government revenue available at time t

I_t = The amount of revenue allocated to new investment in fixed inputs at time t

W_t = price of the variable input

P_t = price of the fixed input

At any time, e.g., $t = 1$, the government must decide how much of its revenue should be allocated to purchasing variable inputs, and how much should be allocated to purchasing new

capital. Let us assume the following:

(1) The price of government services is the numeraire good, equal to one. Thus Q_t , the quantity of government output is also the value of government output

(2) Output is determined by the following generalized production function; which we will assume is differentiable.

$$(1) \quad Q_t = f(K_t, V_t)$$

where

$$(2) \quad V_t = \frac{R_t - P_t I_t}{W_t}$$

Now assume that the objective function of the government is to maximize the present value of the stream of government output subject to the production function and total revenue constraints.

Let ρ = the discount rate of the government

Then

$$(3) \quad Q = \sum_{t=1}^T \frac{f(K_t, V_t)}{(1 + \rho)^t} \quad \text{where} \quad K_t = K_{t-1} + \frac{I_t}{P_t} \quad \text{and} \quad V_t = \frac{R_t - P_t I_t}{W_t}$$

or

$$(4) \quad Q = \sum_{t=1}^T \frac{f\left(K_{t-1} + \frac{I_t}{P_t}, \frac{R_t - P_t I_t}{W_t}\right)}{(1 + \rho)^t}$$

or

$$(5) \quad Q = \sum_{t=1}^T f\left(\sum_{i=0}^{t-1} K_0 + \frac{I_i}{P_i}, \frac{R_t - P_t I_t}{W_t}\right) / (1 + \rho)^t$$

Taking the partial derivative of Q with respect to I_j , and setting the result equal to zero, we get

$$(6) \quad \frac{-P_j f_{2j}}{W_j (1 + \rho)^j} + \sum_{t=j+1}^T \frac{f_{1t}}{P_j (1 + \rho)^t} = 0$$

or

$$(7) \quad \frac{P_j}{W_j} \frac{f_{2j}}{(1 + \rho)^j} = \sum_{t=j+1}^T \frac{f_{1t}}{P_j (1 + \rho)^t}$$

where

$$f_{1t} = \frac{\partial Q_t}{\partial K_t} ; f_{2j} = \frac{\partial Q_j}{\partial V_j}$$

The interpretation of the result seems straightforward. The government should allocate resources until the present value of the marginal value product of an additional unit of the variable input is exactly equal to the present value of an additional unit of fixed inputs.

When this decision rule is not followed, either because of LDC government policy which underallocates resources to the variable inputs, or because donors limit the fungibility of their assistance making it impossible for LDC's to allocate resources efficiently, then there is a recurrent cost problem.

Note that there are really two allocation decisions. The first concerns the amount of resources which is to be allocated to public production as opposed to private production. Up to this point we have not investigated that question in this Appendix. The second allocation decision is the choice between fixed and variable inputs, and in terms of our model, a recurrent cost problem exists when

$$(8) \quad \frac{P_j f_{2j}}{W_j(1 + \rho)^j} > \sum_{t=j+1}^T \frac{f_{1t}}{P_j(1 + \rho)^t}$$

Let us now consider the allocation of resources between public and private production. It is clear that by allowing revenues to vary, so that the government can compete for scarce resources, the optimal allocation rule is:

$$(9) \quad PVMPV_t^G = PVMPV_t^P ; PVMPK_t^G = PVMPK_t^P$$

Where

$PVMPV_t^G$ = the present value of the marginal product of an extra unit of variable input into government production

$PVMPK_t^G$ = the present value of the marginal product of an extra unit of fixed input into government production

$PVMPV_t^P$, $PVMPK_t^P$ have similar meanings for private production.

thus the present value of the marginal product of any input should be equal in the public and private sectors.

If government cannot claim enough resources so that its marginal production is as valuable as that of the private sector, then resource allocation is not optimal. The same result holds if the government claims too many resources.

From the point of view of project analysis we are interested in both allocation questions. If either

$$(10) \quad \begin{aligned} PVMPV_t^G > PVMPV_t^P \text{ or} \\ \frac{PVMPV_t^G}{W_t} > \frac{PVMPK_t^G}{P_t} \end{aligned}$$

then the shadow price of government revenue is greater than one.

In calculating rates of return for new projects, the use of such a shadow price for recurrent expenditures and revenues will enable one to make investment decisions so as to economize on recurrent resources (cf. Appendix II for a detailed example).

The model is easily expanded to include three inputs: a fixed input, a locally produced variable input such as labor, and an imported variable input such as petrol.

APPENDIX II

NUMERICAL ILLUSTRATION OF PROJECT ANALYSIS UNDER A RECURRENT COST CONSTRAINT*

We assume three alternative opportunities for immediate investment (realization assumed to occur at time zero or January 1 of the first year) of one billion francs CFA of foreign aid resources, each having an economic lifetime of ten years and each involving equal annual streams (annuities) of net benefits and, where relevant, government recurrent expenditure, both of which are realized on December 31st of the first and succeeding years. Net benefits and recurrent expenditure are stated below in constant prices as at January 1 of the first year.

The projects differ as follows:

I. Project A generates a stream of net social benefits equal to F.CFA 250 million, accruing to members of society at large (i.e., not the government). Its operation and maintenance either involve no recurrent government expenditure at all, or else the project generates in each year net additional government receipts, whether directly or at higher levels, of the production and distribution chain, exactly equal to government expenditures on operation and maintenance, so that the net burden on the government's recurrent budget remains zero.

II. Project B generates a stream of social benefits, net of all social costs except those corresponding to government recurrent expenditure, equal to F.CFA 500 million. Its operation and maintenance impose an annual recurrent expenditure burden, net of incremental government receipts generated directly or indirectly by the project, equal to F.CFA 200 million.

III. Project C generates a stream of net social benefits equal to F.CFA 200 million, realized in the form of a net annual contribution of F.CFA 200 million to the government Treasury (i.e., receipts generated directly or indirectly by the project exceeded government recurrent expenditure on its operation and maintenance by F.CFA 200 million.)

The present value of each project's net benefits is given by a standard formula, i.e., that representing the present value of an annuity,

$$\frac{1 - (1 + d)^{-t}}{d}$$

*This example is taken directly from the CILSS/Club du Sahel Study "Recurrent Costs of Development Programs in the Countries of the Sahel."

t being the duration of the annuity or project, here equal to ten years, and d being the discount rate, which we will assume here to equal 0.10 or 10%, the whole expression being multiplied times the constant annual amount of benefits. Interest tables show us that

$$\frac{1 - (1.10)^{-10}}{0.10} = 6.145.$$

Each project's total net present value, subtracting the cost of the investment, is then given by 6.145 times net benefits minus F.CFA one billion.

Allowing no premium over the normal value of uncommitted government revenue, which amounts to assigning it an accounting price of 1.0, we obtain the following net present values for the three projects:

Project A:	6.145 X F.CFA 250 million – F.CFA 1 billion = F.CFA 536 million
Project B:	6.145 X F.CFA 300 million (= 500–200) – F.CFA 1 billion = F.CFA 844 million
Project C:	6.145 X F.CFA 200 million – F.CFA 1 billion = F.CFA 229 million

Clearly Project B is the preferred alternative, while C gives the least return of the three.

Now we assume a severe budget crunch, such that the Treasury is forced to ration available revenues among public sector claimants, the result being that a significant amount of public sector capital operates below capacity. Using the example cited in the text, vaccination teams are forced to sit idle at dispensary or health ministry headquarters due to lack of fuel to send them into the countryside. Segments of irrigation schemes are closed down for want of funds to maintain the canals. Lack of maintenance likewise causes roads to become impassable, or at the very least users incur a high cost on account of vehicle wear and tear.

In sum, the situation is such that an additional unit of government revenue allocated to any of these uses would bring an incremental return greater than the marginal return to operation and maintenance expenditure that was anticipated at the time the capacity in question was created. This is because the additional revenue brings into operation capacity that otherwise has to lie idle, whereas the respective project plans assumed that revenue would be available to operate all this capacity at an economic level, and that additional expenditure would make the difference only because operation at economic capacity and operation at a slightly more intensive level.

We assume that the government's planners, viewing the situation from a perspective that covers the whole public sector, estimate that the average unit of additional government revenue, by activating otherwise idle capacity, will create a net benefit equivalent to 1.50 times its amount (nominal value), i.e., an additional million francs CFA of revenue will generate F.CFA 1.5 million of social benefits. This implies an accounting price of 1.5 for uncommitted government revenue, tantamount to an opportunity cost of F.CFA 1.5 for each franc of domestic revenue expended and not recovered in establishing and operating a new investment project.

The calculus for the three projects then changes as follows:

Project A--no net government expenditure or revenue generation assumed, hence no change in calculation of NPV, which remains F.CFA 536 million.

Project B--the net recurrent expenditure burden of F.CFA 200 million now translates into a social cost of F.CFA 300 million (200×1.5), reducing the annual net benefit from F.CFA 300 million to 200 million, giving an NPV of F.CFA 229 million.

Project C--the F.CFA 200 million worth of net revenue generated by the project now has a social value of F.CFA 300 million, raising its annual net benefit by F.CFA 100 million to a level of F.CFA 300 million, giving a new social NPV of F.CFA 844 million.

Thus, use of an accounting price for uncommitted government revenue reverses the ranking of the three projects, making C the most beneficial and B the least beneficial.

The same procedure could of course be repeated using alternative values of the accounting price--e.g. 1.7 or 2.0--in connection with a broader sensitivity analysis.