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 I 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.CVA 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 (Le, receipts generated directly or indirectly by the project exceded 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

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

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 f or each f ranc 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 x 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.