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FOREIGN AID AND FISCAL BEHAVIOR IN A BOUNDED RATIONALITY MODEL: DIFFERENT POLICY REGIMES

by

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Abstract

We examine how the source of foreign aid affects the composition of the recipient government's spending. Does the source of aid -- bilateral or multilateral -- influence recipient policy-makers' choice between development and nondevelopment expenditure? We depart from previous literature by introducing strong asymmetries in policy-makers' preferences. With the financial constraints set by foreign aid and domestic revenues, this formalization allows us to model and estimate the fiscal behavior of government policy-makers in the presence of foreign aid.

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FOREIGN AID AND FISCAL BEHAVIOR IN A BOUNDED RATIONALITY MODEL: DIFFERENT POLICY REGIMES

I. INTRODUCTION

We examine how the source of foreign assistance affects the budgetary distribution of public expenditures and revenues in a less developed country. We look at the impact of an aid inflow on aggregate government revenue from domestic sources. We develop several theoretical models of policy-makers' behavior and analyze the fiscal consequences of each of these models.

The empirical part of our study investigates the particularly interesting case of India. Over time India's foreign assistance sources changed greatly. In 1961, 89% of aid received was country-to-country, a distribution of aid between bilateral and multilateral sources that remained roughly unchanged until 1970.¹ During the Seventies the share of multilateral aid grew, reaching 47% of the total in 1979 and overtaking bilateral aid one year later. By 1989, the latest year used in our analysis, 71% of total economic assistance to India was from multilateral donors.

Given such shifts in sources of aid we want to know if Indian development and nondevelopment expenditures differ when aid is from bilateral as opposed to multilateral donors. Frey and Schneider (1986) argue that multilateral agencies, for example the World Bank, can largely be seen as representing donor nation desires in rough proportion to donor nation contributions. Maizels and Nissanke (1984), on the other hand, find that multilateral agencies rely more heavily on the needs of recipient countries in allocating their aid. These studies implicitly compare bilateral with multilateral donor behavior.

Existing work on the issue of the differential impact of bilateral as opposed to multilateral

¹The Indian fiscal year runs from April 1 to March 31. The years referred to in this paper are the beginning of the fiscal year.

aid on recipient countries is not conclusive. Heller (1975), Khan and Hoshino (1992) and Khan (1994) find no difference between the two sources as to their impact on LDC governments fiscal behavior. These studies used pooled cross-country data. Gang and Khan (1991) using time-series data for India, found, on the other hand, statistically significant differences between the two sources of aid.

Here, we employ a model of bounded rationality to describe the behavior of aid-recipients. As Simon (1982) points out, policy-making in the real world inevitably encounters institutional bounds to rational behavior. In such a context, policymakers may know their targets (e.g., development expenditures) only provisionally. They may wish to minimize losses from such targets. These targets are not the solutions of an optimizing exercise. Thus in our model, the policymaker minimizes a loss function incorporating targets that reflect institutional limits to rational prediction. In this framework, we argue, the targets are not known with certainty. They are the outcome of a complex negotiation process. We simplify our empirical work, by approximating these targets.

We model the decision-making process of rational policy-makers who consider in their budgetary planning certain indicators of the "proper" level of planned expenditures and revenues. They possess a loss function in which they try to minimize upward and downward deviations from the values of indicators. The indicator levels can be thought of as the status quo, or short-term target levels. By modeling policy-makers behavior in this way, we can estimate the marginal impact of aid on budgetary expenditure and revenue categories. Earlier work on aid that explicitly models policy-makers preferences [Khan and Hoshino (1992), Gang and Khan (1991), Mosley, Hudson and Horrell (1989), Heller (1975)] employed linear-quadratic or quadratic representations of the objective function. We depart from previous literature by introducing strong asymmetries in policy-

makers preferences.

Asymmetry in preferences is a desired property. The class of models presented in this article assumes that policy-makers experience greater loss from undershooting certain public finance planning indicators, and overshooting others. Using time-series data for India, we can examine foreign aid's budgetary impact under a variety of assumptions of the proper representation of policy-makers preferences.

Our model of foreign aid extends the rational policy-maker framework introduced by Heller (1975) by making explicit the asymmetries in the policy-makers' loss function. It is a model that is nonlinear in both parameters and variables. The next section describes this new model. We estimate the model's parameters by employing budgetary time-series data from India for a variety of policy-maker preference structures. Section III describes the data set and estimation procedures. We then discuss the results and their interpretations in Section IV. Summary and conclusions follow.

II. *MODEL*

In this section we discuss our model of foreign aid allocation by recipient government policy-makers. The model explores how foreign aid affects recipients expenditure- and revenue-raising behavior. We assume a rational group of policy-makers who possess short-run indicator levels of expenditures and domestic receipts. In meeting these preassigned values subject to financial constraints, decision-makers respond predictably to any flows of aid from abroad. The goal of policy-makers is to get actual revenues and expenditures as close to their indicator levels as

possible.² A symmetric (e.g., the quadratic) loss function implies underachieving and over-achieving a desired value are to be penalized equally. This may not realistically portray policy-makers' preferences when evaluating performance. We attempt to improve on previous models by employing an asymmetric loss function.

The use of an explicitly asymmetric loss function is important, for in reality policy-makers may weigh the overshooting and undershooting of indicators differently. In the earlier works [Heller (1975), Mosley, Hudson and Horrell (1987) and Gang and Khan (1988), Khan and Hoshino (1992)], based on the quadratic and linear-quadratic loss function, adequate attention was not paid to the possibility of asymmetry in the policy-makers loss function.³ In practice, the under-achievement of some indicator values may be a more serious problem than overshooting. For other indicator values, exactly the opposite may be the case. We formulate below a decision-making problem where asymmetries are taken into account.

The model incorporates the potential effect of aid on development and nondevelopment expenditures. Consider the budget facing the policy-maker. Development expenditures (D) include the public sector's contribution to gross capital formation, including human capital. *Inter-alia*, it also reflects the government's investment in long-run development projects. The other component of development expenditures is the government's contribution to *social* and *economic* services, e.g.,

²In contrast, with the standard macroeconomics stabilization literature [Holt (1962), Sengupta (1970)] we do not assume that the unconstrained loss function is minimized when the actual values of decision variables equal the indicator values. It is for this reason that we do not refer to these indicator values as targets. Our planning indicator values are benchmarks which are derived from imperfectly available information with recognition of uncertainties in the future. Although they are not meant to be fulfilled exactly, "too much" deviation is not desirable. In this sense, our model can be classified as incorporating 'bounded' rationality.

³See the discussions in Binh and McGillivray (1993) and Gang and Khan (1993) on the theoretical differences and empirical consequences of assuming quadratic vs. linear-quadratic loss functions.

expenditure on public health and education. Nondevelopment expenditures (N) are the expenditures of the state to reproduce itself, i.e., maintaining the bureaucracy and other administrative organs. Development and nondevelopment expenditures are financed by internal and external means. Domestic revenues (R) are raised by taxes, public sector profits and borrowing. External assistance is through bilateral (A_B) and multilateral (A_M) aid.

Much of the literature on the macroeconomic effects of foreign assistance focuses on aid's effect on economic growth. Our modeling approach is to analyze the impact of aid on public sector variables. Since aid funds pass through policy-maker's hand before reaching their destination, understanding where these funds are allocated by policy-makers is a prerequisite to understanding the long-term effects of aid. The distinction made here is between current development and current nondevelopment expenditures. As a rule the former will contribute to the long-run health of the economy while the latter will not.⁴

The policy-makers minimize a loss function subject to expenditure constraints. In most general terms, the (quadratic-ratio) loss function, L, is given by

$$\alpha_0 + \sum_i (\alpha_i / 2) (i^j / i^k)^\beta,$$

if $j = *$, then $i^k = i$,

if $k = *$, then $i^j = i$,

⁴Obviously, there can be some complementarity between development and nondevelopment expenditures. For example, within provisions of an infrastructure, legal and other kinds of services and certain types of regulatory environment for 'normal' business activities the directly productive investment could be very productive.

$$i = R, D, N,$$

$$\beta \geq 2. \tag{1}$$

"j" and "k" are related in the following way: if j (respectively k) represents the indicator value (symbolized by *) then i^k (respectively, i^j) equals i. "i" and "j" can be R, D, or N (domestic revenues, development expenditures and nondevelopment expenditure, respectively). The simplest non-linear model that is also asymmetric and economically meaningful, is obtained when $\beta = 2$. Note that for exact fulfillment of chosen indicator levels, $L = \alpha_0 + (\alpha_R/2) + (\alpha_D/2) + (\alpha_N/2)$. The policy-maker is deciding various categories of public expenditures. Each decision will reflect on her abilities, possibly her status, or even her job. In an uncertain environment, the best she can do is to reach the stated chosen indicator value.

The loss function stated in equation (1) has the advantage of allowing for asymmetries in loss when the policy-maker over- or undershoots the chosen indicator level. It also allows us to examine different assumptions about the "type" of the policy-maker. For example, writing the loss function explicitly as

$$\alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N/N^*)^2 + (\alpha_R/2)(R/R^*)^2,$$

illustrates a policy-maker who is "developmentalist" in orientation: undershooting the development expenditure indicator value is worse than overshooting it. The above policy-maker is a "fiscal liberal" since overshooting the revenue raising indicator value is worse than undershooting. Such policy-makers are not very anxious about the emergence of the inflationary gap. These bureaucrats are also "non-statist" in that overshooting nondevelopment expenditures is worse than undershooting. Statist bureaucrats who seek to maximize the resources that the state uses to reproduce itself would have loss functions that are asymmetric in exactly the opposite direction

regarding the composition of public expenditure. Overall, given the structure of our model, there are eight possible characterizations of the type of decision-makers. These are summarized in Table 1. Rather than impose an a priori view on which characterization best captures policy-maker's behavior, we examine which characterization does "best" in an empirical setting.

TABLE 1 NEAR HERE

Given the type of policy-maker, the decision making problem can be described as the minimization of a specific form of equation (1). The budget constraint to which this minimization problem is subjected is the following:

$$N + D = R + A_B + A_M.$$

The above, of course, is the accounting identity that expenditures equal receipts. To capture the distribution of foreign aid and domestic revenues into budgetary categories we instead write,

$$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M, \quad (2)$$

and,

$$N = \rho_R R + \rho_B A_B + \rho_M A_M. \quad (3)$$

$(1 - \rho_R)$, $(1 - \rho_B)$, and $(1 - \rho_M)$ are the fractions of domestically raised revenues, bilateral aid and multilateral aid, respectively, allocated to government development expenditures. These two constraints reflect alternative uses of government revenues augmented by foreign assistance.⁵ The

⁵One would like the allocation of aid among budgetary categories to be the outcome of a utility maximizing problem. Incorporating fungibility into a decision making problem as a subproblem is extremely difficult. Use of a single budgetary constraint *a priori* assumes that aid is 100 percent fungible. While not directly addressing the fungibility issue, our approach does not *a priori* assume 100 percent fungibility; it does look at the allocation of aid among budgetary categories.

first constraint allows for the possibility that D can be financed partly by domestic revenues and partly by different sources of foreign aid. The second constraint assumes that domestically raised revenues, and foreign aid not used for development purposes, go toward nondevelopment government expenditure. The model thus involves a trade-off between development and other spending by the government. It is a theoretical model of the implications of recipient preferences that can be used to determine the fiscal behavior of the government in the presence of foreign aid.

Solving the constrained loss minimization problem leads to a set of nonlinear simultaneous equations. The direction and extent of the impact of bilateral and multilateral foreign aid on N and D can be estimated. The eight sets of estimating equations appear in Table 2.

TABLE 2 NEAR HERE

III. DATA AND ESTIMATION PROBLEMS

Our data set covers observations on fiscal revenues and expenditures for India from 1961-89 and associated data concerning foreign aid. All observations are given in millions of real rupees in terms of the 1980-81 gross domestic product deflator. Most of the data are contained in the *Indian Economic Statistics--Public Finance*, published annually by the Ministry of Finance. These are supplemented by several series drawn from the *National Accounts Statistics*, the *Reserve Bank of India Bulletin*, *Economic Survey*, and Chandhok (1990).

Policy-makers work with actual budgetary data, not with theoretical variables. Here we examine government budgetary behavior in India. To do this we need to know the composition of budgets according to expenditure categories and sources of revenue. There are four categories of Indian budgetary data: revenue receipts and expenditures, and capital receipts and expenditures.

Expenditures are further divided into development and nondevelopment. The revenue budget consists of the revenue receipts of the government (tax and other revenues) and the expenditure met from these receipts. Broadly speaking, expenditure that does not result in the creation of assets is treated as revenue expenditure. The capital budget consists of capital receipts and payments. The main items of capital receipts are loans raised by the Government from the public, borrowing from the Reserve Bank and other parties through the Treasury Bills, and so on. Capital expenditures consist of expenditure on the acquisition of assets such as land, building, and equipment.

The empirical work relies on the assumption that 'broadly' or 'generally' the primary budget categories used in India correspond with the concepts of development and nondevelopment expenditures, and domestic revenues. Generally, the budgetary categories revenue and capital expenditures on development, nondevelopment revenue and capital expenditures, revenue and capital receipts, correspond respectively to our development expenditure, nondevelopment expenditure, and domestic revenues. This categorization allows us to isolate spending for development purposes from other expenditures. However, the budgetary categories do not completely correspond to economic variables. An advantage of the data from the *Indian Economics Statistics--Public Finance* is its degree of disaggregation. The degree of disaggregation of the data allows us to 'adjust' the series so that the empirical categories reflect more accurately the theoretical variables.⁶

Whether policy-makers view deviations from budgetary chosen indicator levels

⁶The data for India generally do not include public sector (as opposed to government) expenditures, with the exceptions of the railways and posts and telegraphs. For our purpose, investment by the enterprises out of retained profit is not relevant since we are interested in only that part of investment which is financed by the government. Certain categories of expenditures such as border roads are reclassified as capital expenditures (which they in fact are) although they occur in the current non-capital part of the budget. Also, a break in the series occurred in 1974. We were able to put together a continuous series by going back to the original documents.

asymmetrically, and in which direction the loss is greater, depends not only on their underlying attitudes to expenditure and revenue, but how the indicator levels themselves were set in the first place. Only if, in some sense, the original indicator level was "right" would a policy-maker with a given set of attitudes always view an upward deviation in the same way, or a downward deviation in the same way.

Since we have no evidence on Indian policy-makers' actual chosen indicator levels, it remains an important problem of method whether the estimation of indicator levels is done so one can have confidence in their being "right" - i.e., the ones from which a deviation in a given direction would always induce a policy-maker with a given set of attitudes to experience the same loss. While in an ideal world we would know what these indicator levels are, in reality we are forced to estimate these levels. The Indian budgetary documents provide very few clues.⁷ While some argument can be made to use the targets contained in the *Plan* documents, several reasons argue against this. First, the *Plans* are established every five years and represent longer term targets. Second, the *Plans* are broken down in different ways than that relevant to our study. Generally, we will need to approximate the chosen indicator levels by regressing the actual values on a series of instrumental variables and forecasting the values. Our procedure tells us how aid would have been used if India policy-makers behaved rationally in the sense defined.

We impute indicator values to policy-makers by the following procedure. Each indicator level is estimated by specifying an equation relating the actual variable to some instruments. We then regress the actual variable on the chosen instruments. The Cochrane-Orcutt procedure is used

⁷*Public Finance Statistics* provide information on budgetary estimates which represent the short term targets policy-makers are trying to achieve. These are available for only 17 years, which would make our data series unreasonably short.

to correct for first-order autocorrelation. To obtain Planned D we estimate an equation where D is a linear function of GDP and total gross domestic capital formation from the private sector, and proxies for investment in human capital. We then use the fitted values of the dependent variable as the indicator value. We find Planned R in the same manner, by regressing R on GDP and lagged imports and again using the fitted values of the dependent variable as the indicator value. Planned N is obtained by regressing N on and the lagged value of itself.⁸

All the data on foreign aid come from the annual editions of *Economic Survey*.⁹ Since we are interested in the budgetary effects of aid, we look at disbursements of aid rather than authorizations. Bilateral aid is given from particular countries to India, while multilateral aid comes from international organizations (in India's case, primarily the World Bank group, the EEC and OPEC).

IV. RESULTS AND INTERPRETATION

We now discuss the policy-makers marginal budgetary response to bilateral and multilateral aid.¹⁰ We are, in particular, interested in the distribution of foreign aid revenues (A_B and A_M) by policy-makers into development and nondevelopment expenditures, and their impact on domestic

⁸Admittedly, our implementation of the indicator values is *ad hoc*--a better approach is to model the indicators as outcomes of a decision-making process. Our formulation is clearly a compromise which, given data constraints, makes the maximum use of data availability. Our procedure is similar to that used in Sargent (1976). For a discussion of the rationale for choosing the particular functional relationships see Heller (1975) and Mosley, Hudson, and Horrell (1987).

⁹Data for latter years is exclusive of suppliers credits and commercial borrowing; however, for earlier years this is not clear.

¹⁰The nonlinear SURE procedure found in SHAZAM 7.0 (SHAZAM, 1993) was used. First-order autocorrelation was corrected for, with the same value of rho given to each equation.

revenue raising.

Let us examine the results given in Table 3, where foreign aid is considered according to its source. Parameters ρ_R , ρ_B , and ρ_M , which occur in the structural equations by way of the constraints (2) and (3), show the nondevelopment expenditure responses to an increase in domestic revenues, bilateral aid, and multilateral aid, respectively. Table 3 shows these parameter estimates (plus some others) for the eight different objective functions describing different policy-maker types (see Table 1). The structural equations are given in Table 2. Below we discuss three of these cases. Others can be interpreted in a similar fashion.

Consider, first, the type II policy-maker, who displays an overall conservative bureaucratic attitude. All the ρ 's are positive and significant, although the specific values vary. This shows that both domestic and foreign sources of revenue are used, at the margin, to finance both development and nondevelopment expenditure albeit in different proportions. Approximately 46 percent of the domestic revenue goes to finance nondevelopment expenditures. Out of bilateral aid, only 17 percent goes toward development expenditures. It is even worse for multilateral aid. Here only 9 percent contributes to the financing of development expenditures. Of course all the coefficients have *ceteris paribus* (since they are partial derivatives) interpretations. Therefore we cannot tell (although it seems intuitively plausible) if the absence of aid had led to less development expenditures out of domestic revenues.

The ratios of the parameters from the loss functions can be interpreted from the structural equations. In the presence of simultaneity, given our specific functional form and constraints, various ratios of α 's (eg., α_D/α_R or α_N/α_R) indicate how to explain the changes in the domestic revenue in the presence of foreign aid. For the Type II policy-maker both α_D/α_R and α_N/α_R are

significantly different from zero. When both development and nondevelopment expenditures vary the change in revenue is positively affected by these changes although the actual effect is not very high.

In contrast to the conservative bureaucratic attitude of Type II, Type VI offers us a view of a fiscally conservative, non-statist, but developmentalist policy-maker. There are some interesting similarities and differences between the two policy-maker types. Again both domestic and foreign sources of financing are considered. The allocation between development and nondevelopment expenditure categories out of domestic revenue is about equal. This is not so different from the previous case. About 12 percent of the bilateral aid goes for development. This is, again, similar to the behavior of Type II policy-maker. However, here 29% (as opposed to 9% for the Type II policy-maker) of the multilateral aid goes toward financing development expenditures. Furthermore, for Type VI policy-maker, α_D/α_R is statistically insignificant, while α_N/α_R affects revenue.

Next we look at a fiscally conservative, developmentalist and more state-oriented policy-maker, given by the equation set describing Type VIII. Here overshooting both development and nondevelopment expenditures will lead to less loss for the same amount of undershooting for this type of policy-maker. The results are quite different from the other two cases. In the first, place neither ρ_R nor ρ_M is statistically significant. So in a statistical sense both the domestic revenue and multilateral aid are used for financing development expenditure. Therefore, it seems that the development alist characteristic is much stronger than the merely state-bureaucratic characteristic. The effect of bilateral aid on development expenditures is relatively weaker. Never-the-less, the absolute effect is greater than any other case. Here 70 percent of the bilateral aid is used for financing development expenditures. Also, for Type VII policy-maker, the α_D/α_R and α_N/α_R

coefficients are significantly different from zero, with α_D/α_R being negative and α_N/α_R being positive.

At this point, given the plurality of models categorized by different policy-maker types, the following question can be raised: what is the best model to choose from among the eight estimated ones in Table 3? The answer to this question is far from obvious. If reasonable, unambiguous qualitative information on the policy-maker types was available, we could have made a "best guess" on that basis. Toye (1981) and Lipton and Toye (1990) might, for example, argue that, in the Indian case, the policy-makers changed their attitudes after the heady days of planning from 1955 to 1965, when the developmentalist plus inflation tolerance characterization of planning is not inaccurate, to something much close to the bureaucratic/sound finance approach in the period 1966-84. Our data comes mainly from the period of bureaucratic/sound finance.

In the absence of *a priori* information about policy-makers we are forced to rely on statistical criteria. Here too there are many criteria each with its own advantage and disadvantages. We have presented one such commonly used criterion, namely the Akaike information criterion (AIC) in Table 3. This is a general criterion that is applicable to any model that can be estimated by the maximum likelihood method. It involves minimizing $-(2 \log L)/n + 2 k/n$, where k = the number of parameters in the likelihood function L and n is the number of observations. For regression models like ours this implies minimizing $[RSS \exp (2 k/n)]$. Since $(2 k/n)$ is a constant in our case this amounts to minimizing the RSS. AIC is commonly used for non-linear models because of its ease of computability. By this criterion Type II policy-maker is this most acceptable. This implies that Indian policy-makers are nondevelopmental, fiscally conservative and non-statist. At the margin, foreign aid is used primarily for nondevelopment purposes. However, there are several other models with AIC only slightly higher than the one for Type II. For example, Type IV with AIC 58.53

implies a policy-maker who is like that in model II in every respect, except being a statist. Model VI also has a value for AIC close to models II and IV. If this is accepted, we are dealing with a policy-maker who is a developmental, non-statist and fiscally conservative bureaucrat. In fact, the range of AIC is a small one for all of the models, from the smallest value of 58.07 to the largest value being 60.12. This points to the need for *a priori* information about the policy-maker type in the Indian case.

TABLE 3 NEAR HERE

V. CONCLUSIONS

Before 1970 aid to India was predominantly bilateral in origin, aid to India post-1970 became predominantly multilateral in origin [Gang and Khan (1990)]. Was this good or bad for Indian development efforts? This is the policy framework debate to which this paper contributes. Our paper examined the fiscal behavior of policy-makers in the presence of foreign aid -- both bilateral and multilateral. The policy-makers can respond by varying expenditures and revenue raising efforts. By examining such policy-maker behavior we can make several comments about aid's effect on long-term development.

The element of originality in the modeling of policy-maker behavior in this paper is the introduction of a series of explicitly asymmetric loss functions possessed by different types of policy-makers. The 'rational' policy-maker who sets explicit budgetary indicator levels has been modeled previously as having a loss function that gives equal weight to upward and downward deviations from chosen goals (indicator levels). The work we presented here examines different types of policy-makers, characterized by three elements: developmentalist or not, statist or not, and

fiscally conservative or liberal.

Our modeling strategy has been to focus modeling and estimating efforts on the intermediate behavior of the policy-maker. The effect of aid on development efforts will depend on how the policy-maker allocates the aid. Here we distinguish two possible allocations: nondevelopment and development expenditures. Furthermore, in the presence of foreign aid, we ask, how are domestically raised resources used. If we assume that budgetary development expenditures go into development efforts --i.e., that what we have included in this variable will have long term economic effects as opposed to the short-term effects on nondevelopment expenditures -- then we should be interested in what happens to development expenditures in the presence of foreign aid.¹¹

We explore the effects that the source of foreign aid has on its distribution under different assumptions about how the policy-maker behaves. Studies indicate that from 1966-84 the nondevelopment, non-statist, fiscal conservative approach was followed [Toye (1981) and Lipton and Toye (1990)]. The reason we must explore alternative characterizations of the behavior of policy-makers is that tracing the flow of foreign aid to its destination is impossible. While in an *ex post* sense we can, of course, trace the aid flow, from the policy-makers and the economy's perspective this is not what is important. It is how aid affects the *ex ante* budgetary decisions (which we really do not know) that is problematic. If the recipient plans to spend a certain amount of domestic resources on a specific project, and then receives foreign aid tied to that project, such aid is fungible: the earlier earmarked funds can be allocated elsewhere. However, if the recipient

¹¹This paper does not directly address the issue of fungibility, though our results are relevant to its discussion. To actually say something about fungibility one needs to know where the donors intended the aid to go, and that their stated intentions are their actual intentions [see Pack and Rothenberg-Pack (1990, 1993), Cashel-Cordo and Craig (1992)]. Our paper sheds light on this if we assume that intentions of donors are that aid should go for development purposes.

conducts its budgetary exercise on the premise that certain programs will be funded by project aid, and if such aid appears, the budget constraint remains unaltered. Here aid is not effectively fungible.

One of our most important findings is that our assumptions about policy-maker behavior do, in fact, make an important difference in determining what is policy-maker behavior in the presence of foreign aid. This is not a one-dimensional variation. Types I-IV are all nondevelopmentalist, and the allocation of aid between nondevelopment and development expenditures vary considerably. Variations also exist if we look at the results along one dimensional statist or fiscal stringency lines, as well. All three elements must be taken into account together for evaluating the impact of aid.

Using the AIC criteria, Type II policy-maker is the appropriate model of the Indian policy-maker. Here, 17 cents of the marginal bilateral aid dollar goes toward development expenditures, while nine cents of the marginal multilateral dollar goes toward development expenditures. If the policy-maker is behaving like this, the shift in aid sources from bilateral to multilateral causes a change in the composition of public expenditure, with less going into long-term development expenditures. This is consistent with earlier findings and qualitative judgements by researchers such as Toye (1981) and Toye and Lipton (1990).

Thus one policy conclusion that emerges from this study is that the chances for success of development strategies involving both growth and distribution can be improved by providing more bilateral aid as opposed to multilateral aid. This conclusion, however, depends on how the policy-maker is behaving. Furthermore, there is still the open question of whether the budgetary allocations are spent effectively on development projects. Further work linking budgetary allocations to actual completion of projects can illuminate this issue.

REFERENCES

- Binh, Tran-Nam and Mark McGillivray, 1993, "Foreign Aid, Taxes and Public Investment: A Comment," Journal of Development Economics 41, 173-176.
- Cashel-Cordo, Peter and Steven G. Craig, 1993, Donor Preferences and Recipient Fiscal Behavior: A Simultaneous Analysis of Foreign Aid, Manuscript, Canisius College, Buffalo NY 14208.
- Chandhok, H.L., 1990, Database of the India Economy New Delhi: The Policy Group.
- Frey, Bruno and Friedrich Schneider, 1986, "Competing Models of International Lending Activity," Journal of Development Economics 20, 224-245.
- Gang, Ira N. and Haider Ali Khan, 1993, "Reply to Tran-Nam Binh and Mark McGillivray, "Foreign Aid, Taxes and Public Investment: A Comment,"" Journal of Development Economics 41, 177-178.
- Gang, Ira N. and Haider Ali Khan, 1990, "Some Determinants of Foreign Aid to India, 1960-1986," World Development 18, 431-442.
- Gang, Ira N. and Haider Ali Khan, 1991, "Foreign Aid, Taxes, and Public Investment," Journal of Development Economics 34, 355-369.
- Heller, Peter S., 1975, "A Model of Public Fiscal Behavior in Developing Countries: Aid, Investment and Taxation," American Economic Review 65, 429-445.
- Holt, C.C., 1962, "Linear Decision Rules for Economic Stabilization and Growth," Quarterly Journal of Economics 56, 20-45.
- Khan, Haider Ali, 1994, "Does Bilateral Foreign Aid Affect Fiscal Behavior of a Recipient?," Journal of Asian Economies, forthcoming.
- Khan, Haider Ali and Elichi Hoshino, 1992, "Impact of Foreign Aid on the Fiscal Behavior of LDC Governments," World Development 20, 1481-1488.
- Lipton, M. and John Teye, 1990, Does Aid Work in India? A Country Study of the Impact of Official Development Assistance, Routledge.
- Maizels, Alfred and Machiko K. Nissanke, 1984, "Motivations for Aid to Developing Countries," World Development 12, 879-900.
- Mosley, P., J. Hudson and Sara Horrell, 1987, "Aid, The Public Sector and the Market in Less Developed Countries," Economic Journal 97, 616-41.
- Pack, Howard and Janet Rothenberg Pack, 1990, "Is Foreign Aid Fungible: The Case of Indonesia",

Economic Journal 100, 188-94.

Pack, Howard and Janet Rothenberg Pack, 1993, "Foreign Aid and the Question of Fungibility," Review of Economics and Statistics, 258-265.

Sargent, T.J., 1976, "A Classical Macroeconomic Model for the United States," Journal of Political Economy 84, 207-238.

Sengupta, G.K., 1970, Optimal Stabilization Policy with a Quadratic Criterion Function, Review of Economic Studies 36, 127-146.

SHAZAM User's Reference Manual Version 7.0, 1993, McGraw Hill.

Simon, Herbert A. 1982. Models of Bounded Rationality, MIT Press, Cambridge, Ma.

Toye, J., 1981, Public Expenditure and Indian Development Policy 1960-70, Cambridge.

Table 1
Policy-makers Alternative Preferences

Type of Policymaker	Development Expenditure	Nondevelopment Expenditure	Domestic Revenue	Specific Loss Function
Type I: Nondevelopmental, non-statist, fiscal liberal	overshooting worse than undershooting	overshooting worse than undershooting	overshooting worse than undershooting	$\alpha_0 + (\alpha_D/2)(D/D^*)^2$ $+ (\alpha_N/2)(N/N^*)^2 +$ $(\alpha_R/2)(R/R^*)^2$
Type II: Nondevelopmental, non-statist, fiscal conservative	overshooting worse than undershooting	overshooting worse than undershooting	undershooting worse than overshooting	$\alpha_0 + (\alpha_D/2)(D/D^*)^2$ $+ (\alpha_N/2)(N/N^*)^2 +$ $(\alpha_R/2)(R^*/R)^2$
Type III: Nondevelopmental, statist, fiscal liberal	overshooting worse than undershooting	undershooting worse than overshooting	overshooting worse than undershooting	$\alpha_0 + (\alpha_D/2)(D/D^*)^2$ $+ (\alpha_N/2)(N^*/N)^2 +$ $(\alpha_R/2)(R/R^*)^2$
Type IV: Nondevelopmental, statist, fiscal conservative	overshooting worse than undershooting	undershooting worse than overshooting	undershooting worse than overshooting	$\alpha_0 + (\alpha_D/2)(D/D^*)^2$ $+ (\alpha_N/2)(N/N^*)^2 +$ $(\alpha_R/2)(R^*/R)^2$
Type V: Developmental, non-statist, fiscal liberal	undershooting worse than overshooting	overshooting worse than undershooting	overshooting worse than undershooting	$\alpha_0 + (\alpha_D/2)(D^*/D)^2$ $+ (\alpha_N/2)(N/N^*)^2 +$ $(\alpha_R/2)(R/R^*)^2$
Type VI: Developmental, non-statist, fiscal conservative	undershooting worse than overshooting	overshooting worse than undershooting	undershooting worse than overshooting	$\alpha_0 + (\alpha_D/2)(D^*/D)^2$ $+ (\alpha_N/2)(N/N^*)^2 +$ $(\alpha_R/2)(R^*/R)^2$
Type VII: Developmental, statist, fiscal liberal	undershooting worse than overshooting	undershooting worse than overshooting	overshooting worse than undershooting	$\alpha_0 + (\alpha_D/2)(D^*/D)^2$ $+ (\alpha_N/2)(N^*/N)^2 +$ $(\alpha_R/2)(R/R^*)^2$
Type VIII: Developmental, statist, fiscal conservative	undershooting worse than overshooting	undershooting worse than overshooting	undershooting worse than overshooting	$\alpha_0 + (\alpha_D/2)(D^*/D)^2$ $+ (\alpha_N/2)(N^*/N)^2 +$ $(\alpha_R/2)(R^*/R)^2$

Table 2
Structural Equations

Lagrangian	Estimating equations
Type I: $\min. V = \alpha_0 + (\alpha_D/2)(D/D^*)^2 + (\alpha_N/2)(N/N^*)^2 + (\alpha_R/2)(R/R^*)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$	$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = [-(\alpha_D/\alpha_R)(1 - \rho_R)(D/D^*)^2 - (\alpha_N/\alpha_R)\rho_R(N/N^*)]R^{*2}$
Type II: $\min. V = \alpha_0 + (\alpha_D/2)(D/D^*)^2 + (\alpha_N/2)(N/N^*)^2 + (\alpha_R/2)(R^*/R)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$	$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = \{[(\alpha_D/\alpha_R)(1 - \rho_R)(D/D^*)^2 + (\alpha_N/\alpha_R)\rho_R(N/N^*)][1/R^{*2}]\}^{(-1/3)}$
Type III: $\min. V = \alpha_0 + (\alpha_D/2)(D/D^*)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R/R^*)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$	$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = [-(\alpha_D/\alpha_R)(1 - \rho_R)(D/D^*)^2 + (\alpha_N/\alpha_R)\rho_R(N^*/N^3)]R^{*2}$
Type IV: $\min. V = \alpha_0 + (\alpha_D/2)(D/D^*)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R^*/R)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$	$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = \{[(\alpha_D/\alpha_R)(1 - \rho_R)(D/D^*)^2 - (\alpha_N/\alpha_R)\rho_R(N^*/N^3)][1/R^{*2}]\}^{(-1/3)}$
Type V: $\min. V = \alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N/N^*)^2 + (\alpha_R/2)(R/R^*)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$	$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = [(\alpha_D/\alpha_R)(1 - \rho_R)(D^{*2}/D^3) - (\alpha_N/\alpha_R)\rho_R(N/N^*)]R^{*2}$
Type VI: $\min. V = \alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N/N^*)^2 + (\alpha_R/2)(R^*/R)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$	$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = \{[(\alpha_D/\alpha_R)(1 - \rho_R)(D^{*2}/D^3) + (\alpha_N/\alpha_R)\rho_R(N/N^*)][1/R^{*2}]\}^{(-1/3)}$
Type VII: $\min. V = \alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R/R^*)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$	$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = [(\alpha_D/\alpha_R)(1 - \rho_R)(D^{*2}/D^3) + (\alpha_N/\alpha_R)\rho_R(N^*/N^3)]R^{*2}$
Type VIII: $\min. V = \alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R^*/R)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$	$D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = \{[(\alpha_D/\alpha_R)(1 - \rho_R)(D^{*2}/D^3) - (\alpha_N/\alpha_R)\rho_R(N^*/N^3)][1/R^{*2}]\}^{(-1/3)}$

Table 3

The Impact of Bilateral and Multilateral Aid to India, 1961-89
 Nonlinear SURE Parameter Estimates
 (numbers of observations = 29, standard errors in parentheses)

Loss Function	ρ_R	ρ_B	ρ_M	α_D/α_R	α_N/α_R	rho	AIC
Type I	0.3636 (0.1202)	1.0006 (0.2622)	0.9066 (0.2969)	-0.4469 (0.1138)	-0.6069 (0.2288)	1.0994 (0.0210)	60.0513
Type II	0.4563 (0.0718)	0.8323 (0.2005)	0.9153 (0.2808)	0.1248 (0.0295)	0.1177 (0.0290)	1.0783 (0.0041)	58.0034
Type III	0.7878 (0.1607)	0.4406 (0.1770)	-0.0493 (0.2690)	-0.6732 (0.4172)	-0.2439 (0.0829)	1.0859 (0.0050)	59.5561
Type IV	0.3855 (0.0853)	0.6563 (0.2028)	0.7695 (0.2693)	0.1679 (0.0471)	-0.1325 (0.0902)	1.0738 (0.0062)	58.4576
Type V	0.1347 (0.2235)	0.8561 (0.1963)	1.1950 (0.2242)	-0.0703 (0.0358)	-0.0481 (0.9497)	1.0710 (0.0103)	59.9906
Type VI	0.5003 (0.0775)	0.8819 (0.1917)	0.7131 (0.2651)	-0.0111 (0.0185)	0.1996 (0.0395)	1.0792 (0.0059)	58.5718
Type VII	0.1270 (0.2305)	0.8503 (0.1703)	1.1903 (0.2382)	-0.0692 (0.0365)	0.5917 (0.4398)	1.0707 (0.0081)	59.9907
Type VIII	0.0184 (0.2016)	0.2950 (0.1438)	0.1343 (0.1816)	0.0064 (0.0070)	-8.3891 (89.8940)	1.0560 (0.0157)	59.0855