

Does Japanese Bilateral Aid Work? Foreign Aid and Fiscal Behaviour in a Bounded Rationality Model: The Case of Bangladesh

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Abstract. How does bilateral Japanese foreign aid affect the allocation of government expenditures and revenues? Using a nonlinear model with asymmetric loss function and data from Bangladesh, an answer to this question was sought. The answer turns out to be dependent upon the type of policymakers. The model distinguishes between eight different types of policymakers. The most likely type for Bangladesh during the period 1975-92 turns out to be a nondevelopmentalist, statist, and fiscally-liberal type. Inflows of aid increase nondevelopment expenditures more than the development expenditures. However, Japanese aid seems to have been more successful in creating development expenditures than aid from other sources — bilateral and multilateral. Regardless of the type of source, all aid also seems to dampen domestic revenue-raising efforts.

KEYWORDS: Bangladesh: Japan: Bilateral Aid: Multilateral Aid: Development Expenditures: Nondevelopment Expenditures: Econometric Models: Policy-making: Policymakers.

In recent years, Japan has become one of the world's largest donors of foreign aid. Perhaps because of the sudden growth of Japanese aid in the 1980s, there are as yet very few rigorous studies of the impact of Japanese foreign aid. This article proposes to examine the macroeconomic impact of Japanese aid on the public sector of one of the recipient countries, Bangladesh.

Specifically, it examines the relationship between Japanese bilateral aid and the development and nondevelopment expenditures of the Government of Bangladesh. Insofar as some previous studies of foreign aid^{1/} also draw a connection between aid flows and the revenue-raising effects of the recipient, this aspect is also examined. Bangladesh is a particularly interesting case since it can be argued *prima facie* that development motives may be the prime reason for giving aid to Bangladesh. Yet up until now, no one has really been able to systematically link aid to development expenditures.

Khan and Hossain,^{2/} the authors of the most widely cited study on the Bangladesh economy, have found public savings in Bangladesh to be negative. Private

savings are also quite low. Therefore, the bulk of public investment in Bangladesh (which has been the larger type of investment in the country, by far) must have been financed by "foreign savings". According to their estimates, 59 per cent of the total investment since the country's independence has been financed by external assistance. Initially, the former USSR, the Eastern-bloc countries, and Scandinavia were the only donors. But after 1975, many other Western countries led by the US started giving aid. Multilateral sources were also forthcoming after 1975. Given such dependence on foreign aid, of which Japan is a major source, Bangladesh is a natural candidate upon which to base a study of the impact of Japanese aid.

Existing empirical work on the impact of aid on the recipient countries does not offer a uniform set of conclusions. Since much of the work in the past used pooled time-series cross-section data for several countries, the results may not apply to any single country. Pack and Pack, Gang and Khan, and Khan^{3/} have all tried to use single country time-series to remedy this problem. The present work follows this more recent trend of econometric work using time-series data for a single country.

Starting with Heller,^{4/} many of the researchers have used either a quadratic or a linear-quadratic loss or utility function depending on their modeling philosophy. Gang and Khan, and Khan^{5/} argue for the use of an explicitly asymmetric loss function which explicitly highlights the asymmetries of policymakers' priorities.

An equally important aspect of policy-making in the real world is the endemic uncertainty and institutional bounds to full rationality.^{6/} Departures from the strict rationality model carry one to the realm of bounded rationality. In this type of world, policymakers may not know their targets for certain as these are the outcomes of a complex institutional negotiation process.

Following Gang and Khan, and Khan,^{7/} the decision problem of such a boundedly rational policymaker is considered. The policymaker considers *ex ante* in the budgetary planning process certain indicators of the "proper" level of (planned) expenditures and revenues. Although these levels are treated as targets *ex ante*, they may not be the utility maximizing values. The asymmetric loss function incorporates this possibility as well.

The policymaker tries to minimize a function of the upward and downward deviations from these *ex-ante* targets. As is explained in the second section of this article, the deviations in the two different directions are weighted differently — hence the asymmetry in the loss function. The indicator levels from which such deviations are measured (in real terms) can be thought of as outcomes of bureaucratic negotiations within the state and between the recipient and the donors. The model in the next section formulates the problem in mathematically explicit terms.

THE MODEL

The model used here is a variation of the model introduced by Gang and Khan, and Khan.^{8/} It describes how Japanese foreign aid influences the recipient's ex-

penditure and revenue-raising behaviour. This is the major difference between the present model and the ones used previously in the aid literature.^{9/} In meeting preassigned values of indicator levels of expenditures and receipts, the decision makers respond in a predictable manner to any aid flows from abroad of which Japanese aid is a distinct part.

It is important to use an explicitly asymmetric loss function because policymakers may weigh the overshooting and the undershooting of these indicator levels differently. For some policymakers, the underachievement of some indicators may be more significant than overshooting. For others, the opposite may be the case.

The model incorporates the potential effect of aid on development and nondevelopment expenditures. The former type of expenditures include the public sector's contribution to capital formation. Human as well as nonhuman capital are included. A third component of development expenditures is the government's contribution to social and economic services, e.g., expenditure on health and general welfare. Nondevelopment expenditures are expenditures for state administration. These two types of government expenditures are financed by internal and external means. Domestic revenues include taxes, public enterprise surpluses, and borrowing. External assistance comes in the form of both bilateral and multilateral aid.^{10/}

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

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

if $j = *$, then $i^k = i$,
 if $k = *$, then $i^j = i$,
 $i = R, D, N$,
 $\beta \geq 2$. (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 expenditures, respectively). The simplest nonlinear model which 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 policymaker is making decisions on various categories of public expenditures. Each decision will reflect on his/her abilities, possibly status, or even his/her job itself. In an uncertain environment, the best he/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 policymaker over- or undershoots the chosen indicator level. It also allows one to examine different assumptions about the type of policymaker. 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 policymaker who is “developmentalist” in orientation: undershooting the development expenditure indicator value is worse than overshooting it. At the same time, the above policymaker is a “fiscal liberal” since overshooting the revenue-raising indicator value is worse than undershooting it. Such policymakers are not very anxious about the emergence of the inflationary gap. These bureaucrats are also “nonstatist” in that overshooting nondevelopment expenditures is worse than undershooting them. Statist bureaucrats who seek to maximize the resources which the state uses to reproduce itself would have loss functions that are asymmetric in exactly the opposite direction with regard to the composition of public expenditure. All in all, there are eight possible types of policymakers. These are summarized in table 1. Part of the problem is to explore which of these characterizations captures the behaviour of policymakers “best” in an empirical setting.

TABLE 1. POLICYMAKERS' ALTERNATIVE PREFERENCES

| Type of Policymaker | Development Expenditure | Nondevelopment Expenditure | Domestic Revenue | Specific Loss Function |
|--|---------------------------------------|---------------------------------------|---------------------------------------|--|
| Type I: Nondevelopmental, nonstatist, 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, nonstatist, 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, nonstatist, 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, nonstatist, 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 | $\alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R^*/R)^2$ |

Given the type of policymaker, the decision-making problem can be described as the minimization of a specific form of equation (1). The economic and institu-

tional constraint to which this minimization problem is subjected is the following:

$$\begin{aligned} N + D &= R + A_B + A_m \\ N &= \text{Nondevelopment expenditures} \\ D &= \text{Development expenditures} \\ R &= \text{Government revenue (domestic)} \\ A_B &= \text{Bilateral aid from Japan} \\ A_m &= \text{Multilateral and other bilateral aid} \end{aligned}$$

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 from Japan, and aid from other sources, respectively, allocated to government development expenditures. These two constraints reflect alternative uses of government revenues augmented by foreign assistance.¹¹ The 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 towards 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 behaviour of the government in the presence of foreign aid. Setting up the decision-making problem in this way enables us to use closed-form solutions for empirical work.

Solving the constrained loss minimization problem leads to a set of nonlinear simultaneous equations. The direction and extent of the impact of Japanese and other foreign aid on N and D can be estimated. The eight sets of estimating equations appear in table 2. Each one of the eight represents a particular type of policymaker.

DATA AND ESTIMATION ISSUES

Time-series data for the period 1975-91 was specially constructed by using both Bangladeshi and international information sources. The data set covers annual fiscal revenues and expenditures for Bangladesh from 1975 to 1991.¹² All observations are given in (or converted to) *taka* monetary units in terms of the 1980-81

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: $\min. V = \alpha_0 + (\alpha_D/2)(D/D^*)^2 + (\alpha_N/2)(N/N^*)^2 + (\alpha_R/2)(R/R^*)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$ | $D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = \{[(\alpha_D/\alpha_R)(1 - \rho_R)(D/D^*)^2 + (\alpha_N/\alpha_R)\rho_R(N/N^*)][1/R^{*2}]\}^{(-1/2)}$ |
| Type III: $\min. V = \alpha_0 + (\alpha_D/2)(D/D^*)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R/R^*)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$ | $D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = [-(\alpha_D/\alpha_R)(1 - \rho_R)(D/D^*)^2 + (\alpha_N/\alpha_R)\rho_R(N^*/N)]R^{*2}$ |
| Type IV: $\min. V = \alpha_0 + (\alpha_D/2)(D/D^*)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R^*/R)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$ | $D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = \{[(\alpha_D/\alpha_R)(1 - \rho_R)(D/D^*)^2 - (\alpha_N/\alpha_R)\rho_R(N^*/N)][1/R^{*2}]\}^{(-1/2)}$ |
| Type V: $\min. V = \alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N/N^*)^2 + (\alpha_R/2)(R/R^*)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$ | $D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = [(\alpha_D/\alpha_R)(1 - \rho_R)(D^{*2}/D^4) - (\alpha_N/\alpha_R)\rho_R(N/N^*)]R^{*2}$ |
| Type VI: $\min. V = \alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N/N^*)^2 + (\alpha_R/2)(R^*/R)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$ | $D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = \{[(\alpha_D/\alpha_R)(1 - \rho_R)(D^{*2}/D^4) + (\alpha_N/\alpha_R)\rho_R(N/N^*)][1/R^{*2}]\}^{(-1/2)}$ |
| Type VII: $\min. V = \alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R/R^*)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$ | $D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = [(\alpha_D/\alpha_R)(1 - \rho_R)(D^{*2}/D^4) + (\alpha_N/\alpha_R)\rho_R(N^*/N)]R^{*2}$ |
| Type VIII: $\min. V = \alpha_0 + (\alpha_D/2)(D^*/D)^2 + (\alpha_N/2)(N^*/N)^2 + (\alpha_R/2)(R^*/R)^2 - \lambda_D(D - (1 - \rho_R)R - (1 - \rho_B)A_B - (1 - \rho_M)A_M) - \lambda_N(N - \rho_R R - \rho_B A_B - \rho_M A_M)$ | $D = (1 - \rho_R)R + (1 - \rho_B)A_B + (1 - \rho_M)A_M$ $N = \rho_R R + \rho_B A_B + \rho_M A_M$ $R = [-(\alpha_D/\alpha_R)(1 - \rho_R)(D^{*2}/D^4) - (\alpha_N/\alpha_R)\rho_R(N^*/N)][1/R^{*2}]^{(-1/2)}$ |

gross domestic product (GDP) deflator. Most of the budgetary data are published by the Bangladesh Bureau of Statistics (BBS) and the Ministry of Finance. Foreign aid as well as some budgetary data are also available from Organisation for Economic Co-operation and Development (OECD) statistics and the *Europa World Yearbook* (Bangladesh section).^{13/}

It is important to remember that policymakers work with actual budgetary data and not with theoretically-defined entities. In the Bangladeshi budget, however, a distinction is made between development and nondevelopment expenditures. The BBS has estimated that a large component of the development expenditures is actually noninvestment expenditure. By and large, public administration and defence claim the lion's share of nondevelopment expenditures. About 17 per cent of public expenditures is claimed by defence. If one includes subsidies for food and other items given to the military, the figure may indeed be even higher.

In Bangladesh, the shares of education, health, housing, and social welfare have a lower value than in most developing countries. These expenditures are counted here as development expenditures since they are directly or indirectly related to the well-being of the people and human capital formation.

On the revenue side, the Ministry of Finance documents list customs duties as the largest revenue source. This is followed by excise duties and sales tax. There is an increasing trend in income tax revenues but the absolute amount is still modest. On the whole, these and other taxes cover more than 90 per cent of domestic revenues. All told, the revenue base of the Government of Bangladesh is still quite small. Khan and Hossain summarize the situation with regard to public finance quite aptly:^{14/}

...both tax and non-tax revenues have accounted for too small a proportion of GDP. Their growth rates over time have been low. The inability to tax high incomes, the inefficiency of the public enterprises and the failure to price public services appropriately are the factors responsible for the low level and slow growth of current revenue. The level and growth of current expenditure, correctly defined, have been too high to be financed by current revenue. The result has been a high rate of public dissaving, i.e., a negative contribution of the public sector to the investable surplus. Current public expenditure has been dominated by public administration and defense. There has been a decline in the share of education, health, housing and social welfare in current expenditure while the share of economic services has increased sharply. The emphasis of public investment has shifted away from transport, housing and industries in the 1970s to power, energy and agriculture in the 1980s. In very recent years, however, public expenditure in agriculture and irrigation has tended to decline as a proportion of total public expenditure.

As mentioned in the previous section, the "boundedly rational" nature of the policymakers means that the chosen indicator levels of budgetary targets are not exact but only approximate. Since there is very little empirical evidence of Bangla-

deshi policymakers' actual chosen indicator levels for these targets, it becomes an important problem to estimate them. The planning documents are not adequate since they are drawn up at infrequent intervals and represent longer-term targets. The categorizations are also different from those required by the approach adopted here. Therefore, I shall try to approximate the chosen indicator levels by regressing the actual *ex-post* values on a series of instrumental variables and then forecasting the indicator values. As Sargent has recently pointed out in the context of rational expectations, the economist or the econometrician actually works in a bounded rationality sense when predicting values such as these from models such as the ones I have used.^{15/}

Each indicator level is estimated by specifying an equation relating the actual variable to some instruments. I then regress the actual variable on the chosen instruments (with correction for autocorrelation). Planned **D** is obtained by estimating an equation where **D** is a linear function of GDP and total gross domestic investment in the private sector together with proxies for investment in human capital. The fitted values of the dependent variable serve as indicator levels. Planned **R** is found in a similar manner, by regressing **R** on GDP and lagged imports and then using the fitted values of the dependent variable as the indicator value. Planned **N** is obtained by regressing **N** on the lagged value of itself.^{16/}

RESULTS AND INTERPRETATION

According to the theoretical approach adopted here, the policymakers respond to the availability of foreign aid by reallocating money to the various budgetary categories. Although the model assumes bounded rationality, the reallocation itself is in response to additional amounts of foreign aid and is therefore in keeping with allocation at the margin. My major concern here is to examine the allocation of finance to development and nondevelopment expenditures. An additional area of interest is the impact of aid on domestic revenue-raising.

The results of the empirical exercise for Bangladesh are given in table 3. The structural equations in table 2 contain parameters ρ_R , ρ_B , and ρ_M by way of constraints (2) and (3). These three parameters show the nondevelopment expenditure responses to an increase in domestic revenues, Japanese bilateral aid, and other aid, respectively. In the table, estimates for these three parameters, together with some others, are shown for the eight different models describing eight different policymaker types as depicted in table 1. The structural equations have already been given in table 2. I have chosen to discuss two cases for illustrative purposes. Others can be interpreted following a similar approach.

Let us consider the type III policymaker first. According to the typology in table 1, this is a nondevelopmental statist, fiscally-liberal type of policymaker. All the ρ 's are positive and significant at .05 level.^{17/} In the presence of foreign aid (both Japanese and non-Japanese), almost 77 per cent of the additional revenue goes

to nondevelopment expenditures. For bilateral Japanese foreign aid, this percentage is 72 per cent whereas 82 per cent of the other aid is spent for nondevelopment purposes. Thus, a straightforward interpretation would be to claim the superiority of Japanese aid over aid from other sources in this case. However, some caution is required. We do not know if the presence of aid pulls money out of domestic revenue for nondevelopment purposes. It is reasonable to suspect that for some categories of aid (within both the Japanese and other varieties) this may well be the case. Only if the substitution effect is not too high (i.e., aid does not completely replace development expenditures that would have been financed out of domestic revenues), then there is an incremental effect of aid on development expenditures. Under this scenario, Japanese aid would seem to be more effective — dollar for dollar — than foreign aid from other sources.

**TABLE 3. THE IMPACT OF JAPANESE AID: NONLINEAR SURE
PARAMETER ESTIMATES**

(absolute T-values in parentheses)

| Model | ρ_R | ρ_B | ρ_M | α_D/α_R | α_N/α_R | AIC ^{1/} |
|-----------|-----------------|------------------|------------------|---------------------|---------------------|-------------------|
| Type I | .2411 (2.34) | .9512 (3.82) | .9250 (3.57) | -.4082 (4.25) | -.5513 (4.70) | 62.051 |
| Type II | .4590 (6.41) | .7511 (37.03) | .9213 (10.68) | .1585 (5.76) | .2771 (22.38) | 61.065 |
| Type III | .7672 (8.83) | .7212 (50.15) | .8291 (21.13) | .6212 (29.51) | .2312 (3.61) | 58.281 |
| Type IV | .3691 (6.17) | .6712 (3.60) | .8120 (9.35) | .2582 (6.50) | .1495 (2.58) | 59.992 |
| Type V | .5214 (2.85) | .7412 (3.65) | .9123 (23.83) | -.0801 (1.10) | -.0941 (.25) | 60.081 |
| Type VI | .4821 (8.22) | .4213 (7.17) | .5562 (8.25) | -.1047 (1.21) | -.1072 (3.63) | 62.011 |
| Type VII | .6312 (3.11) | .6617 (36.38) | .8122 (5.36) | .0221 (.51) | .2213 (5.64) | 61.121 |
| Type VIII | .8121 (9.36) | .8213 (16.88) | .9125 (3.82) | .0078 (4.82) | .4190 (.50) | 60.062 |

Note: 1/ AIC = Akaike Information Criterion.

The ratios of the parameters from the loss function (the α 's) can be readily interpreted by referring to the structural equations. In the simultaneous equations framework, given the specific objective function and constraints, the ratios of α 's (e.g., α_D/α_R or α_N/α_R) indicate how to explain the changes in domestic revenue in the presence of foreign aid. For the type III policymaker, both α_D/α_R and α_N/α_R are significantly different from zero. The interpretation of the first of these coefficients is as follows: in the presence of foreign aid, any increase in development expenditures reduces the domestic revenue-raising effort. The quantitative magnitude is given in a nonlinear fashion by the product of this coefficient and $(1-\rho_R)$. The coef-

ficient α_N/α_R also gives an estimate of (partial) impact of nondevelopment expenditures on R . In this case an increase in nondevelopment expenditures will lead to an increase in R . Also, this magnitude is further increased by the magnitude of R^* . Thus, a bureaucratic or political decision to increase R^* will lead to an increase in actual revenue if the following condition holds:

$$\alpha_N/\alpha_R \rho_R N^{*2} N^{-4/3} < 3\alpha_D(1-\rho_R)/\alpha_R \cdot 1/D^{*2} \quad (4)$$

We may call this proposition the **aid-dependent revenue effect**.

If the aid-dependent revenue effect is positive (i.e., if (4) above is true), then the presence of aid actually increases domestic revenue. In the case of Bangladesh, for a wide range of N and D , however, it is negative or close to zero. Thus, for the type of policymaker discussed here, aid would seem to have dampened the revenue-raising effort.

Let us now turn to the model for the type VI policymaker. As can be seen from table 1, this is the developmental, nonstatist, and fiscally-conservative type. Looking across the row under the headings for the various parameters, the contrast is indeed empirically quite striking. More than 50 per cent of the domestic revenue goes towards development expenditures even in the presence of foreign aid. The coefficient is significant both statistically and economically. Again, in a statistically significant sense, about 58 per cent of Japanese aid goes to development expenditures. Of the other aid receipts, about 45 per cent goes to development expenditures. Thus, a major hypothesis of this study is verified: the more developmental the orientation of the policymaker, the more foreign aid influences spending in the direction of development. This is particularly true for Japanese aid.

Turning now to the other coefficients, α_D/α_R and α_N/α_R have absolute values of .1047 and .1072, respectively, and both are statistically significant at the 0.05 level. Looking at the revenue equation for this type of policymaker in table 2, we can see that the negativity of α_D/α_R (estimated) implies that revenue increases as indicator levels of development expenditures increase although the rate of increase is quite slow. This is consistent with a developmentalist but fiscally-conservative preference structure. Aid finances development expenditures more than domestic revenue-raising efforts. In the absence of aid, such expenditures may drop dramatically. Nondevelopment expenditures also lead to an increase in revenue-raising. This is consistent with a balancing-the-budget fiscal conservatism. It also suggests that foreign aid is only marginally diverted to nondevelopment expenditures when finance is needed. It is more likely that domestic revenues are increased more than proportionately to cover these nondevelopment expenditures.

Which one of these two models (or any others in between) best describes the "average" behaviour of Bangladeshi policymakers since independence? This is a particularly fascinating question which is also quite difficult to answer definitively. Without a great deal of reliable, unambiguous information on institutional history, only a "best guess" is possible. For example, in the case of India, the discussion in

Toye, and Lipton and Toye^{18/} suggests that from 1955 to 1965, the bureaucrats may have been inflation-tolerant developmentalists. However, since 1965, there has been a change towards statist/sound finance orientation. In the case of Bangladesh, the work by Sobhan^{19/} and others would suggest a dependence on external assistance, not necessarily because of developmentalist concerns although the rhetoric of development is all-pervasive. However, the details of recipient behaviour at the institutional level, especially in the 1980s, is scattered and more institutional historical work is needed.

In the absence of such institutional work on policymaker type, one can look at some statistical criteria for guidance. A common problem of such statistical criteria is their lack of a basis in economic (as opposed to econometric) theory. In table 3, the last column presents the value of the AIC for each of the eight models. AIC is a model selection criterion that can be applied to any model that can be estimated by the maximum likelihood method. One simply minimizes $-(2\text{Log}L)/n + 2k/n$ where k is the number of parameters in the likelihood function L and n is the number of observations. Particularly for a nonlinear model, the AIC is a convenient econometric discriminator among different model specifications. It would seem that by this criterion, at least, the type III policymaker model may be the most appropriate one for Bangladesh during the period of observation, since the type III policymaker model has the lowest AIC score. This means, however, that nondevelopmental statist concerns dominated the real fiscal agenda despite the rhetoric of development. If there were genuine differences between the different regimes (e.g., those headed by Zia or Ershad) the time-series is too small to discriminate among them. Therefore, one needs to qualify this general econometric conclusion with specific institutional and behavioural details within the subperiods.^{20/}

SUMMARY AND CONCLUSIONS

In this article, an asymmetric loss function has been used to model the behaviour of different types of fiscal policymakers. All in all, results have been estimated and presented for eight different policy regimes depending on whether the orientation is developmentalist or not, statist or not, or fiscally conservative or not.

The discussion of two model types shows that actual behaviour is quite sensitive to the policymaker type. This is quite a sensible proposition. However, with the exception of Gang and Khan,^{21/} this has not been the dominant approach in studying the impact of aid on recipient behaviour.

Choosing from this menu of models with diverse types of policymakers, however, presents a problem. Institutional and historical information may allow one to make a potentially controversial but informed judgment. Lacking such detail and information one can use an econometric model selection criterion, such as the AIC.

Accordingly, AIC model III, which posits a statist, nondevelopmental, fiscally-liberal policymaker, appears to have been the most likely model. If this is true, then

policymakers in Bangladesh have used aid to fund statist, nondevelopment expenditures. Not only aid, but domestic revenue has also been used to finance such expenditures.

The selection of this particular model is subject to two caveats. The first is statistical. Although model III has the lowest AIC value (58.281), the range of values is within about 5 per cent to 10 per cent of this minimum. Between model III and its opposite (model VI) there are some, such as types V and VIII, which may also be candidates for a suitable model. The second caveat is the need for caution before accepting model III as the correct one on the basis of AIC criterion alone. Historical information about the behaviour of domestic bureaucracy is needed before firm conclusions can be drawn. Therefore, the econometric work needs to be supplemented with careful institutional analysis.

With respect to the use of Japanese aid in particular, it should be noted that regardless of the type of policymaker it seems to have performed better than non-Japanese aid. It is hard to fathom the reasons for this at the aggregate level of data. A useful conjecture is that Japanese neutrality and the absence of policy conditionality, its promotion of productive public sector development efforts, and the emphasis on technical, often capital-intensive projects may account for this difference.^{22/} Another related factor in the particular case of Bangladesh may be Japan's promotion of health- and social welfare-related projects in the public sector.^{23/} However, without detailed micro-level studies it is impossible to give a definitive answer to the question as to why Japanese aid seems to have been relatively more effective in promoting development expenditures.

It should also be noted that, in any event, the type of policymaker is crucial to the success of the aid. Therefore, an important issue for the Japanese (and other donors) is to determine the type of policymakers in charge. Clearly, if promoting development expenditure is the goal, a given amount of aid will go much further if type VI rather than type III policymakers are at the helm. In the short or intermediate term, monitoring of aid needs to be made more stringent than it is now. Without strict internal and external monitoring, the principal-agent problem will remain unresolved. As long as this remains a problem, aid will be used less efficiently than is possible when greater accountability is present. In the long run, aid flows may need to be made conditional on the type of policymaker spending the money.

Finally, future work can disaggregate different types of development and nondevelopment expenditures. This will elucidate further the link between foreign aid and different types of expenditures. The disaggregation of the revenue side can also lead to insights regarding the interaction between components of foreign and domestic finance. Longer time-series data would naturally be a requirement of such detailed analysis.^{24/}

NOTES

- 1/ See Peter S. Heller, "A Model of Public Fiscal Behavior in Developing Countries: Aid Investment and Taxation," *American Economic Review* 65 (1975):429-45; Ira N. Gang and Haider Ali Khan, "Modeling Foreign Aid and Development Expenditures" (Paper presented at the American Economic Association (AEA) Conference held in Atlanta, 1989); see also their "Foreign Aid, Taxes and Public Investment," *Journal of Development Economics* 34 (1991):355-69; and their "Foreign Aid and Development Expenditures: Does the Policymaker Make any Difference?" (Unpublished paper, 1994); Haider Ali Khan and Eiichi Hoshino, "Impact of Foreign Aid on the Fiscal Behavior of LDC Governments," *World Development* 20 (1992):1481-8; P. Mosley, J. Hudson, and Sara Horrell, "Aid, the Public Sector and the Market in Less Developed Countries," *Economic Journal* 97 (1987):616-41; and Howard Pack and Janet Rothenberg Pack, "Is Foreign Aid Fungible: The Case of Indonesia," *Economic Journal* 100 (1990):188-94; also their "Foreign Aid and the Question of Fungibility," *Review of Economics and Statistics* (1993):258-65.
- 2/ Azizur Rahman Khan and Mohabub Hossain, *The Strategy of Development in Bangladesh* (London: Macmillan, 1989).
- 3/ See Pack and Pack, "Is Foreign Aid Fungible"; and their "Foreign Aid"; see also Gang and Khan, "Foreign Aid, Taxes, and Public Investment"; and their "Foreign Aid and Development Expenditures"; Haider Ali Khan, "Does Bilateral Foreign Aid Affect Fiscal Behavior of Recipient?" *Journal of Asian Economies* (1994); see also his "Does the Policy-maker make a Difference?" (Paper presented at AEA/Allied Social Science Associations (ASSA) meetings held in Washington DC, January 1995).
- 4/ Heller, "A Model of Public Fiscal Behavior."
- 5/ Gang and Khan, "Modeling Foreign Aid"; and their "Foreign Aid and Development"; see also Khan, "Does the Policy-maker make a Difference?"
- 6/ Herbert A. Simon, *Models of Bounded Rationality* (Cambridge, MA: MIT Press, 1982).
- 7/ Gang and Khan, "Modeling Foreign Aid"; and their "Foreign Aid and Development"; and Khan, "Does the Policy-maker make a Difference?"
- 8/ *Ibid.*
- 9/ As cited previously, for these models see Heller, "A Model of Public Fiscal Behavior"; see also Mosley, Hudson, and Horrell, "Aid, the Public Sector and the Market"; and Gang and Khan, "Foreign Aid, Taxes and Public Investment." The models in the latter two publications follow Heller's lead.
- 10/ Japan, of course, gives both bilateral and multilateral aid. The purpose here is to look at the effect of **bilateral** aid from Japan.
- 11/ Incorporating fungibility (i.e., a priori degree [or lack] of restriction in allocating aid among various expenditure categories) into a decision-making problem as a subproblem is extremely difficult. Use of a single budgetary constraint a priori assumes that aid is 100 per cent fungible. While not directly addressing the fungibility issue, our approach does not a priori assume 100 per cent fungibility; it does look at the allocation of aid among budgetary categories.
- 12/ The data are on a fiscal year basis. The fiscal year in Bangladesh begins on 1 July.
- 13/ Organisation for Economic Co-operation and Development (OECD) geographic distribution of financial flows are used from 1976 to 1993. For data of years 1975 to 1991, see *Europa Yearbooks* (London: Europa Publications, 1980 to 1992).

- 14/ Khan and Hossain, *The Strategy of Development*.
- 15/ Thomas Sargent, *Bounded Rationality in Macroeconomics* (Oxford: Clarendon Press, 1993), pp. 21, 34, and 160.
- 16/ These regression equations are available from the author upon request.
- 17/ From here on, wherever the phrase "statistically significant" occurs, it will mean significant at .05 level unless otherwise specified.
- 18/ John Toye, *Public Expenditure and Indian Development Policy 1960-70* (Cambridge, UK: Cambridge University Press, 1981); see also Michael Lipton and John Toye, *Does Aid Work in India? A Country Study of the Impact of Official Development Assistance* (New York: Routledge, 1990).
- 19/ Rehman Sobham, *The Crisis of External Dependence: The Political Economy of Foreign Aid to Bangladesh* (Dhaka: Dhaka University Press, 1982).
- 20/ This calls for a detailed analysis of the economic history of the period (and subperiods) which looms as a future research task.
- 21/ Gang and Khan, "Foreign Aid and Development."
- 22/ Stephan Browne, *Foreign Aid in Practice* (New York: New York University Press, 1990), pp. 193-5.
- 23/ There are, for example, projects like *Shapla Neer*, which promotes rural health and welfare programmes.
- 24/ It would be reasonable to assume that forty or more observations will be necessary if, for instance, the expenditure variables are increased by disaggregation from 2 to 4.

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APPENDIX 1: THE TARGET VARIABLES ESTIMATION PROCEDURE

There are three target variables requiring estimation. These are: development expenditures (D^*), nondevelopment expenditures (N^*), and revenue (R^*).

Development expenditures targets are regressed against the level of output in the previous period, the current period level of private investment, and the level of primary school enrollments.

Nondevelopment expenditures targets are determined by the level of bureaucratic expenditures lagged one period.

The revenue targets are estimated from the previous year's income and the level of the previous period's imports.

All relationships are linear, single-equation, and estimated by ~~ordinary least squares~~ (OLS) procedures.