

TOPIC 2: FOREIGN AID and DEVELOPMENT

3. Aid effectiveness and the recipient countries

3.1. Aid, good economic policies and poverty

3.2. Aid fungibility and fiscal effects

3.2 . Aid fungibility and fiscal effects

Aim:

- What is aid fungibility? To what extent does it affect the effectiveness of aid? What are the limitations of this type of studies?
- What are fiscal response studies and why might they be better than fungibility studies?

Outline

3.2.1. Aid fungibility

3.2.2. Fiscal studies

Reading

*Feyzioglu, T., Swaroop, V. and Zhu, M. (1998), 'A Panel Data Analysis of the Fungibility of Foreign Aid', *World Bank Economic Review*, 12(1), pp. 29-58.

*McGillivray, M., and O. Morrissey (2004), 'Fiscal Effects of Aid' in T. Addison and A. Roe (eds.), *Fiscal Policy for Development*, Basingstoke: Palgrave Macmillan/WIDER, pp. 72-96. Also as WIDER Discussion Paper 2001/61, <http://www.wider.unu.edu/publications/dps/dp2001-61.pdf>.

Devarajan, S., Rajkumar, A. S. and Swaroop, V., 1999, 'What Does Aid to Africa Finance?' *World Bank Policy Research Working Paper* No. 2092.

Introduction

Since aid generally goes to the public sector, its impact on growth and poverty reduction will be mediated by how aid influences government behaviour, in particular fiscal policy. Therefore important questions are:

- Is aid used for the purposes for which donors provided it?
- What is the impact of aid on various categories of public sector expenditure, including investment (fixed and human capital) and consumption?
- What is the impact on revenue and financing decisions, including taxation and borrowing?
- Does aid cause reductions in public sector saving, and prolong a dependence on external financing?

Two types of studies on the effects of aid on fiscal policy: fungibility studies and fiscal response studies.

3.2.1. Fungibility (Feyzioglu et al., 1998)

One of the main channels through which foreign aid can influence development outcomes is the recipient country budget.

”The link between foreign aid and public spending is not straightforward because some aid may be “fungible.” An aid-recipient country could render earmarked aid fungible by reducing its own resources in the sector that receives aid and transferring them to other sectors of the budget.” (Feyzioglu et al.p.30)

Thus, aid is fungible when in reality it is spent on something else than intended by the donors. This is most likely to occur when aid funds something that the recipient would have funded in any case without the aid inflow. Now the inflow of aid releases funds in the recipient budget to other uses, which in practice means that the spending on the aid funded item may not have increased at all from what it would have been without the aid inflow.

Fungibility can be illustrated via the following example. Assume that a country is given a certain amount of aid to construct schools. The question is would these schools have been constructed in any case without the aid flow? If so, the aid inflow relieves a constraint on the budget and the resources that would have gone into building the school go into something else. The fundamental question is – what is this something else? If it is a project that the donor thinks would be beneficial for development, this may not bother the donor as much as if this money flows for instance into supporting a military conflict.

Aid may also end up being used to lower tax rates or pay back debt (lower the deficit).

Simplified example (aid as pure income supplement, aid does not change relative prices):

Suppose that the government only spends on education and the military, and both are normal goods. It spends S on schools and W weapons (point X on the budget line). Donor gives a grant of amount A to finance schools. If aid is not at all fungible, $S+A$ is spent on schools, and the same amount as before on weapons (W).

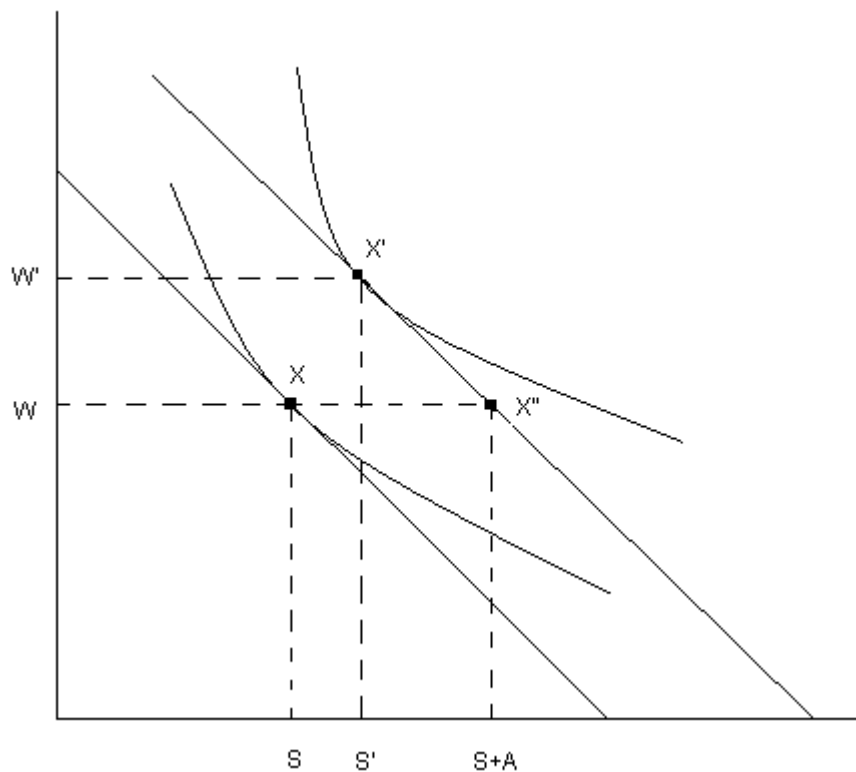
Fungibility is of concern to donors when the preferences of the recipient differ from those of the donor.

Aid is fully fungible: The government optimises allocation according to its own preferences. New budget is pre-aid budget plus A and the recipient government spends more than A on schools. As the budgetline shifts out, the government reaches a higher indifference curve. In this example the government spends S' on schools (more than the pre-grant S and more than A but less than $S+A$) and W' on weapons. New allocation of resources occurs at X' . Thus, the aid also enables a rise in military expenditure. If this is efficient and promotes development, donors may not mind. However, in the case of military, this hardly is the case.

Aid is fully non-fungible: Recipient allocates all of aid and designated pre-aid resources ($A + S$) to schools. New allocation of resources is X'' .

How to reduce fungibility? Monitoring of expenditure may be difficult. Expenditure fluctuates from year to year and previous year figures can lead to false estimates of domestic spending. Additionally, not all aid even goes to the government budget.

Allocation of resources when aid is fully fungible or non-fungible



Notes:

a) Even when aid is fully fungible, all of the amount of money given as aid may be spent on schools in an administrative sense. The relevance of fungibility depends on whether the donor and recipient have the same objectives. If the donor wishes to expand the budget in general, but it is administratively simple to provide aid for schools, then fungibility does not matter. If, the donor has different preferences than the recipient and wishes A to function as **additional expenditure** on schools, then fungibility is a problem.

b) Case 1: full fungibility (from X to X')

Case 2: zero fungibility (from X to X''). This is suboptimal given govt preferences.

Case 3: Partial fungibility: budget constraint shifts by the amount of fungible aid. Govt chooses a point on new budget line and adds the non fungible portion of education. Govt cannot spend on W as much as it wants so the equilibrium will lie in between X' and X''. Equilibrium will be suboptimal but the govt will have higher utility than in case 2.

• Model Specification

Feyzioglu et al. (1998) apply an indirect approach to assess fungibility via the impact of foreign aid on government expenditure.

The aid recipient government buys S (public goods (g_1, \dots, g_s)) in the market to provide to its citizens at price p_s ($s = 1, \dots, S$). It pays for these goods with the fungible portion of foreign aid and R (all other domestic and foreign sources net of foreign aid). Let ϕ ($0 < \phi < 1$) be the portion of aid that is fungible and can be treated as pure income supplement.

Assume that all aid is earmarked by purpose toward the purchase of K ($\leq S$) specific public goods. Then $1 - \phi_k$ is the non fungible portion of aid earmarked for good k and citizens also consumes goods that the govt purchase from this fund.

Assume that a_k ($k = 1, \dots, K$) is the amount of aid for good k , so public spending on good k has to be at least a_k .

The representative agent welfare W is a function of S public goods and a single private good (c_p):

$$W = U(c_p, g_1, g_1^{NF}, \dots, g_k, g_k^{NF}, g_{k+1}, \dots, g_s) \quad \text{where} \quad g_k^{NF} = \frac{(1 - \phi_k)a_k}{p_k} \quad (1)$$

subject to

$$p_1 g_1 + p_2 g_2 + \dots + p_s g_s = R + \sum_{k=1}^K \phi_k a_k \quad \text{and taking } p_s, R, \phi_k, a_k \text{ as given.} \quad (2)$$

Note that the consumption of an aid-funded public good is composed of two parts: non-fungible quantity imposed by the donor and the fungible part. Utility is maximised subject to domestic revenue (R) and the fungible proportion of aid. Note that ϕ is assumed to be exogenous and aid affects the government's choice of public goods only through the fungible component. If aid was entirely non-fungible, it would not affect government consumption choice.

The authors assume that the utility function is of the Stone-Geary form:

$$W = F(c_p) + H\left(\sum_{k=1}^K g_k^{NF}\right) + \prod_{s=1}^S (g_s - \gamma_s)^{\beta_s} \quad (3)$$

where $\gamma_s > 0$ are the subsistence quantities of the public good and $\sum \beta_s = 1$.

The government maximises (3) subject to the budget constraint. This results in the following system of linear expenditure equations

$$p_s g_s = p_s \gamma_s + \beta_s \left(R + \sum_{k=1}^K \phi_k a_k - \sum_{j=1}^S p_j \gamma_j \right), \quad s=1, \dots, S \quad (4)$$

β_s is the share spent on good s beyond subsistence level. Since we observe only total expenditure (and not spending that is financed by fungible and non-fungible resources), rewrite (4) as

$$p_s \bar{g}_s = p_s \gamma_s + (1 - \phi_s + \beta_s \phi_s) a_s + \beta_s \left(R + \sum_{k \neq s}^K \phi_k a_k - \sum_{j=1}^S p_j \gamma_j \right), \quad s=1, \dots, S \quad (5)$$

where $\bar{g}_s = g_s + g_s^{NF} = g_s + (1/p_s)((1 - \phi_s)a_s)$

Note that $R = G^N = G - A$ where $G = \sum_{s=1}^S p_s g_s + \sum_{k=1}^K p_k g_k^{NF}$ and $A = \sum_{k=1}^K a_k$, so

substituting G^N for R , equation (5) becomes

$$p_s \bar{g}_s = p_s \gamma_s + (1 - \phi_s + \beta_s \phi_s) a_s + \beta_s \left(G^N + \sum_{k \neq s}^K \phi_k a_k - \sum_{j=1}^S p_j \gamma_j \right), s=1, \dots, S \quad (6)$$

which is the equation to be estimated in the empirical part of the paper. The γ_s (subsistence quantities) are either proxied by economic and social variables or estimated directly. These variables also capture the underlying differences in preferences across countries. If the estimated coefficient of G^N is equal to that of a_s , then $\phi_s = 1$ (provided that β_s is not equal to 1 for any sector s , otherwise the donor and recipient will have the same preference for that sector so fungibility does not make sense). If the estimated coefficient of $a_s = 1$, then $\phi_s = 0$ i.e. aid for good s is fully non-fungible. If the estimated coefficient of G^N is less than that of a_s and this latter less than 1 ($G^N < a_s < 1$), then the estimated coefficient of G^N indicates partial fungibility ($0 < \phi_s < 1$).

- **Empirical analysis**

The authors are interested in estimating how aid affects different types of government expenditure to determine the degree to which aid is fungible.

Previous studies to theirs: Pack and Pack (1990) for Indonesia: no evidence of fungibility across sectoral expenditures. Pack and Pack (1993) for Dominican Republic: substantial diversion of foreign aid away from its intended purposes. These are single country studies. However, perhaps a more general study would give more indication to donors of sectors across countries in which aid resources are likely to be more or less fungible. So, authors have panel data for several countries.

Authors use a panel dataset for developing countries from 1971 to 1990, which includes variables on aid, public spending and various controls. Controls are supposed to reduce endogeneity problems and lags are used.

They begin by estimating the impact of total foreign aid on total government spending.

They then estimate the effect of foreign aid on the government's investment and consumption spending. Finally, they estimate the impact of sector-specific aid on components of government spending. They have data on both aggregate and sector-specific aid.

Specifically, they estimate 3 equations for a panel of countries i and time t

$$G_{i,t} = \alpha_{0,i} + \alpha_1 Aid_{i,t} + \sum_{c=1}^C \alpha_{c+1} Z_{c,i,t-1} + \varepsilon_{i,t} \quad (7)$$

$$G_{i,t}^j = \delta_{0,i} + \delta_1 \alpha_1 G_{i,t}^N + \delta_2 Aid_{i,t} + \sum_{c=1}^C \delta_{c+2} Z_{c,i,t-1} + \nu_{i,t} \quad (8)$$

where E_j ($j=1,2$) is government current (consumption) or capital (investment) expenditure and Z refers to controls.

$$G_{i,s,t} = \lambda_{0,i,s} + \lambda_{1,s} G_{i,t}^N + \lambda_{2,s} Aid_{i,t} + \sum_{k \neq s}^S \lambda_{3,k} Aid_{i,k,t} + \sum_{c=1}^C \lambda_{c+3,s} Z_{c,i,t} + \eta_{i,t} \quad (9)$$

where $\lambda_{1,s} = \beta_s$; $\lambda_{2,s} = (1 - \phi_s + \beta_s \phi_s)$; $\lambda_{3,k} = \beta_s \phi_k$. Equation (9) refers to a system of linear equations.

Dependent variables:

For (7): Total government expenditure (including foreign aid) as a share of GDP.

For (8): Government expenditure of current or capital expenditure (including foreign aid)) as a share of GDP.

For (9): Government expenditure (including foreign aid) in sector s as a share of GDP.

Independent variables:

Net disbursements of total foreign aid as a share of GDP. (Official Development Assistance – multilateral and bilateral grants and concessionary loans).

Net disbursements of total foreign aid to sector k as a share of GDP.

(The aid variable in this case includes only concessionary loans, not grants, since data on sectoral grants was not as easily available.)

Share of government expenditure (net of foreign aid) in sector s (education, health, agriculture and transport and communication).

Other control variables (infant mortality rate, average years in schooling in the labour force, average ratio of a neighbouring country's military expenditure to GDP, ratio of agricultural output to GDP).

Technique: Either a fixed or a random effects model.

Results: They found that for 1971-1990:

In a sample of 38 developing countries: A dollar disbursed of development official assistance to GDP (ODA/GDP) increases total government spending by 33 cents, but by 63 cents if only concessionary loans to GDP are taken into account.

Table 1. *The Impact of Foreign Aid on Government Expenditure, 38-Country Sample, 1971–90*

Variable	Equation	
	1-1	1-2
Constant	31.20 (6.51)	32.77 (6.86)
Share of official development assistance in GDP	0.33 (3.29)	
Share of concessional loans in GDP		0.63 (3.13)
Real per capita GDP	-0.001 (-0.61)	-0.001 (-0.91)
Neighboring country's military expenditure in GDP, lag (-1)	-0.03 (-0.29)	0.02 (0.11)
Average schooling in labor force, lag (-1)	-0.12 (-0.20)	-0.18 (-0.31)
Infant mortality rate, lag (-1)	0.02 (0.58)	0.006 (0.21)
Share of agriculture output in GDP, lag (-1)	-0.39 (-6.53)	-0.39 (-6.50)
Adjusted R ²	0.25	0.22
Number of observations	309	309
Type of model ^a	Random	Random

Note: The results reported here are for estimation of equation 8 in the text. The dependent variable is government expenditure expressed as a share of gross domestic product (GDP). Z-values are in parentheses. The 38 countries in the sample are listed in appendix A.

a. Indicates whether the country dummies in the regression represent a fixed effects or a random effects model. The test is based on Hausman (1978).

Source: Authors' calculations. Government expenditure data are from the IMF's *Government Finance Statistics* (IMF various years).

Source: Feyzioglu et al. (1998)

The reason why concessional loans have a relatively larger impact on government expenditures than ODA could be that a portion of such loans have matching requirements - for every dollar that a government spends on a specified activity, it gets a matching amount in concessional loans.

This evidence suggests that aid is fungible at the aggregate level. Total expenditure does not rise by as much as aid inflow – therefore the aid money allows possibly for a reduction in tax revenue! This may however have at least positive short-run consequences.

- They use another data source for public investment (more accurate). This leads to a fall in the number of countries included and so equation (8) is only estimated for 14 countries.

Table 2. *Impact of Foreign Aid on Total, Current, and Capital Public Expenditures, 1971–90*

Variable	Dependent variable ^a					
	Total government spending		Public current expenditures		Public capital expenditures	
	Eq. 2-1	Eq. 2-2	Eq. 2-3	Eq. 2-4	Eq. 2-5	Eq. 2-6
Constant						1.80 (0.29)
Government expenditure net of aid in GDP			0.63 (15.33)	0.65 (14.44)	0.35 (9.15)	0.35 (8.80)
Share of official development assistance in GDP	0.95 (5.82)		0.72 (10.59)		0.29 (4.65)	
Share of concessionary loans in GDP		1.24 (4.08)		1.22 (8.97)		0.27 (1.19)
Real per capita GDP	0.01 (1.67)	0.01 (1.10)	-0.002 (-0.43)	-0.004 (-1.05)	0.002 (0.59)	0.002 (0.80)
Neighboring country's military expenditure in GDP, lag (-1)	0.33 (1.04)	0.43 (1.26)	-0.10 (-0.76)	-0.53 (-0.37)	0.08 (0.64)	0.04 (0.30)
Average schooling in labor force, lag (-1)	-1.78 (-1.04)	-1.12 (-0.61)	3.74 (4.19)	2.92 (2.90)	-3.58 (-4.27)	-1.95 (-2.66)
Infant mortality rate, lag (-1)	0.09 (1.51)	0.06 (0.94)	0.06 (2.19)	0.01 (0.26)	-0.05 (-1.91)	-0.02 (-0.89)
Share of agriculture output in GDP, lag (-1)	-0.63 (-2.69)	-0.53 (-2.09)	-0.12 (-0.94)	-0.09 (-0.63)	0.07 (0.59)	0.15 (1.55)
Adjusted R ²	0.87	0.84	0.97	0.97	0.79	0.19
Number of observations	128	128	89	89	89	89
Type of model ^b	Fixed	Fixed	Fixed	Fixed	Fixed	Random

Note: The results reported here are for estimation of equations 8 and 9 in the text. *t*-statistics are in parentheses for the fixed effects models; *Z*-values are in parentheses for the random effects model. The 14 countries in the sample are listed in appendix A.

a. Dependent variables are expressed as a share of gross domestic product (GDP).

b. Indicates whether the country dummies in the regression represent a fixed effects or a random effects model. The test is based on Hausman (1978).

Source: Authors' calculations. Government expenditure data are from the IMF's *Government Finance Statistics* (IMF various years).

Source: Feyzioglu et al. (1998)

Now, for the smaller sample, a dollar increase in foreign aid appears to lead to an increase of \$0.95 in total government spending. So aid seems to increase government spending almost 1 to 1. And now, a dollar increase in concessionary loans leads to a dollar 1.24 increase in government expenditures. Now, aid at the aggregate level aid does not appear to be fungible.

Roughly $\frac{3}{4}$ of aid is spent on government's current expenditure and the remaining $\frac{1}{4}$ goes into capital expenditure. Whether this allocation is good or not from a growth perspective will depend on how development friendly current expenditure is. Capital and current expenditure are often complementary (e.g. education – both school building and salaries to teachers are important).

- The next regressions focus on the link between the net disbursement of concessionary loans to a particular sector and government expenditure in 6 different sectors.

Table 4. *The Impact of Sectoral Concessionary Loans on Sectoral Government Expenditure, 1971-90*

Variable	Dependent variable ^a					
	Education, eq. 4-1	Health, eq. 4-2	Energy, eq. 4-3	Agriculture, eq. 4-4	Transport and communication, eq. 4-5	Defense, eq. 4-6
Constant	4.12 (1.49)	1.19 (1.28)	-0.63 (-0.51)	-2.07 (-1.20)	2.08 (3.44)	3.36 (0.89)
Government expenditure net of aid in GDP	0.08 (4.94)	0.02 (4.32)	0.01 (1.99)	0.03 (2.75)	0.10 (5.57)	0.11 (5.10)
<i>Sectoral loans (as a share of GDP)</i>						
Education	1.55 (1.08)	0.01 (0.03)	0.16 (0.27)	0.05 (0.05)	0.52 (0.31)	0.71 (0.38)
Health	-3.21 (-0.73)	-0.31 (-0.23)	3.07 (1.61)	3.45 (1.29)	1.10 (0.21)	5.19 (0.91)
Energy	-0.71 (-1.21)	0.12 (1.84)	0.36 (3.82)	0.21 (1.59)	0.17 (3.75)	0.02 (0.07)
Agriculture	0.56 (2.22)	0.19 (2.45)	0.09 (0.82)	-0.05 (-0.32)	-0.01 (-0.03)	0.21 (0.65)
Transport and communication	-0.59 (-3.01)	0.14 (2.44)	0.16 (1.92)	0.21 (1.77)	0.92 (3.98)	0.36 (1.44)
Other sectors	-0.05 (-1.65)	0.02 (2.30)	0.01 (0.79)	0.06 (3.25)	0.04 (1.09)	-0.01 (-0.35)
Real per capita GDP	0.0003 (0.26)	-0.0001 (-0.15)	0.001 (1.44)	0.0003 (0.45)	-0.0002 (-0.17)	0.0002 (0.15)
Neighboring country's military expenditure in GDP, lag (-1)	-0.12 (-1.28)	0.003 (0.17)	0.02 (0.41)	-0.004 (-0.12)	-0.04 (-0.67)	0.01 (0.16)
Average schooling in labor force, lag (-1)	-0.19 (-0.68)	-0.08 (-0.89)	-0.12 (-0.99)	0.46 (2.55)	-1.65 (-4.87)	-0.29 (-0.75)
Infant mortality rate, lag (-1)	0.01 (1.37)	-0.003 (-0.91)	0.002 (0.53)	0.01 (1.60)	-0.03 (-2.38)	-0.01 (-1.12)
Share of agriculture output in GDP, lag (-1)	-0.05 (-1.17)	0.008 (0.65)	0.02 (1.12)	-0.004 (-0.18)	-0.08 (-1.92)	-0.03 (-0.56)
Adjusted R ²	0.04	0.24	0.18	0.09	0.89	0.34
Number of observations	128	128	128	128	128	128
Type of model ^b	Random	Random	Random	Random	Random	Random

Note: The results reported here are for estimation of equation 10 in the text. Z-values are in parentheses. The 14 countries in the sample are listed in appendix A.

a. Dependent variables are sectoral government expenditure expressed as a share of gross domestic product (GDP).

b. Indicates whether the country dummies in the regression represent a fixed effects or a random effects model. The test is based on Hausman (1978).

Source: Authors' calculations. Government expenditure data are from the IMF's *Government Finance Statistics* (IMF various years).

Source: Feyzioglu et al. (1998)

The coefficient on government expenditure net of aid variable indicates how the government distributes an additional dollar that it gets from all resources net of concessionary loans. Loans to two sector - transport and communication and energy - account for roughly 29 and 31 percent of all concessionary loans. Table 4 refers to OLS estimated of equation (9). Need to solve for ϕ_s separately – see Table below.

Table 5. *Least Squares Estimates of the Foreign Aid Fungibility Parameter*

Sector and type of public spending	Fungibility parameter estimate, ϕ_k	Hypothesis testing results			All ^a
		Full fungibility, $\phi_k = 1$	Partial fungibility, $0 < \phi_k < 1$	Nonfungibility, $\phi_k = 0$	
<i>Education</i>					
Total central government	-0.60 (-1.58)				√
Total public investment	0.52 (0.39)				√
<i>Health</i>					
Total central government	1.33 (1.18)				√
Total public investment	0.35 (0.81)				√
<i>Energy</i>					
Total central government	0.65 (0.09)		√		
Total public investment	—				
<i>Agriculture</i>					
Total central government	1.08 (0.16)	√	√		
Total public investment	0.88 (0.10)	√	√		
<i>Transport and communication</i>					
Total central government	0.09 (0.24)				√
Total public investment	0.07 (0.24)				√

— Not available.

Note: √ indicates that the null hypothesis cannot be rejected at the 5 percent significance level. Standard errors are in parentheses.

a. We cannot reject any null hypothesis within a reasonable range.

Source: Authors' calculations based on data for total government expenditures from the IMF's *Government Finance Statistics* (IMF various years) and for total public investment from Easterly and Rebelo (1993).

Source: Feyzioğlu et al. (1998)

The results show that loans to the transport and communication sector are fully nonfungible - a dollar in concessionary loans given to the sector is fully spent in the sector.

On the other hand, loans to the agriculture and energy sectors are fungible in the sample countries. In other words, expenditure in these sectors does not rise by the amount of the aid inflow. The case of education and health is unclear - the estimated coefficient is not statistically significant. No evidence that aid is diverted to military spending.

Two social indicators:

- 1) Rate of change in infant mortality on per capita, net concessionary loans given to the health sector. Concessionary loans do appear to lower infant mortality, but expenditure in general does not
- 2) Rate of change in primary school enrolment. The effect of concessionary loans is unclear and expenditure does not improve enrolment. Perhaps this reflects the fact that aid to education appears to be fungible.

Table 10. *The Impact of Concessionary Loans on Social Indicators, 1971–90*

<i>Variable</i>	<i>Rate of change in infant mortality, eq. 10-1</i>	<i>Rate of change in primary school enrollment, eq. 10-2</i>
Constant		0.89 (0.20)
Per capita health expenditure	0.05 (0.35)	
Per capita health expenditure, lag (-1)	0.17 (0.91)	
Per capita concessionary loans to the health sector	-14.26 (-4.75)	
Per capita concessionary loans to the health sector, lag (-1)	-18.48 (-6.04)	
Per capita education expenditure		-0.25 (-0.49)
Per capita education expenditure, lag (-1)		0.31 (0.57)
Per capita concessionary loans to the education sector		-4.57 (-0.60)
Per capita concessionary loans to the education sector, lag (-1)		3.31 (0.44)
Real per capita GDP	-0.01 (-2.30)	-0.001 (-0.61)
Population growth rate	-1.78 (-1.45)	-0.12 (-0.10)
Adjusted R ²	0.68	0.04
Number of observations	105	105
Type of model ^a	Fixed	Random

Note: Per capita numbers are in real 1987 dollars. *t*-statistics are in parentheses for the fixed effects model (infant mortality); *Z*-values are in parentheses for the random effects model (primary school enrollment). The 14 countries in the sample are listed in appendix A.

a. Indicates whether the country dummies in the regression represent a fixed effects or a random effects model. The test is based on Hausman (1978).

Source: Feyzioglu et al. (1998)

- **Conclusions and policy implications:**

- a) Success of aid programme should not be judged by the proportion of aid that goes to capital expenditure.
- b) Most aid appears to be fungible, therefore the need to link foreign aid to an overall govt expenditure program.

Summary of results of other fungibility studies (McGillivray and Morrissey, 2001)

Table 2: Results of Selected Categorical Fungibility Studies

Study	Sample	Extent of Fungibility	Incremental Impact of Aid on:						
			Domestic Revenue	Total Expenditure	Developmental Expenditure	Non-developmental Expenditure	Health and Education Expenditure	Investment Expenditure	Consumption Expenditure
Pack & Pack (1990)	Indonesia	0.00	0.29	1.37	1.37	0.00	0.19	n.r.	0.00
Cashel-Cordo & Craig (1990)	48 LDCs	n.r.	10.36 ^a 4.25 ^b	12.82 ^a -2.79 ^b	n.r.	n.r.	n.r.	n.r.	n.r.
Khilji & Zampelli (1991)	Pakistan	1.00	-0.01	0.26	n.r.	0.74	n.r.	n.r.	n.r.
Gupta (1993)	India	0.04	0.01	1.69	0.96	0.73	n.r.	n.r.	n.r.
Pack & Pack (1993)	Dominican Republic	0.79	-0.39	-0.27	-0.05	-0.31	0.002	n.r.	0.08
Feyzioglu <i>et al.</i> (1998)	14 LDCs	-0.57	n.r.	0.95	0.23	n.r.	0.13	0.29	0.72
Swaroop <i>et al.</i> (2000)	India	n.r.	0.00	0.00	0.00	0.90	0.00	0.00	n.r.

Notes: n.r.: not reported (or cannot be inferred). a: African countries. b: non-African countries.

Not only lots of variations in the results (fungibility 0 for Indonesia, full fungibility for Pakistan) but it is not known how much aid was intended to finance specific projects!

3.2.2. Fiscal Response Studies (McGillivray and Morrissey, 2001)

- **Limitations of fungibility studies**

- Inappropriate theoretical framework: The fungibility model assumes two different types of good, one in which aid is allocated and another in which aid is not allocated (funded out of fungible aid and other revenues). In particular, it assumes that aid affects the government's choice only through the fungible portion; public goods purchased from the non-fungible part do not affect this choice. This may be unrealistic – it is likely that aid receipts will affect expenditure on other than aid-funded items. The government will have some perception as to how much of aid is fungible.
- Data problems: reliability of the data, not all aid is allocated to the budget.
- Modelling problems: OLS is an inappropriate method since different components of budget are jointly determined – should use 3-stage least squares or a similar systems approach. The effect of aid on expenditure may be dynamic - over time expenditure allocation may correspond to aid allocation even if within same year appears fungible.
- Studies treat tax revenue (and other non-aid revenue) as a residual. In reality aid can influence tax effort as well as domestic borrowing.
- The divergence in donor and recipient preferences may not necessarily imply that aid is spent unproductively.

- **Fiscal Response Studies**

- ⇒ **Theoretical framework**

- Heller (1975) and extensions (e.g. Mosley *et al* (1987) and Binh and McGillivray (1993)) can be considered as the basic model of government fiscal response to foreign aid inflows.

- Components: government consumption (G) and capital expenditure (I_g), government tax and other recurrent revenue (T) and borrowing (B). In this model, aid (A) is exogenous - an external source of revenue that enters the budget constraint.

The government utility function is: $U = U(I_g, G, T, B)$

Government maximises utility subject to budget constraint. The government sets targets for various expenditure items and revenue targets for tax and borrowing. Utility is maximised when the targets are reached. The utility function can then be represented in the form of a quadratic loss function

$$U = \alpha_0 - \frac{\alpha_1}{2}(I_g - I_g^*)^2 - \frac{\alpha_2}{2}(G - G^*)^2 - \frac{\alpha_3}{2}(T - T^*)^2 - \frac{\alpha_4}{2}(B - B^*)^2 \quad (1)$$

where the asterisks denote exogenous target levels of the endogenous variables and $\alpha_i > 0$ for $i = 1, \dots, 4$. Utility is maximised when the targets are reached and the maximum utility is α_0

The utility function is maximised subject to the following constraints:

$$I_g = (1 - \rho_1)T + (1 - \rho_2)A + B \quad (2)$$

$$G = \rho_1 T + \rho_2 A \quad (3)$$

The government overall budgetary constraint is simply

$$I_g + G = T + A + B \quad (4)$$

Standard fiscal response studies maximized (1) subject to (2) and (3).

Problems:

- Interpretation of ρ_2 was taken to represent the extent of fungibility of aid. The implicit assumption was that aid is intended solely for investment purposes and any aid money allocated to G is fungible.
- The representation over-constrains the model, so that the government may not reach α_0 even when aid revenues are sufficient to meet all targets. Even if total revenue may be sufficient to meet (4), the α s constrain allocation so that specific expenditure targets in (1) cannot be met.

In more recent papers, aid is made endogenous. The assumption is that the government also has a target for aid revenue. When determining revenue and expenditure allocations, anticipated aid revenue is also taken into account. In Franco-Rodriguez *et al* (1998) the loss function (1) now becomes:

$$U = \alpha_0 - \frac{\alpha_1}{2}(I_g - I_g^*)^2 - \frac{\alpha_2}{2}(G - G^*)^2 - \frac{\alpha_3}{2}(T - T^*)^2 - \frac{\alpha_4}{2}(A - A^*)^2 - \frac{\alpha_5}{2}(B - B^*)^2 \quad (5)$$

Treating aid as endogenous is not unrealistic, since often donors commit a certain amount of aid to recipients each year, and the recipient will decide how much of the commitment is spent in the year. A is the amount of aid disbursed (spent) and A^* represent the commitment (target). Under-spending an aid commitment means that not all of aid is used and over-spending in practice means that some part of commitments have been spent with a delay or that additional emergency aid was granted that year (beyond recorded commitments).

One can derive a set of equations for all endogenous variables that can be estimated by maximising (5) subject to (4) and the following inequality

$$G \leq \rho_1 T + \rho_2 A + \rho_3 B \quad (6)$$

The inequality reflects the existence of external constraints that limit how governments allocate revenues, either by donors or domestic interest groups. So targets may not necessarily be met, depending on values of ρ s. This retains the possibility that a failure to raise adequate revenue leads to targets not being met.

⇒ Estimation and results

Heller (1975) estimated the fiscal response model using two-stage least squares (2SLS) and cross-sectional data. Subsequent studies use time series data and three-stage least squares (3SLS) method (more efficient). But, it is possible that 3SLS estimation leads to degrees of freedom problems – developing country data often has a short time dimension. Studies often just report direct effects and not the feedback effects operating through the system of structural equations (because of endogenous variables). Total (direct and indirect) effects can be derived by solving the system for each endogenous variable.

A few other problems with the early problems relate to estimates of ρ s, which may have been negative in some cases and the problems with estimating the target values. Data for target values is often not available.

Table 3 Selected results of fiscal response studies

Study	Sample	Incremental impact of aid on				
		<i>T</i>	<i>Ig</i>	<i>G</i>	<i>B</i>	
Heller (1975)	Cross-section (Africa)	-0.4	1.1	-0.1		
Gang & Khan (1991)	India	0.0	0.0	0.0		
Khan & Hoshino (1992)	Cross-section (Asia)	1.2	1.2	0.3		
Iqbal (1997)	Pakistan	0.0	0.0	1.6		
Franco-Rodriguez <i>et al</i> (1998)	Pakistan	Direct effects	-2.9	0.1	-2.0	-1.1
		Total effects	-3.6	0.1	-2.4	0.9
McGillivray & Ahmed (1999)	The Philippines	-0.1	-0.02	0.02	-1.81	
Franco-Rodriguez (2000)	Costa Rica	Direct Effects	1.1	-0.36	2.47	-1.27
		Total effects	0.05	-0.02	0.07	-0.08

Notes: Figures are the total effect (incremental impact) of a unit of aid on public investment, public consumption spending, tax revenue and, where reported, borrowing (measured in the same units). Sources as indicated. We can note that Iqbal (1997) had a very short time series.

Source: McGillivray and Morrissey, 2001

Results of some of fiscal response studies are shown in the table above. The authors consider the three last studies to be stronger in terms of the methodology.

The findings suggest that:

- Aid discourages tax effort, although only clearly for Pakistan and not in Costa Rica.
- The evidence does not strongly suggest that aid would be spent primarily on consumption rather than investment.
- Pakistan: positive effect on investment, reduction in tax effort.
- Costa Rica: negative effect on investment, a rise in consumption, and a rise in tax effort and fall in borrowing.

⇒ Conclusions

Fiscal response models can improve understanding of the effects of aid on government behaviour.

No definitive conclusions can be drawn from these studies. However, fiscal response studies do not appear to clearly support fungibility hypothesis in the sense that aid does not necessarily raise consumption spending by more than it increases investment spending. They also show that aid can have an effect on tax revenue, and tax effort seems to fall. Perhaps, aid reduces the incentive for governments to raise tax revenue or then the provision of aid is associated with policy reforms that lower tax revenue (e.g. tariff reductions). Finally, aid also seems to affect borrowing - aid is associated with reductions in borrowing in Costa Rica and the Philippines, but with increased borrowing in Pakistan. The fiscal effect of aid appears to vary by country – caution required with cross-country studies.

Aid may increase investment.

Aid may also be associated with higher borrowing which is allocated to additional consumption. It could be those aid projects require additional/matching spending (maintenance etc.). This would be consistent with evidence that total spending can increase by more than the value of aid. If tax revenue is constant, new borrowing is required. If tax effort is reduced, borrowing requirements rise even more. A further explanation is that spending officials misperceive their budget constraint – there is an “aid illusion” – possible when reporting is poor.

Aid may also be associated with lower borrowing – perhaps as a result of conditions imposed by donors. If tax effort rises, total spending may increase by at least the value of the aid. If tax revenue is not increased, and borrowing reduced, spending cannot rise by as much as aid. This could be one reason for studies that find that aid is fungible or that spending rises by less than the aid flow.

Implication: In addition to fiscal effects of aid, donors should take into account fiscal implications of policy reforms associated with conditional aid.

What can fiscal response studies tell about the links between aid and growth. We could assume that aid is more likely to promote growth when

- Aid intended for investment increases spending in those areas.
- Aid does not encourage reduced tax effort, since the tax/GDP ratio is usually low in aid-dependent economies.
- Aid does not raise borrowing to finance consumption. However, if increased borrowing is used to finance productive investment, then this may not be of much concern.

More recent studies on the fiscal impact of aid have estimated a theoretical models (such as VARs) to overcome problems such as having to estimate targets etc.