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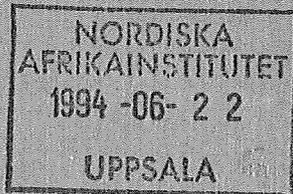
Secretariat for Analysis of
Swedish Development Assistance

Macroeconomic effects of aid

Literature review and methodological framework

Howard White
The Hague, January 1994

SASDA

The Secretariat for Analysis of Swedish Development Assistance

The Swedish government has appointed a committee with the task of analysing the results and effectiveness of Swedish development aid. A special Secretariat, SASDA, was set up on 1 March 1993 to carry out the work.

The Secretariat will work until the end of 1994 and will have as its main task to propose to Government suitable mechanisms for evaluations and policy analyses of Swedish aid. In its work SASDA will give priority to carrying out a set of of selected studies world-wide, at country, sector and subject level and to studies of individual organisations to provide a basis for decisions on development co-operation in the future and to gain experience on how policy evaluations should be carried out. A major study concerns Sweden's co-operation with Central and Eastern Europe.

SASDA's point of departure is the aim of a better understanding of the mechanisms of development in order to enhance the results and increase the effectiveness of aid in achieving the five goals set by the Swedish parliament: increased resources, economic and social equality, economic and political independence, the democratic development of society, and the long-term management of natural resources and care of the environment.

The studies and analyses will be managed partly by the Secretariat's own staff and will include studies commissioned from different specialists in the committee's areas of priority.

The staff are :

Ambassador Claes Sandgren	Head of the Secretariat
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MACROECONOMIC EFFECTS OF AID

LITERATURE REVIEW AND METHODOLOGICAL FRAMEWORK

Report for SASDA/SAU

Howard White

with the assistance of Joke Luttik

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CHAPTER 1

INTRODUCTION

In 1992 US$ 60.8 billion of aid flowed from the developed to developing countries through official bilateral and multilateral channels.[1] Although aid flows have grown only very modestly in real terms since the early 1980s and many donors are making little or no progress toward the agreed target of aid equal to 0.7 per cent of GNP (see White and Woestman, 1993) there is, nonetheless, an increasing restlessness in donor countries, often labelled "donor fatigue". Whatever the reason, aid budgets are being subject to additional scrutiny - and, in some cases, cut. Against this background the Swedish parliament created an independent agency - the Secretariat for the Analysis of Swedish Development Assistance (SASDA) - to evaluate the effectiveness of Swedish aid.

SASDA have commissioned a series of studies on all aspects of the aid process - including an evaluation of the macroeconomic impact of aid in four major recipients of Swedish aid (Guinea-Bissau, Nicaragua, Tanzania and Zambia) to be carried out jointly be the Institute of Social Studies and the Stockholm School of Economics.[2] This report, the first to be produced for the macroeconomic evaluation, is a review of the existing literature and statement of the methodological approach to be adopted in the study.

How are we to understand aid's macroeconomic impact? In Chapter 2 we list three approaches that have been used in examining the impact of structural adjustment and stabilisation programmes, but which can as well be applied to aid more generally. The three approaches are: (i) before versus after; (ii) control group approach; and (iii) modelling. Our discussion of the three leads to the adoption of the modelling approach for this study. In Chapter 2 some issues relating to good econometric practice are also discussed.

The macroeconomic impact of aid inflows is best understood within the context of an accounting framework, but very little of the existing aid literature has adopted such an approach. Nonetheless, the existing literature can mostly be fitted into the context of such a framework. The exception is the empirical literature on aid and growth - which appears to us as an over-ambitious exercise, a point of view explained in more detail in Chapter 3. The remainder of the chapter

first reviews the channels through which aid may influence imports, investment and government expenditure and the theoretical mechanisms that may offset these effects and then the related empirical evidence. Those familiar with the macroeconomic debate should recognise the rigorous application of the accounting framework as a new approach. In addition, unpublished material and new work are included on the analysis of recipient fiscal response to aid inflows. This report does not repeat in full the points to be found in my survey article from the *Journal of Development Studies* (White, 1992b) - though the most relevant areas are included here. As a "guide to action" the report should therefore be used in conjunction with the *JDS* survey.

A similar review is attempted in Chapter 4 of the literature on the macroeconomic impact of adjustment policies. Particular attention is paid to the issue of how the analysis of aid monies and aid-supported policy reforms can be incorporated into a single framework - but with the effects of each clearly separable. An important related issue is whether we wish to measure the effects of policies or the presence of a programme - the latter, which has dominated the literature - appears conceptually flawed.

Aid may assume one of four main types: project aid, commodity aid (notably food aid), programme aid and technical assistance. One problem in much of the literature is that an aggregate aid figure is used, even though the macroeconomic repercussions of these different types of aid will differ. Chapter 5 reviews the elements of the debates over food aid, technical assistance and project aid which have macroeconomic relevance.

Chapter 6 examines the literature on the impact of aid and adjustment on social and environmental variables. Ways in which the mechanisms that have been identified in these literature may be incorporated into the macroeconomic accounting framework are discussed, since this report suggests a synthesised approach as a direction for further research. The main channel for such effects is through the response of the sectoral composition of government expenditure, although adjustment policies will also have affects through changes in relative prices (including the introduction of user charges).

The application of an accounting framework requires a data set fully consistent with that framework - an important part of the initial work of this study is therefore the creation of a database. Chapter 7 first details the work required for the database construction and then summarises the proposed methodology.

Notes to Chapter 1

1. This figure is for aid from DAC countries and multilateral institutions only.

2. The analysis of Tanzania will draw on the work carried out for SIDA on import support to Tanzania - see White and Wuyts (1993) and Doriye *et al.* (1993) - and the results of the Gothenberg team working for SASDA on Tanzania and Zambia.

CHAPTER 2

METHODOLOGICAL FRAMEWORK

2.1 Introduction

Analysis of the effects of aid monies and aid-supported policy reforms has been the subject of a large and growing literature. In the second part of this chapter we outline and appraise the three main approaches that have been adopted to examine these effects: (i) before and after: (ii) comparator country: and (iii) modelling. This discussion lays the basis for the review of the evidence in subsequent chapters.

In this chapter we also (Part 2.3) indicate potential problems in orthodox econometric methodology and illustrate how data analysis and general to specific modelling can cast doubt on some results in the aid literature. Part 2.4 provides a summary.

2.2 Three Approaches to the Analysis of Aid Impact

The problem is to analyze the impact of aid monies and aid-supported policy reforms in three areas: macroeconomic performance, poverty and welfare measures, and environmental considerations. Of these three, the greatest attention has been paid to methodological considerations in the case of the impact of structural adjustment policies on macroeconomic performance (see Goldstein and Montiel, 1986; World Bank, 1990: Annex 2.1; Mosley *et al.*, 1991 Volume 1: 181-187; Mosley, 1993; and Ajayi, 1993). The same debate has taken place to a lesser extent in the examination of the impact of these policies on the poor (e.g. Cornia, 1987: 53-55).

Three distinct methodological approaches have been identified: (i) before and after: (ii) comparator country; (iii) modelling. In this section we discuss these approaches and the advantages and disadvantages of each. Before moving to this discussion two points need to be made.

First, the underlying basis for the correct economic approach, as for all scientific work, is analysis which compares the "with case" against the "without case". This notion is that captured by Goldstein and Montiel in their definition of program effectiveness as

> the difference between actual macroeconomic performance observed under a Fund program and the performance that would have been expected in the *absence* of such a program.

> (Goldstein and Montiel, 1986: 305)

To understand the impact of action x on events the question to answer must be, what would have happened if action x did not take place but all other circumstances remained unchanged (the *ceteris paribus* assumption). The three methodologies must be appraised against their ability to answer this question.

If this question is answered correctly then a main concern in recent analysis - to separate out the effects of aid funds from those of aid-supported policy reforms - is automatically taken care of.

Second, the literature we are discussing here is that which has been used to analyze the impact of adjustment policies. But the approaches are just as applicable to the assessment of aid monies and to an analysis of environmental and poverty effects. The framework adopted in this report is to classify all studies of aid impact according to the three basic approaches identified here.

Before versus after

The before versus after approach compares the value of a variable before and after the occurrence of the event (the implementation of an adjustment program, an aid inflow or whatever), attributing the whole of the change to the program. Baldly stated thus, the limitations of the approach seem clear - its validity is correctly dismissed by Goldstein in the following words:

> the before-after approach can be useful to show what happened in program countries, but not why it happened.

> (Goldstein, 1986: 3; my emphasis)

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A before versus after analysis makes no allowance for other factors that influence outcomes, and so cannot possibly accurately be used as an indicator of effectiveness. Before and after is not without versus with.

Nonetheless, the approach has been a popular one in the analysis of adjustment policies: though sometimes it is applied by implication rather than in an explicit manner.

An example of explicit application of the methodology is Cornia's (1991) assessment of adjustment in 24 adjusting sub-Saharan African countries based on a table of performance indicators for 1980-81 and 1987-88. For example, in the case of investment he concludes that:

> capital accumulation slowed down in five-sixths of these [adjusting] countries. In 1987-88 the average (unweighted) gross investment/GDP ratio was 30 percent lower than in 1980-81.

> (Cornia, 1991: 23)

Jespersen's (1992) discussion of the same topic also gives before and after data on capital accumulation, manufacturing value added and growth performance. The terminological sleight of hand between the description of the data and ascribing causation is clear from the sentence:

> With few exceptions, stabilization was accompanied by sharp losses in GDP growth, investment and human capital development. Of the 18 countries which managed to stabilize their economies in the 1980s, only five recorded positive growth in GDP per capita. In all others macroeconomic stabilization was achieved at the expense of growth.

> (Jespersen, 1992: 14)

The descriptive term "accompanied" becomes the causal relationship "at the expense of". Often the logical non sequitur of the above quotations is left implicit, as in the following examples:

> ... the per capita income of non-cocoa farmers [in Ghana] has stagnated... In summary, conventional adjustment policies.. often aggravated poverty.

> (Cheru, 1992: 507)

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... the [Tanzanian] reform program has seen a sharp improvement in export performance, increasing from an average of 9.6 per cent of GDP in the pre-reform period to an average of 26.9 per cent during the period of reform.

(Nord *et al*, 1993: 17)

The quote from Nord *et al.* is doubly misleading. Not only do they apply the before-after approach but also base the comparison on ratios calculated using current prices, ignoring price effects from devaluation. The current price ratio may be written as:

$$\frac{EXP}{INC} = \frac{EP_x^* x}{P_y y} \qquad (2.1)$$

where EXP and INC are nominal exports and income respectively, E is the exchange rate (local currency per dollar), P_x^* the dollar export price index, P_y the GDP deflator and x and y real exports and GDP respectively. From equation (2.1), the percentage change in the current price export ratio may (ignoring higher order effects) be decomposed into three components:

$$\frac{\hat{EXP}}{INC} = \hat{E} + \frac{\hat{P_x^*}}{P_y} + \frac{\hat{x}}{y} \qquad (2.2)$$

where ^ denotes percentage change.[i]

The nominal export ratio rises if there is a devaluation even though all other factors (export and output volumes and prices) remain constant. In Tanzania the average exchange rate from the five years 1981-86 to the period 1987-91 increased over 800 per cent - by contrast the current price export ratio reported by Nord *et al.* increased by only 180 per cent. Export growth has been around the same level as that for the economy as a whole so that the third component of equation (2.2) has been constant - the difference between the current price ratio and the large positive revaluation effect is accounted for by falling export prices whilst domestic inflation has been in the range 20-30 per cent a year. The apparent increase in the export ratio is purely a price effect, and so not indicative of any improvement in performance, as measured by the export-output ratio in real terms. In general, one should be careful in the interpretation of nominal price ratios during periods devaluation, especially if the ratio involves exports, imports or investment (as most investment goods are imported) and, of course, the aid ratio.

Comparator (control group) country approach

The control group approach overcomes the problem of changes in external environment by comparing the experience of adjusting and non-adjusting countries over the same time period (although the variable analyzed may be either a levels indicator or the change in that indicator). The assumptions are that all included countries have experienced the same external environment over the period of the analysis and that they share the same basic structure. The World Bank studies identify three groups: non-adjusting, (early) intensively adjusting and other adjusting countries. Whether or not a country is "adjusting" is defined by whether or not it has drawn on adjustment credits, not its policy stance. No additional attempt is made to ensure comparability of the countries, so that doubt may be cast on the underlying assumption that countries in different groups are the same except for the fact of adjustment.

Table 2.1 shows data from the second World Bank report on adjustment lending which demonstrate that neither the initial conditions nor external factors were particularly similar between the three groups identified. The initial conditions were in most instances worst in "Other

Table 2.1 Comparison of adjusting and non adjusting countries

(a) Initial conditions

	Debt/ exports	Fiscal deficit	Resource balance	Real GDP growth	Invest. rate
EIAL	204.7	-6.4	5.1	4.6	22.5
OAL	206.2	-7.0	7.3	3.9	21.3
NAL	144.6	-4.4	6.7	5.5	23.4

(b) External shocks

	1981-84 against 70-80			1985-88 against 70-80		
	Terms of trade	Real interest	Total	Terms of trade	Real interest	Total
EIAL	-10.5	-1.9	-12.4	-6.0	-3.2	-9.2
OAL	-2.9	-2.0	-4.9	-3.4	-3.6	-7.0
NAL	-10.4	-1.2	-11.6	-13.9	-2.0	-15.9

Note: total shock is sum of the terms of trade and real interest rate shocks. For calculation of these shocks see World Bank (1990: 14).

Source: World Bank (1990: 13-14).

Adjusting Lending" (OAL) countries and best in "Non Adjusting Lending" (NAL) ones. On the other hand, OALs suffered least from external shocks; either NALs or "Early Intensive Adjustment Lending" (EIAL) countries were the most adversely affected, depending on the period of comparison.

Mosley et al. made more effort to ensure comparability by matching forty countries into twenty pairs, where each adjusting country was matched with a non-adjusting partner with a similar economic structure. Despite this effort some of the pairs (for example, Ghana-Zambia; Jamaica-Nicaragua; and Philippines-Indonesia) seem ill-matched: both for reasons of internal structure and because there the countries do not share a common external environment as assumed. The data in Table 2.2, given by the authors themselves, confirm the view that some of controls are rather dissimilar to their partners.

One reason for non-comparability of adjusting and non-adjusting countries is that the samples are not drawn from populations with the same characteristics. More specifically, it has

Table 2.2 Economic variables for selected country pairs

	Change in terms of trade, 1975-81 (% pa)	Change in terms of trade, 1981-86 (% pa)	GNP per capita (S), 1981	Real GDP growth, 1970-81 (% pa)
Bolivia	7.7	-8.0	600	1.7
Colombia	0.6	3.7	1,380	3.6
Malawi	-4.3	0.8	200	2.5
Zimbabwe	-7.1	na	870	-1.4
Pakistan	-5.6	-2.0	350	1.9
Egypt	-2.9	-4.6	650	4.9
Thailand	-7.0	-1.9	770	4.6
Malaysia	-0.1	-6.3	1,840	5.2
Turkey	-6.6	na	1,540	2.6
Greece	-2.4	na	4,420	3.3

Source: Mosley et al. (1991: 191-92).

been argued (notably by Goldstein and Montiel, 1986) that countries adopting stabilization programs are more likely to be in a situation of economic crisis. To the extent that current economic performance is determined by lagged economic performance then there will be inherent sample selection bias in the control group approach - since on average the pre-program performance of adjusting countries will be worse than that of non-adjusters (a view supported by the data on initial conditions presented in Table 2.1). Goldstein and Montiel proposed the modified control group approach to overcome this problem.

Modified control group approach

The modified control group approach endogenises the policy response in order to model what policies would have been in the absence of adjustment. The effect of these policies is removed to give the net impact of the program itself. The presentation that follows is based on Goldstein and Montiel (1986), who laid the foundations for subsequent work in this area. (Goldstein and Montiel were concerned with the analysis of IMF stabilization programs, though the approach can and has been applied to World Bank adjustment programs. Their terminology is, however, preserved below).

The model consists of four core equations, the first of which captures the determinants of macroeconomic performance:

$$\Delta y_{ij} = \Delta x_{ij}' \beta_{ij} - \Delta W' \alpha_{ij} - \beta_{ij}^{IMF} \Delta d_i + \varepsilon_{ij} \qquad (2.3)$$

where y_{ij} is the jth macroeconomic outcome variable for country i, x_i the vector of policies observed in country i the absence of a program, W a vector of global variables affecting domestic performance, d_i is an dummy variable which takes the value 1 if a country has an IMF program and zero otherwise and ε_{ij} w white noise error term.

The apparent problem with equation (2.3) is the variable x_i - policies is the absence of the program - which is clearly unobservable for program countries. The values of x for program countries are generated by the policy reaction function:

$$\Delta x_i = \gamma [y_i^d - (y_i)_{-1}] + \eta_i \qquad (2.4)$$

where y_i^d is the desired level of y_i (also unobservable) and η an error term. In practice y_i^d is assumed to be constant for each country over time and so for the purpose of empirical estimation is captured by county dummies.

The final two equations determine whether or not a country will adopt an IMF program:

$$z_i = [y_i^d - (y_i)_{-1}]'\delta + \pi_i \qquad (2.5)$$

$$d_i = 1 \quad if \ z_i > z^* \qquad (2.6)$$

$$d_i = 0 \quad if \ z_i \leq z^*$$

where z_i is the vector of determinants of program adoption and π an error term.

In the context of this model, Goldstein and Montiel define three measures (estimators) of the effects of IMF programs on macroeconomic performance, corresponding to the before-after, simple control and modified control group approaches respectively:

$$\hat{\beta}_{ij}^{IMF,A} = \Delta y_{ij}, \qquad i\epsilon P \qquad (2.7)$$

$$\hat{\beta}_j^{IMF,C} = (\overline{\Delta y_j})_P - (\overline{\Delta y_j})_N \qquad (2.8)$$

$$\hat{\beta}_j^{IMF,M} = (\overline{y_j})_P - (\overline{y_j})_N - (\overline{x_P} - \overline{x_n})'\beta_j \qquad (2.9)$$

where the subscripts P and N stand for program and nonprogramme countries.

The derivation of the expected value of these estimators using equation (2.3) shows the first two approaches to be biased. The bias of the before-after estimator comes both from the sum of changes in global conditions (W) and domestic policies undertaken in the absence of the program.

The simple control group approach is biased even assuming that changes in and reactions to global conditions are the same for program and nonprogram countries. The remaining bias comes from the extent that the contribution of macro policy in the absence of the program differs between the two groups - which will be the case if we expect policies in program countries, in the

absence of the program, to differ from policies in nonprogram countries. Goldstein and Montiel's argument is, as stated above, that we should expect such differences since program countries are, on average, worse initial performers (so that the reaction function - equation (2.4) - suggests they will have different "without program" policies to those countries without programs).

By contrast the modified control group approach attempts to remove the sample selection bias by differencing out the effects of policies in the absence of the program. The proof of unbiasedness by Montiel and Goldstein does, however, rely on the assumption that the vector of global non-program variables is the same across countries. This assumption seems doubtful: countries experience different terms of trade shocks depending on the composition of their exports and imports, with the former also influencing how sensitive they are to demand conditions in the developed countries; and a country's debt structure determines the importance of changes in the "world interest rate". More importantly for our analysis is the absence of a variable to measure capital inflows in the analysis of Goldstein and Montiel. Their approach potentially provides an avenue for separating out the effects of aid flows from aid-supported policies, but in practice they (and subsequent applications of the technique) have ignored the role of the flows altogether. Moreover, the estimates of programme effectiveness may remain biased if the errors in equations (2.4) and (2.5) are correlated, i.e. given all observable factors, countries with systematically bad policies are less likely to embark on programs.

Goldstein and Montiel demonstrate that the impact of the adjustment program on any one performance indicator may be decomposed into three separate effects: (i) the change in policies from what they would have been in the absence of the program; (ii) the change in effectiveness of given policies; and (iii) a "confidence effect" associated with the program. However, neither their study nor any subsequent ones of which I am aware have applied this decomposition empirically, which is an unfortunate omission in the literature.

Discussion of the direction of bias suggests that the other two approaches will give an over-optimistic picture of the impact of IMF programs. The empirical analysis presented by Goldstein and Montiel supports this suggestion. They calculate the impact of fund programs on the overall balance of payments and the current account both expressed as a per cent of GNP, the rate of inflation and real GDP growth by all three methods using a common data set. Comparing the modified control group approach with the other two methods they report that:

the improvement in the current account ratio disappears entirely, the deterioration in the balance of payments ratio is magnified, and the favourable outcomes for inflation and growth are reversed.

(Goldstein and Montiel, 1986: 337)

However, the coefficients on the dummy variable are in fact insignificant in all cases.

In summary, the modified control group approach is a considerable advance on the before versus after and simple control groups approaches. However, there have been shortcomings in its application - in particular to failure to allow for the effects of aid inflows. It is possible within the technique to allow global factors (including aid flows) to be country specific. But to do so is to move towards the estimation of a separate model for each country in the sample - in which case why not just proceed on the basis of country-specific models? The use of country-specific models is the approach favoured by this report, and that which is dictated by the requirements of the study to analyze aid impact in only four countries.

Simultaneous estimation of aid flows and macroeconomic performance

Before moving to a discussion of modelling approaches, we should mention the simultaneous estimation of aid and macroeconomic performance, which is the analogous technique to the modified control group approach for aid flows rather than aid policies. It is sometimes argued - for example in Mosley (1980) - that countries receive aid because of poor performance as well as aid affecting performance. Hence the relationship between aid and performance must be estimated simultaneously. There are, however, a number of reasons not to accept the importance of this argument.

First, donors may conceivably allocate aid by income per capita but will not do so by growth, which is often the dependent variable of interest in aid studies. Second, donors are more concerned with policy than performance, and the link between these two varies across time and place. Third, studies of aid allocation shown that donor political and commercial interests are a stronger determinant of bilateral aid flows than are measures of recipient need (e.g. Maizels and Nissanke, 1984). Finally, the allocation decision concerns aid commitments, whereas disbursements are the relevant variable for economic analysis - and there may be little relationship between commitments in any given year and the amount actually disbursed in that year (McGillivray and White, 1993).

Modelling

Models can have a great range of complexity. The simplest model is a single equation - for example a savings function. At the other extreme, models can run to thousands of equations. The complexity of the required model depends on the task to hand. It is not the intention of having a model which captures every aspect of reality.[2] On the other hand, too simple a model may omit key relationships which, if included, would greatly alter our conclusions.

Most of the literature on the macroeconomic impact of aid has relied on a single equation approach and so fallen into the latter trap. Whilst a full blown general equilibrium model may not be required, a single equation is often too partial an analysis to give meaningful insights. An example of this argument is the savings debate.

Griffin (1970 and 1971) argued that aid displaced domestic savings. He reasoned that aid will be treated by the recipient as income and so there will be an increase in consumption. As consumption has risen but income (net of aid) is constant then domestic savings (income net of aid minus consumption) must necessarily fall. The fallacy in this argument (explored further in Chapter 3) is that income will not be constant in the face of an aid inflow. At its simplest the aid-induced increase in consumption will set off a multiplier process leading to an eventual increase in income that may be well in excess of the value of the aid inflow. Alternatively, production multipliers may achieve the same results.[3] Hence, it is quite possible that both consumption and savings can rise. We will see in Chapter 3 that most conclusions in the literature on the macroeconomics of aid can be faulted for adopting a partial approach.

Some studies of the effects of adjustment policies use single equation techniques, and they may also be faulted for their partial analysis (see Chapter 4). But larger macro models have also been more intensively used is the adjustment debate. There can be a problem of non-transparency which restricts the influence that such studies have. That is, the economic mechanisms driving the results from model simulations may not be at all obvious. Hence models should be parsimonious where possible, but sufficiently comprehensive to incorporate the most important relationships.

Ideally, the modelling approach can solve the problem of analyzing with versus without. A properly specified model will contain all the main determinants of the variables of interest and the impact of changes in these variables - other factors held constant - may be examined through model simulations. Hence the impact of aid monies can in principle be distinguished from that of

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aid-financed policies. In modelling policy changes it is important to remember that policies may have effects through two channels. First, through changes in the exogenous policy variables. Second, by changing the nature of behavioral relationships, which can be captured through the use of dummy variables. Proper use of dummy variables is just one aspect of good econometric modelling - in Part 2.3 some other aspects are discussed.

2.3   Specification Searches and Data Analysis

Econometric methodology since the Cowles Commission may be broadly characterized as the statement of a model which is estimated using the appropriate technique (OLS, two stage least squares or whatever). By contrast, recent developments emphasize instead that the model cannot be established independently of the data. These developments are contained in two approaches: general to specific modelling and data analysis. Although the two approaches have somewhat different heritages they do share a common philosophical rejection of much orthodox econometrics. It is my view also that the two methodologies are complementary rather than competitors.

General to specific modelling (GSP) is identified most strongly with the "LSE school" and David Hendry in particular (for overviews see the recently published collection of Hendry's papers (1993) and Gilbert, 1986). An incorrectly specified model (i.e. the one with the wrong variables - or right variables with the wrong lag structure - on the right hand side) will give incorrect coefficient estimates and test statistics. Therefore there is no point in testing hypotheses relating to economic theory until the correct model (the data generation process) for the independent variable of interest has been established.

A misspecified model gives inconsistent estimates of all parameters. It is therefore not correct to argue, as Mosley *et al.* do in their study of adjustment policies that:

> there are many other independent variables which could have been included as
> explanatory variables in the equations. In addition, lags could have been
> introduced to more of the independent variables... However, since it is
> specifically the impact of Bank finance and policy conditions which we wish to
> quantify, we have refrained from more complex specification of the equations

(Mosley *et al.* 1991: 210)

The correct model must be established - that is with the right explanatory variables and correct lag structures - before we can sensibly look at the coefficients on the variables of interest. But how to establish to what is the correct model?

The specific to general approach is to start with the simplest possible model. Only if this model does not appear to perform adequately (judged by the R^2, t-test and usual diagnostics) should additional variables be added. The flaw in this argument is that the t-tests etc. are not valid if the model is misspecified, and so they are not the appropriate means by which to judge the model's validity. Diagnostic tests may give clues as to misspecification, but the output from estimating a model may equally well obscure the misspecification. Specification can only be properly tested by reference to some more general model.

General to specific modelling begins from an unrestricted dynamic equation (UDE) which contains all potential variables of interest with a number of lags.[4] Testing proceeds from this general model to exclude insignificant variables until a more specific form consistent with the data is identified. (Successive restricted models are tested, by the F-test, against the UDE).

The main form of misspecification identified by GSP is omitted variables or an inappropriate lag structure. Incorrect functional form may also be detected[5], but such misspecification is often more easily spotted by data analysis.

Data analysis relies on the use of graphical techniques, using both simple and partial scatter plots. In this way, non-linearities are readily detected. In addition to identifying the extent and nature of key relationships. data analysis may indicate if one or two observations exert an undue influence on the results. Any observation that has an X value far removed from the mean for that series is a point of leverage, with the potential to exert a large influence on the result. An influential point is defined as one whose exclusion would result in a substantially different regression line. Under such circumstances it may be more appropriate to use robust regression, which will reduce the weight given to the influential point.

The term robust regression is used both to apply to this specific technique and more generally. In the general sense, a robust result is one which is not dependent upon the sample (and therefore not the result of influential points) but also one that holds up in the face of different

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(but appropriate) specifications.[6] These points may be illustrated by the well known. but not robust, result that aid displaces domestic savings.

Griffin (1970, 1971) claimed that aid displaces savings' and backed up his argument by reporting the results from regressions of the savings rate on the aid ratio. He found statistically significant slope coefficients from cross-section data of -0.67, -0.73 and -0.82.[8]

Using more recent cross section data for 66 developing countries I obtained a coefficient of -0.87 (White, 1992b and 1992c). But the regression of the savings rate on the aid ratio is clearly misspecified: other factors play a role in determining savings. Indeed, from Griffin's own algebraic presentation of his model (contained in the 1971 paper) it is clear that the estimated equation should include the inverse of income $(1/Y)$. which he omits. Re-estimation of the equation with my data set including this variable changes the coefficient from -0.87 to -0.40.[9]

A graphical illustration of this change in impact is shown in Figure 2.1. The upper graph shows the simple scatter of the savings and aid rates and the fitted simple regression line. The lower box shows the partial scatter plot - that is one the effect of $1/Y$ has been removed from both S/Y and A/Y. The fitted line in this plot (which has the same slope as the coefficient on A/Y from the multiple regression of S/Y on A/Y and $1/Y$) is much less steep than that from the simple plot.

Further variables should also be included on the right hand side for a convincing model of savings determination. In White (1992b and 1992c) I report the regression in differences for this data set including also the export rate. inflation and income per capita - in this regression the coefficient on aid is insignificant.

The top graph in Figure 2.1 shows also that there are three points somewhat to the right of the rest of the observations. Are these influential points? Figure 2.2 shows the fitted lines from (i) the full sample; (ii) from omitting the point labelled observation 1; and (iii) from omitting observation 2. The slopes of these lines are -0.87, -0.64 and -1.24 respectively. Clearly the results do depend on the sample.

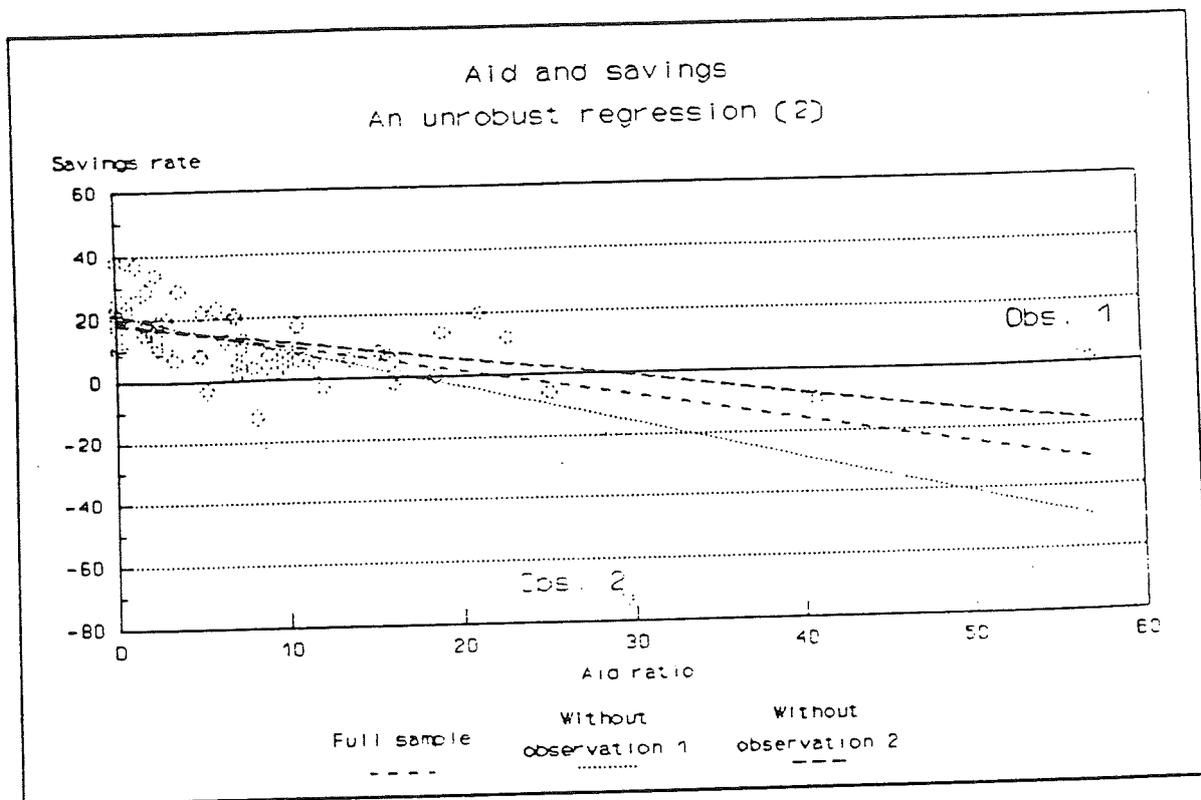Further illustrations of the importance of data analysis to identify influential points may be provided from a recent World Bank report on adjustment in sub-Saharan Africa.[10] It is useful

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Figure 2.1

Aid and savings
An unrobust regression (1)
Simple regression

Partial regression plot
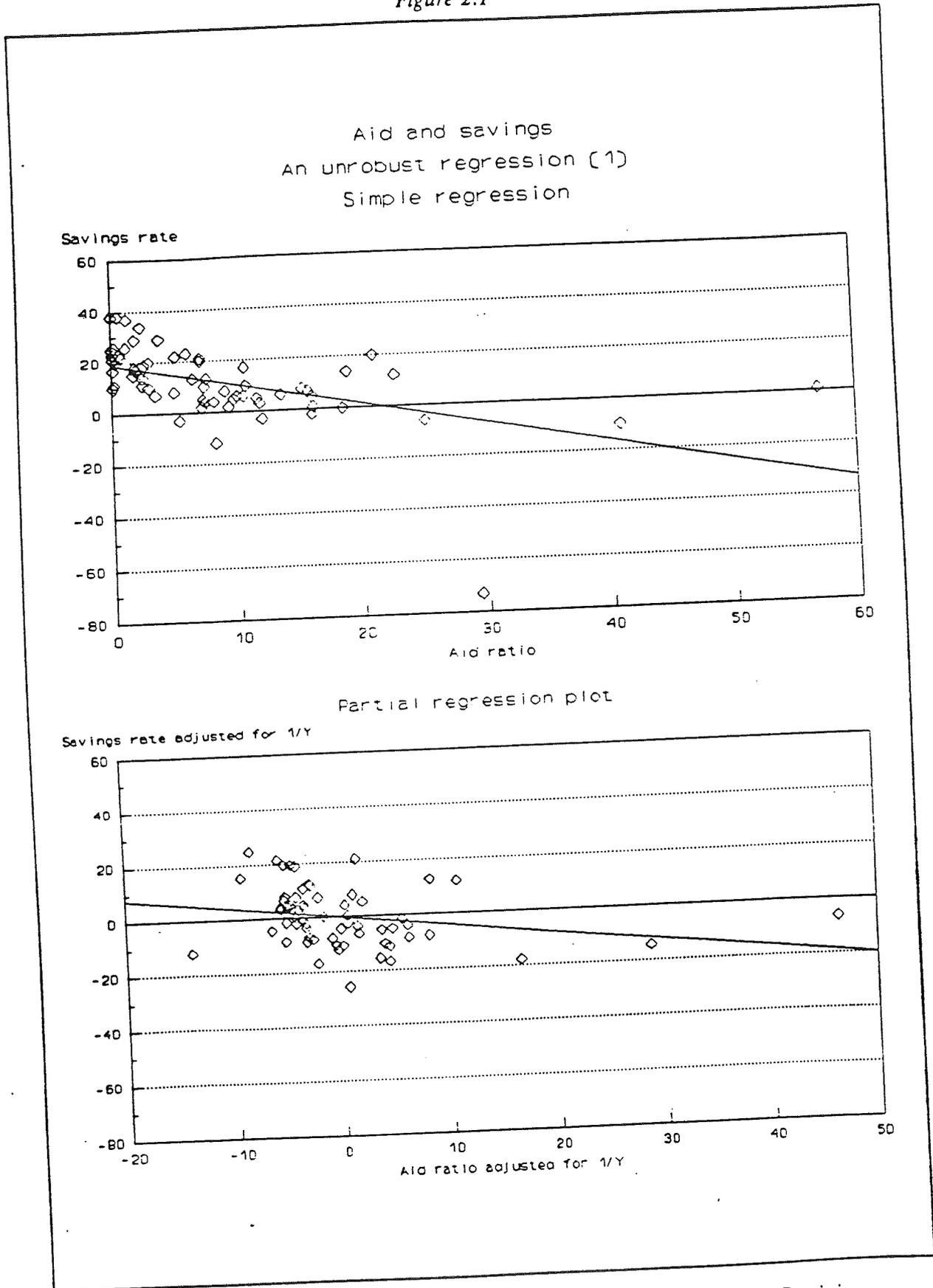
that this report contains the scatter plots for many of the relationships discussed. But it is

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Figure 2.2

Aid and savings
An unrobust regression (2)

surprising that many of them have evident points of leverage with no discussion of whether or not these points exert undue influence on the results.

Figure 2.3 illustrates one such case. Using data for 27 sub-Saharan African countries, the graph purports to show how much of the improved growth performance of the late 1980s may be attributed to changes in macro policies, and is accompanied by the statement that "the effect of changes in macroeconomic policies on growth is positive and statistically significant". Indeed, the regression coefficient is 1.91 with a t-statistic of 2.88.[11] Yet this result depends crucially on one observation - that in the bottom left, which is for Cameroon. Once this observation is excluded the line looks rather different - the slope is now only 1.31, with a t-statistic of 2.24. If Rwanda is also dropped from the sample the slope coefficient falls to 1.14 and is no longer significantly different from zero.

One further example of the importance of visual data analysis is shown by Figure 2.4, drawn using data from Holmqvist (1992). The figure shows cross-country data for 38 developing countries - plotting educational expenditure per capita against aid receipts for educational purposes, also per capita.

Figure 2.3

Macro policies and turnaround in GDP growth
Sensitivity to sample

Change in GDP growth

Change in macro policies

Full   Restricted
sample   sample

Figure 2.4

Aid and educational expenditure
A regression determined by influential points

Education expenditure per capita (US$)

Education aid per capita (US$)
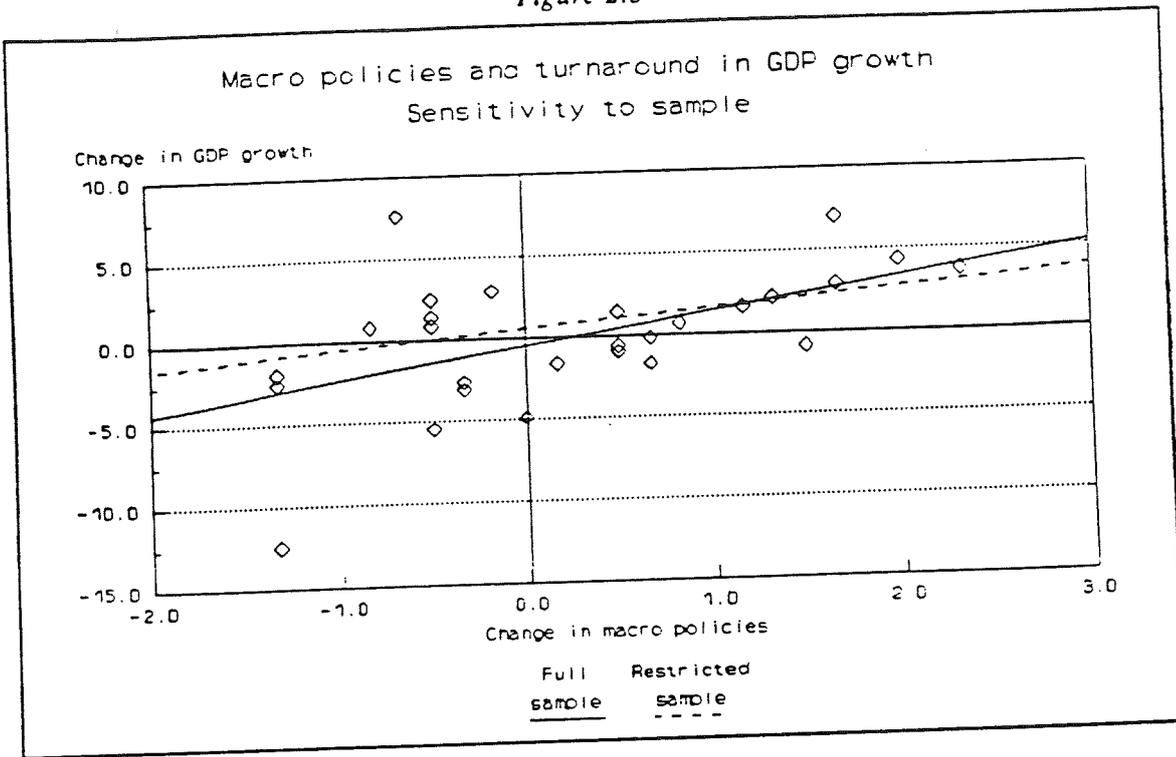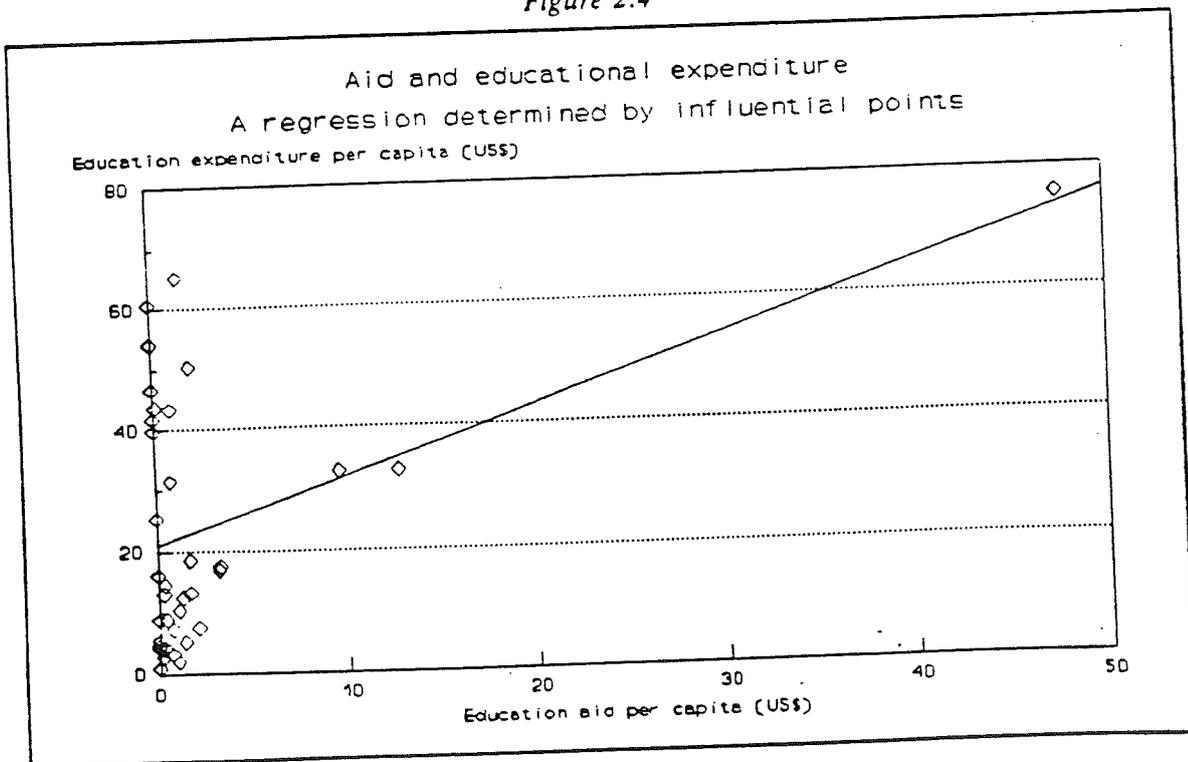
The author is concerned to test if aid for education does indeed increase educational expenditure. Accordingly he regresses educational expenditure on aid for education. other aid and GNP (all expressed per capita), with the following result:

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$$EDUEXP = \begin{array}{c} -3.412 \\ (-1.032) \end{array} + \begin{array}{c} 0.917 \, EAID \\ (3.903) \end{array}$$

$$+ \begin{array}{c} 0.077 \, OAID \\ (1.736) \end{array} + \begin{array}{c} 0.031 \, GNP \\ (6.018) \end{array} \quad R^2 = 0.752 \qquad (2.10)$$

The results apparently confirm that educational expenditure rises by roughly one dollar for every dollar of educational aid received - whereas aid for other purposes has little or no impact.

The scatter plot shown here is a simple rather than partial plot - but it strongly suggests that the top three recipients of educational aid, all of which have high leverage, play an important part in determining the position of the regression line. The line would be _steeper_ - that is educational aid increase educational expenditure on a more than one for one basis - if these observations were omitted. The results reported in Table 2.3 for repeating the regression from equation (1) bear out this suspicion: the slope of the line increases as the sample size is reduced (the sample is sorted by educational expenditure in ascending order).

Table 2.3 Regression results with different sample sizes

	Slope coefficient	t-statistic	R^2
Full sample	0.917	3.903	0.752
Observations 1 to 37	1.209	1.678	0.703
Observations 1 to 36	1.432	1.282	0.701
Observations 1 to 35	1.504	0.678	0.698

But more important in this case than the slope coefficient is the t-statistic - other than in the full sample the coefficient on educational aid is insignificantly different from zero.[12] The intuition behind this finding is as follows. The t-statistic is the ratio of the estimated slope coefficient and the standard error of that estimate. The second of these is square root of the ratio of variance of the error term and the sum of squared deviation of the independent variable. In the full sample the denominator is large - there are three observations with a large mean deviation - so that the standard error will be smaller and the t-statistic larger than if these observations were omitted. (To put it simply: once the three influential points are removed there is very little

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variation in educational expenditure, which must necessarily result in inexact estimates). Meanwhile the numerator will (taking the fitted line as an approximation of the true relationship) be small in the full sample since these three observations lie very close to the line - removing these observations will not reduce and may even increase the error variance.

Therefore the results reported by Holmqvist are very sensitive to the sample used. Dropping just one observation leaves GNP per capita as the only significant determinant of educational expenditure. Aid - either that targeted to education or for other purposes - has no role.

The examples presented here are of cross-section regressions, and most of the aid effectiveness literature has been of this type. However, the need for analysis of individual countries using time series has long been recognized (e.g. Papanek, 1973) and some studies have adopted such an approach (for example, Morisset's study of Argentinean savings, 1989). As is now widely recognized, economic time series data are prone to spurious regression.

A variable which assumes its own lagged value plus a random error (white noise) is described as a random walk. It has been shown that the regression of one random walk on another will most likely yield a significant result, even though there is actually no relationship between the two variables - this is a spurious regression. A random walk is an example of a non-stationary series. More generally it has been demonstrated that OLS regression with non-stationary series yields biased and inconsistent results.

The techniques for handling non-stationary series (tests for cointegration and estimation of an error correction model) are beginning to make an impression in the development literature. Papers by Mavorotas (1992) and White (1992d) estimate error correction models for aid's impact on savings in Ghana and for a model of fiscal response in Sri Lanka respectively.

Country-specific analyses of aid's macroeconomic impact have to handle the likely problem of non-stationarity. Since such models are also simultaneous systems it is important to note that the problem of non-stationarity "takes precedence" over that of simultaneity bias. That is, the coefficients in an error correction model will not suffer from simultaneity bias even though the equation may be part of a wider system. On the other hand, techniques for estimating

simultaneous equations (two or three stage least squares) do not avoid spurious regressions if the series are non-stationary.

2.4   Summary

Three approaches have been applied to the analysis of the impact of adjustment and stabilization programs: (i) before versus after; (ii) control (and modified) control group approach; and (iii) modelling. These approaches may be more generally applied to the analysis of aid impact. The before versus after and simple control group approaches must be rejected as they make *ceteris paribus* assumptions that will not generally be valid. Before versus after comparisons may be made to describe trends or raise questions, but they do not analyze causation. The modified approach is more appealing, although its application has not addressed the important issue of separating out the effects of aid monies that are received in support of adjustment programs. Moreover, a country-specific approach is the preferred methodology of this report (and in fact required by the nature of the study in hand), thus rendering the modified control group approach inappropriate.

Modelling can in principle overcome the difficulties identified in the other approaches. In developing an appropriate model a trade-off must be made between a model so simple that important relationships are absent and obscuring key mechanisms with over detail. The strategy proposed here is to begin with an accounting framework (which ensures consistency) and use data analysis to determine the key behavioral relationships. The combination of identities with behavioral relationships will form the (different) model for each country. The next chapter presents an appropriate accounting framework.

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1. The treatment given here understates the revaluation effect since it ignores the fact that, in the presence of a trade deficit, a devaluation will reduce nominal GDP.

2. Joan Robinson said that such a model would be as useful as a map with a scale of 1 in 1.

3. It has recently been argued that (Bhaduri et al., 1993) that aid depresses domestic demand, so Griffin's point is reinforced not negated by incorporating aid's impact on income. These arguments are pursued in Chapter 3.

4. There is an obvious limitation to this approach given the restricted length of most developing country data sets. For an modified approach using developing country data see White and Wignaraja (1992).

5. For example, the apparent presence of autocorrelation in either time series or cross-section data is often symptomatic of incorrect functional form.

6. The concept of robustness (and its converse fragility) are formalized in the extreme bounds analysis (EBA) propounded by Leamer (1983). Pagan's (1987) examination of GSP and EBA shows there to be many points of overlap, and where they differ that GSP probably has the upper hand.

7. His argument is discussed more extensively in Chapter 3.

8. Time series analysis of Colombian data gave a coefficient of -0.84.

9. White (1992d) discusses the factors behind the size and direction of the bias resulting from Griffin's misspecification.

10. This report is not yet in the public domain.

11. These results are from the simple regression. Despite the fact that the report contains the data for the analysis I was unable to replicate the regression results in the report (but got close for the macro policy variable). The slope coefficient on that variable is quite robust to changes in model specification (but not choice of sample).

12. The problem here may also be one of imposing an invalid restriction on the data by inappropriate pooling, which may be dealt with by adding dummy variables. (Invalid pooling is a form of omitted variable bias). Re-estimation of equation 2.3 with a slope dummy for EDUEXP (equal to EDUEXP for observations 36 to 38 and zero for all others) gives a similar result to that from omitting these observations: the slope coefficient for EDUEXP is higher but insignificant.

CHAPTER 3

AID'S IMPACT ON MACROECONOMIC AGGREGATES

3.1 Introduction

The traditional economic rationale for development aid is that it will increase growth in the recipient countries. This belief remains widespread, as evidenced by the following quote from a recent World Bank report:

> A net transfer of resources of about 9 percent of GDP on average will be required
> to achieve sustained growth during the 1990s.
>
> (World Bank, 1989: 176)

By contrast many academic studies have found no relationship between aid and growth. The British economist Paul Mosley (1980, 1987 and 1993) has published a number of papers illustrating the absence of such a relationship - in a recent example he writes:

> The apparent inability of development aid over more than twenty years to provide
> a net increment to overall growth in the Third World must give the donor
> community a grave cause for concern.
>
> (Mosley et al., 1987: 636)

It is my view, argued in Part 3.2 of this report, that existing regressions of growth on aid do not yield meaningful results, and so can be of no use in deciding whether or not aid has increased growth. A more fruitful approach is to examine the channels through which aid is intended to increase growth - increasing imports and investment and raising the efficiency of investment.

In Part 3.3 an accounting framework is presented which is a useful basis for laying out the possible channels through which aid may or may not affect imports, investment and other macroeconomic aggregates. This accounting framework is the cornerstone of the proposed methodology. The discussion locates the existing literature on the macroeconomics of aid within a single consistent framework and forms the basis for the subsequent discussions in Parts 3.4 and 3.5 of aid and external and internal balance. The issue of aid and the efficiency of investment is

explored in Part 3.6 and the notion of aid dependence in Part 3.7. Part 3.8 reviews two related literatures: global macroeconomic modelling and estimates of aid requirements. Part 3.9 provides a brief summary.

3.2 Empirical Estimation of the Aid-Growth Relationship

Empirical analysis of the impact of aid on growth has typically regressed real growth of income on aid inflows (perhaps aggregated with other capital inflows, or perhaps disaggregated into types of aid, e.g. grant or non-grant), usually with some additional regressors included (e.g. change in TOT, domestic savings rate and various dummies).[1] The results from selected regressions of growth on aid are shown in Table 3.1. As can be seen, there is little agreement: both positive and negative significant relationships have been reported.

Table 3.1 Results of selected aid-growth studies

Study	Data	Coefficient
Papanek (1973)	Pooled: 1950s and 1960s	0.39 (5.80)
Voivodas (1973)	Pooled: 22 LDCs (none SSA)	-0.01 (0.20)
Dowling and Hiemenz (1981)	Panel: Asia	0.43 (2.14)
El Shibly (1984)	Time-series: Sudan	-1.12 (1.16)
Gupta and Islam (1983)	Cross-section: 52 LDCs	0.18 (n.a.)
Mosley, Hudson and Horrell (1987)	Aggregate cross section	
	1960-70: 52 LDCs	-0.05 (2.12)
	1970-80: 63 LDCs	-0.03 (0.32)
	1980-83: 56 LDCs	0.01 (0.07)

Notes: coefficient is that on aid variable, the definition of which varies between studies. Figures in parentheses are t-statistics.

Source: as shown in table.

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However, the lack of unanimity need not concern us, since the equations on which these results are based are misspecified in three respects: (i) omitted variable bias; (ii) single equation estimation of simultaneous relationships; and (iii) parameter instability. We deal with each of these in turn.

Omitted variable bias: the fragility of cross-country growth regressions

We have only an imperfect understanding of the growth process. But it is not difficult to make a long list of variables that have at one time or other had growth regressed upon them (military expenditure, instability of export earnings, policy orientation and various social indicators, to name but a few), many of which have been found to have a "significant" impact on growth - Levine and Renelt (1991) report that over fifty variables have been found to be significantly correlated with growth.

To the extent that aid is correlated with any of these omitted variables (as it surely is in many cases - such as military expenditure, educational indicators, macro policy performance variables etc.) then the equation is subject to a specification error that will cause the estimate of the aid coefficient to be biased.

Levine and Renelt (1992) examined the robustness of some established results in the growth literature - they find that many of the macroeconomic indicators commonly used in the literature are indeed correlated with growth, but that the results are fragile. Their analysis concentrates on the replication of two representative existing studies, from which they conclude

> although each study presents intuitively appealing results, they use different explanatory variables... a union of the two sets of variables leaves none of the economic policy indicators significantly correlated with growth.
>
> (Levine and Renelt, 1992: 959)

They go on to say that:

> We find that very few economic variables are robustly correlated with cross-country growth rates of GDP or the ratio of investment expenditures to GDP.
>
> (Levine and Renelt, 1992: 959)

Average investment rates are, however, reported to be robustly related to average growth rates.

Levine and Renelt do not include any measure of aid or capital inflows amongst their explanatory variables. But their results strongly support the argument made above - the coefficients from regressing growth on aid and a few other variables are not likely to be robust, that is the coefficients will change substantially if different variables are included in the regression. But even if all the relevant variables could be included other problems would remain.

Single equation estimation of a simultaneous system

Relationships may exist between aid and other variables on the right hand side so that single equation estimation is unable to capture aid's full impact. Consider, for example literacy, which is included in the model of Mosley *et al.* (1987). The inclusion of this variable on the right hand side of the regression holds literacy constant whilst analyzing aid's impact on growth. Yet increasing literacy may be one of the channels through which aid affects growth - it is hoped that higher literacy will result from aid to the education sector. This effect will not be captured by including literacy in the equation, since a single equation is being used to estimate what is, in fact, a simultaneous system.

One response to the problem just raised may be that the link from aid to literacy to growth is a long term one, so that single equation estimation is not inappropriate. But this response is no answer to the problem at all - in fact it just highlights the third, and most important, fault in regressing growth on aid.

Parameter instability

What are the channels through which aid may affect growth? During the 1960s it may have been the case that aid was used for investment in infrastructure. But since that time aid has expanded into the social sector, there has been increased use of technical assistance and aid explicitly tied to policy reforms intended (after a period of restructuring) to facilitate growth.

During the 1980s a larger proportion of aid has been program aid rather than project aid: with excess capacity import support aid may lead to substantial increases in output whereas further project aid may actually reduce output as it draws resources into expanding capacity rather than using existing capacity (Doriye and Wuyts, 1992; Doriye *et al.*, 1993).

Aid may well contribute to growth - but both the extent and the period over which it occurs will be very different for different types of aid and for different sectors. It would be

foolhardy to claim that a textile factory, a feeder road, a primary health clinic and a student pursuing a masters degree are all going to have the same return, and what is more, within the same time-frame. Yet this is precisely what is implicitly assumed by studies that regress aid on growth. Most studies (Mosley *et al.*, 1987 being one exception) also take no account of the quite lengthy lags which may exist in the aid-growth relationship.

Few such studies have incorporated the lags that will occur between aid-financed activities and their eventual impact on growth. But such efforts are, anyhow, futile, since the required lag structure will change as the sectoral composition of aid changes. There is no theoretical foundation whatsoever for assuming that the impact of aid on growth is constant either across countries or across time. We would therefore expect that the aid coefficient in an aid-growth regression would be unstable (in both cross-section and time series studies).

White (1992c) reports results for a cross-country regression of growth on official transfers, net long-term capital inflows, savings and exports for a full sample of seventy three countries and for three sub-samples of African, Asian and Latin American and Caribbean countries. An F-test is used to test the hypothesis that the pooled regression is a valid restriction of the three sub-sample regressions. The calculated F-statistic is 6.21, compared to a critical value of less than 3, so that the null hypothesis of parameter stability between the three regions may be rejected with 99.9 per cent confidence.

Conclusion

In summary, whilst studies of aid and growth do not tell us that aid has increased growth, neither do they tell us that it has not done so. There are too many problems inherent in the methodology being employed for us to put any reliance on the results of this literature one way or the other. We would be far better advised to analyze aid's impact by examining the various links in the chain running from aid to growth more carefully. The accounting framework presented in Part 3.3 provides a basis for such an analysis.

3.3   An Accounting Framework

The national accounting identity:

$$Savings\ gap\ =\ Current\ account\ =\ Capital\ account \tag{3.1}$$

is a useful starting point for the discussion of aid's impact on macroeconomic aggregates. The gap between gross national savings and investment (the savings gap) must be financed by the net

inflow of foreign savings (the capital account), and the value of this inflow must equal the current account deficit (the trade gap). These identities must hold at all times. As described below, aid will appear in either the current or capital account. The question is: how are the identities preserved when one of the balances is disturbed by an increase is aid? (Or, to use the terminology adopted below, how does the economy accommodate the aid inflow)? Fitting actual data into these accounting equations will highlight main issues of interest as to how aid may have affected the economy.

In the remainder of Part 3.3 this question is examined in more detail, linking the possible accommodatory mechanisms to the existing literature on aid's macroeconomic impact. Parts 3.4 and 3.5 review the relevant empirical literature.

Fungibility

Aid is primarily intended to increase investment and imports - to the extent that these aggregates do not increase by the value of the aid inflow then the aid is said to be fungible. It is useful to distinguish two kinds of fungibility: aggregate fungibility and categorical fungibility. Suppose that funds (A) are intended to be used to finance goods or activity X. Aggregate fungibility occurs if the increase in expenditure on X is less than the value of the funds (that is, $dX/dA < 1$). Suppose X may be sub-divided into items X_1, X_2... X_n and that the funds are intended to be used for item X_1. If expenditure on the other categories of item X (X_2... X_n) rises in response to the increased availability of funds ($dX_j/dA \neq 0$ for any $j \neq 1$) there is categorical fungibility.

This distinction may appear unnecessary, as whether a case is described as aggregate or categorical fungibility rests on the perhaps arbitrary designation of expenditure items as X or non-X goods. In practice, the distinction proves easy to apply.

Consider the case of import support aid given to finance importation of intermediate goods. If the aid reduce exports through Dutch disease effects or displaces foreign borrowing imports rise by less than the value of the aid inflow: there is aggregate fungibility. But if imports of consumer goods increase as a result of the aid then there is categorical fungibility. Of course, both may types of fungibility may occur at once.

The distinction is also useful in the discussion of aid's impact on fiscal policy. Aggregate fungibility exists if taxes or government borrowing fall when aid increases. There is categorical fungibility if non-developmental expenditures (such as military expenditure) rise with higher aid.

The capital and current accounts

The capital and current accounts may be written in more detail as:[3]

$$X + NTR + NFP - M = -(LTL^c + LTL^n + STL + OKI + dR) \qquad (3.2)$$

where X is exports of goods and non-factor services; NTR net current transfers (which comprise official transfers (OT) - that is grant aid - and private current transfers, PCT), NFP net factor payments from abroad. M imports of goods and non-factor services. LTL^c net disbursements of concessional long-term capital, LTL^n net disbursements of non-concessional long-term capital, STL net short-term inflows, OKI net other capital inflows and dR the change in reserves. (A positive dR is a reduction in reserves, that is an "inflow" of capital to the capital account).

Aid is either a grant - that is an official transfer (OT) - on current account or a concessional long term inflow (LTL^c) on the capital account.[4] The net aid inflow[5] is therefore given by:

$$AID = OT + LTL^c \qquad (3.3)$$

Combining equations (3.2) and (3.3) gives:

$$AID = M - PCT - NFP - X - LTL^n - STL - OKI - dR \qquad (3.4)$$

The orthodox view - made explicit in the two gap model (of which Chenery and Strout (1966) is the best known example) - is that aid leads to a one for one increase in imports: thus the identity contained in equation (3.4) is preserved since the first term on both the left and right hand side of the equation increase by the same amount. There is an important implication of such a response for "gap analysis". If aid is on capital account then the current account deteriorates by an amount equivalent to the value of the aid inflow. If aid is on current account then the current account excluding official transfers (which is how it is often reported - see note 4) deteriorates by this amount. Hence, if aid is having the intended effect, an economy with substantial aid flows will (must) have a large external deficit. It is not appropriate to point to the poor performance of such economies on the basis of their current account deficits - but such a practice is not uncommon.[6]

Similarly, it is incorrect to look at the magnitude of the current gap and say that the aid was required to fill that gap - the aid itself creates the gap. Aid is gap creating rather than gap filling. The important issue - and the one in relation to which I define the concept of aid dependence - is whether the economic structure is such that the gaps will close over time. Discussion of this point is pursued in Part 3.6.

But it may not be the case that imports rise by the value of the aid inflow - the accommodation may, in principle, be through any of the other items. Maybe exports or non-concessional borrowings are displaced or aid may be used to finance debt service or accumulation of reserves: if any of these occur, then the increment in imports will be less than the value of the aid inflow.

Identities are not behavioral relationships. We may observe that imports rise by less than the increase in aid because the purchasing power of exports has fallen. There may be a relationship here - the aid inflow causing a real exchange rate appreciation that crowds out exports. But there may not - perhaps the fall in purchasing power is solely the result of adverse movements in the external terms of trade. Nevertheless, the accounting framework is useful both theoretically and empirically. Theoretically it allows the identification of the kind of effects that may undermine aid's impact on imports and investment. Empirically, it points to questions as to aid's effect in a particular economy. For example the application of this framework to Tanzania (White and Wuyts, 1993) highlights the fact that real imports have fallen since 1970 despite a very substantial increase in aid volume. But the framework can only be the starting point for an investigation of behavioral relationships.

Bearing these comments in mind, I now describe aid's possible relationship with the other capital and current account items.

(a) Aid and exports: the two gap model was criticized using a traditional trade theory approach by Joshi (1970) and Findlay (1973: Chapter 10) who both questioned the excessive structuralism of the model which excluded any price effects. An aid inflow in the alternative model presented by Findlay would improve the terms of trade of the recipient - that is reduce its competitiveness so that imports rise by less than the value of the aid (White, 1992b: 211-212). The result that aid

reduces the competitiveness of the recipient follows from a wide range of open economy macroeconomic models (see Dornbusch, 1980: Chapter 6; and White, 1990) and analyses of the real exchange rate (Edwards, 1988 and 1989) and has led to a small literature on "aid as Dutch disease".

The Dutch disease operates through the spending effect. Aid-financed activity results in increased demand, some of which will fall upon non-tradables. The price of the non-tradable goods and services will therefore rise relative to that of tradables, whose price is assumed to be given (the small country assumption): that is, there is an appreciation of the real exchange rate. (If there is a floating exchange rate regime the real appreciation may also operate through the nominal rate).

The basic mechanism, outlined in the previous paragraph, is simple. The analysis of actual cases is more complex on account of the different channels through which aid reaches the economy. For example, Younger's (1992) analysis of the aid boom in Ghana suggests that the aid crowded out private investment since the government maintained a tight monetary policy to counteract the aid-financed increase in demand as part of an attempt to maintain the real exchange rate.

More complex stories also emerge from consideration of changes in the composition of expenditures - especially investment - resulting from Dutch disease effects, an analysis that has been taken furthest in the work of David Bevan, Paul Collier and Jan Willem Gunning (for example, Bevan et al. 1990) and their analysis of construction booms. As indicated above, a windfall gain (including an aid boom) results in increased demand for non-tradables - non-tradable capital goods are identified as "construction" so that the analysis of the impact of aid on investment becomes a theory of construction booms.

(b) Aid and other inflows: the recipient may substitute away from non-concessional sources of finance if aid funds are available, hence the increment in forex availability (and therefore imports) is less than the value of the increase in aid. One critic of aid, Peter Bauer, has argued that this saving of debt service charges is the only benefit of aid to the recipient (1976: 106-110). On the other hand - aid may "crowd in" other inflows if they support a reform process which improves the country's credit-worthiness. The notion that adjustment lending would act as a catalyst for other inflows was common in the early 1980s. The most recent World Bank report on adjustment

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lending restates the view, but with a recognition that there will be lags:

> Reforms increase the ability of a country to use foreign savings productively. Eventually, good performance is recognized by international capital markets and bilateral lenders, but a long time may elapse between execution of reforms and this recognition, leaving a balance of payments gap that needs to be filled for growth to occur.

<div align="right">(World Bank, 1992: 9)</div>

If such crowding in occurs then the initial aid may support increases in imports over and above the value of the aid itself.

(c) Aid and debt service: some part of the aid may be intended to be used for debt relief. Accurate recording would show the inflow as aid receipts and the outflow as either net factor payments for interest relief or a reduced net capital inflow for amortization. If the relief is for principal payments on past aid then the net aid figure is unaffected by the debt relief if the debt would have not been paid in the absence of the relief. If the debt would have been paid then the debt relief is equivalent to untied foreign exchange (and so may stimulate imports).

The above accounting points may apply if aid intended for imports is diverted to debt service. If repayment of principal is an important capital account item it is preferable to present the data showing gross disbursements and amortization, rather than the net disbursement form used in the equations above.

(d) Changes in reserves: a part of an increased aid inflow may be added to reserves. Studies of the macroeconomic effects of counterpart funds - notably Roemer (1989) and Bruton and Hill (1990 and 1991) - discuss this possibility. Such a response may be appropriate if there are likely to be Dutch disease effects from a temporary aid boom.

Internal and external balance

Now consider how the internal (investment-savings) balance accommodates an aid inflow. First suppose aid to be a grant. Combining the definition:

$$GNS = GDS + NFP + NTR \qquad (3.5)$$

where GNS and GDS are gross national and domestic savings respectively, with the first identity in equation (3.1) gives:

<div align="center">34</div>

$$GDS + NTR + NFP - I = X + NTR + NFP - M \qquad (3.6)$$

Suppose that the increase in NTR is fully accommodated within the current account - this is meant to happen by an increase in M of the same amount. The left hand side of equation (3.6) must therefore also remain unchanged. The orthodox view of how this balance occurs is that investment increases by the value of the increment in aid with other variables (notably GDS) remaining unchanged. Simply put, the aid is fully (and directly) used to finance higher investment: in equation (3.6) the increase in NTR is entirely offset by the one-for-one increase in investment so that there is no change in the net balance on the left-hand side.

Similar arguments may be applied if the aid is on capital account - analyzed through the identity of internal balance with either the current or capital accounts. But, as before, the accommodation may through several alternative channels, of which the main one is savings displacement - Griffin's argument that aid may displace savings has been one of the most debated issues in the macro aid effectiveness debate.

Aid and savings

Griffin (1971) presented his argument in the following model. Consumption is given by:

$$C = \alpha + \beta(GDP + A) \qquad (3.7)$$

where C is consumption. Since domestic savings are given by:

$$GDS = GDP - C \qquad (3.8)$$

it follows that:

$$GDS = -\alpha + (1-\beta)GDP - \beta A \qquad (3.9)$$

demonstrating the negative relationship between aid and savings.

Colman and Nixson claimed that the above argument contains a "basic algebraic flaw" (1978: 115) since, they argue, aid should also be added to the savings identity (so that S = Y + A - C). This argument is not correct. Equation (3.7) is a behavioral function - maybe aid should be included and maybe not, the issue is ultimately an empirical matter. But equation (3.8) is an identity and cannot be messed about. Equation (3.8) is a correct definition of gross domestic

savings. If savings were instead to be gross national savings then grant aid should be included but aid loans not (though Griffin states that the "S" in his analysis is domestic savings). The issue can be clarified by the writing out the identities in full.

By definition:

$$GNS = GDS + NFP + NTR \qquad (3.10)$$

where GNS and GDS are gross national and domestic savings respectively. Equation (3.7) is rewritten as:

$$C = \alpha + \beta(GDP + A + NFP) \qquad (3.11)$$

Hence:

$$GDS = -\alpha + (1-\beta)GDP - \beta(A + NFP) \qquad (3.12)$$

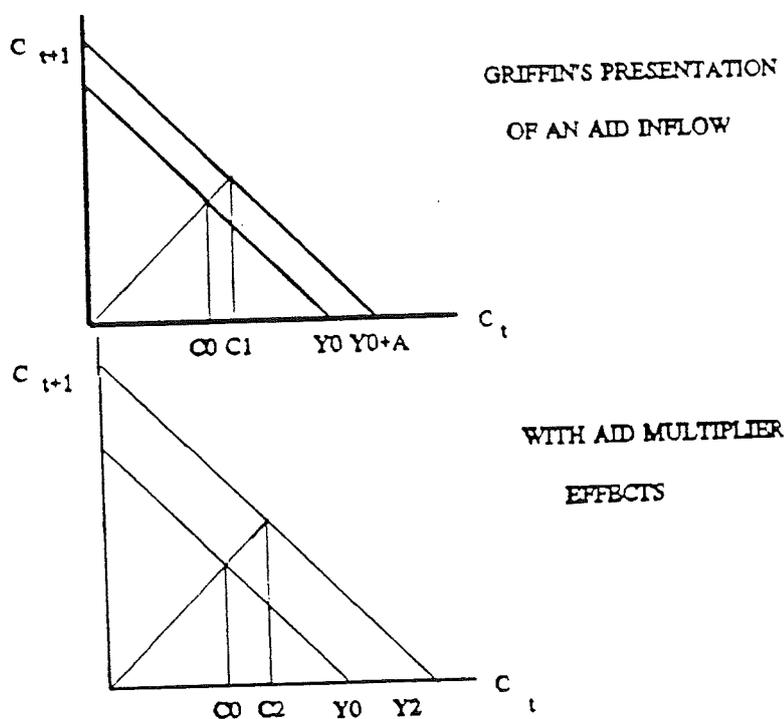$$GNS = -\alpha + (1-\beta)(GDP + NFP + OT) - \beta LTL^{c}$$

Thus if are concerned to analyze national rather than domestic savings then Colman and Nixson are correct that aid on current account will not have a negative relationship with savings - but that on capital account still does. Moreover, as stated above, the concern is really with domestic savings anyhow.

There have been a number of criticisms of arguments of Griffin's argument, of which three are discussed here.[7] First, he measured capital inflows by the current account deficit. As discussed below, there are (and were then) more accurate measures available. Second, as shown in White (1992b: 179-181), Griffin's presentation implicitly assumes that fungibility exists - in terms of the graphical presentation (given in Griffin, 1970) the budget constraint should be kinked. This issue is discussed in the next section in which we explore the relationship between aid and public savings. Finally, Griffin's argument assumes that GDP is constant in the face of the aid inflow - it is this assumption which is examined here.

Aid may (and should) result in higher output and income in both current and future periods. This higher income will allow both consumption and savings to expand: a point noted by both Eshag (1971: 149-150) and Kennedy and Thirlwall (1971: 136) in their comments on Griffin's paper, but lost sight of in most of the subsequent literature.

In Figure 3.1 Griffin's diagrammatic presentation is shown to demonstrate how feedback in the current period leads to an ambiguity in the relationship between aid and savings. The top part of the figure shows Griffin's presentation. Without aid income is Y_0 - so that consumption is C_0 and domestic (and national) savings are Y_0-C_0. He argues that the aid inflow shifts out the budget constraint in a simple additive manner, so that the horizontal intercept is now Y_0+A, consumption rising to C_1. Domestic savings are now Y_0-C_1 - that is, they fall be the amount that consumption rises since domestically generated income (output) is assumed constant.[•] But it is extremely unlikely that domestic output will be unaffected by the aid inflow.

Figure 3.1

C_t+1

GRIFFIN'S PRESENTATION
OF AN AID INFLOW

CO C1   Y0 Y0+A   C_t

C_t+1

WITH AID MULTIPLIER
EFFECTS

CO C2   Y0   Y2   C_t

The bottom part of Figure 3.1 shows a budget constraint with a horizontal intercept Y_2. Y_2 includes A not as an additive component but as the income that results once multiplier effects in the period of the aid inflow - which may be either consumption or production multipliers - are allowed for. That part of domestic income not given by the transfer may be designated Y_2-A, so that the comparable domestic value for domestic savings is Y_2-A-C_1. This value may be greater or less than the value of domestic savings in the absence of aid, depending on the strength of the aid multiplier. We discuss in the final section of Part 3.3 factors which determine this multiplier.

The feedback from aid to higher income may also (or instead) occur in subsequent periods: indeed, that this would be the case was an important part of the two gap model as the savings gap will then close as income grows (assuming that the marginal propensity to save is greater than the average). Grinols and Bhagwati (1976) and White (1992d) show that, as higher income leads to higher savings, savings levels and rates may be higher with aid than without it, even allowing for displacement effects.

The absence of feedback in either a dynamic or static context is one manifestation of the weak theoretical basis of Griffin's argument, which has no real theory of savings determination. A convincing theory would have to begin with a distinction between public and private savings, which may be done with the accounting framework.

Decomposing internal balance

The savings-investment balance may be broken down into those for the government and private sectors:

$$GNS_p - I_p + GNS_g - I_g = X + NTR + NFP - M \tag{3.13}$$

or, equivalently:

$$GNS_p - I_p + T - G = X + NTR + NFP - M \tag{3.14}$$

with obvious notation, noting that grants received by government from abroad are a part of government savings (GNS_g) and revenue (T).

Consider first the case in which an increase in grants leads to no increase in GNS-I. This result may be explained by government savings increasing by the full value of the rise in NTR and I_g increasing by the same amount. Alternatively I_g may not rise by this full amount if government revenue does not increase by the amount of the rise of NTR, which is commonly supposed to occur as government uses some of the aid to "finance" lower taxes.

A similar point to that made above about current account performance in the presence of large aid inflows may be made about the budget deficit (which is T-G or S_g-I_g). Suppose the government receives substantial grants which are used, as intended, entirely to finance development expenditures. Government expenditures rise with no increase in recurrent revenues - the budget deficit before grants looks bad - and it may appear as if the grants are needed to fill the

gap. In fact the causation flows the other way, with the grants creating the gap. It is wrong therefore to condemn the poor performance of the budget deficit. The relevant question to ask is instead if the aid is being used in such a way so that in future the government will be able to fund all expenditures from domestic revenue. To this end an analysis of the tax base is an important part of analyzing aid effectiveness.

Whilst project aid is intended to increase government expenditure, this use should not be the case for aid intended for budget support. If aid is intended for budget support then T is intended to go up by the full amount of NTR whilst G remains unchanged. (Donors that tie their budget support to particular expenditures may either be trying or may anyway succeed in increasing G above what it would have been in the absence of the aid. To the extent that this is the case then the budget support is not reducing the need for deficit financing). Suppose the aid is given as import support in grant form and leads to 100% additional imports. The left-hand side of equation (3.13) (or 3.14) must remain unchanged. Thus any increase in T-G must be offset by a reduction in S_p-I_p. For example, if the imports are all capital goods then I_p rises by the value of the import support thus maintaining balance. Consumer imports will, instead, affect S_p.

Our discussion thus far is restricted to the identities and does not look for behavioral links. These links have been analyzed in the fiscal response literature, to which we turn below. First, however, we consider the link between aid and investment.

Aid and investment

Perhaps surprisingly, the theoretical (and much of the empirical) literature have focused on the aid-savings link, rather than that between aid and investment. Moreover, nearly all studies regress aggregate investment on aid, whereas - as argued in White (1994b) - to trace the aid-investment link it is important to begin with the disaggregation of investment into public and private, and then to explore how aid may affect each of these components (which have very different behavioral determinants).

Historically it has been the case that aid-supported investment projects fall under the public sector - a situation that has probably not changed so greatly. The direct impact of aid on investment will, by and large, be on government investment. It is, however, important in any particular case study to examine the amount of aid channelled to the private sector through DFCs and other credit schemes.

The strength of the direct effect of aid on government investment depends on the extent to which the aid is fungible. This issue has been examined in the context of the fiscal response literature, which is discussed below.

The indirect relationship between aid and private investment operates through the crowding in\out mechanisms linking public and private investment. Crowding in may occur as aid-financed activity generates demand for domestically produced goods and services - but these same effects create relative price movements which may discourage investment in other sectors. Public investment projects should create infrastructure which opens up new investment opportunities for the private sector (for example, agricultural marketing in response to improved roads).

Empirical analysis of the determinants of private investment in developing countries (e.g. Greene and Villanueva, 1991) have found the accelerator mechanism to be important - that is the level of investment is positively related to the rate of growth of output. Aid-induced growth may therefore initiate a "virtuous circle" of higher growth and private investment.

Whether there is crowding out through credit markets (or credit rationing) depends on the net impact of aid on the budget deficit - if the increase in expenditure plus the fall in revenue collection exceeds the value of the aid inflow then the government's borrowing requirement will increase, resulting in the possibility of crowding out. (This argument is presented in a formal framework in White and McGillivray, 1992). The fiscal response literature explores aid's impact on these different aspects of government fiscal behaviour.

The fiscal response literature

Peter Heller's 1975 paper in the *American Economic Review*, which investigated the fiscal response of recipient governments to an aid inflow, has resulted in a growing literature: Gang and Khan (1986 and 1991), Mosley *et al.* (1987), Khan and Hoshino (1992), McGillivray and Papadopoulos (1991), Forster (1993), Binh and McGillivray (1993), Gupta (1993a) and White (1993 and 1994a[9]). Here we concentrate on the model presented by Gang and Khan and critiques of its construction - problems in the estimation of the model are discussed in Part 3.5. So much space is devoted to this model since it is one of the growing areas of the new macroeconomics of aid and since this form of the model is so seriously flawed as to be a poor basis for further analysis.

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Heller's model supposes that recipient governments maximize a loss function comprising five choice variables subject to two budget constraints. The choice variables are: government investment (I_g), government expenditure on socio-economic (or developmental) and other civil (or non-developmental) purposes (G, and G_c respectively), taxation (T) and borrowing (B). Denoting a target variable by an asterix (*), the objective function used by Heller and adopted by Gang and Khan is:

$$U = \alpha_0 + \alpha_1(I_g - I_g^*) - \frac{\alpha_2}{2}(I_g - I_g^*)^2 + \alpha_3(G_s - G_s^*)$$

$$- \frac{\alpha_4}{2}(G_s - G_s^*)^2 + \alpha_5(G_c - G_c^*) - \frac{\alpha_6}{2}(G_c - G_c^*)^2 \qquad (3.15)$$

$$- \alpha_7(T - T^*) - \frac{\alpha_8}{2}(T - T^*)^2 - \alpha_9(B - B^*) - \frac{\alpha_{10}}{2}(B - B^*)^2$$

Binh and McGillivray (1993) fault the specification given in equation (3.15) on the grounds that the model is <u>not</u> optimized when the target values of the choice variables are achieved, so that the targets may not truly be considered targets. To avoid this problem Binh and McGillivray suggest the specification:[10]

$$U = \alpha_0 - \frac{\alpha_1}{2}(I_g - I_g^*)^2 - \frac{\alpha_2}{2}(G_s - G_s^*)^2 - \frac{\alpha_3}{2}(G_c - G_c^*)^2$$

$$- \frac{\alpha_4}{2}(T - T^*)^2 - \frac{\alpha_5}{2}(B - B^*)^2 \qquad (3.16)$$

from which it is clear that utility is maximized (to α_0) when the targets are satisfied.

The loss function given by either equation (3.16) or (3.16) is then maximized subject to budget constraints:

$$I_g = B + (1 - \rho_1)T + (1 - \rho_2)A_g + (1 - \rho_3)A_l \qquad (3.17)$$

$$G_s + G_c = \rho_1 T + \rho_2 A_g + \rho_3 A_l \qquad (3.18)$$

where A_g and A_l are grant aid and foreign loans respectively. The loans term must, by definition, include all foreign borrowing. <u>not</u> just concessional aid. Although Gang and Khan (1991) and

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Khan and Hoshino (1992) are correct on this point in their definitions, they use the term "aid" interchangeably with the sum of the two - a practice which is incorrect terminology.

The rationale for the separate budget constraints is that governments will not finance recurrent expenditure out of domestic borrowing. This rationale is asserted by Mosley *et al.* (1987: 619), Gang and Khan (1991: 358) and Khan and Hoshino (1992: 1483). Examination of the data for Greece by McGillivray and Papadopoulos (1991), Papua New Guinea by Forster (1993), and Tanzania by Doriye *et al.* (1993) show that this assertion is not true in general[11] - and defies the notion that developing country governments are rather prone to printing money to finance their spending.[12]

But this criticism withstanding, it is odd to write the budget constraint in a way which pre-determines the allocation of the income terms in given proportions (that is, the ρ parameters). Such an allocation should be the outcome of the utility maximization problem. By pre-determining the allocation of aid, government behaviour is over-restricted - a problem which is apparent from simulations. White (1994a) calculates the model's solution with the values of the ρs obtained by Gang and Khan and a hypothetical set of αs which give equal weight to each target.[13] The hypothetical policy targets and aid inflows are set exogenous to the model, being chosen to ensure that the government's targets can all be met. Using equation (3.16) as the utility function, utility will be maximized to α_0 by each endogenous variable being equal to its target level - hence, since the targets <u>are</u> attainable, this outcome is the solution that should be found by the model. But the solution is not that - utility is not maximized since government fiscal behaviour is determined by the two separate budget constraints.

On account of this problem we may wish to use instead the single budget constraint:

$$I_g + G_s + G_c = T + B + A_g + A_l \qquad (3.19)$$

It is shown in White (1993) that the fiscal response model will produce the result of fungibility when the utility function is combined with the budget constraint given in equation (3.19). That is aid inflows do not fully fund expenditure increases, but are partly used to decrease taxes and borrowing - which is what the model is intended to demonstrate - even when a budget constraint is used.

However, the budget constraint in equation (3.19) is problematic since different types of aid are analytically equivalent, which will only be the case where all aid is fully fungible. Aid will not be fully fungible if the target level for a category of expenditure is less than the aid tied to that use since actual expenditure on a category must be at least equal to the aid inflow tied to that purpose - that is the budget constraint should be kinked to allow for the fact that aid tying sets a minimum value to expenditure categories.[14] Further work is therefore required on theoretical modelling of fungibility. However, as demonstrated in Part 3.5, there are serious shortcomings in the empirical application of the fiscal response model, so that it is not an appropriate vehicle for such an analysis.

A further limitation of the fiscal response model is that it is only a partial analysis, since it does not take account of feedback effects which may operate. Such effects may be of two kinds. First, the equations for the target equations (reported below) contain economic parameters, including lagged values of some of the model's endogenous variables. For example, the target for government non-developmental expenditure is an increasing function of the lag of that variable. Through this channel a current aid inflow will increase future non-developmental expenditure.

Second, the model contains no examination of economic variables. Mosley *et al.* (1987) combine the model with a Harrod-Domar equation and a private investment function to examine the impact on growth. But the model of Mosley *et al.* ignores the dynamics the model contains, since income and growth are treated as independent of one another (whereas income should be given as a function of growth and lagged income).[15] White (1993) allows for consumption multiplier effects by combining the fiscal response model with investment and consumption functions and the income-expenditure identity. Dynamic feedback from higher income to increased tax targets are also included. Simulations show that the theoretical result from the fiscal response literature that aid reduces taxes may be reversed, depending on parameter values, once these effects are allowed for.

Aid, income and output

Feedback effects - that is the possibility that consumption and production multipliers that reinforce aid's positive impact on income - have been mentioned above as very important, but have received very little attention in the aid literature. As indicated in the previous paragraph, the introduction of a consumption multiplier into a simple fiscal response model, shows that the initial adverse impact of aid on taxes may be reversed by feedback effects.

However, my own analysis was misformulated, since the national accounting identity used is that for a closed economy:

$$Y = C + I \qquad (3.20)$$

But an aid-receiving economy cannot be closed! The identity should instead be:

$$Y = C + I + X - M \qquad (3.21)$$

Since $M = X + A$, equation (3.17) may be rewritten as:

$$Y = C + I - A \qquad (3.22)$$

suggesting that aid has a depressing effect on domestic demand. This argument that aid displaces demand for domestic output has been around for a long time under the guide of the "disincentive effect" in the analysis of food aid (see Chapter 5) but has only recently been stated at the macroeconomic level by Bhaduri et al. (1993) and Bhaduri and Skarstein (1993).

But to argue that aid displaces domestic demand assumes that consumption and investment are unchanged in the face of the aid inflow - which is not so. At the simplest, the sum of consumption and investment rise by exactly the amount of the aid inflow. The aid fully finances these increases and there in no net impact on expenditure on domestic output. But the story may be more complicated. Let us suppose Griffin's consumption function and an aid-driven investment function:[16]

$$C = \beta_0 + \beta_1(Y + A) \qquad (3.23)$$

$$I = \gamma_0 + \gamma_1 A \qquad (3.24)$$

From equations (3.22), (3.23) and (3.24) it follows that:

$$\frac{dY}{dA} = \frac{\beta_1 + \gamma_1 - 1}{1 - \beta_1} \qquad (3.25)$$

showing that the overall impact of aid on income is positive, provided that $\beta_1 + \gamma_1 > 1$ - that is, the impact effect of an aid inflow on absorption is greater than one.

The impact on savings is given by:

$$\frac{dS}{dA} = \gamma_1 - 1 \qquad\qquad (3.26)$$

That is, savings fall if the increase in investment is less than the value of the aid inflow. This result is the same as Griffin's; but the difference is that it is possible in the formulation given here for $\gamma_1 > 1$. If the aid goes to increase government investment and there is crowding in then it is not unlikely that this condition will be satisfied.[17]

For an increase in demand to lead to higher output and income then the economy must be demand constrained. If, instead, the supply constraint is binding then this higher demand will just be converted into inflation (like aid as Dutch disease). Of course, if on the other hand, the aid depresses demand for domestic output it has a deflationary price effect. In practice, we might usually expect a combination of higher output and inflation.

It is also possible that the aid has production multiplier effects - through increasing the efficiency of production or providing intermediate goods to enable the utilization of idle capacity. If aid does stimulate supply in this way the effect may be deflationary. Roemer (1989) incorporated such a possibility into his model of the macroeconomic impact of counterpart funds. But little empirical or detailed theoretical work exists analyzing the differential impact of aid depending on the type of aid and the nature of the binding supply-demand constraints. Rather, empirical work has for the most part been restricted to single equation analysis of specific relationships identified in the aid debate. In Parts 3.4 and 3.5 we turn to a discussion of these empirical studies. Before doing so it is in order to first briefly discuss the measurement of aid.

The measurement of aid

Some analyzes (e.g. Griffin, 1971; and Collier, 1991) have used the current account deficit as a measure of aid inflows - yet this figure includes also changes in reserves, errors and omissions and does not allow us to disaggregate the different types of capital inflow or to explore disaggregations of interest within the aid variable.

The appropriate measurement of the aid variable depends on the purpose of the analysis. This purpose may be partly informed by the accounting framework. Should technical assistance be included in the aid variable? If the services provided by technical assistance are recorded on the import service account (which is doubtful in the extreme) they TA should be included in an analysis of real imports of goods and service. If these items are not included then they should be

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excluded from the identities. (But both experts and scholarships generate additional import demand, and so some allowance for TA need be made when it comes to analyzing behavioral relationships). If growth is the dependent variable then (hopefully!) TA should be included (though it has usually, without explanation, been excluded). It has been argued here that growth regressions should be discarded as a tool of analysis of aid effectiveness, but TA should also play a role in analyzing the efficiency of investment.

The question is not only one of what should be included and what not - but also at what level of disaggregation. There can be little doubt that sensible discussion of aid's macroeconomic effects quickly recognizes the need to disaggregate aid - at least into project aid, program aid (possibly separating out further commodity aid, general import support and debt relief) and technical assistance. The desired effects of different types of aid vary. Project aid is intended to raise government expenditure on the designated activity by at least the value of the aid. On the other hand, many donors intend the counterpart funds raised by the sale of commodity aid to be used to offset the need for deficit financing (reduce borrowing).

But data on aid flows by type are not readily available for most countries[18] - with the result that most empirical work has, inappropriately, used total aid as the aid variable. Other studies (particularly fiscal response studies) separate grant from loan aid and/or bilateral from multilateral. But these breakdowns are not functional classifications, and so of little real interest. Levy (1987a) attempts a disaggregation of anticipated and unanticipated aid, but it is unclear that his series may be meaningfully interpreted.

A further issue is whether to use gross disbursements, net disbursements (gross minus amortization) or net transfers (net disbursements minus interest repayments). Lipton (1972) argued that the appropriate measure also depends upon the use: to analyze aid's effect on investment/growth then gross disbursements should be used, but to look at imports net transfers are the correct variable. However, consideration of the accounting identities presented above suggest that net aid should be used in each case. Some studies (e.g. Mosley et al., 1987) have used the grant equivalent of aid, but it is difficult to see a theoretical rationale for this procedure.

A recent World Bank paper (Demery et al., 1993) further adjusts (real) net transfers to take account of terms of trade losses. This procedure is acceptable for the descriptive purpose of the extent of additional resources mobilized for development purposes. But it is not the

appropriate measure to use in analyzing the impact of aid, since the terms of trade adjustment "belongs" to the capacity to import rather than aid inflows.

How is the real value of aid to be calculated? The most common procedure is to deflate by the import price index, since aid is intended to purchase imports (but a less valid assumption where there is a significant component of local-cost financing from the aid budget, a phenomenon which has reemerged in recent years). Other studies (notably in the fiscal response literature) deflate all categories by the GDP deflator. In the latter case it may be preferable to use specific deflators, but a problem will emerge in the accounting framework of identities no longer holding as we move further from the base period where different deflators have been used for different series.

3.4 Empirical Analysis of Aid and the External Account

Much of the aid literature has been empirical rather than theoretical in nature - and the empirical work is most strongly concentrated in the aid-savings and aid-growth debates. In this part, however, empirical evidence of aid and external account variables is presented.

Aid, imports and fungibility

Despite the fact that aid is intended to increase imports, then there has been surprisingly little empirical analysis of this issue. Some more attention appears to being attracted to the issue given the extreme forex shortage faced by many sub-Saharan African countries.

As we shall see in Part 3.8, some global models assume, as did the two gap model, that aid is fully used to finance higher imports - a result confirmed by the cross-country study of Massell *et al.* (1972). However, Chenery and Syrquin (1975) report a coefficient of only 0.43. Moran (1989) provides a more rigorous analysis of the topic, but reports his results as elasticities, so with out the data it is not possible to know if the marginal increment is significantly less than unity, which is the hypothesis in which we are interested.

Work undertaken within the World Bank (Demery *et al.*, 1993) for the SPA has analyzed how much higher import volume in SPA countries in the pre and post adjustment periods is because of higher aid inflow and how much because of improved export performance (and therefore the result of policy reforms). The paper states that 58 per cent of the increase in import volumes is from improved export performance and the remaining 42 per cent from the aid inflows

(and in the best performers improved exports accounts for the whole of the increase, as the higher aid they have received is just sufficient to meet the debt burden).

A study of import support in Tanzania (White and Wuyts, 1993), applying the accounting framework, found import volume to have fallen as aid has risen - therefore other sources of forex must have fallen. Analysis of causal links in the Tanzanian case found evidence of some aid being used for reserve accumulation in the 1970s and a displacement effect in the first part of the 1980s. Few other studies have explored the possible fungibility of aid with respect to reserves and other borrowing. Faini *et al.* (1991b) analyzed whether adjustment funds had acted as a catalyst for other inflows, and found that they had not; Mosley *et al.* (1991) find the same result. The one area that has received rather more attention has been the recent concern that aid may cause Dutch disease.

Aid and the real exchange rate

Econometric analysis of aid's impact on the real exchange rate has been reported by van Wijnbergen (1985) and White and Wignaraja (1992). Younger (1992) discusses the pressure for an appreciating real rate in the case of Ghana and Nabi and Hamid (1990) make the same point with regard to Pakistan in the 1960s. but both without a formal test.

Van Wijnbergen regressed the real exchange rate on current and lagged aid, GDP, a proxy for technological progress, the terms of trade and non-concessional borrowing for six African countries: a significant negative relationship is found in four cases. Aside from some econometric problems (see White, 1992b: 219), van Wijnbergen's specification leaves out important short-run determinants of the real exchange rate, notably the nominal rate, but also a measure of the government's fiscal and monetary policy stance.

The model of White and Wignaraja is based on that of Edwards (1989) which combines long-run (fundamental) and short-run determinants. The Sri Lankan case is one of substantial aid inflows since liberalization in 1977 and little movement in the real exchange rate, despite continued nominal devaluation. That is, there has been an increasing wedge between the nominal and real rates. The aid inflows are shown to have had an important contributory role. Lal (1985) reached the same conclusion by a rather different route.

The behaviour of the real exchange rate in the presence of substantial aid inflows has also been examined in the context of a CGE in two studies, which also permit the tracing through of the price effects on exports. The model of Collier and Gunning (1992) analyses two alternative means of maintaining a liberalization - devaluation or aid inflows - in African economies. They find that aid inflows do indeed have a price response that draws labour and capital into the production of non-tradables, so that the export supply response is weakened - exports expand by only 9% two years after the reform in the case of an aid-financed liberalization, compared to 12% if there is devaluation.

Weisman's (1990) CGE of Papua New Guinea shows aid to have spending effects through increases in government expenditure which result in a real exchange rate appreciation and move of resources into the production of non tradables.

3.5   Empirical Analysis of Aid, Savings and Investment

There has been rather more work on aid and savings, with a lesser amount on aid and investment. The most recent area of attention has been to the fiscal response literature, which analyzes both aid and public investment and savings (though the latter has been left implicit). Each of these three areas is discussed in turn.

Aid and aggregate savings

As was discussed in Chapter 2. Griffin supported his argument that aid displaces savings with a simple regression of aid on savings. Table 3.2 shows Griffin's results and those of subsequent studies, which have also mostly found significant negative relationships.

But, as pointed out above, such an approach suffers from serious misspecification bias (even in the context of Griffin's own model). Subsequent work (e.g. Morriset, 1989) has used more sophisticated specifications, but single equation estimation cannot clearly identify the different channels through which aid affects savings. Yet few studies have adopted a simultaneous approach.

Snyder (1990) argues, correctly, that single equation estimation is biased and sets out a simple two equation simultaneous model - which he then estimates by OLS! Levy (1984) estimates a model for Egypt in which aid can increase investment and so, through a production function, output, thus leading back to higher income. Despite this feedback effect his empirical

Table 3.2 Results of selected studies of
aid, savings and investment

Study	Data	Coefficient
Savings		
Griffin (1970)	Cross-section: 32 LDCs	-0.73 (6.64)
	Time series: Colombia	-0.84 (2.90)
Weiskopf (1972)	Pooled: 44 LDCs, 1950s and early 1960s	-0.23 (5.30)
Gupta and Islam (1983)	Cross-section: 52 LDCs	-0.47 (n.a.)
Morisset (1989)	Time series: Argentina	-0.98 (0.91)
Investment		
Levy (1988)	Aggregate cross-section for sub-Saharan Africa	1.08 (4.40)
Bhalla (1990)	Time series: Sri Lanka	0.94*
White (1992d)	Time series: Sri Lanka	
	Public investment	0.32*

Notes: *elasticities. Coefficient from White (1992d) is that from the levels regression for an error correction model, i.e. it is the long-run relationship. Figures in parentheses are absolute t-statistics.

Sources: as shown in table.

estimates suggest that displacement effects of aid inflows on public savings dominate. However, he does not look at the dynamic aspects of his model - that is the possibility that future savings may be higher despite current displacement.

Analysis of theories of consumption (the converse of savings) are, of course, rooted in more complex formulations than the simple savings function used by Levy (and others). Gupta and Islam (1983) estimate a simultaneous model of savings and growth which contains a number of demographic relationships - but the model is void of economic analysis.

The aid-savings relationship is a debate very much in need of some attention to quality, rather than quantity, of analysis. One direction for such attention is to analyze the relationship at the more disaggregate level of public versus private savings - the fiscal response literature considers the former of these. There is practically no literature at all analyzing the response of private savings to aid inflows (Levy (1984) is the only case of which I am aware). Before moving on to the fiscal response literature a short discussion of empirical analysis of the aid-investment link is in order.

Aid and investment

The comments of the preceding paragraph apply equally to the aid-investment literature (which is much smaller than that on aid and savings - the results from some studies are shown in Table 3.2). In Part 3.3 a number of channels for aid's impact on public and private investment were identified - but (with the exception of White, 1992d) these mechanisms have not been empirically explored. Indeed, the aid-private investment link has not been empirically analyzed, except for (other than my paper just mentioned) a cross-country simple regression by Mosley (1987).

Levy (1987b and 1988) has reported some regressions of aid and investment. The coefficients from these regressions are always significantly positive and usually close to unity. But the shortcoming of single equation estimation of such relationships need be borne in mind. Bhalla (1990) estimates a simultaneous investment-growth model for Sri Lanka, finding the elasticity of investment with respect to aid to be 0.94% (which suggests a more than one-for-one increment since aid only finances one third to one half of investment).

Empirical estimation of the fiscal response model

As in Part 3.3, the discussion of the fiscal response literature concentrates on the presentation of Gang and Khan (1991), though the problems discussed are present in other applications of the model. It will be recalled that government is supposed to maximize a loss function subject to two budget constraints. Gang and Khan solve the model algebraically to obtain the structural equations:

$$I_g = \beta_7 + (1-\beta_8)I_g^* + \beta_8\{(1-\rho_1)T + (1-\rho_2)A_g + (1-\rho_3)A_l\}$$

(3.27)

$$G_s = \beta_1 - (1-\beta_2)G_c^* + \beta_2 G_s^* + \rho_1(1-\beta_2)T + \rho_2(1-\beta_2)A_g - \rho_3(1-\beta_2)A_l$$

(3.28)

$$G_c = -\beta_1 - (1-\beta_2)G_c^* - \beta_2 G_s^* + \rho_1\beta_2 T + \rho_2\beta_2 A_g + \rho_3\beta_2 A_l \qquad (3.29)$$

$$T = \beta_3 + \rho_1\beta_4(G_c^* - G_c) + \beta_5 T^* + \beta_6(1-\rho_1)\{I_g - (1-\rho_2)A_g - (1-\rho_3)A_l\} \qquad (3.30)$$

To estimate the parameters of equations (3.27) to (3.30) it is first necessary to obtain values for the target variables. To do this the targets are defined as follows:

$$I_{g,t}^* = \gamma_1 + \gamma_2 Y_{t-1} + \gamma_3 I_{p,t} \qquad (3.31)$$

$$G_{s,t}^* = \gamma_4 + \gamma_5 ENR_t + \gamma_6 Y_t + \gamma_7 \dot{Y}_t \qquad (3.32)$$

$$G_{c,t}^* = \gamma_8 + \gamma_9 G_{c,t-1} \qquad (3.33)$$

$$T_t^* = \gamma_{10} + \gamma_{11} Y_t + \gamma_{12} M_{t-1} \qquad (3.34)$$

$$B_t^* = 0 \qquad (3.35)$$

where Y is GDP and $\dot{Y}$ growth of GDP, I_p private investment, ENR primary school enrollments and M imports.

The parameters for the target equations (3.31 to 3.35) are obtained by OLS using the actual values of the variables I_g etc. as the regressand. The fitted values from these regressions are then used as the target values. There are two problems with this approach.

First, there is no guarantee that the targets so produced will be consistent with the budget constraints - indeed, they almost certainly shall not. A better approach may be to model targets for expenditure and taxes, and then model target borrowing as that required to fill the gap once expected aid flows are taken into account.[19]

The second problem is more serious. Suppose that, for example, I_g is very closely related to the variables selected to determine the target level. Suppose in fact that the R^2 from this regression is 1. Then I_g^* is I_g! When we come to estimate equation (3.27), which involves regressing I_g on I_g^*, we will be regressing I_g on itself - the coefficient on I_g^* will of course be unity, and all the other coefficients insignificant. In practice the R^2 will not be 1, but if it is high then

the problem will still be present. If the R^2 is low it is difficult to see how the fitted values calculated using the estimated coefficients may be meaningfully interpreted as values of the targets. The fit will be poor either because the wrong variables have been included in the target equation, or because the outturn was far removed from the target. In the latter case the coefficients will not be those used in the formation of targets.

Consider, for example, the parameters for the tax equation. If the argument of the preceding paragraph is correct we would expect β_5 to be unity and β_3, β_4 and β_6 to all be insignificant. These expectations are indeed borne out by Gang and Khan's results. For the estimate of equation (3.27) we expect β_8 to be zero - again this is the case. The other two equations are more complicated. From equation (3.28) we may expect β_2 to have a value of one - but from equation (3.29) we expect a value of zero! Since the coefficient cannot be both zero and one, it falls between the two.

This hybrid result is also perhaps suggestive of the fact that the cross equation restrictions contained in the model are not valid. As mentioned in Chapter 2, restrictions imposed on the data by the model should be tested. Gupta (1993a) reports the results of estimating both restricted and unrestricted versions of the fiscal response model and shows the restrictions to be decisively rejected.[20]

It therefore appears that Gang and Khan's results are derived from the way in which the target series are estimated: as such the results can tell us nothing about the Indian government's fiscal response to aid inflows.

But even if we ignore the above-mentioned problem then we may still argue that Gang and Khan give a misleading interpretation of their results for two reasons: (i) failure to report reduced form coefficients; and (ii) suppression of the model's implicit dynamics. The second of these was discussed above in Part 3.3 - that is feedback effects through the target equations are ignored. Forster (1993) did allow for such effects in his estimation of the model for Papua New Guinea and found that, as expected, they reinforce the impact of aid on investment and reduce to the extent to which the increase in funds is offset by falls in borrowing and taxation. Here we consider the first point.

Gang and Khan write that "foreign aid does not have any statistically significant effect on government consumption" (1991: 363). This conclusion is based on the result that the estimates

for ρ_2 and ρ_3 are insignificantly different from zero, and so do not enter the budget constraint for government consumption. By the same reasoning, we would suppose that all aid is used to increase government investment. Simulations (reported in White, 1994a) using Gang and Khan's point estimates, show an increase in loans of 100 units, for example, causes an increase in government investment of 103 units and a drop in total government consumption of 3 units.

But it is rather odd to look at the coefficients of the budget constraint. For these results do not imply that I_g will increase by 103 units if A_l increases by 100 units: for the results to mean this would require B and T to be constant in the face of the increased aid. But the whole point of the model is that B and T are not constant - indeed, fungibility suggests that some aid will be used to reduce these domestic revenue sources. In order to analyze the total impact of aid on the different categories of government expenditure and revenue we must either derive the reduced forms or otherwise obtain solution values for the system of structural equations. White (1994a) reports the results of model simulations using Gang and Khan's parameter values for the βs and ρs and a hypothetical set of exogenous variables to examine the impact on the various categories of expenditure of an increase in A_g and A_l of 100 units.

The results of these simulations are rather a stark contrast to the conclusions drawn by Gang and Khan. For example, an increase in grant aid reduces borrowing by nearly twice the value of the increase in aid and reduces taxes by nearly the amount of the aid - that is the reduction in the recipient's own revenue raising efforts sets off the new aid monies more than two and one half fold. The result is that higher aid must lead to a reduction in total expenditures. This reduction falls entirely on government consumption. Neither type of aid has any impact at all on government investment.

The various shortcomings in the fiscal response model and the methodologies applied to its estimation clearly indicate the existing results cannot be meaningfully interpreted. We would argue, moreover, that the problems in the model are too great to be resolved. An alternative approach, which has been adopted to examine the sectoral impact of aid, appears to be the more promising channel.

Categorical fungibility of aid to specific sectors

Pack and Pack (1990) regress sectoral government expenditure (D_i) on GDP, project aid designated to that sector (A_i), project aid to other sectors and time for five sectors (the total

included in these five sectors omit expenditures on a few items).[21] Logs are used so that the coefficients are elasticities. It is not clear why logs are used, since we are interested in the marginal increment in expenditure with respect to aid. (If D_i is inclusive of aid, as it is for Pack and Pack, then the hypothesis of interest is whether the coefficient on A_i is one or more; if the expenditure is exclusive of aid, as for the similar study of Kenya by Ekman and Metell (1993), then there is fungibility if the coefficient is significantly less than zero). Regressions are also estimated for recurrent (non-developmental) expenditures and revenue. System estimation (Seemingly Unrelated Regressions, SUR) is used to allow for the cross equation error correlation implied by the relation of the dependent variables through the budget constraint.

The coefficient estimates are then used to simulate the effects of a one rupiah increase in aid per capita, which is spread over the sectors in proportion to their average share in project aid during the period of the study. The results are shown in the top part of Table 3.3.

The table also shows the results for Kenya obtained by Ekman and Metell (1993). Since they use an expenditure series which is exclusive of aid the total impact is given by the sum of the three columns, rather than the two aid coefficients, as is the case for Pack and Pack's results.

The figures for Indonesia show an expenditure increase of 1.58 rupiah for a one rupiah increase in aid. Half of this increase (0.29 rupiahs) is financed by an increase in revenue. The finding that aid increase revenue collection is in contrast to the consensus in the fiscal response literature that taxes fall as aid rises. Pack and Pack suggest that the need to increase revenue collection comes from the local cost financing contribution of government.[22]

The remaining 0.29 rupiah is supposed to come from falls in expenditure in the excluded sector. The method of excluding a sector means that, through an identity, expenditure in this sector is assumed to adjust to the required level. This assumption is in effect a cross-equation restriction in the model - a restriction whose validity may be roughly checked by plotting the fitted versus actual values - but which is left implicit by Pack and Pack's methodology. A better approach would be to incorporate the restriction into the model and estimate by three stage least squares.[23] This approach is laid out more fully below.

In the case of Ekman and Metell's study the expenditure increase is marginally (but probably insignificantly) less than one - so that they conclude that aid causes a slight reduction in

Table 3.3
Categorical fungibility in Indonesia

	Change in aid	Coefficient on Sector aid	Other aid	Total aid	Ratio
	(1)	(2)	(3)	(4)	(4)/(1)
Agriculture	0.10	0.09	0.05	0.13	1.41
Industry	0.46	0.37	0.08	0.44	0.97
Transport and tourism	0.21	0.18	0.02	0.20	0.96
Social sectors	0.10	0.07	0.12	0.19	1.86
Other	0.14	0.18	0.27	0.45	3.23
Current expenditure	0.00	n.a.	n.a.	0.17	n.a.
Total	1.00	0.88	0.53	1.58	1.58
Revenue	0.00			0.29	

Source: Pack and Pack (1990)

Categorical fungibility in Kenya

	Change in aid	Coefficient on Sector aid	Other aid	Total aid	Ratio
	(1)	(2)	(3)	(4)	(4)/(1)
Agriculture	0.18	0.11	-0.10	0.19	1.05
Industry	0.33	0.05	0.18	0.21	0.63
Public works	0.15	0.07	0.09	0.31	2.04
Social sectors	0.22	-0.02	0.01	0.22	0.97
Other	0.11	0.00	-0.00	0.11	0.98
Current expenditure	0.00	n.a.	n.a.	-0.06	n.a.
Total	1.00	0.22	-0.18	0.98	0.98
Revenue	0.00			-0.04	

Source: Ekman and Metell (1993)

/ctd.

non-aid financed expenditure. In fact, we cannot be sure about this statement. If the budget constraint they give is correct then expenditure in the excluded sectors must fall in the face of the aid inflow, since the increase in expenditure in other sectors plus the fall in revenues is slightly

greater than one. But the budget constraint is written excluding borrowing (printing money) - Pack and Pack state that in Indonesia budgets have been balanced, but the topic is not mentioned in the Kenyan study.[24] The observed decrease may be accommodated by a fall in borrowing - but borrowing also may have risen to allow a further rise in expenditure in the excluded sectors: we simply cannot say. But we can say that inappropriate imposition of a balanced budget budget constraint assumes that aid has no effect on public savings, when this effect is one of the key issues under examination.

Therefore one modification to the approach should be to include borrowing in the budget constraint (which may take the value of zero if there is none). Second, as explained, the rationale for excluding certain sectors is unclear. It would be preferable to include all sectors.

Gupta's (1993b) study of India both includes the full budget constraint (although the treatment of non-project aid is unclear) and does not exclude any sectors. In his model, however, borrowing is determined as a residual, so that same comments as before apply. The results show an increase in development expenditure which is almost identical with the aid flow, but also an increase in non-developmental expenditures, almost entirely financed by increased borrowing. These results are difficult to understand: we find neither fungibility between developmental and non-developmental expenditures, nor that aid crowds in government developmental expenditures. Why should the government borrowing to finance defence be considered a response to the aid inflow when the aid cannot in any sense be being said to be being used for the defence expenditures?

The approach described here is only a partial one for reasons already discussed. The expenditure equations include GDP as a regressor, hence holding income constant rather than allowing for multiplier effects. To the extent that aid does increase GDP the full effect of aid on expenditure is being under-stated. To capture the full effect of the aid inflow requires estimation of an economy-wide model.

So far we have discussed the results of these studies as regard to aggregate fungibility. Analysis of the sectoral effects shows that sectoral expenditure increases by nearly or more than the value of aid allocated to that sector in all but one case (industry in Kenya). However, only in one case (other for Indonesia) is the increase attributable to sector-specific aid as large as the increase targeted at that sector. In the other cases the remainder (which is as often as not the

Table 3.3 (ctd.)
Categorical fungibility in India

| | Change in aid (1) | Coefficient on | | Total aid (4) | Ratio (4)/(1) |
		Sector aid (2)	Other aid (3)		
Agriculture	0.17	0.07	0.10	0.16	0.94
Food subsidies	0.01	-0.00	0.07	0.07	11.76
Industry	0.32	-0.07	0.02	0.10	0.30
Energy	0.30	0.13	0.04	0.16	0.55
Transport and communications	0.10	0.01	0.06	0.07	0.86
Other	0.10	0.09	0.35	0.44	4.31
Total	1.00	0.36	0.64	1.00	1.00
Defence				0.73	n.a.
Other non-developmental				0.21	n.a.
Government revenue				0.01	n.a.
High powered money				0.00	n.a.
Borrowing				1.94	n.a.

Source: Gupta (1993b).

larger part) comes from other aid. These results are evidence of categorical fungibility. First, because sector aid is apparently not fully used in that sector and, second, because other aid increases sectoral expenditure. But some of the increase must, at least in the Indonesian case, come from higher revenue. It is curious that a revenue term is not included in the expenditure regressions. Use of the full simultaneous model, incorporating the budget constraint, as suggested above, would take care of this problem.

Holmqvist's analysis of the impact of education aid on educational expenditure using cross section data, already discussed in Chapter 2, is an alternative approach to categorical fungibility. We have already expressed reservations about cross section analysis. These doubts aside, his

simple methodology is intuitively appealing. However, as demonstrated in Chapter 2, his particular results are determined by a single observation.

Simultaneous equation models

The argument of this report is that broad-based analysis using cross-section data of very general relationships should be replaced by more careful analysis of time series data of more detailed channels through which aid may affect macroeconomic aggregates. It is also argued that such work should usually be conducted in the context of simultaneous economic models, to capture the full range aid's effects.

Some object to econometric models using developing country data, as the data are not deemed sufficiently good for such analysis. Poor data quality is, however, a more convincing argument against cross-section analysis, since the researcher is more likely to be using numbers pulled out of a database and about which they have little knowledge (changes in definition, lack of comparability between countries, and, most of all, inadequacies in the data). Analysis of a single country allows greater familiarity with these issues.

There are a few multi equation models of aid impact which may be mentioned (in addition to the two CGE models mentioned above in the discussion of aid and exports). Hill (1988) presents a twenty-two equation output-driven model of Bangladesh, which disaggregates the government and agricultural sectors: a halving of aid flows is shown to lead to a drop in GDP of between 5.9 and 11.8 per cent. White's (1992d) eleven equation model of Sri Lanka focuses on investment, but is set in the context of a demand-determined macroeconomic model. A reduction in aid is shown to reduce both public and private investment and lead to a fall in GDP of about twice the value of the aid reduction. Radelet (1993) presents a CGE - the results from which are discussed in Chapter 4 - to analyse if Gambia's economic growth comes from rain, aid or policy reform. Ahluwalia's (1979) model of India - discussed in Chapter 5 - allows for the incorporation of possible disincentive effects from aid. These models provide a useful basis for further work.

3.6   The Efficiency of Investment

Chenery and Strout's (1966) two gap model assumed the ICOR in their two gap model to be constant. Griffin (1970) questioned this assumption, asserting aid-financed investment to be less productive than that financed from domestic resources. Since he also argued that aid displaced domestically-financed investment, the average productivity of investment will fall with the aid

inflow.²⁵

Defenders of aid may argue to the contrary that aid increases the productivity of investment through the provision of technical assistance or enhancing the transfer of technology. The microeconomic evidence on these issues is necessarily mixed since there are both good and bad aid projects. Unfortunately no theoretical or empirical work has explored these issues at the macroeconomic level (except a couple of attempts to regress the ICOR on aid - Voivodas, 1973; and Rana, 1987). The development of such analysis should be high on the list of any research agenda on aid issues.

3.7   Aid Dependence

The concept of aid dependence has long been evoked by critics of aid, who imply that aid allows foreign interference in domestic political and social development. Such a concern, which we do not say is unfounded, is not the one pursued here. Instead we define aid dependence with reference to the two gap model (see Mutasa and White (1993) for a fuller exposition).

Chenery and Strout's (1966) approach was to set a growth target and hence, given the model parameters, determine the savings and trade gaps. The amount of aid required is that to fill the larger of the two gaps. If either gap is positive then aid is required to attain the target growth rate. Most important is if the gaps are closing or widening. If they are not then, in the absence of further structural change, the country will need to receive aid indefinitely to maintain growth. It is this situation - when the gaps are not closing - that we define as one of aid dependence: the country will always need aid. A related topic of interest is the extent to which aid is helping remove (or reinforce) this position.

This definition of aid dependence differs from that implicit in much of the original two gap literature, where the term was used to describe a situation in which aid was needed to attain the target growth rate.

Mutasa and White's study of Tanzania shows that the country is aid dependent, since the conditions are not satisfied. Further structural change will be required before the economy will be on a path toward self-sustaining growth. Doriye and Wuyts (1993) and Doriye et al. (1993) show how project aid may have been partly responsible for this situation as aid-generated demand led to an expansion of food production at the expense of the export sector.

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3.8   Other Relevant Literature

There are two academic literatures closely related to that of the macroeconomics of aid: these are aid requirements studies and global modelling of financial flows. From the point of view of this report the interesting question is: does the literature on these different aspects contain insights on aid's macroeconomic impact not in the literature already reviewed? The converse question is of more general interest: does modelling of aid's macroeconomic impact in these models reflect current thinking on the macroeconomics of aid?

The Aid Requirements Literature

Chenery and Strout's seminal 1966 paper in *American Economic Review* grew out of work they had done for USAID on the capital requirements of LDCs. They combined two existing approaches to estimating capital requirements - those based on the savings gap and those using the foreign exchange gap. Thus the idea of calculating the aid required to fill a gap had been around for some time and remains in use to this day.[26]

Recent academic contributions to this approach are Fishlow (1987) and Lensink and van Bergeijk (1991). The latter determines capital needs through a Harrod-Domar equation and various exogenous projections concerning debt and other inflows. By contrast, Fishlow's model is based on import requirements. But the important point to note is that none of these exercises allow for any kind of fungibility, the analysis of which has dominated the aid literature.

It is this discrepancy that underlies the contrast between the quotes with which we opened this chapter. The World Bank's forecasts of requirements are also a "gap filling" exercise, with very little, if any, attention paid to the actual macroeconomic impact of aid in the recipient country.

Modelling Macroeconomic Impact of Financial Flows at the Global Level

Modelling aid impact at the national level, no matter how sophisticated, can be condemned as a partial approach as it does not allow for global feedback effects. The case made by the Brandt Commission in the early 1980s for a massive increase in resource transfers to LDCs was based on a simple "global Keynesianism" (aid would feedback to the donor in the form of higher demand for its exports) - as Brandt said it is no good to say you are alright because it is the other end of the boat which is sinking.

Global macroeconomic modelling is a relatively new field - the pioneering Project LINK model was launched in 1968. Of the global models developed since the 1970s, those of particular interest here are those concerned with (i) the North-South income gap; (ii) the evolution of the foreign debt situation; and (iii) the transmission of macroeconomic shocks from industrial countries to LDCs.

In global models, developing regions are generally represented by a finance constraint current account equation. An inflow of external finance increases import capacity, and, assuming that additional imports are capital goods, increases investment - that is, a common assumption is that aid (or other capital flows) allow a one-for-one increase in both imports and investment. There is no fungibility. Hence. with the assumption that all external finance is used efficiently, inflows contribute to growth. We see below that not all global models are this simple.

Many models do not make a distinction between private flows and ODA, usually treating total external finance as commercial loans. In other models the supply of ODA - usually a fixed proportion of GDP in industrial countries - is different from the supply of private external flows, but the mechanisms through which ODA and private flows affect the economy are the same. In some models ODA is assumed to go to the public sector of the receiving economy. which behaves differently from the private sector. receiving only private flows.

Here we discuss four global models (the World Model, the FUGI model. STAC and a model due to Lensink), focusing on the mechanisms through which aid affects growth in the receiving economy. To repeat, the crucial question is: are there things to be learned from aid in global models that cannot be learned from analysis at the national level? (Or is the modelling of the aid-growth relation too simple in global models. and is global modelling lagging behind recent developments in the aid-growth literature?).

ODA modelling: some examples

The World Model, first described in Leontief et al. (1977), is an interregional input-output model of the world economy. The model was constructed for the study of development in relation to environmental questions. However, the model is a general-purpose economic model and is thus applicable to the analysis of the world economy from other points of view (Leontief, 1977: 2).

The model projections are mostly produced with fixed income targets, and determine the levels of employment, rates of investment and international transfers required to achieve these targets irrespective of the economic and institutional forces that affect these instruments of growth. In the scenario which treats income levels as dependent variables, the future growth of LDCs is determined either by the projected rates of domestic savings supplemented by the funds coming from abroad or by foreign exchange constraints - operating through the balance of payments - which would limit the imports of raw materials and capital goods that these countries cannot yet produce themselves (Leontief 1977: 28).

Another example of scenario analysis through a world model is found in Lensink (1993). The model is constructed with four objectives: (i) to forecast LDCs' economic performance in the 1990s; (ii) to assess the contribution of an increase in ODA to LDCs: and (iii) to investigate the impact of higher growth rates in industrial countries on LDCs' economic growth. A central feature of the analysis is the foreign exchange constraint, and, for LDCs, the emphasis is on intermediate imports. Potential production is partially determined by ODA through imports. ODA is a fixed percentage of GDP in industrialised countries. Total capital flows from official creditors are exogenously distributed over the different regions (by a fixed percentage). In the ODA scenario, ODA donations gradually increase to a level of 0.7% of GDP of industrial countries in the year 2000 - the simulation shows that only growth rates of Sub-Saharan Africa are substantially increased; in other developing regions the ODA to GDP ratio in the baseline is too low for ODA to have a strong impact on growth. In Sub-Saharan Africa the foreign constraint is eased, resulting in a rise in intermediate imports and hence potential production. The growth stimulating effects of ODA are strongest in the first five years of the simulation period. The model also allows for Dutch disease effects as the increase in ODA stimulates inflation and hence reduces exports (since exchange rate adjustment is sluggish). Thus the increase in ODA is partly counteracted by a decrease in foreign exchange due to lower exports.

The FUGI model not only distinguishes between official and private creditors, but also has a public-private disaggregation at the receiving end. There are in fact three different, loosely interrelated models: (i) a global macroeconomic model: (ii) a static global input-output model; and (iii) a set of global metal resource models. The macroeconomic model represents a system of regional submodels, which are linked through trade, ODA and private overseas investment (Kaya et al., 1983). The level of ODA from the donor nation is determined by its GDP - the individual country parameters allow either a rising trend in the share of ODA in GDP (the newer donor

countries), a declining trend (the US), or essentially no trend (Japan). Each country's bilateral aid is allocated across recipients, with shares either reflecting the most recent allocation, or the developing country's individual allocation summed across all donors. Productive potential in developing countries is determined by the capital stock, recent past investment, the real oil price, government expenditure on education and ODA. Since ODA is usually provided as an inter-official grant or loan, its first effect is to increase the financial resources available to the recipient government, relaxing the budgetary constraint on public expenditure. The receipt of ODA influences the recipient country through: (i) an increase in government expenditure which adds to the capital stock of the economy; (ii) an increase in foreign exchange earnings, increasing the capacity to import, which adds to private sector investment; and (iii) an increase capacity to import which allows increased exports from trading partners, with macroeconomic repercussions which will ripple at least in principle back to the aid recipient (Gregory, 1991: 11).

The purpose of the World Bank Global Economic Model is to develop a fully linked (with trade and financial flows) model of the world economy that incorporates small macro-models of growth and adjustment for 100 LDCs. The individual LDC receives a fixed share of credit from official concessional funds, which follows the growth of incomes in OECD countries. Limited supplies of external finance places a constraint on the country's ability to import capital goods, hence, constraining the growth of investment leading to slow growth of output over the medium term (Petersen et al., 1991: 25). Countries with limited supply of external finance are classified as supply-constrained. Middle-income countries generally enjoy access to international capital markets unless their creditworthiness is marred by a debt overhang. With a few exceptions, low-income countries have little access to international capital markets, relying almost exclusively on ODA; some countries are not supply-constrained because they are able to get large chunks of ODA (Petersen et al., 1991: 26).

The STAC model (Vos, 1991) is a structuralist North-South model, incorporating aid flows and the commercial loan market developed to study global macroeconomic interactions between North and South. In the STAC model, output will increase with public investment on the assumptions that inadequate infrastructure forms a bottleneck in production. Aid flows finance public sector investment (less resources needed to finance current expenditures, which are endogenous with terms of trade) . A larger public sector wage bill will decrease available funds for public investment, assuming aid funds may be fungible (Vos, 1991: 153 and 166). The growth rate in the South is determined by: (i) the growth rate of the North; (ii) Northern government

debt; (iii) capital stocks in North and South, (iv) world interest rate; (v) aid flows; (vi) public sector employment South. There is a direct (positive) effect from aid-financed public investment. There are indirect effects which depend on the way the aid transfer is financed in the North. The STAC model provides theoretical explanation for the often hypothesized negative relationship between foreign aid and domestic savings (Vos, 1991: 167-170).

A number of other studies were reviewed in the preparation of this report, but are not discussed in detail here since they add little over the points discussed thus far.[*]

Summary

We see that many models capture aid's main impact as relaxing a foreign exchange constraint which has been binding investment or capacity utilisation. The former view is that of the two gap model, whereas the role of aid in supplying intermediates goods has been only little analyzed in the aid- macroeconomic literature. The models also contain disaggregations of the public and private response that much of the aid literature has ignored. The model of Lensink has endogenous prices, thus allowing for Dutch disease effects, but this is not a general feature of these models. And more generally, the possibilities for fungibility are not captured in any depth by the global models.[28] In conclusion, there is scope for cross-fertilisation between the two literatures.

3.9   Summary

The literature on the macroeconomic effects of aid has been almost entirely from a modelling perspective - usual single equation - and with an emphasis on empirical estimation at the expense of theoretical consideration. One of the largest areas - regressions of growth on aid - are argued here to be uninformative, and should be discarded as a tool if analysis.

The main requirement is for more careful work that requires further disaggregation of both dependent and independent variables. More thorough theoretical analyzes of how aid affects private savings and investment are required. Theoretical discussion should be informed by, and empirical work use, the breakdown of aid by functional categories (project aid, programme aid and technical assistance) - a topic which is pursued in Chapter 5.

The single equation approach is incapable of capturing all the channels through which aid effects the macroeconomy - a simultaneous model is required. Hence work should proceed on a

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country-specific level (a recommendation much made and little heeded in the literature). The accounting framework presented in Part 3.3 is the basis for such a model: but good theory and estimation are required to provide the behavioral relationships to fit in such model. Additionally, models will provide the basis for separate analysis of aid monies and aid supported policies. The latter of these is the subject of Chapter 4.

Notes to Chapter 3

1. For reviews of such studies see Riddell (1987), Michalopoulos et al. (1989) and White (1992b).

2. The argument of this part of the report is given in more detail in White (1992b and 1992d).

3. In practice there will also be an errors and omissions term on the capital account.

4. By the UN's *System of National Accounts* (SNA) grant aid intended for investment purposes should appear in the capital account as capital grants. Some economists dispute this method, arguing that only inflows carrying with them a repayment obligation should appear in the capital account. And in practice most countries do not follow the SNA recommendation but instead record all grant aid (that intended for both consumption and investment) as an official transfer. Although transfers are a current account item it is a common practice to treat OT as an "intermediary item" and report the current account with and without official transfers. Such a practice is commonly adopted by the World Bank and IMF and has important implications for the macroeconomic analysis of countries with high aid inflows.

5. That is, net of amortization payments on past aid. The various definitions of aid flows are discussed below.

6. And this point has been almost entirely overlooked in the academic literature. One exception is Lele and Agarwal's (1990) observation that the tying of aid to India in the 1960s meant that aid was of no help in relieving the balance of payments problems.

7. The three "Comments" published a year after Griffin's paper (by Eshag, Kennedy and Thirlwall, and Stewart) have been unjustly ignored in the subsequent literature.

8. In accordance with the above argument $Y_0 + A - C_1$ is gross national savings plus aid on capital account.

9. The discussion of the fiscal response model in this report draws heavily on White (1994a).

10. This specification had already been used by Mosley et al. (1987) in their application of the fiscal response model. But these authors did make explain their reasons for preferring this functional form. Although the target values are the optimal ones the model does not have an asymmetry that is desirable in such a function. As Gang (1993) points out, overshooting the target for a variable such as government investment should be less heavily penalized than undershooting.

11. Pack and Pack (1990) state that the Indonesian government, on the other hand, has maintained balanced budgets over the period of their study.

12. It may be more, but not entirely, credible to argue that foreign borrowing is not used to finance recurrent expenditure - but this assumption is not made.

13. Attempts to derive the implicit αs from Gang and Khan's results show them to be calculable from different expressions, but that the numbers thus derived are inconsistent. For a demonstration of this point with respect to the results reported in Khan and Hoshino

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(1992) see McGillivray (1993).

14.   For a more formal demonstration of this point see White (1992b).

15.   Mosley *et al.* also solve the model incorrectly, leaving the endogenous variable, taxes, in the reduced form. The correct solution is given in White (1992a).

16.   Stewart (1970) pointed out that multiplier effects from aid may raise import demand over and above the value of the aid inflow - the consumption function used here implicitly allows for such an effect. The simple investment function may be viewed as a reduced form incorporating direct effects and crowding in/out (see White and McGillivray, 1992).

17.   Akrasanee's (1990) discussion of aid to Thailand argues that, although relatively small in macro terms, aid has had a large effect on growth because of its concentration on infrastructure. (By contrast, Handoussa (1990) says that in the case of Egypt aid's focus on infrastructure meant that it did not affect the agricultural and industrial sectors).

18.   The form that donors file to the DAC for their database would allow this functional classification to be at least partly achieved, but DAC do not report any data in this form (other than for separating out technical assistance).

19.   Whilst the approach suggested here is intuitively appealing it may well render the model inestimable. If actual aid flows are close to expected then there will be extreme multicollinearity when attempting to estimate reduced form equations (as is required for the 3SLS approach used in the literature): if expected aid flows equal actual then there will be perfect multicollinearity. It may therefore not be possible to estimate the reduced form since the matrix of regressors may be singular or near singular.

20.   The restrictions imposed by Gupta are tighter than those in the model estimated by Gang and Khan since he also ensures that unique estimates of the utility function coefficients may be derived. However, Gupta misinterprets his results; saying that the restrictions must be imposed in order to get "consistent" parameter estimates. The correct interpretation is that the model is misspecified and that an alternative model should be sought.

21.   A recent paper by Pack and Pack (1993) presents the same analysis for Dominican Republic.

22.   Doriye and Wuyts (1992) make a similar argument in the case of Tanzania.

23.   It is not clear why Pack and Pack excluded one equation from their system. If all equations are included then the cross-equation restriction most likely will not hold unless it is specified in the system prior to estimation: 3SLS allows the imposition of the restriction.

24.   The budget constraint also excludes non-project aid, which should be added.

25.   If the two effects are sufficiently strong aid amy therefore have an adverse impact on growth.

26.   For a more detailed review of the early literature see White and Woestman (1993).

27. These models include OECD's INTERLINK DEMOD (for Latin America) (Dittus 1990: 18-19) and that of Vines and Allen (1992).

28. INTERLINK, mentioned in the previous note, allows for reserve accumulation out of increased inflows.

CHAPTER 4

MACROECONOMIC EFFECTS OF AID-SUPPORTED POLICY REFORM

4.1   Introduction

The conclusions to a recent volume on the role of capital inflows is development (Lele and Nabi, 1990a) deliberately avoided quantifying the contribution of these flows to growth. The reason given was that the country case studies showed domestic policies to be the primary determinant of a country's development (Lele and Nabi, 1990b) - the role of government, aid and policies is too complex to disentangle. Whilst not agreeing that we should not at least try to answer the question "can aid work without reform?"[1] it is undoubtedly true that policy stance is a vital factor in macroeconomic performance. In this chapter issues concerning the assessment of the impact of aid-supported policy reforms are discussed.

The first analyses of policy conditionality (e.g. Killick, 1984) focused on IMF stabilisation programs and were critical of the excessive emphasis on demand restraint to restore balance of payments equilibrium. In more recent years the study of World Bank adjustment programs has led to a slightly more positive consensus. Most studies find the investment rate to suffer as a result of adjustment policies (e.g. Mosley et al., 1991; World Bank, 1988, 1990 and 1992). The effect on growth, however, is usually positive - but often weakly (and often also insignificantly) so (e.g. Mosley et al., 1991; World Bank, 1988 and 1990 - but not 1992, which reports a significant positive impact). The effect on the balance of payments is negative (Mosley et al., 1991; World Bank 1988) - largely because of the import surge following trade liberalization and the weak or slow supply response of exports (World Bank, 1990 - again the 1992 report finds a stronger export response).[2] However, there are a number of methodological issues that need to be addressed before these findings may be accepted.

For aid-supported policy reforms to have a beneficial impact on a country's economic performance, two conditions must be satisfied. First, the donor presence must make a difference to the reforms that are implemented. Does the presence of aid donors make for better policies or does aid, as critics maintain, allow recipient governments to pursue unsustainable and misguided policies? Second, the reforms that do take place must have a positive impact on performance. These two issues are analytically distinct.

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If the reforms would have gone ahead even in the absence of the aid we may still be interested to learn the economic impact of such reforms (since they are the types of policy which donors support) - but the impact of the reforms cannot be directly attributed to the aid. It is therefore important to address the two questions separately, as we do in Parts 4.2 and 4.3 respectively. Part 4.4 draws out the implications of this chapter's discussion for further research on aid effectiveness.

4.2   Does Aid Affect Policy?

The World Bank's reviews of adjustment lending (1988, 1990 and 1992) have reported indicators of "compliance" - that is the extent to which countries have actually implemented the reforms outlined in the various agreements relating to adjustment loans.

Mosley *et al.* (1991 Volume 1: 134-145) argue that these compliance measures do not give an accurate picture of the extent of reform since some measures are very easy to implement whereas others may prove impossible to do so because of either poor design or changes in the external environment. If our concern is to trace causation from aid to policy to performance we must take their argument very seriously: compliance simply is not a measure of the degree of reform, and so is not a suitable variable to use in such analysis. There are two problems here. Since compliance measures cannot tell us the extent of actual changes which have occurred they cannot tell us how much reform aid has really supported. Second, these indicators are therefore not the appropriate variable for analyzing the macroeconomic impact of reform. This latter point is returned to in Part 4.3.

Furthermore, compliance indices are a form of before versus after approach - all changes in policy since the start of adjustment borrowing are attributed to that borrowing. No attempt is made to determine the policies that would have occurred in the absence of the adjustment loan. As argued in Chapter 2, before versus after is not a satisfactory method for determining causality.

But a more serious underlying problem is that the presence of a program is not the relevant exogenous variable, it is the policies which are themselves pursued - this point was partly recognized in the World Bank's (1992) third report on adjustment lending, which suggested that the analysis of the impact of adjustment borrowing should consider the change policies rather than the presence or not of adjustment borrowing. This suggestion has been followed up in an internal review of the adjustment experience in sub-Saharan Africa [this publication is not yet in the public

domain]. In the Bank report a macro policy performance indicator[3] is constructed which is a composite of measures of exchange rate policy, fiscal stance and monetary restraint for twenty seven countries. The changes in performance between the periods 1981-86 and 1987-91 are then calculated.

This approach is an improvement over the compliance approach as a variable is defined to capture the degree of policy reform. But the methodology remains before versus after. No attempt is made to analyze whether or not the reforms would have occurred in the absence of the reforms. To answer such a question requires a model of the reform process. The modified control group approach is one simple way of modelling what policy would have been in the absence of the program - but no studies applying this approach have reported this aspect of their findings.

Judgements on likely policy scenarios in the absence of the adjustment program are probably best made by more in-depth analysis of the political economy of decision making in the country in question. For example, in the Tanzanian case, it is likely that the government would have attempted reform without donor support (indeed it had been doing so during the period of dispute with the IMF). But it is questionable whether these reforms would have been either politically or economically sustainable in the absence of the aid money.

The Tanzanian example illustrates a second point - the role of aid in hindering or supporting policy reform can change markedly over time. Many would today identify the support given to Tanzania's villagisation program in the 1970s as a prime example of how aid has supported detrimental levels of state intervention. Import support received by Tanzania during the 1980s was often allocated to parastatals, reinforcing rather than restructuring the industrial sector. However, as indicated in the previous paragraph, the aid donors have probably has a positive impact on the reform process in the 1990s.

To repeat: a final decision on the aid-policy relationship can only come from case studies of actual cases, with comparative analysis to draw out overall lessons. I am not aware that such work has been undertaken on a systematic basis: though the review by Cassen *et al.* (1986: Chapter 8) concludes that in general aid has been more beneficial to private sector development than harmful (we return to this point in the next chapter). Finally, the more technical issue of whether reforms which have short-run adverse impacts are sustainable without additional financial

flows can in principle be analyzed through models of how policy changes affect the economy. Such models are the subject of Part 4.3.

4.3 Modelling the Macroeconomic Impact of Policy Changes

As discussed in Chapter 2, the before versus after and control group approaches are much used in the analysis of the macroeconomic impact of adjustment policies. For the reasons discussed there, we do not pursue such studies here but concentrate on the modelling approach. Rather than present a whole range of models some key conceptual issues are discussed: (i) distinguishing adjustment policies from adjustment *per se*; (ii) measuring adjustment policies; and (iii) the use of dummy variables to model structural change; and (iv) dynamic aspects of some results. A brief discussion of some of the key relationships follows.

Distinguishing adjustment from adjustment policies

The term "adjustment" is used to refer to two, quite distinct, phenomena. All agree on this distinction, but it is not always clearly made, and this failure to distinguish results in confusion.

The external environment facing an economy is constantly changing. In the early 1980s these changes were large, abrupt and mostly unpleasant. Economies automatically respond to such changes through a variety of price and quantity adjustments - this I call <u>automatic adjustment</u>. Such automatic adjustment may well put the economy on a low growth path, so that governments wish to intervene in the adjustment process to enable the economy to grow in the context of the changed environment. Such interventions are <u>adjustment policies</u>. As just mentioned, all developing economies were *per force* involved in substantial automatic adjustment during the 1980s and nearly all have responded, at some stage or other, with recourse to adjustment policies.

In both senses then, the 1980s were "a period of adjustment" - the term adjustment here referring to the eighties and <u>not</u> specifically either automatic adjustment or adjustment policies. However, this correct observation can lead to ambiguous statements such as the following:

> Private investment has fallen during adjustment in all cases - with no sign of recovery by 1988.

> (Fitzgerald and Sarmad, 1990: 41)

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.. our results suggest a sizeable output loss because of lower aggregate investment levels during the period of adjustment under IMF-WB lending.

(Faini *et al.*, 1991a: 964)

In both of these cases the authors are referring not to the impact of adjustment policies but simply to what happened during the 1980s - the period of adjustment. Whilst the above cited papers are (reasonably) clear on this point - they are not laying the blame for lower investment at the door of adjustment policies - the terminology makes the statement ambiguous, open to misinterpretation, and. in the hands (or mouths) of the less scrupulous, simply incorrect. Others are quicker to make the "sleight of mind" whereby the responsibility for poorer performance during the period of adjustment policies make this poor performance the fault of those policies: indeed this tendency is intrinsic to the before versus after approach. and hence one reason for rejecting the method.

Our concern is to examine how adjustment policies influence macroeconomic performance -that is, to disentangle this influence from the automatic adjustment necessitated by external shocks suffered by developing countries during the 1980s. In order to conduct such an analysis we must have a measure of adjustment.

Measuring adjustment

It is common to model the impact of adjustment by using an "adjustment variable" which commonly takes one of three forms: (i) a dummy variable which is one in the presence of a program and zero otherwise (e.g. Corbo and Rojas. 1992); (ii) a measure of the "intensity of adjustment", usually by a compliance index (e.g. Mosley *et al.*, 1991); or (iii) the value of adjustment lending (e.g. Mosley *et al.*, 1991). None of these measures are adequate. The use of a dummy variable to capture the effects is flawed for two reasons: (i) it does not measure the extent of reform; and (ii) it does not allow fully allow for structural changes in behavioral relationships. As mentioned above, different programs require different measures and so the extent of reform is not indicated by the existence or otherwise of a program. Moreover, the degree of implementation varies greatly between countries.

This latter problem is not resolved by using a compliance indicator since the first problem - that what is there to be complied with differs between countries - remains (and there is a second problem that different countries may comply with different conditions). Compliance

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simply is not a measure of the extent of reform - although it has been used in this way. For example, the third report on adjustment lending presents a table of regression results for the macroeconomic impact of adjustment policies "corrected for implementation" (World Bank, 1992: 28). This correction has been applied by "making the adjustment variable equal to intensity by the percentage of conditions fully or substantially implemented". The study of Mosley *et al.* (1991) includes a compliance indicator as an explanatory variable, as well as the value of Bank adjustment loans and drawings from the IMF.

The second problem with the use of dummy variables is that there may be a structural break in the slope of behavioral relationships, whereas the use of the dummy allows only for changes in intercept. For example, financial market liberalization may make private investment more responsive to changes in the interest rate as administrative controls on credit allocation are relaxed - this change is a rotation, not a shift, of the investment function. This problem can be handled by using a slope dummy for the adjusting countries/period of adjustment - a solution that can be less clearly applied if a compliance indicator is being used. Slope dummies allow for changes in the nature of economic relationships rather than just imparting exogenous shifts to these functions. Such allowance is particularly important if the approach adopted is, as recommended below, to model policies rather than the presence of a program.[4]

The third measure of adjustment, that is the value of adjustment-related borrowing, bears no relation to either the extent of intended reforms or compliance with these intentions. As Mosley *et al.* themselves indicate, lending is little related to compliance. Nor can the approach be interpreted as separating out the effects of the aid funds from those of the policies. As explained, the compliance indicator is not a good measure of policies. To measure the effects of aid monies then all aid, not just adjustment lending must be included (though, at least initially, as separate variables).

None of the existing measures of adjustment therefore seem very satisfactory: but in fact it does not matter. There is an analogy here with the literature on the macroeconomic effects of aid. Attempts to estimate the aid-growth link directly were misplaced - analysis should concentrate on the channels through which the link is expected to operate.[5] Similarly, we cannot regress macro performance directly on adjustment programs - we should instead trace and quantify the links from reform to changes in exogenous (policy) variables to changes in outcomes.

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The importance of identifying the policies through which adjustment lending has its effects carries over to the usefulness of the analysis as a tool for appraising policy. The use of dummies or comparisons of adjusting versus non-adjusting leaves the processes through which adjustment achieves its results inside a black box - which is of no use in the design of adjustment programs. It is necessary to open the box to see which bits are working (and which are not).

Single equation models

Single equation estimation has been a common approach in the literature (e.g. Mosley *et al.*, 1991; Faini *et al.*, 1991a; and Corbo and Rojas, 1992). All of these studies estimate a number of equations modelling the behaviour of key macroeconomic aggregates. All of these include on the right hand side (possibly with lags) variables that are also used as dependent variables.

In the study of Mosley *et al.* this practice results in a problem of simultaneity bias in their estimation, and we would also expect a loss in efficiency. Hence their results, which contain very few significant relationships, may not be relied upon.

The systems estimated by Corbo and Rojas (1992) and Faini *et al.* (1991) are not simultaneous in the current period and so bias does not result from the estimation procedure. But the models do implicitly contain different short and long run effects which are not discussed. In the former study, the change in growth, the investment and savings rate and the export ratio are regressed on the lagged values of each of these variables and three exogenous regressors: a shock variable, the fiscal deficit (which probably ought to be endogenous), and an adjustment dummy.[6]

Regressing the change on a variable's own lagged value will give the identical result for all the regression results as regressing the level of the dependent variable on the same set of regressors, except that the coefficient on the lagged dependent variable in the latter regression will be one plus the coefficient in the former regression. Stated thus, it is clear that in Corbo and Rojas' model adjustment policies now affect current growth, investment, savings and exports which will, in turn, affect all of these variables in the next period.[7] The long run effects may well be very different from the impact effects.

The results from simulations of the impact of the introduction of adjustment policies using the four equations reported by Corbo and Rojas are shown in Table 4.1. The differences between

Table 4.1 Short and long run impact of adjustment policies on macroeconomic aggregates

	Impact effect	Long run effect	Ratio
Simulations using results of Corbo and Rojas			
Change in			
growth of GDP	0.016	0.020	1.2
investment rate	-0.035	-0.035	1.0
savings rate	0.014	0.115	8.2
export ratio	0.065	0.028	0.4
Simulations using results of Faini _et al._			
Change in			
growth of GDP	-0.001	-0.016	16.1
investment rate	-0.006	0.025	-4.2
current account (% of GDP)	0.034	0.063	1.9
inflation rate	0.008	-0.001	-0.1

Source: own simulations based on results reported in Corbo and Rojas (192) and Faini _et al._ (1991a).

short and long run effects are, except in the case of investment, marked. The beneficial impact of adjustment policies on growth and savings are reinforced, especially that on the savings rate. On the other hand, the positive response of the export rate is more than halved.

The Faini _et al._ study is similar, except that rather than the savings rate and exports they have the rate of inflation and current account deficit (as a per cent of GDP) as endogenous variables. As shown in Table 4.1, the effect of the dynamic simulations is even more dramatic using the coefficients from their study.[8] The negative impact on growth is strongly reinforced so that the growth rate falls by 1.6 percentage points, rather than only 0.1 percent. Despite this fact the impact on all of the other indicators is improved: the adverse impact on the investment rate and inflation are both reversed and the long run improvement in the current account is nearly double the impact effect.

Reviewing the results

This chapter begun by saying that there is something of a consensus over certain key relationships. But it has been argued here that cross-country regressions are not the best way to carry out the analysis - rather a country-specific modelling approach is required. Does the consensus stand up in the face of the evidence to date from such studies? The answer to this question is "not particularly" - here a range of the factors that need be considered are listed.

(a)   Growth

In Chapter 2 scepticism was expressed over the possibility of adequately explaining growth using cross-country analysis. Country-specific economic models may also be poor predictors of growth, unless exogenous factors are both included in the model and their time paths accurately forecast. Nonetheless, such models may still indicate whether certain policies are "good for growth" (bearing in mind the possibility that changing external conditions may require different policies). The model developed at the OECD to analyze the impact of adjustment on poverty (discussed in Chapter 6) has tended to find a positive impact of adjustment on growth (compared to a base run of the types of external shock typical to developing countries in the 1980s) - though purely contractionary policies (which may be best characterized as stabilization) do not always have such a favourable impact.

(b)   Investment

Investment ratios have undoubtedly fallen in the 1980s (hence the before-after approach finds adjustment to be bad for investment). It is worth remembering that this fall was from a historical peak in investment ratios reached by most countries around 1980 - this peak was fuelled by the excess international liquidity of the 1970s and was not necessarily very productive. Nonetheless, the apparent failure of adjustment policies to stimulate private investment has rightly been a cause for concern and led to a renewed interest in private investment in developing countries.

The conclusion that can be drawn from this literature is that the determinants of private investment are many, and the actual driving force likely to vary from country to country. Some main debates are:

-    crowding in versus crowding out: some argue that the falls in government investment associated with adjustment and/or stabilization are a main cause of declining private

investment (e.g. Taylor, 1988; Serven and Solimano, 1992; and Mosley, 1992); others (e.g. Benjamin, 1992) assert the more conventional view of crowding out that government expenditure will increase recourse to deficit financing and therefore reduce credit availability to the private sector (either through quantity rationing or changes in the real interest rate). The general decline in absorption at the outset of stabilization or adjustment will (often through expectationary mechanisms) reduce investment. The issue is clearly an empirical one, and both the type and financing of investment will be important in determining the outcome in any particular case.

- the role of financial liberalization: the McKinnon-Shaw view that liberalizing interest rates will stimulate investment (by increasing savings availability) has found a number of critics, for reasons including the following - (i) higher interest rates alter only the composition not the level of savings (see review by Fry (1988: Chapter 6) and argument by Morisset (1993) on portfolio effects of higher interest rates); (ii) in a standard structuralist model (e.g. Taylor, 1983) higher interest rates push up costs and prices because of fixed working capital requirements, but do nothing for investment; and (iii) the interest rate may go "too high" for productive investors (Roe, 1982 and Rittenberg, 1991).

- the role of uncertainty has been stressed by several writers, investors must be confident that the reforms will remain in place (the incentive structure will not change) if they are to invest. This aspect is one of the most difficult to model.

- exchange rate policy is policy is a further important determinant of investment; although there is some ambiguity, most channels (e.g. contractionary impact and higher cost of capital goods) suggest a reduction in investment as a result of a devaluation.

In addition to these relationships the possibility of increasing the efficiency of investment (through financial liberalization, removal of other administrative controls etc.) need also be considered. Evidence from returns to World Bank supported projects show the returns to be higher in adjusting economies (World Bank, 1992: 33).

(c)   The current account

Rather than estimate the response of the current account to the adoption of an adjustment program it is more enlightening to consider how imports and exports respond to changes in

relative prices brought about by devaluation, relaxation of price and quantity controls, changes in subsidies and infrastructural development/decline.

The flood of imports from trade liberalization has been one concern of critics of adjustment, who now claim that sub-Saharan Africa is undergoing "deindustrialization" (e.g. Stewart, 1991) - though the data on this point are not conclusive (see Doriye et al., (1993) for the case of Tanzania). On the positive side is the possibility that the removal of quantitative controls will allow a more appropriate import mix, but little analysis has been done of this issue. Models should try and analyze imports at least at the level of capital, intermediate and consumer goods since (i) different policy regimes and aid flows will alter this composition; and (ii) the import mix influences the import-output elasticity.

More attention has been paid to the supply response of agriculture. Some cases (e.g. cocoa in Ghana) seem to have been successful, whereas in others the response is more sluggish. Estimates of supply elasticities are often low - and even negative (see Chhibber, 1989; and Binswanger, 1989). This sluggishness is often blamed on: (i) lack of supporting infrastructure; and (ii) incomplete implementation of reforms. To cater for (ii) models should be sure to use the real producer price received by farmers (relative to alternative cropping opportunities). Proxies for (i) are harder to obtain since they are very region specific and relevant data (say on travelling times to market) not readily available.

Aid-supported policies versus aid monies

It has been argued several times in this report that good modelling can provide the basis for separate analysis of policy reforms and the impact of aid inflows. One study (Radelet, 1991), entitled "The Gambia's Economic Recovery: policy reforms, foreign aid or rain?", explicitly embraces this use of a CGE model. Radelet reports that all three factors listed in the title contributed to growth - and, moreover, that all three together contribute more than the three individually:

> When simulated individually, the effects from the policy package (5.1 per cent), foreign aid (4.7 per cent) and rainfall (2.9 per cent) account for a total of 12.7 per cent growth in GDP. Yet when the exact same changes are modelled simultaneously from the same base, output grows by 14.9 per cent.

<div align="right">(Radelet, 1991: 34)</div>

Thus a combination of reforms and aid is superior to either one alone. The increased combined effect (which Radelet ascribes to "synergistic" effects) must result from feedbacks in production and consumption, since the model does not allow for changes in structural relationships (for example, a stronger supply response) under the reform program. Moreover, the modelling of aid is quite simple - appearing in additive form in the investment function, but not affecting the government budget equations nor (directly) import demand. The model could therefore benefit from incorporating further aspects of the literature from the macroeconomic analysis of aid. This is a theme which is returned to in chapter 6, in which the impact of adjustment on poverty is discussed.

4.4   Summary

Aids critics have argued that it can reinforce the position of the state and help sustain misguided policies. Such a criticism seems somewhat dated given the importance donors themselves have placed on policy reform in the last 15 years. The more relevant issue now is the extent to which donors are successful in having the policies they propose adopted.

Much of the adjustment literature has asked "what is the impact of adopting an adjustment program?". This seems to be the wrong question - the right one is "what effects do these polices have". This is the right question as we can more reliably measure a policy than a program, and because we want to know which policies in a program are good ones and which ones not. We are therefore led to adopt a modelling approach - which should allow the separation of shocks (including aid inflows) from policies. Neglected aspects of the models that have been used are: (i) allowance for structural change as a part of the reform program, and (ii) explicit allowance for the effects of aid in accordance with the impacts discussed in Chapter 3. The models developed for this study will, by contrast, have the effects of aid at their core, and model estimation should be informed by changes in policy. As discussed in Chapter 6, such a modelling strategy can allow for the explicit incorporation of indicators of social welfare.

1. This question being the motivation behind my formulation of aid dependence given in Part 3.7.

2. In interpreting results from the current account two points need also be borne in mind: (i) devaluation from a deficit position will worsen the deficit as a per cent of GDP; and (ii) increased aid supporting the adjustment program will also worsen the current account. It is not clear that all studies have allowed for these effects.

3. This indicator was introduced in Part 2.3 above during the discussion of econometric methodology.

4. It was noted in Chapter 2 that the modified control group approach can cater for changes in the effectiveness of policies. but this aspect has always been left implicit.

5. Some studies - for example Doroodian (1993) - use both policy variables and an intercept dummy for the presence of an adjustment program. The correct interpretation of the results from such a regression are unclear.

6. The use of both investment and savings rates as regressors may well lead to problems of multicollinearity - a possibility that may explain the insignificant coefficients on these two regressors in most of the equations.

7. The regressions reported by Corbo and Rojas use time periods of five to ten years - that is the data are not annual. Long run effects would therefore take a very long time to run through the system. The simulations are reported to underline the importance of analyzing all aspects of a model.

8. The authors do not report the constant term. We used that from Corbo and Rojas where possible and a guesstimate for the other equations. The use of an arbitrary constant is unimportant since the term drops out of the results which show the change between periods. The reported inflation equation is explosive (the implicit coefficient on the lagged dependent variable is 1.077) - whilst such a coefficient may capture situations of hyperinflation it is not conducive to a stable equilibrium to analyze the effects of policy experiments! To conduct the simulations the inflation equation was "dampened" by using instead a coefficient of 0.9.

CHAPTER 5

THE DISTORTIONARY IMPACT OF AID

5.1 Introduction

Aid has four main types: project aid, programme aid, commodity aid (mainly food aid) and technical assistance. We argued in Part 3.2 that each different type of aid may be expected to have different effects on growth. More generally, the macroeconomic effects of different types of aid will differ - yet most analysis, including that presented in Chapter 3, does not distinguish between types of aid. There are, however, considerable literatures on each type of aid, elements of which are of macroeconomic relevance. The previous chapter discussed the issues surrounding the use of programme aid; in this chapter debates over the other three types of aid are considered.

Aid is, by definition, a government directed activity so that the use of aid implies the possibility of reinforcing the role of the state and enabling state-created economic distortions. Peter Bauer (e.g. 1976) has persistently argued that aid is detrimental to development for precisely these reasons - earlier Friedman (1957) had argued that aid was counter-productive as a weapon in the Cold War since it was promoting the "communization" of the developing world.

It is the possibility that aid may impede market-oriented development and/or impose distortions to the pattern of such development that concerns us here. The best known example of an aid created distortion is the "disincentive effect", whereby food aid may generate a number of disincentives affecting domestic agricultural production. In Part 5.2 we trace the evolution of thinking on the disincentive effect from concern over its potential strong impact in the 1960s to the current consensus that the effect can be, and mostly has been, avoided by careful use of food aid.

Far less extensively analyzed are the distortions that widespread use of technical assistance (TA) may impose on labour markets. Yet current writings on TA, which emphasize a general failure at institutional development, suggest that TA-created distortions of skilled labour markets in recipient countries may be quite significant. Part 5.3 outlines the relevant issues, illustrated with such data as are available.

Part 5.4 turns to project aid, discussing first the specific issue of sectoral distortions that may be created by subsidised credit programmes. The more general issue is that any aid-financed activity (which includes food aid and TA) is potentially distortion-creating since, somewhere along the line, someone usually receives benefits at less than the economic cost of those benefits. That is, the role of projects in a market-oriented development strategy is not readily apparent, and must be argued on a case-by-case basis by reference to specific market failures. Part 5.5 concludes, with the implications of this chapter for the SASDA study.

5.2   The disincentive effect of food aid

Food aid may generate disincentives to domestic agricultural production through the following channels (Maxwell and Singer, 1979; and Maxwell, 1991):[1]

- a price effect as food aid pushes out the domestic supply curve, hence lowering the domestic price of agricultural output;

- a labour market effect when food aid is used in food for work projects, as wages in these projects are higher than the income obtainable from agricultural production;

- a policy effect as the availability of food aid may allow a government to postpone necessary policy reforms to stimulate domestic agriculture; and

- by changing the pattern of tastes away from domestic output toward "exotic" imported foods.

The main debate has been over the price effect, to which we devote most attention. The possibility of adverse price movements from food aid was first raised by Schultz (1960), who - contrary to general thinking at the time - argued that peasant producers were sensitive to prices. Schultz's analysis, as extended by Fisher, is shown in Figure 5.1(a), which shows the market for agricultural output. The domestic supply schedule is S and demand D, resulting in an equilibrium price and quantity of P_0 and Q_0 in the absence of food aid. Food aid shifts the supply curve to the right by the amount of the aid (to $S + A$). To clear the market with the increase supply, price falls. At the new market clearing price of P_1, domestic output has fallen from Q_0 to Q_1.

An early and often-cited study is Mann's (1967) finding of a strong disincentive effect in India: showing that food aid imports resulted in a decline in domestic agricultural output of one third of the amount of the aid. However, Mann's analysis was based on the above theoretical framework, which has a number of shortcomings. Further elaboration of the model has resulted in empirical evidence of, at worst, a weak disincentive effect.

Figure 5.1

The disincentive effect
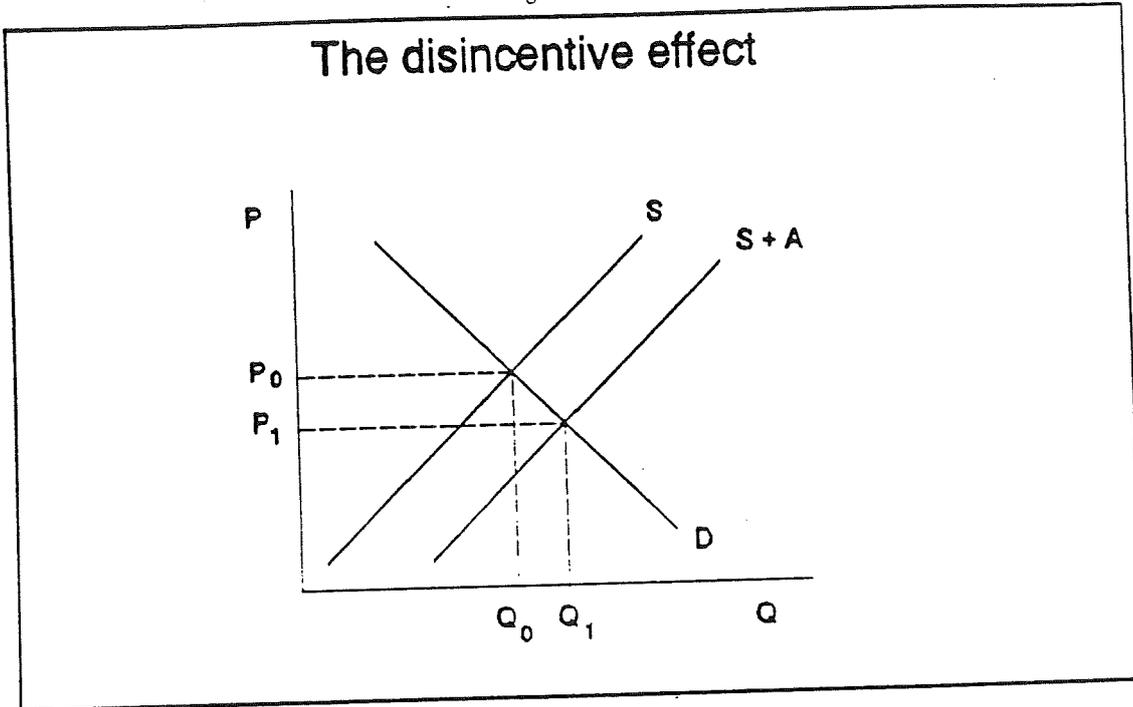
The above presentation allowed price to be determined domestically. By contrast. Figure 5.1(b) presents the same argument with the small country assumption (so that the domestic price is fixed at the world price) - in this case the food aid displaces commercial food imports (which fall from ac to ab) leaving domestic production unaffected.[2] But donors are not happy for aid to displace imports as this result frustrates the use of food aid as a surplus-disposal mechanism. Hence. usual marketing requirements (UMR) are imposed - by which recipients of food aid must import commercially what they would have done in the absence of that aid. In Figure 5.1(b) aid and UMR can only be accommodated by forcing the domestic price below the world market price. so that the disincentive effect is present.

But, the above argument ignores the possibility of the aid generating increased demand. Increased demand may come through two channels. Directly, the food aid is an increase in recipient income (either to government who may then spend the counterpart funds domestically or to consumers if distribution is subsidised). If food is distributed to poor consumers who could not otherwise have purchased it then there can be no displacement of existing demand. Indirectly, the food aid may be used in food for work projects which promote income-generating activities and improved nutrition can enhance productivity. The income increases result in a shift in the demand curve - at least partially (and possibly more than) offsetting the shift in the supply curve so that the adverse price movement is mitigated.

Figure 5.2

Displacement of commercial imports

P · · · S · · S + A · · · Sw · · · D · · · a · · · b · · · c · · · Q
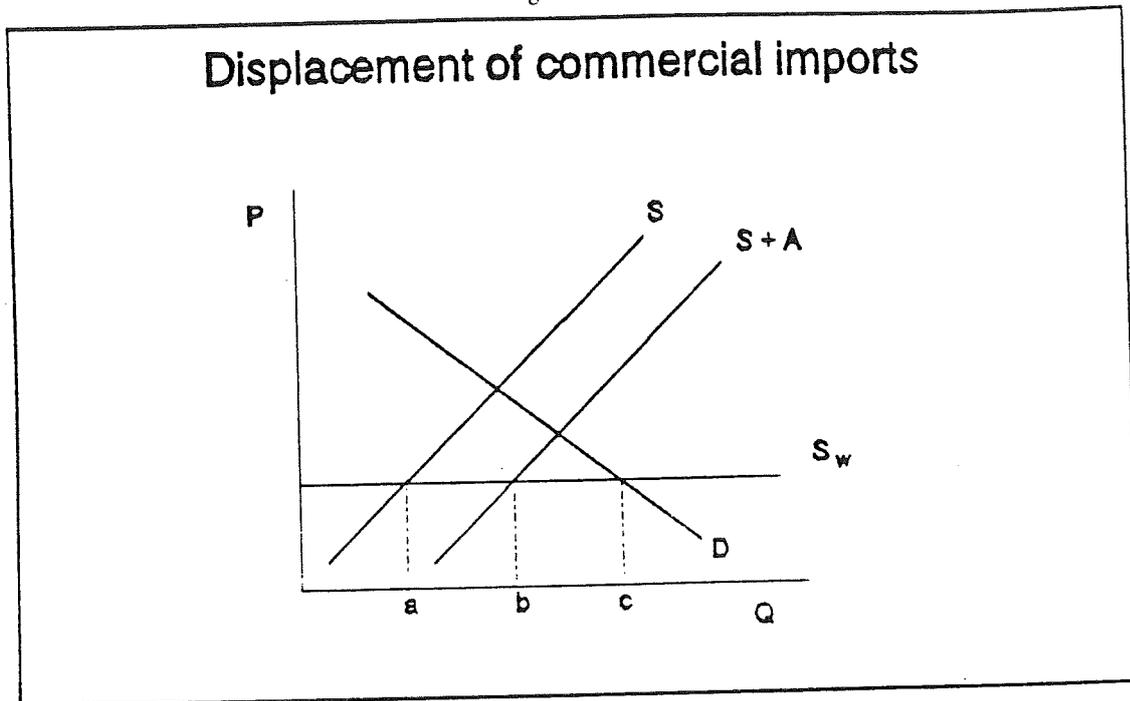
The above considerations have led to a series of studies showing disincentive effects to be weak or non-existent. Isenman and Singer (1977) attributed their finding that domestic output in India fell by only 3 per cent of the amount of the food aid to the fact of subsidised food distribution. Model simulations by (Ahluwalia) (1979) for India showed disincentive effects from food imports (much of which were PL 480) to be unimportant since its was easy to generate the additional demand for the extra commodities: in fact agricultural output as a whole is shown to rise slightly as a result of foodgrains imports.

By the time of Maxwell and Singer's review of the literature in 1979, they could write that:

it does seem probable that a price disincentive effect on production can be and has mostly been avoided by an appropriate mix of policy tools

(Maxwell and Singer, 1979: 231)

If anything, this view has grown stronger during the 1980s - as donors become more practised in avoiding disincentive effects and further studies report the absence of such effects (e.g. Bezuneh *et al.*, 1988).[3]

Policy initiatives to minimise disincentive effects are mainly to use food aid in the context of an overall food security strategy and careful targeting of subsidised food aid distribution. Whilst, as indicated above, these efforts have more-or-less eliminated disincentive effects at the national level

it is still possible that such effects may operate at the local level. The avoidance of the effect at the local level requires generation of demand (through income earning opportunities) in conjunction with the food aid.

The second major debate of macroeconomic relevance linked to food aid is the use of counterpart funds from the sale of commodity aid (or foreign exchange). The debate is admirably reviewed by Bruton and Hill (1990a and 1990b) who reaffirm the view that such funds need not be inflationary. It would be useful if studies of the impact of aid on government fiscal behaviour explicitly separated out counterpart funds in their analysis since: (i) many donors do not intend these funds to increase expenditure, but rather to offset deficit financing; and (ii) data on counterpart funds are frequently available from government accounts. In support of Bruton and Hill's position the analysis of Tanzanian data by Doriye et al. (1994) found that counterpart finds (unlike other forms of aid) did not increase government expenditure.

5.3   Technical assistance and the displacement of skilled labour

Aid projects may be expected to generate demand for unskilled labour. With the exception of (these days rare) ill-conceived use of young volunteers, this labour will be provided from domestic sources. By contrast, the requirements for skilled labour are likely to be met by expatriate personnel. The issue of interest here is whether the use of expatriates substitutes for domestic labour.

Chenery and Strout's (1966) presentation of the two gap model in fact identified three constraints - savings, forex and the capacity to invest, the last arising from a skills gap. Foreign assistance may be required to fill this gap to attain the desired level of investment.[4] But, as with the other two gaps, sustainable development is only achieved by the closing of the gap, and so the important question is whether TA has contributed to the closure of the gap as well as filling it. At first sight the figures - which show increasing quantities of aid personnel - suggest that the gap has not closed. Why is this?

Technical assistance in fact covers two distinct areas - overseas training and employment of expatriates, the latter nearly always including an on-the-job training component for counterpart staff. Ideally speaking, expatriates will be used where a genuine skills shortage exists and then be replaced by local personnel who become available through the two channels of training provided by TA. But whilst the number of skilled people in recipient countries has grown so have the numbers of unemployed graduates and brain drain to developed countries. These phenomena exist despite the

high cost of expatriate personnel - estimated to be nearly US$300,000 a year in much of Africa: even low ranking expatriates are likely to earn ten times more than a government minister (Berg, 1993).

Recent reviews - notably Berg (1993), but also Forss (1990) - have been critical of the failure of institution building *via* technical assistance. This criticism comes despite the acknowledgement of the achievements pointed to by earlier defenders of TA (e.g. Cassen *et al.*, 1986). This failure may partly account for the continued "need" for expatriate assistance. But also important is the "supply-driven" nature of much TA - that is the experts who benefit from the contracts are the ones that benefit. Donor insistence on TA is in part because of its "control" function to ensure aid quality (see Cohen, 1992), but one must suspect that there are considerable material incentives to many advisors to extend their work. By contrast, the line ministry receiving the assistance will often pay less for an expatriate than they would have to do for a local staff member (TA is most usually grant aid) - so there is little incentive to build up local staff capacity instead.[5]

No empirical work has been done on the impact of the 100,000 expatriates estimated to be in sub-Saharan Africa on the skilled labour market. But it seems likely that aid has assisted increasing the supply of local skilled personnel but may simultaneously undermine the demand for their services: permitting low professional salaries and encouraging brain drain.

5.4 Project Aid

Project aid is seen as the "traditional form" of aid. However, the role of projects in a market-oriented development strategy can be questioned. Projects most usually involve either direct or indirect subsidies - if they did not, why the need for a project? An important part of adjustment policies is often the raising of interest rates: yet many aid funds support subsidised lines of credit. Projects may contain components to supply subsidised agricultural inputs whilst, nationally, such schemes are being removed. And so on. At another level, donor support may sustain the existence of unviable entities - be they government, parastatal or favoured private sector firms. (Traditionally it is the government and parastatal sector that has benefitted from this treatment. More recently a large number of developing country NGOs, dependent on foreign assistance for their activities, has been spawned).

However, donors are aware of these problems. One response has been the reduction in the importance of project aid in the overall aid programme. (Such a reduction has also been necessary when the recurrent finance for current projects has not been available, so that it is senseless to initiate new projects). Another response is to use projects to pioneer market disciplines - e.g. user fees for

social services, cost-recovery for utilities and market levels of interest. Despite trying to operate "like the market" would, donors appear to believe that the market would not do these things in the absence of the projects. Although it cannot be denied that aid projects have at certain times in certain places impeded indigenous market-based development, the possibility of designing "market-friendly" projects demonstrates that projects are not inherently anti-market. However, more work is required to learn the extent to which project aid can remain as a compatible part of aid programs.

5.5 Conclusions

The discussion of this chapter demonstrates the importance of disaggregating aid flows in any analysis of the macroeconomic impact of aid. However, testable (and, even more so, tested) hypothesis are few in this literature: which is surely in part a result of the difficulty of obtaining the required data. As a part of our study we shall attempt to collect data on the different types of aid and to incorporate them into our analysis where possible.

1. By supporting surplus production the existence of food aid also supports misallocation of resources at the global level, but we do not pursue this point here.

2. In this case the aid is fully fungible, since the food aid releases an equivalent amount of foreign exchange, so that the food aid is the same as untied financial aid.

3. Maxwell (1986) points out that food aid studies may be divided into formal modelling favoured by academics and a less formal checklist approach used by donors. We focus here on formal studies, but the findings from less formal analysis are similar.

4. Chenery and Strout were not, however, the first economists to provide an intellectual basis for TA, which was given by Johnson's (1963) argument - captured in the expression a "generalized human capital approach" - about the productivity gains to be realised from institutional development.

5. There is usually a requirement for counterpart staff - so that aid staff may create a requirement for additional local staff. But in reality counterpart obligations are additional to existing workload or no counterpart is appointed.

CHAPTER 6

AID, SOCIAL ISSUES AND THE ENVIRONMENT

6.1 Introduction

The ultimate objective of aid is to raise the living standards of the recipient population - our interest in macroeconomic aggregates is only as a means to that end. In this chapter we review the literature that traces aid's impact on the ends.

Most of the literature on these topics - especially on aid and the poor - concerns the effect of aid-financed policy reform, rather than aid monies. Nonetheless, the point made in the previous chapter - that modelling can capture and distinguish the two channels of aid impact - applies equally to this topic. Some of the analysis of Chapter 3 - particularly how aid affects the level and composition of government expenditures should be an important part of such models.

In Part 6.2 studies of policy reforms and the poor are discussed. Much of the literature has, rather unsatisfactorily, relied upon before versus after or simple control group approaches. In addition to discussion of what modelling work there is, related work on the determinants of social indicators is also presented, in order to identify how such work may be integrated into a common framework for the analysis of aid impact.

One important channel for improving the welfare of the poor is female education - which is also important in its own right as one aspect of raising female living standards. Therefore in Part 6.3 we focus more closely on analyses of aid and gender issues. Part 6.4 reviews the links between aid and the environment, which are obviously of importance for living standards in the long (and sometimes short) run. Part 6.5 summarizes.

6.2 Aid and Poverty

The rhetoric of aid donors suggests that poverty alleviation is the primary objective of aid - such statements are common from the World Bank's current President. What evidence there is suggests that they have some way to go (see Cassen, 1986; and Chaudhuri, 1986). As Mosley (1987) points out, there really is very little evidence on the poverty impact of aid - donors have made distressingly little effort to gather information either from or on the beneficiaries of their

projects. It is believed, however, that a number of biases operate at the levels of donor agency, recipient government and the project itself to mitigate against successful poverty alleviation. These biases include the pressure for rapid disbursement, the "big is beautiful" syndrome, lobbying by powerful pressure groups, elite identification (on the part of either local or expatriate staff), and inadequate research into how the poor earn their living (a lack of knowledge which is itself the product of a bias).

Donors are making attempts to overcome these biases. Renewed concern with poverty and basic needs received impetus from work carried out under the auspices of UNICEF. By the late 1980s the World Bank was taking these concerns on board and has become an important player in the development of the "New Poverty Agenda". Some data on the poverty impact of aid to different sectors is available from efforts that the Inter-American Development Bank (IDB) made in this direction. In the early 1980s IDB adopted the target that 50 per cent of project benefits should go to the poor and set about monitoring attainment of the target. The coefficient of income distribution (CID) is defined as the share of benefits accruing to the poorest 50 per cent - sectoral CIDs for two time periods are shown in Table 6.1.[1] These figures, which demonstrate that efforts at poverty alleviation should be intensified, are an aggregation of micro-level projects. The concern here is to trace the impact at the macroeconomic level. All the analysis conducted at this level considers the impact of aid-supported policy reforms, rather than aid monies. The former literature is discussed before considering how the latter may be tackled.

As in chapter 4, analysis must be concerned to trace the links from conditionality to policy reform to living standards. The first of these links was discussed in Part 4.2. Here we consider the second link. A first issue which immediately arises is the measurement of living standards, given the paucity of income data in many countries, especially those in sub-Saharan Africa.

Measuring the living standards of the poor

The most appropriate measures of the poor's living standards might appear to be data from household income and expenditure surveys. However, such data are frequently scanty, unreliable and only available with a considerable lag. In many cases we need different indicators. One such indicator is beneficiary assessment - if you want to know how well off people are then ask them. The use of such indicators is relatively undeveloped and could be more widely used in future.[2]

Table 5.1 Sectoral CIDs for IDB Projects
1979-1986

Sector	1979-82	1983-86	1979-86
Agriculture	74.1	48.3	64.0
Fisheries	35.6	59.2	43.1
Industry	27.2	26.0	25.0
Tourism	24.0	82.3	80.4
Mining	20.1	47.6	45.9
Energy	10.3	14.6	20.1
Transport	26.6	27.7	27.3
Communications	54.6	83.4	74.4
Urban Development	83.5	74.5	76.3
Science and technology	-	91.2	91.2
Education	31.9	77.1	58.7
Health	87.2	87.3	87.2
Sanitation	51.4	45.6	47.6
Environment	45.0	-	45.0
Total	53.3	37.7	44.4

Source: Powers (1989: Table 3.4)

But most studies have used "objective indicators": such as life expectancy (e.g. Anand and Ravallion). Only very few studies have use direct measures of poverty as a dependent variable: Morley (1992) is one of the few to use a poverty measure (the headcount index) as the dependent variable in a regression analysis. One World Bank (1990) report on adjustment lending briefly mentions poverty incidence measures. Ravallion and Huppi (1991) use more sophisticated measures, but their discussion of the link between these measures and policy is brief.

Most studies use indicators that capture one aspect of living standards or are proxies. Some of these measures are broad indicators, that is ones covering the population as a whole, such as nutritional status, literacy, school enrolment rates etc. The assumption is that the brunt or benefit of changes in this indicators will be felt by the poor, which is probably not an unjustified

assumption, but one that could perhaps be subject to some critical scrutiny where possible.[3] Morley and Alvarez (1992) use the real wage as a poverty indicator.

Sometimes a proxy is chosen which is one step removed in the line of reasoning - for example, real social expenditure per capita. But for such a measure to be satisfactory it must be further demonstrated that the poor were benefitting from these services and that it is the services from which they benefit that have been cut. Indeed, data from Latin America have shown social indicators to be resilient in the face of declining social expenditures[4] - either the social expenditures did not matter for the welfare of the poor, or they are now better targeted, or the relationship has a lag so that declines are to be expected in the near future. Other objective indicators are more narrowly defined - often by measuring some of the above measures by a particular target group or area.

Since such a range of measures is available care should be exercised in the choice, construction and interpretation of these measures. For example, Cornia and Stewart (1987: 115) say that education expenditure per head of population aged 0-14 in Jamaica fell by 14 per cent in the early 1980s. Behrman and Deolaikar (1990: 13) question this figure, suggesting one instead of only 0.1 per cent (calculated as per head of population aged 5-14). The reasons the latter authors give for this difference are: (i) Cornia and Stewart use the GDP deflator, whereas real wages in education have dropped sharply; (ii) difference in period of comparison: (iii) different denominator, but with that used by themselves being the more appropriate.

A second example is provided from two studies using what may be thought to be similar series - Pinstrup-Andersen (1989) shows a figure of child mortality in Brazil over the period 1977-84, with the gently declining trend giving way to a sharp upward lurch in 1982-84. Zuckerman (1991) reports the infant mortality rate for Brazil over the period 1970-1987 - the number declines steadily throughout the period with no interruption. The two series are not necessarily inconsistent, but if both are correct then the story they tell about changes in welfare is not the unambiguous one claimed by either author.

Methods of analysis

The original impetus for considering the "social impacts of adjustment" - meaning the impact upon the poor, and which may not be very social at all - came from work done for UNICEF, culminating in the seminal *Adjustment with a Human Face*. The World Bank responded

with reasonable speed to these concerns, although the initial reaction was to stress the ways in which the poor would benefit from adjustment policies. The IMF also issued a series of studies (e.g. IMF, 1986), but these were of a mainly theoretical nature, whereas the World Bank's work had a more applied focus. A World Bank study of Côte d'Ivoire concluded that "the poor may be little affected by structural adjustment policies because most of them are subsistence farmers in rural areas" (Glewwe and de Tray, 1988). More helpfully, methodologies were proposed as a basis for modelling the impact of adjustment on the poor (Kanbur, 1987; and Addison *et al.*, 1990) - but unfortunately it has taken time for model results to permeate the literature which has been dominated by the other two approaches discussed in Chapter 2.

An important conceptual distinction is that between primary and secondary income, the former deriving from income from factors of production (which, for the poor, is mostly labour) and the latter from "unearned sources". Primary income is therefore mainly affected by movements in relative prices and other changes in the incentive structure and secondary income by the government's subsidy policy (including provision of health and education services). Broadly speaking, models have analyzed changes *via* adjustments in primary income, whereas the non-modelling literature has focused on issues relating to secondary income.

As stated, much of the literature has relied on before versus after or the simple control group approach. Maasland and van der Graag (1992) and Behrman and Deolaikar (1990) look at deviations from trend, rather than a simple before-after, which is an improvement, but still takes no account of changes in the external environment. Maasland and van der Graag also control for some factors using regression techniques but do not apply the full modified control group approach. In fact, to my knowledge, the modified control group approach has not been applied to analyze this aspect of adjustment policies. Despite the reservations expressed here about the approach the absence of such a study seems a surprising omission, and a regrettable one since the results may be expected to be different to those of the work adopting less sophisticated methodologies.

The before-after and simple control group approaches are first reviewed. An intermediate literature, which uses country case studies, but without formal modelling, is introduced before moving to the limited cases of actual modelling. Finally, some related literatures are discussed.

Before-after and control group approaches

As a broad (but not entirely accurate) generalization, studies that are critical of the impact of reforms on the poor rely on before versus after - showing a deteriorating trend in many welfare indicators - whereas work that is more defensive of the policies uses a simple control group approach - showing that adjusting countries fared no worse than non-adjusting. Clearly these two sets of results are not incompatible, the problem is in interpretation. This problem is compounded by the very pervasive tendency in this literature to fail to distinguish between adjustment policies and external shocks (see Part 4.3 above).

The introduction to *Adjustment with a Human Face* makes the following clear declaration:

> Is adjustment policy (or the adjustment process) the main cause of the human difficulties and social set-backs, especially of vulnerable groups? No, this is not the position of this study.

> (Cornia *et al.*, 1987b: 5)

Unfortunately, the bulk of the study does not appear so cautious - the distinction between adjustment policies and the process of adjustment seldom reappears. Most of the analysis - for example that of government expenditure (Pinstrup-Andersen *et al.*, 1987) - relies on a discussion of trends (that is before versus after), with no attempt to relate these trends to the different causal factors. Despite this fact the study makes such statements as:

> Adjustment policies frequently involve cut-backs in government expenditure. From 1980 to 1984, real government expenditure per capita fell in over half the countries of the developing world, with a greater proportion declining among countries with adjustment policies than among those without. Vulnerable groups are particularly affected by changes in government expenditure on basic health and education services and on food subsidies.
>
> (Pinstrup-Andersen *et al.*, 1987: 73)

The suggestion in this quotation that a simple control group is also applied is not apparent from the analysis itself (which appears to be straight before versus after). Nor is there mention of the incidence of public expenditures, which are important in capturing the effects of expenditure changes on the poor.

Subsequent work making the same case repeats this approach (for example, Pinstrup-Andersen, 1989). The caution expressed by the authors of *Adjustment with a Human Face* is not

shared by many, who have misinterpreted the work as conclusively showing that adjustment policies harm the poor. For example Riddell states that

> There can be little doubt that the effects of SAPs in Africa have led to worsened conditions. Poverty has increased... The quality of life has declined as prices have risen, as infrastructure has crumbled. as services have deteriorated. and as employment opportunities have been reduced.
> (Riddell, 1992: 66)

However, no evidence is produced to substantiate these assertions. What, then, is the evidence?

Simple control group approach

The second World Bank report on adjustment lending devoted a chapter to "Structural Adjustment and Living Conditions in Developing Countries". The report's conclusions are a sharp contrast to those just discussed:

> The available evidence shows that changes in living conditions in the short run do not appear to be systematically related to adjustment lending. Short-run indicators of living conditions have not deteriorated in the early intensive lending countries. and long-run indicators have continued to improve because of past investments.
> (World Bank, 1990: 26)

In support of this conclusion the report presents the following data. in each case grouped by early intensive adjustment lending (EIAL). other adjustment lending (OAL) and non adjustment lending (NAL):

- change in a poverty incidence measure for selected countries. from which no systematic pattern emerges:

- growth in real per capita private consumption, which showed that EIAL countries had protected consumption most strongly in the late 1980s, to the assumed benefit of living standards (at least in the short run):

- nutritional intake. from which there are improvements in all three groups over the period 1980-86 but with no systematic differences between groups;

- social spending share in government expenditure and real growth in social spending per capita, showing weak growth or declines in the early 1980s amongst adjusting countries

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with some recovery in the later part of the decade - in both periods this performance is worse that the average for non-adjusting countries; and

- gross primary enrolment ratios, which have grown across the board, but with the strongest growth in non-adjusting countries.

However, the shortcomings of this analysis have been belaboured in previous chapters. The simple control group approach is subject to systematic biases, which render it useless as an explanatory tool (rather than a descriptive one) in analyzing the effects of adjustment. Moreover the emphasis should, as argued in Chapter 4, be on the impact of specific policies not whether or not a country has taken out an adjustment loan. To carry out such analysis it is necessary to turn to the modelling approach. Before discussing this approach however, it is useful to look at another common approach based on country case studies.

Country case studies of adjustment and poverty

Country specific analyses have the advantage of being able to capture local factors that may be omitted from cross-country approaches. There are a number of examples of such work - the poverty assessments now being produced by the World Bank mostly fall into this category - of which just two illustrative examples are presented here.

The first example is Demery's (1993) analysis of Côte d'Ivoire, whose actual experience is a marked contrast to the assertion of Glewwe and de Tray (1988) that the poor will be by and large unaffected by the adjustment process. In fact, income has fallen in Côte d'Ivoire over the past six years so that all groups appear to have suffered declines in living standards - though it is true that rural food (non-export) farmers have suffered relatively less; although their poverty has increased their share in the poor has declined. Demery attributes Côte d'Ivoire's poor performance principally to the "fetter" imposed by the inability to achieve real devaluation because of the pegging of the CFA franc to the French franc.

Hicks and Per Brekk (1991) study the impact of adjustment in Malawi on the poor. They argue that the Malawian reform program has not involved any major reductions in subsidy or exchange rate reform, and that the impact on the poor will be *via* changes in agricultural pricing policy and the government's anti-inflationary stance. They also consider changes in taxation, which are shown to have a marginal effect on the poor. The price reforms are found to have had

a positive impact on the real incomes of the poor - an effect reinforced by the doubling of the minimum wage.

Such analyses are undoubtedly informative but they lack the ability to convincingly answer the underlying questions: principally that we do not know what would have happened in the absence of the reform program. There is also no way to consider the effects of financial support rather than policies. To answer these questions we must turn to modelling.

Modelling

In his review of the impact of adjustment on the poor in Africa, Sahn states that:

> Performing counterfactual analysis using econometric or general equilibrium models is perhaps the most legitimate approach to examining the relationship between poverty and economic reform. However, models that would enable us to do so with any degree of precision do not exist for sub-Saharan Africa... efforts at modelling the impact of policy reform should, nonetheless, continue. There is much to be learned from prototype models that do not achieve the desired level of disaggregation.
>
> (Sahn, 1991: 1-2)

I am in complete agreement with Sahn's argument - though his position is sadly little reflected in his review of the evidence from which the above quote is taken.[6] However, in work elsewhere, Sahn and others have produced models which yield valuable insights.

Van Frausmum and Sahn (1991) present an econometric model of Malawi, which includes a demonstration that the concessionality of donor finance yields an extra 0.7 per cent GDP growth each year - however, restricting imports to meet current account deficit targets has adverse implications of growth (which may however disappear in the longer run). The model contains some distributional analysis at a high level of aggregation, but this analysis was found to be limited by data constraints. Another model (Sahn and Sarris, 1991) focuses explicitly on the income of rural smallholders under structural adjustment: finding that there is no systematic effect from adjustment on the rural poor. On the other hand, Sahn (1990) argues that raising producer prices in Côte d'Ivoire will have a positive impact on the nutritional status of the poor. By contrast, his discussion (Sahn, 1987) of the Sri Lankan experience suggests that the poor have suffered from policy reforms (largely because of the effect of inflation, which has been a product of the atypical investment boom which accompanied Sri Lankan adjustment).

Ravallion and Huppi (1991) report that poverty indices have not shown a deterioration in Indonesia during the period of external shocks and the subsequent adjustment program. To the contrary, "aggregate poverty in Indonesia decreased over the 1984-87 period for both urban and rural areas according to comparisons of both income and consumption distributions" (1991: 79), a fact which is attributed to a "pro-poor" pattern of growth, but which requires further investigation. The Operations Evaluation Department (OED) of the World Bank has modelled the Indonesian case in an attempt to explain the optimistic picture presented by Ravallion and Huppi. The study found that the government had protected consumption at the expense of investment - but that this policy is not necessarily inimical to long-term growth since the investment projects cut were "white elephants".

The OED is undertaking a series of studies of poverty and adjustment based on calibration of a model developed for an OECD project on the same issue. It is this model which has provided the basis for the most comprehensive analyses of the links between poverty and adjustment.

The "OECD model"

The model, which is presented in Bourguinon, Branson and de Melo (1989 and 1992; see also Bourguinon, de Melo and Suwa, 1991), is a reasonably parsimonious (31 equation) general equilibrium model with four channels through which adjustment policies can affect the distribution of income: (i) the change in factor rewards consequent upon changes in relative prices; (ii) reductions in real income through increases in the cost of living; (iii) changes in the return on financial assets; and (iv) capital gains and losses.

Various policy simulations were run against a base run of external shocks in the terms of trade and the world interest rate. All policy responses achieve some growth of GDP, but this growth is rather less with a credit squeeze or non-accommodatory monetary policy compared to the other policy options (fiscal tightening, "policy rigidity" and "adjustment with a human face" - the latter involving public works, food subsidies and across the board tariff protection of 15 per cent). The first two policies are also associated with increases in the incidence of poverty (measured by the headcount index), whereas the others bring about some reduction in poverty, with the largest reduction from adjustment with a human face. The authors conclude that adjustment without some targeting may result in permanent damage to the welfare of the poorest groups.

A special issue of *World Development* carried a series of papers on adjustment and poverty which, to a greater or lesser extent, drew on the OECD model. The case studies presented came to the following conclusions:

- in Malaysia it has been the recession, not adjustment policies, which are to blame for the increase in poverty - policy simulations fail to find a realistic set of policies that could have achieved a better result than that actually realized (Demery and Demery, 1991);

- adjustment policies in Indonesia have been associated with, and appear responsible for, improvements in income distribution (Thorbecke, 1991);

- drought was an important factor behind increased poverty in Côte d'Ivoire (and a return to rural areas reduced it) - reducing current government expenditures improved the distribution of income but did not affect poverty, whereas devaluation could positively affect both of these (Lambert *et al.*, 1991);

- reductions in government current expenditure would be a progressive adjustment policy in Ecuador but are politically unfeasible, so that they must be supported by some policies which, whilst regressive, will but support for the adjustment effort (de Janvry *et al.*, 1991);

- rising unemployment, falling real wages and declining social expenditures have resulted from adjustment measures in Chile (Meller, 1991).

In summary, the results from model simulations are rather more optimistic than some of the less formal analysis elsewhere in the literature. (Meller's pessimistic analysis for Chile is the only one in the collection not using a model-based approach).

In principle the OECD model can be used to answer the question to which we keep returning: how much can aid alone achieve or is reform also necessary? In practice the model cannot be put to this purpose because of the way in which the equations for the government and balance of payments are written. Notably, the three components of government expenditure (recurrent, employment and investment) are exogenous. Nor do the investment or production functions allow for the "import strangulation" common in sub-Saharan Africa. The main channels

through which aid expresses its macroeconomic effects are thus excluded. The model needs to draw on parts of the literature on the macroeconomics of aid to allow a full analysis to be conducted.

Additionally the model analyzes income distribution and poverty solely as a function of primary income - whereas much of the concern over the poverty impact of adjustment has focused on secondary income, most notably declines in government social expenditure. If the model were to incorporate disaggregated government expenditure categories then models of categorical fungibility could fall neatly into place. Moreover, there is plenty of evidence linking different aspects of government spending and participation in social services to wider aspects of the welfare of the poor. Some of this literature is now reviewed to see what links may be made.[7]

Social sector provision and welfare: some examples

The studies in Psacharopoulos and Patrinos (1993) explore the determinants of poverty amongst the indigenous population in Latin America. This group are disproportionately poor - around 70 per cent of indigenous people are poor compared to about half for the population as a whole. One of the strongest determinants of poverty (based on logit regressions of the probability of being poor) is years of schooling, and educational attainment is much lower amongst indigenous peoples than non-indigenous. Moreover, educational attainment of parents affects the schooling and other human capital characteristics of their children. The authors therefore conclude that "equalizing schooling attainment would result in a considerable increase in relative earnings" (Psacharopoulos and Patrinos, 1993: 230). The implications for expenditure patterns are clear: the analysis needs to take account of the changes in provision of educational services to indigenous communities, being one of the major channels for improving (or worsening) the welfare of one of the poorest sections of the community in both the long and short run.

This implication is made explicit in the study of Côte d'Ivoire by Thomas *et al.*[8], who analyze the determinants of three anthropometric measures of heath - child height, child weight and adult body mass index (weight over height squared).[9] They report that:

> The provision of basic services (such as immunizations) and ensuring facilities are equipped with simple materials (such as having basic drugs in stock) will probably yield high social returns in terms of improved child health.
>
> (Thomas *et al.*, 1992: 32)

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Hence they conclude that the cuts which have taken place in government expenditure, which fell particularly upon the social sectors, are likely to have had a damaging impact on social welfare. The authors also argue that higher food prices, whilst in the long run beneficial, will have had an adverse short run impact on health.

The share of government spending to social sectors was also found to be a significant determinant of underweight prevalence in a cross section global model (UN, 1993: 96) - but this variable was not important in the African sub-sample. However, in both models female secondary education was found to be a significant factor, a finding borne out by many other studies (e.g. Subbarao and Raney, 1992[10]). This is one of the links pursued in the next section, in which issues of gender and adjustment are addressed.

6.3   Gender and Adjustment

Moser (1993) identifies five phases in development policy towards women in developing countries: welfare (promote welfare of women for their benefit and that of their children); equity (redress imbalance of resources between the sexes); anti-poverty (a toned down version of the equity approach); efficiency (gender differences impede efficient resource allocation); and empowerment (empower women to control own resources). These phases have their parallels in theoretical developments concerning gender aspects of development.

The equity/anti-poverty approach made much of the fact that in sub-Saharan Africa the bulk of agricultural work is done by women.[11] But this conception also introduced a dualism: women were seen as food producers and men as producers of cash crops. Structural adjustment policies, promoting the latter at the expense of the former were thought likely to shift the intra-household income distribution away from women, to the detriment of their welfare and that of their children. Due and Gladwin (1991) present a recent example empirical analysis carried out in this framework for the cases of Zambia and Tanzania.

More recent work by Collier has emphasized that food production too can be tradable. Collier's work is rooted strongly in the efficiency approach and gender restrictions are seen as limiting the response to changes in price signals. He argues that discrimination may act in credit or labour markets or through access to services (principally education[12]). Hence discrimination is a brake on adjustment (and relaxing the brake will increase women's income), rather than adjustment reinforcing discrimination.

Elson (1991) counters that any expansion in women's contribution to production will be in addition to their existing tasks. Furthermore these existing tasks are also under additional pressure - for example, declining government health expenditures will increase women's burden in child care (which may therefore also undermine their access to schooling and contribution to a supply response).

Unfortunately, despite some cases studies (e.g. Geisler, 1992) good empirical work on these topics is scanty.[13] The task is to develop a systematic framework for analysis (a task confounded by a relative absence of data). Work prepared by Collier for the World Bank sketches the basis for such an approach, but empirical application is awaited. Analysis should, however, draw on the emerging body of empirical work to link these issues into more general analysis of aid effectiveness.

6.4 Aid and environment

One conception of aid an the environment is of aid projects with an emphasis on large projects. dams, power stations and infrastructure which contribute to the destruction of forests and other environmental resources. The environmental damage done by large projects has been documented in many studies (for example, Adams and Solomon, 1985; and Searle. 1987). During the second half of the 1980s multilateral agencies began to address the issue of the environmental consequences of their aid-giving: for example by systematic screening of environmental impact but also through a larger number of projects with an explicit conservation component.

But a project approach alone is not enough. Much environmental damage is the result of numerous economic activities outside the reach of development projects. Economic policies affect prices of crops and agricultural inputs. exchange rates. interest rates and import and export measures, and thus affect patterns of production and consumption and environmental behaviour. Therefore macroeconomic policies have a larger scope for policy makers to influence environmental behaviour than individual development projects.

However, adjustment lending was not intended to address the environmental dimension of development, and environmental concerns were not incorporated into the design of policy-based lending for several reasons (Reed, 1992). On the other hand, adjustment policies can have beneficial environmental effects and these effects were emphasized in the 1992 *World Development Report*. But reforms like reallocation of government expenditures. expanding

production of agricultural, and expanding industrial or extractive industries may also seriously damage the environment. The remainder of this part assesses the evidence on the various channels through which aid may affect the environment.

Government intervention and the environment

The argument for government intervention on the environmental front derives from the notion of "market failure" (Winpenny, 1990; and Girma, 1992). Market prices do not incorporate environmental information, large parts of the environment are common property and liable to excessive use (the "tragedy of the commons"), environmental effects are not experienced directly by their instigators and private decisions do not normally take the interests of future generations into account. Thus, free market prices do not reflect the environmental external effects like pollution and the resource depletion which is inherent to certain forms of production, so that market intervention is required to protect the environment.

On the other hand, government interventions may worsen environmental conditions - for example tax incentives for deforestation, subsidies for pesticides and fertilizers, and the underpricing of energy. However, as pointed out by Reed (1992), "getting prices right" will not ensure sustained natural resource management if the underlying institutional structure (uncertainty; pricing reforms not implemented or sustained) does not enable economic agents to respond to the new price incentives. Jansen (1991) argues that the case is for better government intervention rather than for less, since many of the existing forms of government intervention in developing countries are outdated and should be adjusted to the changed international conditions. But what is "better intervention"? To answer that question requires a closer look at the links between economic policy and the environment.

Modelling the links: the analytical framework

Table 6.2 (based on Mearns, 1991) lists several policy instruments and their likely environmental consequences, which are the channels through which policy is often considered to affect the environment. One clear conclusion is that the effects are very specific to the precise nature of the intervention and local environmental conditions, so that analysis must necessarily proceed on a country-specific basis. Mearns points to several weaknesses in this approach: principally that it ignores the problem of uncertainty for scientific explanation. Many complex nonlinear interrelationships world are reduced to simple causal links between just two key variables: economic policy reform and environmental impact. The linkages are identified *ex ante*

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Table 6.2 Matrix of environmental effects of policy reform

Policy instruments	Environmental consequences
Exchange rate adjustment	makes possible investment in land management (eg. soil conservation) if change expected to be permanent. a devaluation may lead to a shift out of food crops that may lead to food shortages that may lead to environmentally damaging behaviour.
Financial liberalization	will lead to higher interest rates which may discourage credit-financed investments in land improvement: it may also discourage environment-damaging investment. reduced incentive to undertake resource intensive activities (e.g. more heavily capitalised estate agriculture).
Domestic credit restraint	reduced allocations to environmental protection and resource management directly.
Government expenditure cuts	across the board cuts may reduce road building and hydropower projects, which is likely to slow the rate of deforestation. may leave soil more susceptible to erosion if land newly brought under crop production.
Smallholder producer price increases for maize, and export crops: tobacco, cotton, groundnut	switching between crops depending on relative prices may leave land more, or less, susceptible to erosion. increased land values intensify problems of access to the poor. increased land values may induces land owners to cultivate the land more carefully and may invest in land improvement

/ctd.

Increase export taxes on tea and tobacco	disincentive to produce should reduce the use of wood to cure tea and tobacco and thus reduce pressure for deforestation.
Fertilizer subsidy reduced	reduced access for poor farmers will exacerbate declining soil fertility in case of severe land pressure.
Maintenance of strategic grain reserve or buffer stock	may reduce pressure to produce an ecologically damaging yield in a bad year.
Reduction in energy consumer subsidies (oil-based fuels)	within country impacts may promote oil-based fuel conservation but at cost of forcing backward substitution to woodfuels.
Raise consumer fuel-wood prices	unless strong regulation, higher wood stumpage fees increase incentive both to cut and to avoid payment - possibly increasing forest 'mining' from natural forests - yet provide uncertain incentive to grow more trees.
Investment in hydro and geothermal power generation and other alternative supply sources	mixed in impact, even if successful in reducing pressure on forests.
Import liberalization	increased availability of intermediate foods acts as incentive to produce marketable crops thus similar impact to output price reforms (ie. mixed).
	reduction of import controls may lead to an increase in imports of luxury goods like cars with negative effects on the environment.

and at a very generalized level, assuming that structural adjustment policies are actually, and completely, implemented (a sentiment which echoes the discussion in Part 4.2 above).

Many authors stress the point that the analysis of the links between economic reform and the environment has been eclectic, indeterminate and too simplistic (for example, Mearns, 1991; Cromwell and Winpenny, 1993; Jansen, 1991; and Girma, 1992). Cromwell and Winpenny propose a simple structured analytical system through which policy reforms can be filtered. They argue that the construction of matrices to illustrate the links between policy instruments and environmental effects (like that shown in Table 6.2) would provide useful checklists for policy-makers in the evaluation of the likely impacts of reform programs. The potential impact of structural adjustment measures on the environment should be analyzed according to how these measures affect four crucial variables: (i) the spatial extent of production (bringing new land under cultivation), (ii) the product mix (different crops have different environmental effects), (ii) intensity of production, and (iv) the technique of production (some techniques are more damaging than others).

Other authors (such as Reed. 1992; and Hansen 1990) propose a quantitative modelling approach as a more appropriate technique for analyzing the macroeconomy-environment links. However - as in the case of modelling social effects - there is a lack of data and adequate models designed to study these links. The traditional short or medium term macroeconomic equilibrium models designed to analyze adjustment impacts can at the most provide *ad hoc* assessment of the environmental impacts. For a more comprehensive analysis of medium and long term environmental impacts of adjustment programs, economic and ecological aspects have to be integrated in one model. Braat and van Lierop (1987) give an overview of the state-of-the-art of economic-ecological modelling, and the problems of integrating the two disciplines. So far, only tentative attempts have been made to use quantitative models in the analysis of the environmental impact of structural adjustment.

There are some examples of the use of general equilibrium models to address the links of interest, since in CGEs sector specific environmental impact functions can be attached. These models have been developed and estimated for developing countries. but have to be adapted to include sectoral environmental impact functions (Hansen. 1990).

Reed (1992) adapts a 90-sector CGE macroeconomic model to run several policy scenarios to explore the economy-environment link. The simulations covered some of the basic policy and structural changes that took place in Thailand during the sectoral adjustment period. These changes are (i) reduction of export taxes on rice and rubber, (ii) increase in domestic oil prices, (iii) increase in labour intensive manufactured exports, (iv) increase in tourism growth, and (v) reduction in real public sector investment. Each simulation led to changes in resource use and in the pattern of production. When possible, environmental coefficients, derived from existing information or independent studies, were used to link environmental outcomes to structural changes in the economy. In the model simulations, the effects of policy measures on sectoral output and land use are quantified. For example, in the simulation where export taxes were reduced, agricultural output increased by 0.82% and industrial and services output decreased by 0.38% and 0.27% respectively. It is concluded that industrial pollution is reduced, as are transport-related emissions and environmental degradation by tourism. The effects of the increase in agricultural output, however, are ambiguous, and with the exception of the expansion of agricultural land as a result of the reduction in export taxes, remain unquantified. Hence, the assessment of environmental impacts is to a large extent similar to that given in Table 6.2; for example, it is argued that the reduced export taxes on rubber are likely to extend rubber production to higher slopes, with consequent deforestation and soil erosion.

Cruz and Repetto (1992) adapted a CGE model currently in use in the Philippines. Although the environmental impact of production activities are not modeled explicitly, particular sectors known to have significant environmental impact are distinguished. The model was used to simulate the environmental effects of the various structural adjustment policies carried out in the Philippines. For example, the CGE model was run to approximate full compliance with the tariff reductions and export promotion reforms required by structural adjustment. It was found that the environmental implications were negative since erosion-prone farming, logging, fishing, mining and energy use increased.

An alternative strategy would be to use an input-output model to examine the environmental implications of economic policies in developing countries. The input-output framework is flexible with regard to environmental repercussions and has been applied numerous times in environmental economic research (Braat and van Lierop, 1987). A well-known example is Leontief's global input-output model designed for the study of the interrelationships between environmental and other economic policies (Leontief et al., 1977). In this model pollutants are

treated as by-products of regular production and consumption, and their elimination is a special type of 'productive' activity. Also, stocks of mineral resources are explicitly taken into account. Reed (1992) explored the use of input-output models to study the environmental impacts of adjustment lending at the national level, but concluded that the data requirements are too large for developing countries, while the rigidity of the technique does not lend itself to use of partial and incomplete information.

Some empirical results

Hansen (1990) reviewed 83 of the World Bank's adjustment lending operations up to 1987/88 and 10 Asian Development program lending operations since 1987. In the absence of appropriate general equilibrium models, he looks at different aspects of structural adjustment lending and examines their environmental effects in "a partial microeconomic ad hoc analysis" (Hansen, 1990: 541), which has many elements of to the 'normal' model. His major findings are: (i) the environmental impacts of cuts in government spending are mixed; (ii) the environmental impacts of measures to increase output prices to farmers are mixed and depend to a large extent on the chosen cultivation practices and complementary actions (iii) measures to adjust agricultural input prices towards their economic costs tend to benefit the environment by reducing the use of polluting chemicals like fertilizers and reducing wasteful use of irrigation water, and (iv) measures to increase energy prices tend to benefit the environment, by promoting conservation of resources and more efficient technologies and fuel switching to less polluting forms of energy.

Reed's (1992) examination of the environmental impact of adjustment programs in Côte d'Ivoire, Thailand and Mexico concludes that reductions in public expenditure programs may adversely affect the environment through cutbacks in resources devoted to the environment. This effect occurred in two areas (i) the reduction of environmental infrastructure activities, such as water supply, waste disposal facilities, public transport, and public parks and recreational areas; and (ii) project-level investments such as agricultural extension services. A further conclusion from Reed is that reductions in total domestic credit reduced credit availability in rural areas, and thus failed to increase sustainable agricultural projects. These reductions countered efforts to stabilize the agricultural frontier and promote intensive agriculture.

Cromwell and Winpenny (1993) analyzed the environmental impacts of structural adjustment in Malawi in a "structured analytical system". They point at a perverse response to commodity price changes following from the agricultural price reforms between 1980 and 1986 in

Malawi. They found that for smallholders, there had been some limited expansion of cultivation, mainly be expanding onto steep slopes, and encroachment onto game parks and nature reserves, due to a desire to maintain real incomes in the face of declining real producer prices. Thus, assuming that lower prices automatically lead to lower production is putting things too simply. Cromwell and Winpenny also stress the relation between producer prices and input prices: in Malawi maize prices were increased relative to those of other crops in an attempt to improve food security, but the fertilizer removal program resulted in extremely high fertilizer costs for maize, thereby inducing farmers to shift to low-input crops. In addition, when production is stimulated through producer price changes, a simultaneous increase in fertilizer prices may lead to increasing intensity of production by reducing the proportion of land left fallow each year. Their general conclusion is that early reforms seem to have had a negative impact on the environment at the start, particularly on the crop mix and intensity of production, but later reforms appear incidentally to have ameliorated the environmental impact of macro-economic policies.

The link between external debt and the environment has been made the centrepiece of criticism by many environmentalists. However, the observation that international debt problems (and the subsequent policy based-lending programs) have accelerated the rate of exploitation of natural resources to enable countries to meet their external financial obligations, has also been challenged. The 1992 *World Development Report* concludes that the evidence on the debt-environment observation is limited and contradictory. Reed (1992) argues that the link between government policy makers and a country's natural resources was established long before the debt crisis: in the 1970s governments quite often drew on stocks of natural capital to finance ambitious development plans (Reed, 1992: 144). Despite the fact that Côte d'Ivoire has the highest deforestation rate in the world, in the Côte d'Ivoire case study, no evidence that debt directly aggravated or eased environmental degradation was established. The Mexican case study did not provide any evidence in support of the debt-environmental thesis, pointing out that response to macroeconomic crisis in the form of increases in natural output requires quite a number of years and often additional capital as well. In the Thai case study, it was found that the rampant deforestation which occurred during the mid-1980s could not be linked in any direct way to national debt obligations.

Resource pricing and resource use

The 1992 *World Development Report* emphasized that the cost of energy in developing countries is subsidized - electricity costs on average one third of the cost of supply. The introduction of cost-recovery policies may therefore be expected to lead to greater efficiency in the use of environmental resources. At the same time people are willing to pay more for clean water and sanitation services, so that improvements in environment quality would result. It is not market failure which is responsible for environmental problems but a failure to use the market. In fact the evidence, reported above, is mixed.

Hansen's (1990) analysis supports the idea that higher cost of energy and fertilizer prices has reduced use. But there will be a counteracting effect from the output expansion brought about by aid financed activity and reforms. The analysis of the Philippines by Cruz and Repetto (1992) finds these effects to dominate so that the total effect is an adverse one for the environment. On the other hand, switches in production (say, from industry to agriculture, as in the case of Reed's simulations of the Thai case) can have a beneficial environment impact. The conclusion must be that the result will always be theoretically ambiguous, and that policies can be designed to exploit this ambiguity in pursuit of a favourable outcome.

Poverty and environmental degradation

The effect of policy reforms on poverty levels is important, given the links between poverty and the environment (see e.g. Turner, 1989; and Mink, 1993). The poor often live in environmentally vulnerable or degraded locations. Poverty often implies lacking the means to avoid the impacts of environmental degradation. Pollution damages the health of the poor and environmental degradation constrains the productivity of resources upon which the poor rely. Poverty may lead to an over-exploitation of land and natural resources in order to ensure survival in the short term, at the inevitable expense of long-term sustainability.

Concern with the effects of aid on the environment has many parallels with the effects on poverty, and the two areas overlap. Poverty is a major cause and effect of global environmental problems. However, it is not necessarily true that aid policy directed at alleviating environmental degradation will always be complementary to the poverty-alleviation objective. For example, a policy to protect forests can mean keeping poor people out of them. Also, reducing fertilizer subsidies may have a beneficial impact on the environment in general, but in some places fertilizer use is far below optimal because people cannot afford to buy it. The majority of small-holders,

chronically poor and under-resourced. should therefore be protected by complementary program elements in case of a reduction of subsidies for fertilizers (Hansen 1990; and Cromwell and Winpenny 1993).

Concluding remarks

Structural adjustment is not designed to deal with environmental problems, and the links between the two are complex. The evidence from country studies is mixed: sometimes structural adjustment policies complement environmental goals, but in other cases they conflict and lead to environmentally damaging effects. The World Bank seems to be rather optimistic about the effects of structural adjustment on the environment, emphasizing the beneficial effects of reduced government intervention, or correction of "policy failure". But most work suggests governments need to intervene to protect the environment because of "market failures".

There are few attempts at systematically quantifying or modelling the links, but many authors stress the need for appropriate models and improved data bases. Macroeconomic or general equilibrium models should be developed that integrate economic and environmental aspects. Meanwhile it is clear that we know too little about the links to draw general conclusions about the environmental impact of structural adjustment. The links between the two are country specific and depend on the particular resource basis, production structure, cropping patterns, cultivation methods, climatological and soil conditions, ownership patterns and social and political relations. Identifying the environmental consequences is further complicated by the difficulty of separating the links: environmental effects may be caused by adjustment interventions, but they may also be the result from relationships originating in previous patterns of consumption and production, in the structure of the economies themselves, or in the impact of exogenous factors. Modelling environmental outcomes to aid through the latter's effects on the macroeconomy (as has been suggested for social analysis) would seem, at this stage of our knowledge, a precarious exercise that should best be avoided until further country-level research on macro-environment links has been completed.

6.5 Summary

Modelling of the impact of adjustment on the poor has, in recent years, been based on the country-specific modelling approach recommended in this report for the analysis of all aspects of aid's impact. The shortcomings of existing models are that they do not allow analysis of the impact of aid flows, nor do they consider how the poor are affected by changes in their secondary

income. In this chapter some possible links were discussed - in particular how analysis of aid's impact on government expenditures can be combined with existing models of adjustment policies to get a fuller picture. Work for the SASDA country studies shall incorporate such effects to the extent allowed by the data. This fuller picture can also include links between social spending and education and health provision, and the subsequent, well documented link, to health and educational indicators, and from there to welfare indicators such as mortality. It would, however, be premature to attempt such an approach for analysis of environmental impacts.

1. Where the share of benefits is not calculable the less satisfactory measure of per cent of poor amongst project beneficiaries is used.

2. Ravallion's (1992) excellent discussion of alternative poverty measures includes subjective indicators.

3. One example where the implied relationship has been discussed reflects the need to make explicit and justify this assumption: "although the causes of the increase in child mortality rates and deteriorations in maternal (and probably pre-school child) nutritional status [in Brazil] are not identified, it appears that large falls in real incomes of the poor may be at least partially responsible" (Pinstrup-Andersen, 1989: 91) - the data presented do not show a fall in real incomes of the poor, but rather a rise in working hours at minimum wages, which is more difficult to interpret.

4. See Behrman and Deolaikar (1990) for the example of Jamaica on this point.

5. See also the paper of the same name by Kakwani et al. (1990) which was a background paper for the report.

6.

7. This review is necessarily selective. An excellent more comprehensive review is Behrman (1990).

8. See also Thomas et al. (1990).

9. Height for age is a good indicator of long run health and weight for height a short run indicator.

10. This study presents a simulation which shows that a doubling of female secondary enrolment in 1975 from 19 to 38 per cent would have reduced the infant mortality rate from 81 to 38.

11. This discussion draws on the review by Lockwood (1992).

12. Lele (1991) documents the relation between lower levels of female education and low productivity in agriculture in sub-Saharan Africa.

13. See the collection of papers in Gladwin (1991), which unfortunately do not all qualify for this description.

CHAPTER 7

A FRAMEWORK FOR ANALYSIS

7.1   Data Requirements

The primary data requirements are given by the accounting framework, which should be supplemented by standard national accounts aggregates. Methodological assistance (including consistency checks) is provided by the manual *Guidelines to the EPP Database Exercise*. Where possible, national sources should be used: complemented by international sources as necessary. (The main international sources are *World Tables*, *World Debt Tables* and the IMF's *IFS*).

Aid data may be disaggregated by bilateral/multilateral using *World Debt Tables*. More detailed breakdowns - including sectoral breakdowns for ODF - are available in OECD's *Geographical Distribution of Financial Flows to Developing Countries*. Functional data on aid by recipient (food aid, project aid etc.) are not available from any published international source. Attempts should be made to collect such data in country, but it is to be doubted that sufficiently detailed series shall be available for systematic analysis.

7.2   Summary of Methodology

Step 1: Literature review
Review paper on macro policy and performance in each country (including any relevant aid literature. such as the SIDA import support studies). The papers should be comprehensively referenced.

Step 2: Construction of database.
Data required are national accounts. balance of payments statistics, monetary accounts, government finance statistics and aid flows. These data should be used to create a spreadsheet database from 1970 (or earlier where possible) in which the different accounts are fully consistent with one another.

Aid data are most likely only available from international sources - a balancing item (incorporated into errors and omissions) will almost certainly be required to combine these data with the other accounts. Hopefully the EO will not be disproportionately large.

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The need for large balancing items can be indicative of known shortcomings in the data, such as unrecorded trade flows. We should try to be aware of what these shortcomings are with respect to the data of the respective countries.

The database should initially be constructed in nominal terms and then deflated by the appropriate deflators, as collected.

Step 3: Preliminary data analysis
The key to the data analysis are the accounting identities: given as equations 3.4, 3.6 and 3.13/14 in the World Bank version of the report. A suggested starting point is to produce a scatter of real aid against each of real imports, investment and government expenditure, drawing a 45° line through a selected observation (as in the Tanzania report, in which I drew the 45° line through the earliest observation).

Do these three variables rise (fall) one for one with higher (lower) aid?

The next step is to analyse trends in sources of finance for imports, investment and government expenditure. It is suggested that you may use decomposition analysis here to attribute importance to changes in the different sources.

If $y_t = x_t + z_t$ then

$$\hat{y}_t = \left(\frac{x_{t-1}}{y_{t-1}} \right) \hat{x}_t + \left(\frac{z_{t-1}}{y_{t-1}} \right) \hat{z}_t$$

where

$$\hat{y}_t = \frac{y_t - y_{y-1}}{y_{t-1}}$$

Has the importance of aid as a source of finance increased? Is there evidence that aid has displaced other sources of finance?

The displacement effects of aid are the centre of most debates about aid's macroeconomic effects: the savings debate, the fiscal response literature and aid as Dutch disease (all reviewed in

methodology paper and my *JDS* survey). Preliminary data analysis (exploratory data analysis) is to be used to explore if such effects exist.

Preliminary investigation of the main relationships given in literature: aid and savings; aid and exports; and government revenue and expenditure. Explore robustness of simple relationship to alternative specifications. Note at least if series are non-stationary, even if don't resort at this stage to modern time series techniques (cointegration analysis).

Ultimately, the aim is to build up a series of behavioral relationships for the different variables in our accounting framework (with aid and other variables as appropriate being exogenous). This exercise will of course require bringing in variables not included in the accounting framework (such as the real exchange rate). These equations will together constitute the model - at this point we want to identify the important questions rather than necessarily give all the answers. We also want to make explicit what we expect to get out of our fieldwork.

Step 4: Preliminary paper (for February 11th seminar)
This paper should present: (1) descriptive introduction (growth, trends in real aid, imports and investment; (2) scatter plots of aid-imports, investment and government expenditure; (3) decomposition of sources of variation in imports and investment (and government expenditure?); (4) discussion of likely causal links aid and other variables; (5) gaps and shortcomings in data; and (6) list of questions to be pursued.

The more difficult questions - aid and efficiency and social sectors (and environment?) - should, if possible, also be mentioned.

Step 5: Fieldwork
Collection of additional data and reports. Discussion with government and donor officials and academics of our findings and alternative interpretations.

Step 6: Country reports
Format of these papers will be discussed nearer the time, when we have a clearer idea of content. The specification of country-specific models will be agreed at this stage.

Step 7: Final report

Summary and synthesis of country reports.

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Appendix 2

Style guide

To save time at the report editing stage all reports and documents should adopt the common style outlined below. The style is that used in the Tanzania report.

General

1.   All documents to be in WordPerfect 5.1 (specified in contract by SASDA).

2.   Set initial codes (SHFT-F1, 4, 5) for the following:

       text boxes - border NONE for all four side

       figures - figure caption above figure, outside box

3.   Line spacing 1.5 except single spacing for quotations, endnotes and references. Two returns between paragraphs.

Tables and figures

1.   Tables and figures to be numbered consecutively by chapter e.g. Figure 2.1, Figure 2.2; and Table 2.1 etc.

2.   Heading style for tables

                     Table 2.1 [2 spaces] Upper case first letter only

       Heading is centred, using second line, also centred as appropriate.

3.   Heading style for figures.

       Numbering as for tables, but italicised.

       Text for figure headings but not figure number should be included inside box from graphics programme. If possible produce graphics in a quality package (e.g. HPG, Freelance not Lotus).

3.   Graphics.

       If possible, use a graphics package, such as Freelance or HPG to prepare graphics, as these are far superior to those given by Lotus.

       Use the skip feature for the X axis in graphics to avoid over-bunching or staggering.

4.   Tables should appear in WordPerfect Table Boxes (ALT-F9 2).

5.   Tables should contain few lines: three horizontal lines is the norm (two around headings and one at bottom); no vertical lines.

SASDA Working paper

Nr. 1   Översyn av biståndssamarbete med Guinea-Bissau
         Underlagsrapport; Emma Öståker, Augusti 1993

Nr. 2   Literature search on disaster relief
         Eve Johansson, November 1993

Nr. 3   Swedish Development Assistance to Zambia
         Emma Öståker, January 1994

Nr. 4   Improving Monitoring and Evaluation in Swedish development
         assistance; Colin Bruce and Ugo Finzi, March 1994

Nr. 5   Inventering av svensk forskning om bistånd
         Roy Unge, April 1994

Nr. 6   Macroeconomic effects of aid
         Literature review and methodological framework
         Howard White, January 1994