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Abstract

Foreign aid inflows have grown significantly in the post-war period. Many studies have tried to assess the effectiveness of aid at the micro- and macro-level. While micro-evaluations have found that in most cases aid 'works', those at the macro-level are ambiguous. This paper assesses the impact of foreign aid on growth for a large sample of developing countries. We use an augmented Fischer-Easterly type model and estimate this using both cross-section and panel data techniques. The results strongly support the view that foreign aid does have some positive impact on growth, conditional on a stable macroeconomic policy environment. We also find that these results vary according to income level, levels of aid allocation and geographical location.

Outline

1. Introduction
2. Aid Effectiveness and Macroeconomic Policy
3. Data and Model Specification Issues
4. Regression Results
5. Conclusions

I INTRODUCTION

An important objective of much Official Development Assistance (hereafter 'foreign aid') to developing countries is the promotion of economic development and welfare, usually measured by its impact on economic growth. Yet, after decades of capital transfers to these countries, and numerous studies of the empirical relationship between aid and growth, the effectiveness of foreign aid in achieving these objectives remains questionable.

Many empirical studies have used econometric analysis to test the aid-growth relationship at the macro level, complemented by case-study evidence at the project level. While micro-based evaluations have found that in most cases 'aid works' (e.g. Cassen *et al.*, 1986), those at the macro level have yielded more ambiguous results, often failing to find significant growth effects. This conflict is what Mosley (1987) refers to as the 'micro-macro paradox'. The reasons for it remain unclear but the econometric aid-growth literature has been criticised on several grounds: sample size and composition, data quality, econometric technique and specification. A particularly telling criticism of most of these studies concerns the underlying model of growth, which is typically poorly specified. Most aid-growth investigations, for example, either pre-date or ignore many of the recent advances in growth theory which have allowed more sophisticated empirical growth equations to be specified. If aid is to be reliably identified as a growth determinant it is important that it is included within a robustly specified empirical growth model.

We seek to do that in this paper, firstly by examining aid's growth impact within augmentations of two prominent endogenous growth models: the 'Fischer-Easterly model' (Fischer, 1991, 1993; Easterly, 1993) and the so-called 'Barro model' (see Barro, 1991; Barro and Sala-i-Martin, 1995). The former in particular - which stresses the role of stable macroeconomic policies for sustained growth - has found increasing empirical support in the recent literature. With its emphasis on the role of economic policy, the Fischer-Easterly model provides a natural context within which to study the aid-growth relationship, since many have argued that the developmental impact of aid is conditioned by the policy environment in recipient countries. Indeed since the 1980s, much aid from the multilateral lending agencies has been linked explicitly to

macroeconomic policy reform and structural adjustment (see Krueger 1997, Greenaway 1998, McGillivray and Morrissey 1998).

Secondly, we seek to overcome some of the criticisms of previous econometric aid-growth studies by comparing panel data and cross-section econometric techniques for a large sample (68 developing countries) over a long period (1970-93). We examine robustness to equation specification, sample composition and alternative time periods.

The remainder of the paper is organised as follows. After briefly reviewing recent aid-growth studies in section 2, we examine the arguments for the inclusion of policy variables in growth regressions. Section 3 introduces our data and econometric specification followed by our empirical results in section 4. These suggest considerable empirical support for an augmented Fischer-Easterly type model in which aid, together with key policy variables, is shown to have a significant, robust impact on growth in our sample of countries. Finally section 5 draws some conclusions.

2. Aid Effectiveness and Macroeconomic Policy[1]

Aid and Growth

Until recently, the aid-growth literature has been dominated by cross-section studies using single-equation estimation techniques, producing mixed empirical results. Among early investigations for example, Papanek (1973) appeared to overturn the negative results of Griffin (1970) and Griffin and Enos (1970)[2] by disaggregating capital flows into foreign aid, private capital and other inflows, reporting a positive and significant aid coefficient. On the other hand Voivodas (1973) obtained a negative impact of aid on growth (although not significant) for a sample of 22 LDCs for the period 1956-1968. The ambiguity of these results may, however, arise at least in part from the poor quality of the data for these early periods.

Using later data Dowling and Hiemenz (1983) tested the aid-growth relationship for the Asian region on 13 countries using pooled data and found a positive and significant impact of aid on growth. They also controlled for a number of policy variables such as

1 For a more detailed, critical survey of the aid-growth literature, see White (1992).

trade, finance and government intervention. Singh (1985) obtained similar results for a wider sample of 73 countries during 1960-70 and 1970-80 (particularly in the later period). For Sub-Saharan Africa, Levy (1988) reports a significant positive relationship in a regression model including aid (as a ratio of GDP) and income per capita, for 1968-82. More recently Hadjimichael *et al.* (1995) find positive evidence for the period 1986 to 1992 using a sample of 41 countries. Their model is more sophisticated than most predecessors by attempting to capture potential side effects of foreign aid (such as 'Dutch-Disease'effects) and other policy variables that are hypothesised to affect growth. Similarly Burnside and Dollar (1997), using a model including a variety of policy variables, find that though the ratio of aid to GDP often does not significantly affect growth in LDCs, aid *interacted with policy variables* does. Boone (1996) however has cast doubt on the growth effects of aid, arguing that, for a sample of LDCs, aid has had no impact on either investment or income growth.

Most of these studies can be criticised on a number of grounds. The endogeneity problem of single equation models is well known, whereby the feedback of low growth into larger aid allocations is ignored. Gupta (1975) and Gupta and Islam (1983) for example showed that if indirect effects are included, early estimates of a negative effect of foreign capital can be overturned. By contrast Mosley (1980), using a simultaneous equation model, found a weak, negative correlation between aid and growth, though he did find a positive, significant relationship for the 'poorest' countries in his sample. However, Mosley recognised that even this analysis is 'seriously incomplete'.[3]

An important limitation of much of this literature is the incompleteness of the underlying growth models. Many studies model growth as a function of capital accumulation only, and few have addressed model specification issues seriously. Dowling and Hiemenz (1983) and Mosley (1987), however did introduce variables capturing the role played by government and trade, while Hadjimichael *et al.* (1995) and Burnside and Dollar (1997) are among the first to include macroeconomic policy

2 These studies used the current account deficit to draw conclusions regarding foreign aid effects, finding deficits to be negatively correlated with growth.

variables. On the other hand, the largely separate literature on growth determinants in LDCs which has examined the role of policy has not examined the impact of aid, generally including only aggregate savings/investment variables (see, for example, Fischer, 1991, 1993; Easterly, 1993; Barro and Sala-i-Martin, 1995). In this paper we attempt to improve model specification further by examining the growth impact of aid within a model including both policy variables and all the major sources of investment finance – foreign aid, private and other inflows, and domestic savings.[4]

Macroeconomic Policy and Growth

The case for a stable macroeconomic policy environment as a necessary condition for rapid economic growth and for effective aid implementation has been emphasised in recent years. The World Bank, for example, has stressed the need for a 'supportive macroeconomic framework' for successful structural adjustment. According to the Bank this involves low and predictable inflation; appropriate real interest rates; real exchange rates which are competitive and predictable; stable and sustainable fiscal policy; and a balance of payments which is perceived as viable (World Bank, 1990). The effectiveness of capital flows (and investment) will be greater when there is macroeconomic stability and few distortions. Distortionary policies such as trade restrictions and financial repression, it is argued, reduce the efficiency of capital investment and thus the rate of growth for a given level of capital investment, while removing distortionary policies does the reverse.

Within the 'new' growth literature, the role played by macroeconomic factors and distortionary policies has been emphasised by Kormendi and Meguire (1985), Fischer (1991,1993) and Easterly (1993). Kormendi and Meguire test a set of macroeconomic growth determinants such as monetary variance, government spending, inflation and trade. Fischer (1993) goes further, suggesting that to argue that "macroeconomic stability is necessary for sustainable growth is too strong, but... macroeconomic

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3 For example, Mosley's model assumes that the economy is closed.

4 Burnside and Dollar (1997) probably represents the most sophisticated attempt to date to incorporate aid and policy variables within a growth equation. However they ignore non-aid sources of investment finance (investment variables are also excluded from their regressions) implying, implausibly, that only aid-financed investments affect growth. Their results, unlike those obtained below, suggest that the aid/GDP ratio generally has no effect on growth except when interacted with an index of policy variables.

stability is conducive to growth" (pp. 486).[5] Bleaney (1996) reaches a similar conclusion on the basis of an empirical analysis of 41 developing countries.

An important testing problem in practice is in measuring the extent of distortions and macroeconomic instability. Fischer (1993) regards the inflation rate as the best single indicator of macroeconomic policies with the budget surplus as a second indicator. The inflation rate indicates the overall ability of the government to manage the economy: high inflation rates implying that the government has lost control (as suggested by the experience of some Latin American countries). Since high inflation rates *on average* tend to be correlated with high inflation *variability*, the latter might also indicate the prevailing macroeconomic climate. With regard to the fiscal variable, Fischer (1993) argues that a fiscal deficit also serves as an indicator of a government that is losing control. According to World Bank (1990), reductions in fiscal deficits have typically been at the core of successful stabilisation programmes and are prerequisites for successful structural adjustment and improved efficiency of investment.[6] Hence reducing a fiscal deficit could be expected to improve growth performance, *ceteris paribus*.

Financial repression is also expected to be detrimental to growth. Many developing countries over-regulate their financial sectors through controls on interest rates on deposits and restrictions on credit to the private sector, which hamper its ability to intermediate savings efficiently (World Bank, 1989). Although financial liberalisation is usually argued to foster growth, it may not be effective if it also creates macroeconomic instability. For example, a reduction in forced lending to government could increase the availability of financing for private investment. However, if the government then resorts to inflationary finance, the move could be counter productive. As a result some have argued in favour of repression by arguing that the promotion of high priority "productive" investment, with longer gestation periods and externalities,

5 Of course this view of macroeconomic policy is not supported by standard neo-classical growth models in which distortionary policies affect only the level of income and not its rate of growth. 'New' growth models such as Romer (1986), Barro and Sala-i-Martin (1993) and Rebelo (1991) however show that there are conditions under which distortionary policies can have significant effects on long-run growth. The empirical relevance of these 'conditions' (such as constant returns to capital) remains an unresolved issue.

6 On the links between public investment and aid, see Gang and Khan (1991), McGillivray and Bhin (1993) and White (1994).

justifies suppressing their financial costs and so lowering their cost of capital (see Gelb, 1989).

In the analysis which follows we refer to the growth model incorporating aid and macroeconomic variables as an augmented Fischer-Easterly model. This will allow us to identify not only the *ceteris paribus* growth effects of aid using an established conditioning set of policy variables, but also to assess the robustness of this set to the inclusion of aid, and other forms of, investment finance among the growth determinants. Of course, it cannot yet be said that the new growth literature has established a consensus regarding the 'appropriate' conditioning set. Thus as a further robustness check we also examine the impact of aid within an augmented Barro model (including initial income levels, human capital etc: see Barro, 1991) – a model which has formed the basis for many recent growth analyses.

3. Data and Model Specification Issues

Before turning to issues concerning the specification of our regression models and the econometric techniques which we adopt we outline our dataset.

Trends in Foreign Capital in LDCs, 1970-93

Developing countries have traditionally been net importers of capital. Their two main sources of supply are official financing, including official development assistance (ODA), and private capital. Figure 1 shows the different sources of capital flows to our sample of 68 developing countries (listed in Appendix 2) for the period 1970-1993.[7] In view of the problem of applying appropriate deflators, these data are in nominal terms (though alternative deflators reveal broadly similar episodes in LDC capital flows to those shown in Figure 1, with trends generally dampened). It can be seen that Official Development Assistance (ODA, hereafter foreign aid), other official flows and foreign direct investment exhibit fairly smooth upward trends with relatively minor annual fluctuations. The effect of the debt crisis is evident in private loans however, which declined substantially during the 1980s. The rise in equity investment is essentially a phenomenon of the 1990s.

On average, over 1970-93 developing countries received 9.8% of their GDP annually as foreign aid with a slowly rising trend in both real and nominal terms. However the *share* of aid in total (net) resource transfers fell during 1970-1984, increased during 1985-1987 and fell again thereafter. These declines reflected both a fall in the volume of foreign aid from donors and the relatively rapid expansion of private capital flows, the other major financing source. It is also clear from Figure 1 that, overall, net resource flows have been affected by such major episodes in the world economy as the two oil price shocks (1973-81), the international debt crisis (1982-87) and the recent period of 'liberalisation' in LDCs (1988-onwards).

Model Specification

In section 4 we employ both cross-section and panel data techniques. While we regard the latter as more reliable, using cross-section methods allows us first to investigate the effects of data averaging over the 1970-93 period; and second to compare our results with previous investigations. The cross-section model which we estimate is of the following form:

$$Y_i = \alpha_i + \beta' X_i + \gamma' Z_i + u_i \qquad \text{where } i = 1, 2, \ldots 58^8. \qquad (1)$$

where Y_i is the average growth rate of GDP over the period 1970-93 for country i, X_i is a vector of capital sources (domestic and foreign), Z_i is a vector of 'control variables' including trade, financial repression, macroeconomic and 'Barro' variables and u_i is an error term.

An advantage of panel data techniques is that it contains "the information necessary to deal with both the intertemporal dynamics and the individuality of the entities being investigated" (Dielman, 1989). In particular, it allows the equation intercepts to vary

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7 All data used in our analysis are taken from IMF, *International Financial Statistics*, *Government Finance Statistics* and the World Bank (STARS, CD-ROM).

8 Of the 68 countries listed in Appendix 1 (excluded are small countries with population less than one million and countries which have received foreign aid above 40% of their GDP), 10 have been excluded due to non-availability of data or when the country has less than 10 observations for the fiscal variable over the period 1970-93. Omitted countries are: Algeria, Benin, Central African Republic, Congo, Cote D'Ivoire, Egypt, Mali, Niger, Oman and Senegal. In the remaining sample of 58 countries there are 19 Latin American and Caribbean countries and 22 Sub-Saharan African countries.

as a way of representing country and/or time effects where these effects "are typically thought to arise from the omission of important variables whose explicit inclusion in the model was not possible" (ibid. p.49). A general representation of the panel model is:

$$Y_{it} = \mu_i + \beta' X_{it} + \gamma' Z_{it} + \varepsilon_{it} \quad (2)$$

where *t* denotes time. Equation 2 can be rewritten as:

$$Y_{it} = \alpha_0 + \alpha_i + \lambda_t + \beta' X_{it} + \gamma' Z_{it} + \varepsilon_{it} \quad (3)$$

where α_0 is an overall constant, α_i represents the country effects and λ_t represents the time period effects. These represent non-measurable effects: for instance, α_i represents the net effect of omitted time-invariant variables such as political instability, military governments, climatic conditions, etc., and λ_t represents the net effect of country-invariant time effects such as world commodity prices or interest rates. Hence ε_{it} represents the net effect of omitted variables which vary over both country and time. Equation 2 is a two-way fixed effects model, usually estimated using dummy variables (hence, least squares dummy variables, LSDV). Due to limited time-series data for some of our variables we have averaged the data into four time periods associated with the main international episodes referred to above: 1970-75, 1976-81, 1982-87 and 1988-93, (i.e. t = 1,…, 4)[9]. Note that for some periods some data were not available so that an unbalanced panel dataset (of 238 observations) was used.

Description of variables

As noted earlier, since Fischer (1991, 1993) and Easterly (1993) the need to control for macroeconomic stability/instability and policy distortions is increasingly recognised. Finding variables or proxies for these policy measures is however a daunting task. The variables which we use in our augmented Fischer-Easterly model are:

9 An additional advantage of using averages (rather than annual data) in this case is that it avoids problems of specifying lag structures for the effects of aid on growth. These lags can be quite long, and highly variable across countries.

- *FAIDOECD*: Official Development Assistance (DAC) as defined by the Organisation for Economic Co-operation and Development (1993) as a percentage of the gross domestic product (GDP).
- *PRIV*: Total net private capital flows as a percentage of GDP.
- *OTHERIFS*: All other inflows (including other net long-term inflows) as a percentage of GDP.
- *SAV*: Domestic savings as a percentage of GDP.
- *TOT & WOPEN*: Two measures to reflect trade openness and macroeconomic stability.

Openness to trade is often hypothesised to raise growth through several channels, such as access to advanced technology from abroad, possibilities of catch-up, greater access to a variety of inputs for production, and access to broader markets that raise the efficiency of domestic production through increased specialisation. Various measures of openness have been proposed and tested, with no single 'best' measure emerging. Edwards (1998), for instance, uses a series of openness indices for trade policy and to proxy trade distortions. Frequently used measures include the ratio of total trade to GDP and changes in the terms of trade. We experiment with a variety of measures (discussed below) but generally report those for the terms of trade (*TOT*) and 'weighted openness' (WOPEN), where a standard openness index, $\frac{(X + M)}{GDP}$, is weighted by the current account balance, $\frac{|X - M|}{GDP}$. (i.e WOPEN = $\frac{(X + M)}{|X - M|}$).[10]

This measure is superior to the unweighted ratio because it recognises the importance of both a country's trade intensity and its trade equilibrium.

- *BSUR*: The stabilising role of government has often been proxied by reference to its action in mobilising domestic resources as captured by the budget surplus, BSUR. This is defined as the sum of current and capital revenue including grants, less the sum of

10 Thus more weight is given to countries closer to their equilibrium trade balance and engaged in more trade. Out of the 58 countries on which the cross-section regressions are based, 45 (77% of the sample) have a trade deficit, out of which 23 have a deficit greater than 5%. There is only one country with a trade surplus greater than 5%. The current account weighting therefore essentially treats large trade *deficit* countries as less open, for a given trade ratio.

current and capital expenditure and government lending minus repayments, as a percentage of GDP.

- *INFSTD*: This is the standard deviation of the inflation rate over the period 1970-1993. It gives an indication of the extent of volatility in inflation over the period and is expected to proxy general macroeconomic instability. As discussed above we expect that this variable will be negatively related to growth.
- *MONEY*: Financial repression has been incorporated as a dichotomous variable by many, for example World Bank (1989), who defined financial repression as an average real interest rate below –5% over a period of time. Easterly (1993) examined –5% and –2% interest rate thresholds as well as the *actual* average real interest rate. Others have used the money supply (M2) as a percentage of GDP (e.g. Fry, 1981; Dowling and Hiemenz, 1983) denoted as MONEY in our case. Small values are regarded as being associated with financial repression while large values indicate greater financial liberalism.
- *Continental Dummies*, LAT and SSA: Continental dummies for Latin America (LAT) and Sub-Saharan Africa (SSA) have been included in many recent growth regressions mainly to recognise that, *ceteris paribus*, growth performances in countries on those continents appear to differ from those of other LDCs for unknown reasons. Since both continents have been associated with especially large capital inflows during our period of interest, our model of the growth effects of these inflows may render such dummies redundant. However, where relevant, we allow for continent-specific effects (and, in fact, typically find them to be significant).

Finally, with the exception of Hadjimichael *et al.* (1995) previous regression analyses have tested a linear aid-growth relationship. However, the possibility that LDCs may over-borrow capital from abroad has been recognised at least since Chenery and Strout's (1966) analysis of "absorptive capacity constraints" and has been emphasised in the more recent literature on optimal borrowing and the 'Dutch disease' (e.g. van Wijnbergen, 1984 and Younger, 1992). The possibility of non-linearities in the aid-growth relationship should therefore be recognised and we investigate this by including a quadratic term in the aid/GDP ratio, *FAIDOECDSQ*, in our regressions.

The augmented Fischer-Easterly model to be estimated is therefore:

$$\text{Growth} = \alpha_0 + \beta_{1i}\, FAIDOECD + \beta_{2i}\, FAIDOECDSQ + \beta_{3i}\, PRIV + \beta_{4i}\, SAV + \beta_{5i} OTHERIFS + \beta_{6i}\, TRADE + \beta_{7i}\, MONEY + \beta_{8i}\, BSUR + \beta_{9i}\, INFSTD + \beta_{10i}\, LAT + \beta_{11i} SSA + \varepsilon_I \quad (4)$$

where *TRADE* is proxied either by *TOT* or *WOPEN*.[11]

It should be emphasised that the motivation for this model is to control for the policies and factors discussed above, which might be correlated with growth and omission of which might bias our estimates of the effects of inflows on growth. In discussing results below we do not focus on the interpretation of these control variables though clearly it will be important to identify whether our model is appropriately specified. As a further check on this we re-specify the model as an augmented Barro-type including initial GDP per capita, primary and secondary school enrolment and fertility rates among the conditioning variables.

4. Regression Results

Cross-section Results

Table 1 presents the cross-section results for the augmented Fischer-Easterly type model during 1970-93. It can be seen that in general the model performs well, explaining around 57% of the variation in country growth rates. The macroeconomic and policy control variables are typically correctly signed and statistically significant, supporting the findings of Fischer (1991, 1993) and Easterly (1993). Larger budget surpluses and more stable inflation appear to be conducive to faster growth and there is also some confirmation that financial liberalisation is beneficial to growth - the coefficient of M2/GDP, (MONEY) is positive and significantly different from zero.

11 Alternative openness measures which we investigated were: collected trade taxes, defined as the ratio of total revenues on international trade (exports plus imports) to total trade; the black market exchange rate premium; the average trade ratio (exports plus imports as a proportion of GDP); the openness measure as defined in the Penn World Table Mark 5.5; and the growth rate of total trade as a percentage of GDP. While the foreign aid coefficient in our regressions did not change much in terms of magnitude and significance when using these different measures (except when we used the trade ratio measure), none of them was significantly different from zero. In fact these openness measures were not found to be highly correlated with each other.

The weighted openness measure, *WOPEN*, appears to perform much better than changes in the terms of trade, *TOT*; the coefficient on the latter being wrongly signed (negative) but insignificantly different from zero.[12] As noted earlier, in common with Levine and Renelt (1992), alternative openness measures did not perform well, but had minimal impact on parameter estimates for other variables.

The results for foreign aid are also encouraging. Column 1 reports a positive coefficient on *FAIDOECD*, significant at 10%. The quadratic term however is not significant (though negative as predicted) apparently rejecting the hypothesis that, for this sample, 'too much' foreign aid is detrimental[13]. Omitting the insignificant quadratic term reduces the parameter on *FAIDOCED* as expected, which is now significant at just over 1% (column 3). Though the foreign aid coefficient is almost twice that of domestic savings in column 1[14] excluding the quadratic term (column 3) leads to acceptance of the null hypothesis of equality of coefficients using a Wald test (χ^2 (1) = 0.189). These results suggest care is needed when interpreting and comparing the effectiveness of foreign aid with other sources of capital. Our point estimates indicate that raising the aid/GDP (or domestic savings/GDP) ratio by one percentage point raises the growth rate by about 0.10 percentage points. Finally adopting an alternative measure of foreign aid in column 4 - aid per capita (AIDPOP) – yields similar results, confirming a positive and significant impact on growth.

Table 1 also suggests that the impact of private flows on growth appears to be perverse: a significant negative effect is obtained whereas we would have expected a positive coefficient *a priori*. This may reflect the unstable pattern of growth in private loans within the 1970-93 period (see figure 1) which is obscured by the averaged data. We investigate this below by disaggregating the time period and using panel data methods. Finally, the inclusion of the continental dummies, LAT and SSA appear to be supported by the data, confirming *ceteris paribus* slower growth in those continents

12 A similar result was obtained by Fischer (1993) when using cross-section data, but was positive and significant in a panel data context. We therefore use this variable in our panel setting below.

13 Hadjimichael *et al*. (1995) report a significant negative coefficient on their quadratic term. They argue that beyond a threshold level (around 25% of GDP for Sub-Saharan African countries) the impact of aid appears to be negative.

14 A Wald test of equality of these coefficients rejects the hypothesis that the coefficients are equal.

than elsewhere. Later in this section we can shed more light on continental effects by examining the performance of our model for those two continents separately.

Finally, we examined the robustness of these aid-growth results to our model specification by including the 'Barro-regression' variables: GDP per capita, primary and secondary school enrolment rates (all in 1970), and fertility rates, both with and without our 'Fischer-Easterly' policy variables. As can be seen in Appendix 1, of the Barro variables only secondary enrolment and fertility appear to be significant. More importantly, if anything the growth impact of aid now appears to be somewhat larger and still highly significant, except when policy variables are excluded. This latter result further reinforces the argument that the equation is mis-specified when policy variables are omitted.[15]

Panel Results

In this section we report results using our time-disaggregated data (for the four periods: 1= 1970-75; 2=1976-81; 3=1982-87; 4=1988-93) for both the fixed effects, and random effects, models. The latter treats the coefficients α_i and λ_t in (3) as normally distributed random variables with zero mean and unknown variance, rather than as constants.[16] When we allow for both country and time effects, a Hausman test clearly favours the fixed effects model over the random effects[17]; thus results for the former only are given in Table 2. To gain additional degrees of freedom we also examine a model in which country dummies are replaced by continent dummies (Table 3).

In Table 2, the foreign aid coefficient is again positive as predicted and significant at the 5 % level. The quadratic aid term is now also significant with a negative sign,

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15 We further investigated the robustness of our results to alternative proxies for our policy variables: alternative openness indices; replacing the budget surplus by the government expenditure/GDP ratio; and replacing the inflation rate by its standard deviation. Aid-growth results were unaffected by these changes.

16 Thus the random effects model takes the form:

$$Y_{it} = \alpha_0 + \beta' X_{it} + \varepsilon_{it} + \mu_i \qquad (3')$$

where μ_i is treated as an individual specific disturbance and $E[\mu_i] = 0$, $Var[\mu_i] = \sigma^2_u$, and $Cov[\varepsilon_{it}, \mu_i] = 0$. The model is estimated using a feasible generalised least squares procedure (GLS). The main advantage of this technique is that it accounts for heterogeneity (country or time depending on how the model is specified).

supporting the conclusions of Hadjimichael *et al.* (1995) that too much foreign aid hurts developing countries beyond a certain threshold level. Private capital flows also now appear to have a large positive and significant impact on growth; indeed the magnitude of the effect is around twice that for aid[18]. It seems that our suspicions that the contribution of foreign private capital to growth was being obscured in the cross-section model was correct, and that equations omitting private inflows are potentially mis-specified.

One drawback of the two-way model is the large loss of degrees of freedom. This can be reduced by including regional dummies for Latin America and the Caribbean (LAT) and for Sub-Saharan Africa (SSA) rather than individual country dummies (the default region essentially being Asia/Pacific). We investigated both random effects and fixed effects (one-way, with regional dummies) models; the former was preferred by a Hausman test and is reported in Table 3[19]. This reduces the coefficient on foreign aid, from 0.176 to 0.105, but it remains significant at the 5% level. In addition the macroeconomic variables (changes in the terms of trade, the budget surplus and inflation volatility) all perform well and have their expected signs. Both the regional dummies are significant, indicating *ceteris paribus,* lower growth in Latin America and Sub-Saharan Africa compared to other country groupings.

When assessing the effectiveness of different sources of capital we find that foreign capital (aid or private capital flows) has a greater impact than domestic savings when comparing estimated coefficients. Private foreign capital appears to have particularly strong growth effects. Similar results were obtained by Papanek (1972) and Dowling and Hiemenz (1983). It is not surprising perhaps that private capital flows have a greater impact than foreign aid. The former are mostly directed to projects and activities with higher expected private rates of returns while the latter are mainly directed towards infrastructure building, education, health, communication, water supply and so on where private rates of return (at least in the shorter term) are typically expected to be lower.

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17 The null hypothesis that the random effects model is preferred is rejected: $\chi^2 = 23.2$.

18 Including the quadratic term, the net effect of aid on growth, at mean aid levels, is 0.163.

19 The fixed effects model behaved similarly and is reported in Appendix 1 Table 2. The Hausman test accepts the null hypothesis that the random effects model is preferred: $\chi^2 = 0.11$.

Regional Estimates

Although both the above methods allow for some country heterogeneity a potentially important limitation is the imposition of constant slope coefficients on aid (and other) variables for all countries. Given the differences across continental regions identified by the regional dummies, an obvious question is whether the effectiveness of aid might also differ by region. We focus on the Latin American and Caribbean and Sub-Saharan African regions which have been the major recipients of foreign inflows. We use the GLS procedure but this time account for country heterogeneity within each region. We therefore first apply ordinary least-squares to the pooled data. The residuals from this step are then used to calculate the standard deviation of the residuals for each country, which are, in turn used to scale all the included variables for that country. Finally an OLS procedure is applied again to the pooled, transformed data to obtain the feasible GLS estimators. To take account of the time periods, dummies PER2, PER3 and PER4 are included.

Results for the Latin American and Caribbean region are presented in Table 4; Sub-Saharan Africa in Table 5. Given the fewer degrees of freedom it is not surprising that regression parameters are generally less well determined. However, the regressions continue to perform well and, with the exception of the financial repression variable[20], *MONEY*, the variables accounting for macroeconomic performance are in line with our expectations, and earlier results. Among the time dummies, *ceteris paribus*, period three (PER3) which accounts for the debt crisis phase, exhibits low growth in Latin America and SSA (with autonomous growth continuing to be low in SSA in period 4).[21]

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20 The coefficient on *MONEY* is negative and significant in LAT (and insignificantly positive in SSA). This may arise because the *MONEY* measure uses nominal rather than real money stock (M2), as a ratio of GDP. This may therefore be capturing some of the effects of high inflation rates for countries in the LAT region. Care is clearly needed in interpreting this variable since, as in the case of Argentina where the government used money creation to finance its deficit (see World Bank, 1990, pp. 101), larger values of *MONEY* may signal a loss of macroeconomic control rather than financial liberalism.

21 The regression constants in this case represent autonomous growth during period 1: 1970-75. Period dummies represent *differences* from 1970-75.

The foreign aid variable has a larger coefficient in both regions than for the sample of developing countries as a whole (Table 3). It is significant at the 10 % level in Latin America and at marginally over 10% in SSA. As might be expected, the non-linear effect of aid is confirmed for Latin America (with the quadratic term significantly negative at 5 %) but not for SSA. We interpret this result as evidence that SSA, with its generally lower levels of development and public capital stock (much of it aid-financed) can reap greater benefits than Latin America, *ceteris paribus*, from additional aid inflows.[22]

As a further test of the robustness of our results to sample composition, we sub-divide our original sample into low/middle income countries (using the World Bank's, *World Debt Tables*, 1993, categories) and high/low foreign aid receiving countries (above/below the median aid/GDP ratio). Results are reported in Table 6. This appears to support the view sometimes expressed in the aid literature that foreign aid has been less effective at raising growth rates in initially low income, compared with initially middle income, countries. There is also evidence that high aid receivers (foreign aid of 12.6% of GDP or above) have a positive aid impact on growth (though the optimal aid allocation is not the maximum). Evidence for a positive impact of aid in low aid receivers however is statistically very weak. These results are in line with those of Boone (1994) who found that aid was effective in countries which received aid in excess of 15% of their GNP. One interpretation therefore is that for foreign aid to be effective *in growth terms* it should be above (and below) some threshold level(s) and that the recipient country should also be above a threshold level of economic development.

Finally it is useful to examine the effectiveness of aid in stimulating faster growth by comparing the results from our alternative samples and procedures. Table 7[23] summarises our results, where "aid effectiveness" is defined, from equation (4), as follows:

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22 In fact an F-test conducted on the pooled LAT and SSA sub-samples confirms equality of the *FAIDOECD* coefficients for both regions ($F_{13, 138} = 0.67$), so that regional differences in the effectiveness of aid are essentially captured by the quadratic term for LAT. (The pooled regression result is given in Appendix 3, Table 1).

23 Relevant parameter estimates from the alternative methods are summarised in Appendix 3, Table 2

$$\frac{\P\,(\text{GROWTH})}{\text{FOREIGN AID}} = \beta_1 + 2\beta_2(\text{mean of } \textit{FAIDOECD})$$

It can be seen from the table that overall the panel data generally reports lower aid effectiveness values that their cross-section counterparts, suggesting that cross-section studies may overestimate the positive impact of aid on growth. The panel data results suggest that for developing countries as a whole, a one percentage point increase in the aid/GDP ratio raises growth by just under 0.1 of a percentage point per year (for a country with the mean aid/GDP ratio). These effects are not large but do appear to be statistically robust. For Latin America and Sub-Saharan Africa however aid appears to have been more effective than elsewhere in the developing world, raising growth by about 0.2 percentage points per year.

5. Conclusions

This paper has sought to make a contribution to the empirical debate over the ability of foreign aid to developing countries to stimulate faster growth. We have used an augmented Fischer-Easterly type growth model in which macroeconomic and policy variables, in addition to foreign aid and other (domestic and foreign) source of investment, are allowed to affect long-run growth rates. Our results emphasise the importance of controlling appropriately for other growth determinants when measuring the impact of foreign aid. They also confirm that the external economic environment has important implications for the growth performances of developing countries. In particular we find robust evidence, from a variety of samples and alternative econometric techniques, that greater foreign aid inflows have a beneficial effect on LDC growth, *conditional on* a stable macroeconomic policy environment in those countries. Our results also suggest however that there is an optimal aid allocation in terms of growth effects: while low amounts of aid do not appear to generate faster growth, very high aid/GDP ratios are also associated with slower growth. Our results consistently put this optimum at around 40-45%.[24]

Some caveats are in order however. Our results suggest negligible growth effects of foreign aid (small and statistically insignificant parameters) in low income countries

and those receiving only small amounts of aid (less than about 13% of their GDP). This is compatible with some other recent evidence (e.g. Boone, 1994) and may explain why some earlier studies, with a large proportion of their samples in this low income category, have failed to identify significant aid-growth effects.[25] Alternatively it may arise from the familiar endogeneity problem whereby some low income, low growth countries have attracted substantial amounts of aid. Issues of sample composition and endogeneity deserve further attention.

A second issue concerns the choice of sample period. Studies using data up until the mid-1980s have mostly found evidence of an insignificant impact of foreign aid on growth, while the evidence here and that of Hadjimichael *et al.* (1995) and Burnside and Dollar (1997), using more recent data, suggest stronger aid impacts. One possible interpretation is that in pre-trade liberalisation phases aid was less effective at generating faster growth, but post-liberalisation aid, linked as it is to policy reform, has been much more effective. This interpretation is consistent with the evidence of Burnside and Dollar, who generally find an aid/GDP ratio to be a significant determinant of growth *only in combination (multiplicatively) with an index of good macroeconomic policy/stability*. Though we have not investigated such interactions here, our evidence suggests that aid is a significant growth determinant even when policy variables are entered independently. Indeed, when we omit the 'Fischer-Easterly' policy variables from our panel regressions but retain all four sources of investment finance (aid, private inflows, domestic savings and 'other inflows'), results for our aid variable are little changed. This would seem to suggest that the inclusion of policy variables provides a more fully specified model, but aid-growth effects are not dependent on it. Again, further research on the role of policy and policy reform would be useful, specifying reform periods carefully and perhaps distinguishing reformers from non-reformers.

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24 For example using the random effects model (with regional dummies) in Table 3, the optimal aid/GDP ratio is found to be 41% ($=-\beta_1/2\beta_2$). Similar calculations for the LAT and SSA regions yield values of 45% and 42% respectively.

25 Note that our sample excludes small countries (population less than one million in 1993) and countries receiving foreign aid in excess of 40% of their GDP.

Finally, it is worth noting that the growth effects of *private* capital inflows (which were not picked up in the cross-section setting) appear robustly positive using panel techniques. Indeed the magnitude of the growth impact of private inflows appears to be higher than for any other sources of capital, and there is strong statistical support for the inclusion of these sources of investment finance in the growth model.

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Table 1: Cross-Section Regression Results (OLS)

Dependent Variable: Average GDP Growth 1970-1993 (N = 58).

Independent Variables	Column 1	Column 2	Column 3	Column 4
Constant	2.3535 (0.0261)**	2.5891 (0.009)***	3.1593 (0.000)***	3.6454 (0.000)***
FAIDOECD	0.20158 (0.092)*	0.19869 (0.074)*	0.087723 (0.016)**	-
FAIDOECDSQ	-0.004259 (0.319)	-0.004168 (0.286)	-	-
AIDPOP	-	-	-	0.01555 (0.046)**
PRIV	-0.1987 (0.154)	-0.24668 (0.061)*	-0.21409 (0.093)*	-0.2128 (0.106)
SAV	0.12780 (0.000)***	0.11369 (0.000)***	0.1020 (0.000)***	0.075215 (0.005)***
OTHERIFS	0.017703 (0.259)	0.025031 (0.093)*	0.025705 (0.085)*	0.027962 (0.068)*
TOT	-0.01702 (0.853)	-	-	-
WOPEN	-	0.010497 (0.009)***	0.010568 (0.009)***	0.010969 (0.008)***
MONEY	0.03781 (0.032)**	0.036089 (0.027)**	0.032717 (0.041)**	0.032576 (0.046)**
BSUR	0.31884 (0.000)***	0.30719 (0.000)***	0.29859 (0.000)***	0.29377 (0.000)***
INFSTD	-0.000994 (0.110)	-0.000773 (0.180)	-0.000989 (0.070)*	-0.000484 (0.345)
LAT	-1.2446 (0.035)**	-1.6252 (0.005)***	-1.7777 (0.002)***	-1.9195 (0.001)***
SSA	-1.3591 (0.025)**	-1.5911 (0.006)***	-1.4942 (0.009)***	-1.2466 (0.024)**
R^2	0.60639	0.65981	0.65122	0.63729
Adj.R^2	0.51227	0.57846	0.57702	0.56011
F	8.44***	8.11***	8.78***	8.26***
RSS	96.70	83.58	85.69	89.11
Breusch-Pagan χ^2	16.46	7.38	7.64	3.27
Jarque-Bera statistic	3.90	1.64	0.97	0.99

Note: p-values in parentheses. Where heteroscedasticity was detected, based on the Breusch-Pagan χ^2 test (at the 10% level of significance) p-values are reported following the Mackinnon-White correction. The Jarque-Bera normality test is based on the OLS residuals, is asymptotically distributed as a χ^2, testing the null of normality. *** (**; *) indicates significance at the 1% (5%; 10%) level.

Table 2: Two-way fixed effects model (OLS)

Number of observations: 238 ; Parameters: 76 ; Degrees of Freedom : 162 Residual Sum of Squares: 875.44 R^2 = 0.63775 ; $\bar{R}^2$ = 0.47004 ; F [75, 162] = 3.80***				
Independent Variables	**Coefficient**	**Standard Error**	**t-ratio**	**Probability Value**
FAIDOECD	0.17604	0.08021	2.195**	0.029
FAIDOECDSQ	-0.001963	0.00095	-2.064**	0.040
PRIV	0.39631	0.08218	4.822***	0.000
SAV	0.018366	0.04027	0.456	0.648
OTHERIFS	0.45762	0.00842	0.543	0.587
TOT	0.070834	0.03049	2.323**	0.021
MONEY	0.008783	0.02329	0.377	0.707
BSUR	-0.03128	0.04294	-0.729	0.467
INFSTD	-0.001203	0.00053	-2.282**	0.023
Constant	1.7166	1.2873	1.334	0.184

Note: * significant at least at the 10 % level.

** significant at least at the 5 % level.

*** significant at least at the 1 % level.

Table 3: Generalised Least Squares Regression with regional dummies

Number of observations: 238 ; Parameters: 12 ; Degrees of Freedom : 226 Residual Sum of Squares: 1647.99 GLS R^2 = 0.322251 ;OLS R^2 = 0.334395				
Independent Variables	Coefficient	Standard Error	t-ratio	Probability Value
FAIDOECD	0.10127	0.04489	2.256**	0.024
FAIDOECDSQ	-0.001235	0.0061	-2.012**	0.044
PRIV	0.23713	0.06240	3.800***	0.000
SAV	0.06391	0.02017	3.168***	0.002
OTHERIFS	0.00595	0.00716	0.830	0.406
TOT	0.08977	0.02725	3.294***	0.001
MONEY	0.00744	0.01026	0.725	0.468
BSUR	0.06606	0.03308	1.997**	0.046
INFSTD	-0.00148	0.00046	-3.199***	0.001
LAT	-1.6667	0.44131	-3.777***	0.000
SSA	-1.7345	0.46473	3.732***	0.000
Constant	3.3342	0.91359	3.650***	0.000

Note: Details as in Table 2.

Table 4: GLS Regression for Latin American and Caribbean Region

Number of observations: 74 ; Parameters: 13 ; Degrees of Freedom : 61 Residual Sum of Squares: 261.06 GLS R^2 = 0.598965 ;OLS R^2 = 0.61077				
Independent Variables	Coefficient	Standard Error	t-ratio	Probability Value
FAIDOECD	0.21840	0.12046	1.813*	0.070
FAIDOECDSQ	-0.002453	0.00127	-1.927*	0.054
PRIV	0.37362	0.10402	3.592***	0.000
SAV	-0.010875	0.04808	-0.226	0.821
OTHERIFS	-0.00933	0.00962	0.970	0.334
TOT	0.11359	0.04705	2.414**	0.016
MONEY	-0.01454	0.02641	-1.718*	0.086
BSUR	0.08568	0.04669	1.835*	0.067
INFSTD	-0.12619	0.00037	-3.374***	0.001
PER2	-0.7006	0.61405	-1.141	0.254
PER3	-2.2750	0.69196	-3.288***	0.001
PER4	-1.3731	0.67206	-2.043**	0.021
Constant	5.3826	1.3276	4.052***	0.000

Note: Details as in Table 2.

Table 5: GLS Regression for Sub-Saharan African Region

Number of observations: 90 ; Parameters: 13 ; Degrees of Freedom : 77 Residual Sum of Squares: 756.04 GLS R^2 = 0.337226 ;OLS R^2 = 0.37536				
Independent Variables	Coefficient	Standard Error	t-ratio	Probability Value
FAIDOECD	0.19652	0.12286	1.600	0.109
FAIDOECDSQ	-0.002352	0.00265	-0.887	0.375
PRIV	0.32432	0.11299	2.870***	0.004
SAV	0.04372	0.04015	1.089	0.276
OTHERIFS	0.00302	0.01038	0.291	0.771
TOT	0.09460	0.04763	1.986**	0.047
MONEY	0.02273	0.03251	0.699	0.484
BSUR	-0.03693	0.06020	-0.613	0.539
INFSTD	-0.00359	0.00192	-1.872*	0.061
PER2	-2.0316	0.79015	-2.571***	0.010
PER3	-2.6074	0.85664	-3.044***	0.002
PER4	-2.6458	1.006	-2.644***	0.008
Constant	1.8498	1.44376	1.287	0.198

Note: Details as in Table 2.

Table 6: GLS Panel Regressions for Alternative Groupings

Dependent Variable: GDP Growth rate.

Independent Variables	Low Income Countries	Middle Income Countries	Low Foreign Aid Receivers	High Foreign Aid Receivers
Constant	3.6378 (0.000)***	2.7549 (0.012)**	3.7198 (0.001)***	1.9874 (0.065)*
FAIDOECD	-0.091347 (0.301)	0.23091 (0.010)***	0.0079192 (0.984)	0.17863 (0.010)***
FAIDOECDSQ	0.002104 (0.279)	-0.002579 (0.008)***	0.01124 (0.836)	-0.002032 (0.017)**
PRIV	0.21327 (0.084)*	0.35506 (0.000)***	0.57814 (0.000)***	0.18834 (0.032)**
SAV	0.01502 (0.705)	0.06058 (0.070)*	0.014711 (0.669)	0.062001 (0.106)
OTHERIFS	-0.002812 (0.730)	0.011125 (0.358)	0.004545 (0.569)	0.004595 (0.682)
TOT	0.12380 (0.010)***	0.042935 (0.192)	0.058588 (0.052)*	0.10581 (0.016)**
MONEY	0.018523 (0.347)	0.016365 (0.330)	0.008576 (0.569)	0.02294 (0.319)
BSUR	-0.01357 (0.802)	-0.005932 (0.894)	-0.00337 (0.930)	0.040544 (0.464)
INFSTD	-0.004217 (0.005)***	-0.000999 (0.035)**	-0.002685 (0.000)***	-0.000629 (0.316)
PER2	-0.2554 (0.678)	-1.5960 (0.004)***	-1.3419 (0.008)***	-1.004 (0.124)
PER3	-0.68078 (0.309)	-3.2669 (0.000)***	-2.3541 (0.000)***	-2.2957 (0.001)***
PER4	-0.16311 (0.836)	-2.0514 (0.001)***	-0.97803 (0.070)*	-2.3379 (0.006)***
GLS R^2	0.263888	0.371122	0.35566	0.296242
OLS R^2	0.28441	0.40089	0.40676	0.318110
RSS	417.46	1084.97	849.36	761.47
N	98	140	125	113

Note: Details as in Table 2.

Table 7: Summary of Foreign Aid Effectiveness Results

	Mean of *FAIDOECD (%)*	Aid Effectiveness (at mean aid levels)
Cross-section Regressions (OLS): 1870-93		
	6.49	0.144 (0.088)
	6.49	0.168
Panel Regressions (OLS and GLS)		
Two-Way Fixed Effect Model (OLS)	6.71	0.150
One-Way Fixed Effect (OLS) (with Regional Dummies)	6.71	0.081
Two-Way Random Effects (GLS)	6.71	0.078
GLS (Random Effect Model with Regional Dummies)	6.71	0.085
GLS Regression for Latin American and Caribbean Region	3.14	0.203
GLS Regression for Sub-Saharan African Region	11.78	0.200
GLS Regression Pooling LAT and SSA	7.8795	0.110
GLS Regression for Low Income Countries	10.99	[-0.045]*
GLS Regression for Middle Income Countries	3.71	0.21178
GLS Regression for Low Foreign Aid Receivers	1.42	[0.040]*
GLS Regression for High Foreign Aid Receivers	12.56	0.12596

- Based on parameters insignificantly different from zero.

Appendix 1 Table 1: Cross-Section (Augmented Barro) Regressions (OLS, N= 58).

Independent Variables	**1**	**2**	**3**
Constant	5.0806 (0.032)**	8.4329 (0.000)***	5.6461 (0.004)***
INV	0.15712 (0.010)***	-	
FAIDOECD	-	0.26061 (0.158)	0.25630 (0.029)**
FAIDOECDSQ	-	-0.00845 (0.151)	-0.006816 (0.107)
PRIV	-	-0.11765 (0.486)	-0.23687 (0.066)*
SAV	-	0.12037 (0.014)**	010311 (0.003)***
OTHERIFS	-	0.00318 (0.773)	0.020791 (0.151)
WOPEN	-	-	0.009786 (0.013)**
MONEY	-	-	0.04158 (0.018)**
BSUR	-	-	0.27722 (0.000)***
INFSTD	-	-	-0.000368 (0.524)
GNP70	5.56×10^{-10} (0.533)	3.40×10^{-12} (0.734)	0.461×10^{-11} (0.725)
PRIM70	-0.00493 (0.966)	-0.01192 (0.336)	-0.00264 (0.838)
SEC70	-0.06256 (0.008)***	-0.06725 (0.005)***	-0.056003 (0.020)**
FERTI93	-0.49706 (0.104)	-0.86755 (0.007)***	-0.48213 (0.065)*
LAT	-1.4655 (0.003)***	-1.4358 (0.009)***	-1.4359 (0.016)**
SSA	-1.3953 (0.050)**	-1.5707 (0.026)	-1.6371 (0.009)***
R^2			0.72013
Adj.R^2	0.45978	0.38404	0.62017
F	7.93***	4.23**	7.20***
RSS			68.76
Breusch-Pagan χ^2	30.19***	31.16***	9.91
Jarque-Bera statistic			0.60

Appendix 1 Table 2: One-way fixed effect model with regional dummies

Number of observations: 238 ; Parameters: 15 ; Degrees of Freedom : 223 Residual Sum of Squares: 1506.49 R^2 = 0.38045 ; $\bar{R}^2$ = 0.34155 ; F [14, 223] = 9.78***				
Independent Variables	**Coefficient**	**Standard Error**	**t-ratio**	**Probability Value**
FAIDOECD	0.10532	0.04852	2.170**	0.031
FAIDOECDSQ	-0.001284	0.00066	-1.937*	0.054
PRIV	0.23379	0.06739	3.469***	0.001
SAV	0.065115	0.02176	2.992***	0.003
OTHERIFS	0.006064	0.00772	0.782	0.433
TOT	0.086528	0.02949	2.934***	0.004
MONEY	0.0086517	0.01112	0.778	0.437
BSUR	0.067342	0.03576	1.883*	0.0609
INFSTD	-0.001454	0.00049	-2.922***	0.004
LAT	-1.6470	0.47584	-3.461***	0.001
SSA	-1.7307	0.50081	-3.456***	0.001
Estimated Fixed Effects				
	Group Size	Coefficient	Standard Error	t-ratio
Period 1	58	4.4444	0.74351	5.978***
Period 2	63	3.4385	0.80671	4.262***
Period 3	62	2.3451	0.8589	2.730***
Period 4	55	2.7829	0.89526	3.108***

Note: Details as in Table 2.

Appendix 2 List of sample countries

Algeria	Malaysia
Argentina	Mali
Bangladesh	Mauritania
Benin	Mauritius
Bolivia	Mexico
Botswana	Morocco
Brazil	Nepal
Burkina Faso	Niger
Burundi	Nigeria
Cameroon	Oman
Central African Republic	Pakistan
Chad	Panama
Chile	Papua New Guinea
China	Paraguay
Colombia	Peru
Congo	Philippines
Costa Rica	Portugal
Cote d'Ivoire	Rwanda
Dominican Republic	Senegal
Ecuador	Sierra Leone
Egypt	Sri Lanka
El Salvador	Sudan
Gabon	Syrian Arab Republic
Gambia, The	Tanzania
Ghana	Thailand
Guatemala	Togo
Honduras	Trinidad and Tobago
India	Tunisia
Indonesia	Turkey
Jamaica	Uruguay
Kenya	Venezuela
Korea, The Republic	Zaire
Madagascar	Zambia
Malawi	Zimbabwe

Appendix 3 Table 1: GLS Regression Pooling Latin American and Caribbean and Sub-Saharan African countries

Number of observations: 164 ; Parameters: 13 ; Degrees of Freedom : 151 Residual Sum of Squares: 1080.88 GLS R^2 = 0.39763 ;OLS R^2 = 0.40433				
Independent Variables	Coefficient	Standard Error	t-ratio	Probability Value
FAIDOECD	0.13567	0.05215	2.602***	0.009
FAIDOECDSQ	-0.00162	0.00068	-2.397**	0.017
PRIV	0.36351	0.08256	4.403***	0.000
SAV	0.032753	0.02914	1.124	0.261
OTHERIFS	0.004947	0.00785	0.630	0.529
TOT	0.088159	0.03636	2.425**	0.015
MONEY	0.009099	0.02054	0.443	0.658
BSUR	0.04445	0.0408	1.089	0.276
INFSTD	-0.001243	0.00492	-2.526**	0.012
PER2	-1.5318	0.56993	-2.688***	0.007
PER3	-2.6479	0.61205	-4.326***	0.000
PER4	-2.1180	0.65555	-3.231***	0.001
Constant	3.045	0.86773	3.509***	0.000

Appendix 3 Table 2: Summary of Aid Parameters from Regressions

Cross-section Regressions (OLS): 1970-93			**Panel Regressions (OLS and GLS)**		
	FAIDOECD	FAIDOECDSQ		FAIDOECD	FAIDOECDSQ
Augmented Fischer-Easterly Model	0.19869 (0.074)*	-0.004168 (0.286)	Two-Way Fixed Effect Model (OLS)	0.17604 (0.029)**	-0.001963 (0.040)**
Augmented Barro-Type Model	0.25630 (0.029)**	-0.006816 (0.107)	One-Way Fixed Effect (OLS) (with Regional Dummies)	0.10532 (0.031)**	-0.001284 (0.054)*
			Two-Way Random Effects (GLS)	0.09386 (0.033)**	-0.001156 (0.040)**
			GLS (Random Effect Model with Regional Dummies)	0.10127 (0.024)**	-0.0012348 (0.44)**
			GLS Regression for Latin American and Caribbean Region	0.21840 (0.070)*	-0.002453 (0.054)*
			GLS Regression for Sub-Saharan African Region	0.19652 (0.109)	-0.002352 (0.375)
			GLS Regression Pooling LAT and SSA	0.13567 (0.009)***	-0.00162 (0.017)**
Low Income Countries	0.05174 (0.778)	-0.003536 (0.590)	GLS Regression for Low Income Countries	-0.09135 (0.301)	0.0021038 (0.279)
Middle Income Countries	0.33483 (0.064)*	-0.008515 (0.275)	GLS Regression for Middle Income Countries	0.23091 (0.010)***	-0.002579 (0.008)***
Low Foreign Aid Receivers	0.70193 (0.526)	-0.10660 (0.715)	GLS Regression for Low Foreign Aid Receivers	0.0079192 (0.984)	0.01124 (0.836)
High Foreign Aid Receivers	0.34150 (0.165)	-0.010497 (0.195)	GLS Regression for High Foreign Aid Receivers	0.17863 (0.010)***	-0.002032 (0.017)**

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