Allocation of Foreign Aid: New Evidence for Developing Countries

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Abstract

This paper examines the importance of reverse flows in the allocation of foreign aid in 61 developing countries from 1980 to 2006. Using the Pooled Mean Group (PMG) approach, our results suggest that 23%-25% of any increase in foreign aid was directed towards financing reverse flows. 77% percent was consumed but no significant amount of increases in aid was found to be invested. Region-specific results suggest that approximately half of the increases in aid were directed to financing reverse flows in Sub-Saharan Africa from 1980-2006. Almost 19% of that increase in aid was used to finance reverse flows in the Americas. Finally, for the rest of the developing countries (which covers countries from North Africa, Asia and the Pacific) the reverse flow effect of aid was around 16%-20%. Approximately 36% of any incremental amount of foreign aid was used to increase consumption, while approximately 44% was invested. Findings from these results depart from the assumption made by existing literature that all aid is used to increase consumption and/or investment. Instead, we argue that foreign aid has three destinations in developing countries: consumption, investment and financing reverse flows.

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1. Introduction

In conjunction with the commitment to an increased effort at poverty reduction on the part of developing countries, the United Nations Millennium Declaration of 2000 also mandated a substantial increase in development assistance to these countries (United Nations, 2000). In the five-year period following that declaration, official development assistance (ODA) more than doubled (from US$50 billion in 2000 to US$107 billion in 2005). Such a large increase in foreign resource inflows could potentially provide an important boost for growth. Whether it does will depend, at least in part, on the degree to which these resources can be directed toward enhancing economic activity.

Recent reviews of the literature on the relationship between aid, saving and investment suggest that while aid may have a positive overall effect on domestic investment it also appears to be a partial substitute for domestic savings and thereby increasing consumption (Hansen and Tarp, 2000; Doucouliagos and Paldam, 2006). In short, aid is partly invested and partly consumed. However, given the large amount of external debt carried by many developing countries, particularly since the early 1980s, it is a reasonable supposition that some portion of the foreign exchange implied by aid inflows will be used to finance external debt servicing. It has also been acknowledged that foreign aid contributes to capital flight from developing countries (Quazi, 2004), and is also used to increase the stock of foreign reserves (Aiyar et al, 2005). The part of aid that contributes to capital outflows (i.e. reverse flows) cannot contribute directly to increases in the rate of consumption or investment.[2] This begs the question as to how much of aid contributes directly to the enhancement of domestic consumption and investment rates.

Existing empirical literature has mostly ignored the potential diversion of aid to reverse flows. It is generally presumed that all aid contributes either to consumption or investment. The aim of this paper is to determine the importance of reverse flows in the allocation of aid across developing countries over the period of 1980 to 2006. This is done is following steps. First, we use the national income identity and balance of payments equations to derive how aid is allocated in developing economies. Our results suggest that foreign aid is used to finance consumption, investment and reverse flows. Second, we conduct panel unit root tests suggested by Hadri (2000). We find that most of the variables under consideration are cointegrated. Based on these results, we employ the Pooled Mean Group (PMG) approach developed by Pesaran et al. (1999)

[2] It can be argued that the use of aid-sourced foreign exchange to meet debt service obligations frees up domestic resources to be used for consumption or investment. However, where aid is given in the form of debt forgiveness and where the alternative would have been the accumulation of arrears that is not necessarily the case. Even though the resources may not be totally lost to the domestic economy, the substitution (of foreign for domestic resources) is much less than one to one.

to estimate long-run relationships between aid and consumption, investment, and net exports. Finally, these relationships are used to derive estimates of the proportion of aid diverted to reverse flows. These estimates are first derived for a group of 61 developing countries and then for three-sub regions.

The context, methodology and results of this research are presented as follows: section 2 presents the theoretical and empirical background to the research. Section 3 provides a basic national income accounting framework to revisit the allocation of foreign aid. Section 4 outlines the methodology to be used to derive relevant results. Section 5 presents those results and section 6 concludes the paper.

2 Literature Review on Aid and Resource Mobilization

2.1 The Theoretical Literature

The literature on the importance of official development assistance (ODA) is part of the broader literature relating to the efficacy of aid. The first formal model by Chenery and Strout (1966) explained the importance of foreign assistance in resource mobilization for growth. According to this model, developing countries might face two potential resource constraints, i.e. savings constraint and foreign exchange constraint, in attempting to achieve desired rates of growth. Foreign resource inflows may remove these constraints, at least in the immediate term, by providing sufficient foreign exchange to overcome the foreign exchange constraint and supplementing domestic savings to bridge the gap between domestic savings and investment. An explicit assumption of the two-gap approach is that all of foreign assistance is directed at investment (Chenery and Strout, 1966). It thus follows that foreign assistance is sufficient to achieve the desired growth effect and, therefore, the potential for moving beyond the need for foreign assistance in the future is a credible prospect. This assumption was almost immediately challenged by Rahman (1967). Rahman developed an overlapping-generation model in which an aid receiving country attempted to maximize a social preference function and achieved a target rate of national income. The general conclusion of Rahman's model suggests that aid can be used for consumption and/or investment without burdening the future generation so long the marginal output-capital ratio (within a finite time period) of an aid receiving country is higher than the rate of interest it pays on aid. Based on Rahman's results, Griffin and Enos (1970) argued that if foreign resources arrived in the form of concessional loans and grants (aid) whose cost were, in all likelihood, much lower than the marginal rate of return on domestic investment, these resources would be preferred substitutes for domestic resources (savings). In other words, even if aid is used wholly for investment purposes, its relationship to domestic savings will not be additional but substitutive. Therefore, foreign aid flow will be used to accommodate an increase in domestic consumption and, by definition, reduce domestic savings even if overall investment levels increase or remains the same. Even though aid is sufficient it will not bridge the savings gap.

Most of the existing literature views foreign aid as being used for either consumption or investment (or some combination of the two). One important caveat, noted by Rahman (1967), has largely been ignored by researchers. Rahman argued that the allocations foreign aid on consumption and investment depended on the amount of aid that was available after financing debt service payments.[3] In short, there is a potential loss of resources for the domestic economy from the diversion of foreign aid to "reverse flows" (as Rahman referred to it). As countries' debt burdens go up, such potential losses needed to be taken into account in assessing the impact of aid. Reserve accumulation and capital flight provide similar potential diversions of external flows such as aid.

The precise role of foreign aid is not immediately clear in the theoretical literature. Confounding results on the actual allocation of aid in developing countries thus warrant for further empirical investigations.

2.2 The Empirical Literature

In recent years, two studies have reviewed a significant number of literatures on aid, savings, and investment (which goes back to the 1960s) with the goal of establishing the consensus view on these relationships. Hansen and Tarp (2000) attempted a straightforward examination of the results to determine what the balance of the evidence might suggest. In the second study, Doucouliagos and Paldam (2006) attempted to derive mean coefficient estimates (for aid in savings equations) from the literature to determine not only summary coefficient estimates but also the degree to which the estimated coefficients of past studies could be considered relatively unadulterated (and therefore, trustworthy) interpretations of the data.

Hansen and Tarp (2000) examined 41 aid-savings regressions. Only one of these studies had reported a coefficient of greater than zero for the aid-savings elasticity (implying that an increase in aid caused a reduction in consumption). While some suggested a negative but insignificant coefficient (for aid in an estimated savings equation), however, more than 60% of the studies found a negative and significant statistical relationship between aid and savings (implying that, at the margins, aid is at least partially consumed). For 39 of the 41 studies, Hansen

[3] This, of course, involves an implicit assumption, that was there were no other major source of external flows and exports were required to finance necessary imports.

and Tarp (2000) were able to derive the test statistic for the null hypothesis that the aid coefficient (in the savings equations) is equal to -1. A coefficient of -1 implies all of the aid is consumed. They found that for 20 of the 39 studies the derived test statistic did not allow rejection of the (null) hypothesis of a coefficient of -1. The null hypothesis was rejected for 18 out of those 29 studies, suggesting instead that the aid coefficient was greater than -1 (i.e., at least some aid is invested). Hansen and Tarp (2000) concluded that the balance of evidence suggests the aid-savings elasticity is between 0 and -1; meaning that some aid is typically invested and some of it is consumed.

In a meta-study, Doucouliagos and Paldam (2006) attempted to estimate the average size of the coefficient for the aid-output ratio in savings and investment rate equations from studies that used multi-country samples covering several developing regions. Their broad conclusion is that an increase in aid leads to a decrease in domestic savings (or increase in consumption) by 60%, while an increase in aid increased investment by around 25%. It should be noted that if aid is simply used for consumption and investment (the typical assumption in the literature) the investment-aid elasticity and the consumption-aid elasticity (the negative of the savings-aid elasticity) should add up to 1.[4,5] Doucouliagos and Paldam's conclusions suggest that consumption and investment do not account for all of the aid.

Until recently, the potential importance of reverse flows in the allocation of aid was not directly addressed in the empirical literature. However, some scholars have pointed out the relevance of these flows. Loxley and Sackey (2008) used a pooled cross-section time series dataset to estimate the aid-growth relationship for 40 member countries of the African Union. Their results suggested that aid did matter for growth in these countries. Loxley and Sackey (2008) also mentioned that African countries should strategize to reduce future dependence on aid because future debt servicing obligations are entailed by aid in the form of concessional loans (Loxley and Sackey, 2008, pp: 191). Quazi (2004) applied the Engle-Granger cointegration procedure toward estimating the long-run equilibrium and short term dynamic behavior of capital flight from Bangladesh and argued that the inflow of foreign aid into had contributed significantly to the flight of domestic capital. Aiyar et al. (2005) argued that in 2001 the governments of Ethiopia and Ghana used most of the foreign exchange from their aid receipts to accumulate reserves. They concludes that aid was used to accumulate foreign reserves, and therefore, was not effective to finance domestic spending" (Aiyar et al, 2005).

[4] If foreign assistance is used for consumption, by definition, it reduces domestic savings.
[5] When investment and consumption are measured as ratios of output.

A recent comprehensive work by Serieux (2011) directly addressed the role of reverse flows (in the form of debt service payments, capital flight and reserve accumulation) in the allocation of aid and criticized the underlying assumption in the literature that aid is either used to displace savings (add to consumption) or to increase investment. Using a panel data set of 29 countries in Sub-Saharan Africa over the period 1980 to 2006, Serieux's results suggested that nearly 50 percent of any increase in aid went towards financing reverse flows. The intuition is straightforward. For any dollar of aid, if 50 cents is used to service debt, finance capital flight or accumulate reserves, then only 50 cents will be available for adding to consumption or investment relative to output.[6] It is evident from Serieux (2011) that at least for Sub-Saharan Africa a significant proportion of aid is used to finance reverse flows. Therefore, any study that does not consider the impact of aid on reverse flow overestimates the direct impact of aid on the economy (through consumption and investment).

Given the importance of reverse flows in the allocation of foreign aid, it is important to answer these following questions: how much of an incremental amount of aid is used for consumption and investment? Does aid finance reverse flows in developing countries? Does the reverse flow effect of aid vary across different developing regions? The following section employs some basic accounting identities to explain how reverse flows fit into the aid allocation decision at the macro-economy level.

3. National Income Accounting and the Allocation of Aid

Much of the existing literature argues that foreign aid is used only for consumption and investment. The implicit assumption behind this argument is that all additional foreign aid is eventually used to expand the trade deficit. This can be seen from a simple derivation of the basic national income identity where output is the summation of consumption, investment and net exports. For simplicity, we assume that the total consumption includes both private and public consumption and total investment includes private and public investment.

$$
\begin{aligned}
& Y \equiv C + I + NX \\
& \Rightarrow 1 = c + i + nx \\
& \Rightarrow -nx = c + i \\
& \Rightarrow -\frac{\partial nx}{\partial a} = \frac{\partial c}{\partial a} + \frac{\partial i}{\partial a}
\end{aligned}
$$

where Y, C, I and NX stand for GDP, consumption, investment and net exports respectively. Small letter of these notations represent same variables as a percentage of GDP. a is foreign aid to GDP

[6] It is important to note that this relationship is straightforward only when all of these ratios are measured relative to output. If aggregated themselves are used the relationship may be approximately true but may be complicated by the net effect of aid on output.

ratio. The negative of the net export ratio (the trade deficit) effect of foreign aid $\left(-\frac{\partial nx}{\partial a}\right)$ is identical to the sum of its consumption rate effect $\left(\frac{\partial c}{\partial a}\right)$ and investment rate effect $\left(\frac{\partial i}{\partial a}\right)$. If aid is used only to expand the trade deficit then it is fully accounted for by increased in the rate of consumption and/or investment. The extent to which aid expands the trade deficit depends on the extent to which it is used to finance reverse flows. The following derivation shows that whenever aid is used to finance reverse flows, it is no longer available to expand the trade deficit and thus, for increasing consumption or investment.

$$
\begin{aligned}
& CU \equiv -CA \\
& \Rightarrow nx + ntr + nfi \equiv -nf_O - nf_P \\
& \Rightarrow -nx \equiv ntr + nfi + nf_O + nf_P \\
& \Rightarrow -\frac{\partial nx}{\partial a} \equiv 1 - \frac{\partial nfi}{\partial a} - \frac{\partial nf_O}{\partial a} - \frac{\partial nf_P}{\partial a} \\
& \Rightarrow -\frac{\partial nx}{\partial a} \equiv 1 - \left(\frac{\partial nfi}{\partial a} + \frac{\partial nf_O}{\partial a} + \frac{\partial nf_P}{\partial a}\right) \\
& \Rightarrow -\frac{\partial nx}{\partial a} \equiv 1 - \frac{\partial rf}{\partial a}
\end{aligned}
$$

where CU and CA imply the current account and the capital account respectively. ntr is net transfers to GDP ratio, nfi is net foreign income to GDP ratio, nf_O is net official flows to GDP and nf_P is net private flows to GDP. The current account balance and the capital account balance are disaggregated into their components to more directly explain the relationship between net exports (the trade balance) and reverse flows (rf). Differentiating each of the components of this balance of payments identity by the aid-to-income ratio, we note that aid has a one-to-one impact on net transfers (since grant aid is part of transfers).[7] Interest payments on foreign debt (as part of net factor income), principal payments on foreign debt and reserve accumulation (as part of official flows), and capital flight (as part of private flows) are all potentially affected by foreign aid. Therefore, derivatives of all these flows with respect to foreign aid will be non-zero. Because the direction of these flows is outward the marginal effect of aid on all these flows will be negative and the larger the effect of aid on these flows the smaller will be the net export effect. When these effects (summarized as reverse flows) are taken into consideration in conjunction with the effect of aid on consumption and investment, results generate a complete summary of the marginal allocation of aid. We find the following from the last two derivations.

[7] Aid in the form of grants has a one-to-one impact on net transfers because grants enter into the current account as transfer.

$$\frac{\partial i}{\partial a}+\frac{\partial c}{\partial a}\equiv 1-\frac{\partial rf}{\partial a}$$
$$\Rightarrow \frac{\partial i}{\partial a}+\frac{\partial c}{\partial a}+\frac{\partial rf}{\partial a}\equiv 1$$

This is clear from the above that foreign aid in developing countries is allocated between consumption, investment and reverse flows. Using data for 61 developing countries, we will estimate the marginal effects of aid in the following section.

4. Methodology

4.1 Data and Estimation Procedures

Results from the last section suggest that the proportion of foreign aid that is directed to reverse flows can be estimated at least in two ways. First, the marginal amount of aid directed to reverse flows will be the residual after the (marginal) effect of foreign aid on consumption and investment have been determined (since these three effects must add up to one). Alternatively, reverse flows can also be estimated as a residual after the trade balance effect is accounted for. While it is possible, at least theoretically, to estimate the direct effects of foreign aid on each of the major types of reverse flows, behavioral equations for debt service flows and reserve accumulation are not well established in the existing literature. To avoid this problem, we first estimate the relationships between aid-to-income ratio and the consumption rate, the investment rate, and the net export (trade balance). The proportion of aid directed to reverse flows is then derived (as a residual) from these results. It should be noted that the main focus of this essay is to demonstrate the importance of reverse flows in the allocation of aid vis-à-vis consumption and investment. It is highly likely that the effect of aid on the different types of reverse flows is different. However, this is a second question which should, logically, come after the determination of whether these flows are an important part of the aid allocation decision at all. We will be concentrating on that first question here.

We use a panel dataset for 61 developing countries[8] from 1980 to 2006. The data sources for the variables used in this investigation were the Global Development Finance and the World Development Indicators by the World Bank, the International Financial Statistics prepared by the International Monetary Fund, UNDATA from the United Nations Statistical Office, and OECD Online Library of Statistical Database prepared by OECD.

[8] See Table A1 (Appendix A) for the list of countries.

4.2 Unit Root Tests

Since this panel dataset can be categorized as having a large T and large N, non-stationarity of some variables may become an issue. To determine the level of integration between the dependent and explanatory variables, Hadri's Lagrange Multiplier (LM) test (Hadri, 2000) is employed in this research. Unlike the other panel unit root tests, Hadri test has a null hypothesis of stationarity in the panel. Results (See Table A2 in Appendix A) indicate that the null hypothesis of full panel stationarity is rejected for all but one variable - the innovation in export growth (the deviation of current from past rates of growth). Applying the same tests to the first differences of these variables generally leads to non-rejection of the null hypothesis of stationarity. We can therefore conclude that these variables are mostly integrated of order one $I(1)$ –meaning that a long-run cointegrating relationship may exist among the levels of these variables. The innovation in export growth is related to short-run adjustments. The null hypothesis of stationarity is rejected for the first difference of one particular variable – the dependency ratio. To verify this result Fisher panel unit root test (applying the Phillips-Perron tests at a panel level) is used to determine the level of integration of the first difference of the dependency ratio. This test does not reject the null of non-stationarity for the dependency ratio variable. However, the null hypothesis is rejected when this test is applied to the first differences of this variable. We therefore conclude that the dependency ratio is an $I(1)$ variable.[9]

4.3 Pooled Mean Group

A primary focus of this paper is the long-run relationship between aid and consumption, investment and net export. Moreover, given most of the variables are $I(1)$, this requires an estimation procedure that distinguishes between the short and long-run relationships and potential non-stationarity across at least some panels. The Pooled Mean Group (PMG) approach, developed by Pesaran et al. (1999), is designed specifically for this type of data and utilized an error correction approach that distinguishes between the long-run (cointegrating) relationship and the short-run adjustment process. Behavioral equations of PMG can be represented in the following manner.

$$\Delta y_{it} = \theta_i \left(y_{i,t-1} - \beta'_i x_{i,t-1} \right) + \sum_{j=1}^{m-1} \delta'_{ij} \Delta y_{i,t-j} + \sum_{j=1}^{n-1} \psi'_{ij} x_{i,t-j} + \sum_{j=1}^{q-1} \xi'_{ij} z_{i,t-j} + \mu_i + \epsilon_{it}$$

[9] The differences in results between the different tests likely result from the fact that this variable is, typically, almost stationary for long periods but may undergo significant revisions after every census (i.e. every ten years) leading to an odd structure.

where $x_{i,j}$ is the vector of non-stationary variables; $z_{i,j}$ is the vector of stationary variables; μ_i represents the fixed-effect; $\in_{it}$ represents the vector of standard errors and θ_i is the error correction coefficient. β'_i represents the long run parameters, and finally, δ'_{ij} , ψ'_{ij} and ξ'_{ij} represent country specific short-run coefficient vectors.

One of the advantages of this approach is that it does not necessarily require non-stationarity across all panels (as does the panel cointegration approaches). It makes more effective use of the available data than the Mean Group (MG) approach by employing both pooling and averaging approaches. A long-run equation is estimated by pooling the data for all countries while individual short-run equations are estimated for each country and averaged to determine the short-run coefficients for the region. Another advantage of the PMG estimator is that it is less sensitive to extreme coefficient values at the panel level (Pesaran et al., 1999). The estimation results do indicate that pooling does lead to more definitive results for the long-run equation (compared to the mean group approach).

4.4 The Behavioral Equations

4.4.1 The Consumption Function

The life-cycle-permanent income hypothesis, which argues that individuals attempt to smooth consumption over their lifetime (Friedman, 1957; Modigliani and Brumberg, 1954), is the most widely used theoretical model for estimating consumption equations in the empirical studies. A shortcoming of this model is that neither the permanent income nor life-cycle hypotheses provide justification for a strong relationship between the rate of consumption and the level of per capita income or the rate of output growth. As indicated by Schmidt-Hebbel and Servén (1997), both the level of per capita income and its rate of growth are strongly related to the rate of savings (and, therefore, consumption) across developing countries. The subsistence income model provides a theoretical justification for these relationships. This model argues that in poor countries many households cannot save because income is just sufficient for subsistence consumption. As per capita income increases more households are released from the subsistence consumption constraint and overall savings increase accordingly – which, of course, implies that the rate of consumption falls (Ogaki et al., 1996). The consumption equation used in this essay is therefore a generalized model that nests the life-cycle permanent-income hypothesis as well as the subsistence income model.

$$c = f(pcy, dep, ocfy, oday, dxpg)$$

The consumption rate (c) is thus assumed to have a long run relationship with per capita income (pcy)[10], the dependency ratio (dep), other external flows to GDP ratio $(ocfy)$ and the aid to GDP ratio $(oday)$. To address the short run dynamics (as suggested by the permanent income hypothesis), a proxy for transitory income, the innovation in export growth $(dxpg)$,[11] is added to the short run equation.

4.4.2 The Investment Function

A modified version of the flexible accelerator model of investment is employed to estimate the effect of the aid to GDP ratio on the investment rate.

$$i = f(pcy, rer, ocfy, cpig, debty, oday)$$

Per capita income (pcy) and the real exchange rate (rer) are assumed to affect the desired capital stock. Aid to GDP ratio $(oday)$ and other external flows $(ocfy)$ are assumed to affect the rate at which the gap between desired and actual capital stock is bridged. The rate of inflation $(cpig)$ and the debt-to-income ratio $(debty)$ are assumed to affect both the desired capital stock and the rate at which actual capital stock reaches approaches desired level. All variables are presumed to enter the long run (cointegrating) equation in levels and the short-run equation in first difference form.

4.4.3 The Net Export Function

The net export equation employed in the paper is a combination of the traditional gross export and import equations. In the traditional models, foreign income and relative prices are assumed to be the determinants of exports, while domestic income and relative prices are assumed to be the determinants of imports. The traditional import function that assumes market clearing for imports and foreign exchange has not proved very useful in explaining the movements of imports in developing countries (Mirakhor and Montiel, 1987). A likely reason for this is that foreign exchange in developing countries is not purely price determined but is instead rationed (Hemphill, 1974). According to Hemphill (1974), it is important to include variables in the import function that reflect the availability of foreign exchange. Moran (1989) proposed a more generalized approach that incorporates both perspectives. In this model, Moran redefined the traditional import as the import demand function and Hemphill's model as an import supply function. The long run exports become an explicit function of the price and income variables as

[10] Per capita income (in $US) is logged to reflect the presumption that the relationship is non-linear.
[11] The innovation in export growth is measured as the difference between the current rate of growth of exports and the average growth rate of the previous three years.

well as the foreign exchange variables. This approach describes a long run relationship and is ideal for use in our paper.

$$nx = f(oecdcy, relp, ocfy, resy, oday)$$

Since the dependent variable is the ratio of net exports to income (nx) (rather than the level of net exports) the domestic income variable becomes redundant and the foreign income variable is replaced by an index of the ratio of foreign to domestic income $(oecdcy)$. Foreign income is defined as the sum of the income of high-income OECD countries plus China. The index of relative prices $(relp)$ is calculated as the ratio of the export price index of advanced economies and the domestic price index of each country. Finally, (nx) is also assumed to be affected in the long run by foreign exchange reserves to GDP ratio $(resy)$. Since all relevant variables are mostly non-stationary they enter the long run equation in levels and the short run equation in first differences.

5. Results and Analysis

Estimated results from the PMG estimator of the full sample of 61 countries are presented in Table B1, B2 and B3 in Appendix B. To check the consistency of PMG estimates we test it against the MG estimates. While MG estimates are always consistent (Pesaran et al., 1999), not atypically, the coefficients from the MG estimate are large and insignificant in most of the cases. Pesaran et al. (1999) suggest the use of the Hausman test. If the null hypothesis (PMG and MG estimators are not significantly different) is not rejected then the PMG results can be presumed consistent and therefore, the underlying assumption of common coefficients across panels is valid. Our results support the argument. However, it should be noted that the Hausman test is a weak one due to the large type-two error. Nevertheless, Pesaran et al (1999) argue that the PMG results may be a good estimate of average coefficients even when the stronger assumption of common coefficients is rejected because the PMG estimates are less sensitive to extreme values and errors-in-variables than the MG estimates. Despite its weaknesses the Hausman test is nevertheless used as a criterion for choosing the precise equation specification (especially in choosing the number of lags for the variables in the short run equation).

When the PMG procedure is applied to the full sample of countries, the long-run equation for the consumption rate indicates a coefficient of 0.77 for the $oday$ (Table B1). Thus, on average, 77% of additional aid is allocated to consumption in these countries. We perform a Wald test to see if the coefficient of $oday$ is different from 1. The null hypothesis that this coefficient is not differentiable from 1 is rejected. Thus, aid is not fully used for consumption. The other variables included in the long run equation are found to be insignificant. The error-correction term EC is strongly significant, which suggests a modest speed of error correction. The strongest determinant of short-term movements is the $dxpg$. In other words, short run consumption movements are strongly (and negatively) influenced by transitory income - an assumption of the permanent income hypothesis that has generally been supported in the literature.

The MG and PMG estimates of the investment rate equation are presented in Table B2. The Hausman test does not reject the null hypothesis of similar coefficient estimates across the two estimators. Investment rate is negatively influenced by $debty$, and positively influenced $ocfy$ and rer. The first difference of $cpig$ in the short run equation is significant and negative. The positive coefficient of this variable in the long run equation is contrary to the expectation if one presumes that this variable proxies for macroeconomic stability. Since $cpig$ is also negatively related to the real interest rate which often has a strong negative relationship with investment, it must be presumed that this is the stronger effect. The other variable which is found to be significant in the short run equation is the Δpcy. This result is supported by the subsistence income hypothesis. The long run coefficient for $oday$ in the investment equation is insignificant. Thus, over the long-run, any increase in $oday$ has no significant impact on capital accumulation. In reality, we cannot tell whether the absence of a significant relationship is general across countries or whether it is the result of a wide range of relationships (meaning that there is no common coefficient). Regardless, the presumption must be that aid has no common and consistent effect on investment across the sample of countries over the period of 1980 to 2006.

Table B3 presents the MG and PMG estimates of the net export equation. Results from the PMG estimates suggest that, over the long run, the nx ratio is positively affected by the $oecdcy$ and negatively affected by all other variables that enter the long run equation. All of these coefficients, except the relative price index, have the expected sign. The negative sign for the $relp$ is consistent with inelastic demand for imports. This is indeed the relationship found for one of these countries (Ghana) by Oteng-Abayie and Frimpong (2008). It is also clear from the negative $oday$ coefficient that foreign aid tends to expand the trade deficit. The magnitude of the estimated coefficient is negative 0.75: suggesting that, at the margins, an increase in the flow of aid and the resulting expansion of the trade deficit is not one to one. This result is supported by the Wald Tests which strongly rejects the null that the variable is distinguishable from minus one.

The next table (Table B4) presents derived estimates of the proportion of aid diverted to reverse flows over the period 1980-2006. The first estimate is determined by subtracting the consumption and investment coefficients from one. The second is determined by subtracting the negative of the trade balance coefficient from one. The estimated marginal effect of aid on reverse flows is 0.23 when derived as a residual after the consumption and investment effects (of aid) are accounted for. The estimated marginal effect is 0.25 when it is derived as a residual after the trade balance is accounted for. While these two numbers are not exactly equal, their proximity and the fact that the null hypothesis of equivalence is not rejected by the Wald test makes this a fairly robust result. From 1980 to 2000, around 23 to 25 per cent of each percentage point increase in foreign aid (relative to output) in this group of developing countries was directed toward the financing of reverse flows.

In this investigation, we also estimate the reverse flow effect for different regions of the developing world. The consumption, investment and net export equations are estimated for Sub-Saharan Africa, the Americas and the remaining countries (North Africa, Asia and the Pacific). We combine North Africa with Asia and the Pacific because the size of that sample is too small to validate the use of the PMG procedure. The marginal effects of reverse flows for these regions were derived in the same manner as is done for the full sample above.

Table B5 presents the MG and PMG estimates of the consumption equation for Sub-Saharan Africa. The coefficients for the log of pcy and dep are significant and have the expected signs. $dxpg$ is also found to be significant and negative in the short run equation supporting the transitory income hypothesis. PMG estimates indicate that the long run coefficient of $oday$ is 0.40, suggesting that 40% of additional flow of aid is used to increase the consumption rate in Sub-Saharan Africa. The long run coefficient for the $oday$ in the investment equation (Table B6) is 0.13. All other variables in the long run investment equation are significant and have their expected signs. These results together suggest that only 53 per cent of any additional increase in foreign assistance (relative to GDP) is used to increase consumption and investment in Sub-Saharan Africa. In other words, approximately 47% is directed to the financing of reverse flows.

The estimated long run coefficient for the $oday$ in the net exports equation (in Table B7) is -0.51. This coefficient size suggests that approximately 49 per cent of any increase in the ODA-GDP ratio is not used to finance trade deficit. This portion of the increase in the foreign aid went toward financing reverse flows. In Sub-Saharan Africa, for the 1980 to 2000 period, almost half of aid receipts was spent to meet foreign obligations rather than to boost domestic economic activity directly (Table B8).

The impact of ODA on consumption, investment and net export in the Americas are shown in Table B9, B10 and B11. pcy , dep and $ocfy$ are significant in the consumption equation. A negative dep suggests that high dependency ratio is correlated with a lower rate of consumption in these countries. While the coefficient estimate for long run pcy is positive, that for the $dxpg$ is significant and negative (at the 5% level) in the short run equation. Thus, short run consumption movements are influenced by transitory income - an assumption of the permanent income hypothesis, but that the long run consumption movement may not be explained by the same hypothesis in the Americas. A negative estimated coefficient for *ocfy* in the long run equation suggests that domestic savings rates (displacement of consumption rates) are positively related to all external flows.

Positive and significant coefficients for *ocfy* in the long run investment equation suggest that all other external flows are used to increase investment in the Americas. The log of *cpig* and *rer* are significant but do not have their expected sign. The positive sign (but significant) of the log of *cpig* is disappointing. Since that variable is also negatively (and strongly) related to the real interest rate which often has a strong negative relationship with investment it must be presumed that this is the stronger effect. A negative coefficient for the *rer* may suggest that the period of high investment coincided with a period of currency appreciation. There may be an indication that both high investment and appreciation are caused by a third factor (such as private capital flows or public loans) in the Americas. PMG estimates of the consumption and investment equations suggest that the long run impact of the ODA-GDP ratio on consumption and investment rates is not statistically significant. Given the result from the net export equation we must take that this result derives from the absence of a common coefficient (resulting in a large estimation error) rather than that the absence of any effect across all or most countries.

The long-run coefficient for ODA in the net export equation is -0.81 (Table B11), meaning approximately 19 percent of any additional aid was used to finance increases in reverse flows in the Americas from 1980 to 2006. This is slightly less than the estimated proportion for the full sample of countries. *resy* is the only other variable that is strongly significant in the export equation.

Table B13, B14 and B15 present PMG estimates for the consumption, investment and net export equations for the third group of countries, which covers countries in the sample from North Africa, Asia and the Pacific. *dep* is the only variable in the long run consumption function found to be significant although it does not have the expected sign. This result is robust to equation specifications. Implicating for this group of countries high dependency ratios are correlated with lower, rather than higher, rates of consumption. One possible explanation for this result may be that high dependency ratios are strongly associated with fast-growing countries and thus, high savings (low consumption) rates. The estimated coefficient for *dexg* is not significant in the short run equation, suggesting the consumption movement in the short run is not significantly influenced by transitory income in these countries. The coefficient of the *oday* ratio in the consumption equation is 0.36 (Table B13), suggesting 36%of each additional percentage increase in aid is used to increase consumption in North Africa, Asia and the Pacific during 1980 to 2006.

Long run investment in these countries is negatively influenced by *debty* , *rer* and positively influenced by the log of *cpig* and *ocfy* (Table B14). Although ***cpig*** and ***rer*** are significant, these variables do not have their expected signs. The possibility of a positive coefficient for *cpig* and a negative coefficient for *rer* variables has already been discussed. The long run coefficient for the *oday* in the investment equation is 0.44. This implies that 44% of additional aid is used for financing investment. Overall results thus suggest that approximately 20% (the residual amount) aid is directed to finance reverse flows in these countries (Table B16).

Results from MG and PMG estimators of the net export equation are presented in Table B15. The Hausman test rejects the null hypothesis of common coefficients between the two estimators. However, as Pesaran et al (1999) suggest, even when the assumption of common coefficients is not supported the PMG estimator may still be taken as a better indicator of the mean coefficient estimates than the MG estimator (Pesaran et al., 1999; pp: 631). Therefore, our approach will be valid if we assume the coefficient estimates are an average of the individual country estimates rather than a common coefficient. The *oecdcy* and *ocfy* are significant in the long run net export equation. *relp* and *rer* variables are not significant. The *oday* coefficient in the net export equation is -0.84 suggesting additional foreign aid tends to expand the trade deficit by 84% of that increase. In other words, approximately 16% of additional foreign aid is diverted to the financing of reverse flows in these countries.

The derived estimates for the reverse flow effect of changes in foreign aid ratios (Table B16) are 0.20 and 0.16. The null of identical estimates cannot be rejected by the Wald test but the hypothesis that the reverse flow effect is, in fact, zero is rejected for the estimate derived from the net export equation. Like the Americas, the reverse flow effect is positive but smaller than the proportion for the full sample and much smaller than the estimate for Africa.

6. Conclusion

Development economists have long argued that the large increase in the flow of aid to developing countries has the potential to increase the rate of economic growth if these resources are directed towards enhancing economic activities. However, it is not unreasonable to suppose that some portions of these additional external resources will be used to finance debt servicing. Accumulation of foreign reserves and financing of capital flight also compete for the foreign exchange that aid flows imply. If some part of aid is used to finance these reverse flows (debt servicing, capital flight and reserve accumulation) it is neither available for consumption nor domestic investment. This paper sought to determine the degree to which reverse flows have diverted resources (in a macroeconomic sense) from additional domestic economic activity in the form of consumption and investment during the period 1980-2006.

The empirical analysis, using estimates of consumption, investment and net export equations for a sample of 61 developing countries covering the period 1980 to 2006, indicates, on average, 23%-25% of any increase in foreign aid is directed towards financing reverse flows. 77% percent is consumed but no significant amount of increases in aid is shown to have been invested. Therefore, aid is mostly used for consumption with the remainder is used for financing reverse flows. Approximately one quarter of aid typically did not make it into the domestic economy. This investigation also attempted to capture the regional allocation of foreign aid. Results suggest that approximately half of the increases in aid were directed to financing reverse flows in Sub-Saharan Africa from 1980-2006. Of the remainder, most was consumed (around 40 percent) and a small proportion (around 13 percent) was invested. This echoes the findings by Serieux (2011). For the Americas, the econometric investigation could not find significant consumption or investment effect of aid. Foreign aid in this region reduced the trade balance by 81% (of the foreign aid increase), suggesting that approximately 19% of that increase in aid was used to finance reverse flows. For the rest of the developing countries (which covers countries from North Africa, Asia and the Pacific) the reverse flow effect of aid was approximately 16%-20%. Approximately 36% of any incremental amount of foreign aid was used to increase consumption, while approximately 44% was invested.

Findings from this paper depart from the assumption made by the previous literature that all aid is used to expand trade deficit and thus, allocated only to consumption and investment. In fact, we have found that foreign aid has three destinations in developing countries - consumption, investment and reverse flows (debt amortization, capital flight and reserve accumulation). The allocation of aid can only be completely summarized when the reverse flow effect is accounted for. It has significant dimensions globally as well as regionally. Any analysis that examines the direct effect of aid on consumption and investment ratios without considering its impact on reverse flows does not completely account for the macroeconomic allocation of aid.

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APPENDICES

Appendix A

Table A1: List of Developing Countries in the Sample

Algeria	Egypt, Arab Rep.	Malaysia	Sierra Leone
Bangladesh	El Salvador	Mali	Sri Lanka
Benin	Fiji	Mauritania	Swaziland
Botswana	Gabon	Mexico	Syrian, Arab Rep.
Burkina Faso	Gambia, The	Morocco	Tanzania
Burundi	Ghana	Nepal	Thailand
Cameroon	Guatemala	Nicaragua	Togo
Central African Rep.	Guyana	Niger	Tunisia
Chad	Haiti	Nigeria	Turkey
Chile	Honduras	Pakistan	Uganda
Colombia	Indonesia	Papua New Guinea	Uruguay
Congo, Rep.	Jamaica	Paraguay	Zambia
Costa Rica	Kenya	Peru	Zimbabwe
Cote d'Ivoire	Lesotho	Philippines	
Dominican Republic	Madagascar	Rwanda	
Ecuador	Malawi	Senegal	

Table A2: Stationarity Tests for Relevant Variables: Full and Individual Panel (Country) Tests

Variable	Hadri Panel Stationarity Test (null of stationarity)	
	Level	Difference
c	30.24***	-5.36
pcy	67.23***	-1.97
dep	117.22***	85.52***
dep	97.16†	214.12***†
dxpg	-3.03	-
ocfy	18.30***	-7.01
oday	29.94***	-6.00
i	32.84***	-3.90
debty	30.08***	-1.35
cpig	5.60***	-6.92
rer	6.60***	-6.46
nx	29.79***	-2.87
oecdcy	21.20***	-2.35
relp	70.99***	-2.41
resy	24.17***	0.78

Notes:***, ** and * Indicates significance at the 1%, 5% and 10% level significantly. †Results from Fisher Panel Unit Root Test. Null Hypothesis of Fisher test is non-stationary.

Appendix B

Table B1: The Consumption Equation (All Developing Countries: 1980-2006)

Dependent Variable: *c*

Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
Log of *pcy*	-0.382 (-1.04)	-0.045 (-0.91)
dep	-0.279 (-1.05)	-0.020 (-0.59)
ocfy	-0.338 (-0.47)	-0.046 (-0.52)
oday	19.037 (1.16)	0.774*** (14.60)
	Short-Run Coefficients	
EC	0.660*** (12.85)	-0.300*** (-8.53)
ΔLog of *pcy*	0.196 (1.63)	0.044 (0.45)
Δ *dep*	-0.838 (-0.99)	0.479 (1.37)
dxpg	-0.045*** (-3.45)	-0.052*** (-4.64)
dxpg (Lagged)	-0.003 (-0.47)	-0.004 (-0.68)
Δ *ocfy*	0.249 (1.35)	0.156 (0.91)
Δ *ocfy* (Lagged)	0.101 (1.03)	0.087 (0.93)
Δ *oday*	-0.948 (-0.91)	0.779 (1.39)
Δ *oday* (Lagged)	-0.732 (-1.35)	0.123 (0.33)
Δ *oday* (Second Lagged)	-0.452 (-1.31)	-0.215 (-0.68)
Constant	1.092*** (3.60)	0.287*** (8.47)
Number of Observations	1630	1630
Hausman Test:	$\chi 2$ Coefficient	5.68
H0:Common coefficients (MG and PMG)	Tail Probability	0.2240
Wald Test:	$\chi 2$ Coefficient	18.26***
H0: *oday* = 1	Tail Probability	0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B2: The Investment Equation (All Developing Countries: 1980-2006)

Dependent Variable: i

Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
$debty$	0.100 (1.06)	-0.021*** (-4.09)
Log of $cpig$	-0.087 (-0.63)	0.042*** (5.43)
rer	-0.078 (-0.85)	0.001* (1.88)
$ocfy$	1.880** (2.01)	0.340*** (7.44)
$oday$	1.469 (1.55)	0.028 (0.52)
	Short-Run Coefficients	
EC	-0.620*** (-15.24)	-0.320*** (-11.05)
Δ Log of pcy	0.245*** (4.82)	0.226*** (4.28)
Δ Log of pcy (Lagged)	0.027 (0.62)	0.006 (0.02)
$\Delta\, debty$	-0.017 (-0.84)	-0.016 (-1.12)
Δ Log of $cpig$	-0.008 (-0.26)	-0.034* (-1.92)
Δ Log of $cpig$ (Lagged)	0.001 (0.07)	-0.009 (-0.59)
$\Delta\, rer$	0.043** (1.99)	0.006 (0.34)
$\Delta\, ocfy$	-0.143 (-0.90)	0.168 (1.40)
$\Delta\, ocfy$ (Lagged)	-0.183** (-2.06)	-0.049 (-1.10)
$\Delta\, oday$	-0.136 (-0.51)	-0.048 (-0.21)
Constant	0.100*** (5.93)	0.058*** (10.71)
Number of Observations	1627	1627
Hausman Test:	$\chi 2$ Coefficient:	8.89
H0:Common coefficients (MG and PMG)	Tail Probability	0.1134
Wald Test:	$\chi 2$ Coefficient:	317.58***
H0: $oday = 1$	Tail Probability	0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B3: The Net Export Equation (All Developing Countries: 1980-2006)

Dependent Variable: *nx*		
Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
oecdcy	-0.148 (-1.24)	0.034*** (5.58)
relp	0.111 (1.89)	-0.019** (-2.08)
resy (Lagged)	-1.214 (-1.16)	-0.086** (-2.58)
ocfy	-1.482 (-1.22)	-0.094 (-1.48)
oday	-18.773 (-1.11)	-0.746*** (-17.52)
	Short-Run Coefficients	
EC	-0.666** (-16.60)	-0.356*** (-8.76)
Δ *oecdcy*	0.029 (1.12)	0.064** (2.28)
Δ *relp*	-0.016 (-1.07)	-0.002 (-0.23)
Δ *resy* (Lagged)	0.105 (1.17)	-0.040 (-0.51)
Δ *resy* (Second Lagged)	-0.069 (-0.90)	-0093** (-1.58)
Δ *ocfy*	-0.173 (-1.46)	-0.602 (-1.90)
Δ *oday*	0.775* (1.71)	-0.021 (-0.11)
Constant	-0.023*** (-1.08)	-0.007* (-1.76)
Number of Observations	1605	1605
Hausman Test:	χ2 Coefficient:	7.44
H0:Common coefficients (MG and PMG)	Tail Probability	0.1901
Wald Test:	χ2 Coefficient:	35.37***
H0: *oday* = -1	Tail Probability	0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B4: Estimates of Marginal Allocation of Foreign Aid to Reverse Flows (All Developing Countries: 1980-2006)

The Marginal Allocation of Total Foreign Aid to:		
Variables		**Coefficient**
c		0.77
i		Not Significant
$rf = [1-(c+i)]$		0.23
nx		0.75
$rf = 1 - nx$		0.25
Wald Test:	χ2 Coefficient:	0.30
H0: Reverse Flow Estimates are Identical	Tail Probability	0.583

Table B5: The Consumption Equation (Sub-Saharan Africa: 1980-2006)

Dependent Variable: c

Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
Log of pcy	-1.613 (-0.99)	-0.221*** (-2.51)
dep	-0.212 (-0.40)	0.215*** (3.25)
$ocfy$	-2.011 (-0.78)	-0.156 (-1.30)
$oday$	-2.578 (-0.94)	0.395*** (7.69)
	Short-Run Coefficients	
EC	0.735*** (12.60)	-0.389*** (-7.01)
ΔLog of pcy	-0.110 (-1.08)	0.007 (0.05)
$\Delta\, dep$	-1.149 (-0.96)	-0.208 (-0.29)
$dxpg$	-0.047*** (-3.96)	-0.585*** (-5.42)
$\Delta\ ocfy$	0.189 (0.69)	0.349 (1.00)
$\Delta\ oday$	0.108 (0.96)	0.014 (0.19)
Constant	0.562* (1.73)	0.421*** (6.72)
Number of Observations	776	776
Hausman Test:	$\chi 2$ Coefficient:	6.65
H0:Common coefficients (MG and PMG)	Tail Probability	0.1554
Wald Test:	$\chi 2$ Coefficient:	138.15***
H0: $oday = 1$	Tail Probability	0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B6: The Investment Equation (Sub-Saharan Africa: 1980-2006)

Dependent Variable: i

Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
$debty$	-0.030 (-0.56)	-0.057*** (-6.74)
Log of $cpig$	-0.019 (-0.19)	-0.070*** (-4.23)
rer	0.045 (0.88)	0.058*** (4.25)
$ocfy$	-0.187 (-0.64)	0.430*** (5.67)
$oday$	0.448* (1.83)	0.127*** (2.82)
	Short-Run Coefficients	
EC	-0.670*** (-13.36)	-0.367*** (-7.67)
Δ Log of pcy	0.116* (1.66)	0.123 (1.48)
Δ Log of pcy (Lagged)	-0.033 (-0.54)	-0.036 (-0.79)
Δ $debty$	-0.011 (-0.54)	-0.008 (-0.37)
Δlog of $cpig$	-0.016 (-0.59)	0.003 (0.13)
Δ rer	0.051 (1.33)	-0.015 (-0.47)
Δ $ocfy$	0.214 (0.88)	0.260 (1.01)
Δ $oday$	-0.271* (-1.65)	-0.047 (-0.72)
Constant	0.081*** (3.41)	0.064*** (6.59)
Number of Observations	768	768
Hausman Test:	$\chi2$ Coefficient:	7.70
H0:Common coefficients (MG and PMG)	Tail Probability	0.1734
Wald Test:	$\chi2$ Coefficient:	371.88***
H0: $oday = 1$	Tail Probability	0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B7: The Net Export Equation (Sub-Saharan Africa: 1980-2006)

Dependent Variable: *nx*

Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
oecdcy	-0.160 (-0.88)	0.009 (0.97)
relp	0.233* (1.81)	0.001 (0.21)
resy (Lagged)	0.114 (0.25)	-0.166** (-2.21)
ocfy	-0.384 (-0.46)	-0.334*** (-2.71)
oday	1.830 (0.54)	-0.507*** (-7.83)
	Short-Run Coefficients	
EC	-0.638*** (-10.15)	-0.351*** (-8.03)
Δ *oecdcy*	0.019 (0.53)	0.073** (2.15
Δ *relp*	-0.056* (-1.91)	-0.030 (-1.30)
Δ *resy* (Lagged)	0.065 (0.63)	-0.058 (-0.61)
Δ *ocfy*	-0.263 (-1.25)	-0.608 (-1.20)
Δ *oday*	0.332** (2.40)	0.120 (0.81)
Constant	-0.041 (-1.20)	0.003 (0.48)
Number of Observations	768	768
Hausman Test: H0:Common coefficients (MG and PMG)	$\chi2$ Coefficient: Tail Probability	5.11 0.4025
Wald Test: H0: *oday* =-1	$\chi2$ Coefficient: Tail Probability	58.14*** 0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B8: Estimates of Marginal Allocation of Foreign Aid to Reverse Flows (Sub-Saharan Africa: 1980-2006)

The Marginal Allocation of Total Foreign Aid to:

Variables		**Coefficient**
c		0.40
i		0.13
rf = [1- (*c* + *i*)]		0.47
nx		0.51
rf = 1- *nx*		0.49
Wald Test: H0:Reverse Flow Estimates are Identical	$\chi2$ Coefficient: Tail Probability	0.13 0.719

Table B9: The Consumption Equation (The Americas: 1980-2006)

Dependent Variable: c

Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
Log of pcy	0.529 (0.77)	0.171*** (3.26)
dep	-0.420 (-0.72)	-0.246*** (-4.52)
$ocfy$	-0.283 (-0.41)	-0.220** (-2.24)
$oday$	-6.947 (-0.39)	-0.205 (-1.23)
	Short-Run Coefficients	
EC	-0.516*** (-4.44)	-0.385*** (-4.50)
ΔLog of pcy	0.218** (2.10)	0.202* (1.67)
ΔLog of pcy (Lagged)	-0.187** (-2.05)	-0.232 (-1.30)
Δ dep	1.595 (1.14)	-0.115 (-0.22)
$dxpg$	-0.042* (-1.80)	-0.049** (-2.45)
Δ $dxpg$	-0.001 (-0.09)	-0.002 (-0.24)
Δ $ocfy$	0.368* (1.88)	0.119 (0.98)
Δ $ocfy$ (Lagged)	0.285 (1.38)	0.069 (0.79)
Δ $oday$	1.210 (0.59)	2.709 (1.30)
Δ $oday$ (Lagged)	-0.316 (-0.65)	0.929 (1.20)
Constant	0.622 (1.37)	0.286*** (4.48)
Number of Observations	431	431
Hausman Test: H0:Common coefficients (MG and PMG)	χ2 Coefficient: Tail Probability	5.93 0.2047
Wald Test: H0: $oday$ = 1	χ2 Coefficient: Tail Probability	51.89*** 0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B10: The Investment Equation (The Americas: 1980-2006)

Dependent Variable: i

Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
debty	0.228* (1.87)	0.003 (0.57)
Log of *cpig*	-0.074 (-0.41)	0.083*** (9.96)
rer	-0.015 (-0.30)	-0.011*** (-7.70)
ocfy	0.440 (0.75)	0.396*** (10.03)
oday	-1.328 (-0.43)	-0.154 (-1.09)
	Short-Run Coefficients	
EC	-0.756 (-7.79)	-0.478*** (-5.73)
Δ Log of *pcy*	0.361*** (3.39)	0.304*** (4.34)
Δ Log of *pcy* (Lagged)	0.164 (1.53)	0.033 (0.51)
Δ *debty*	-0.134** (-2.07)	-0.018 (-0.69)
Δ *debty* (Lagged)	-0.013 (-0.50)	-0.004 (-0.25)
Δ Log of *cpig*	0.061 (0.61)	-0.037 (-0.98)
Δ *rer*	0.001 (0.02)	0.010 (0.83)
Δ *rer* (Lagged)	0.021 (0.91)	-0.007 (-0.80)
Δ *ocfy*	-0.074 (-0.19)	0.064 (0.49)
Δ *ocfy* (Lagged)	-0.077 (-0.99)	-0.096 (-0.86)
Δ *oday*	-0.287 (-0.15)	-1.442 (-1.43)
Δ *oday* (Lagged)	-0.214 (-0.21)	-0.957*** (-3.12)
Δ *oday* (Second Lagged)	-0.699 (-0.85)	0.024 (0.07)
Constant	0.107*** (2.71)	0.084*** (5.18)
Number of Observations	431	431
Hausman Test:	χ2 Coefficient:	7.76
H0:Common coefficients (MG and PMG)	Tail Probability	0.1702
Wald Test:	χ2 Coefficient:	66.81***
H0: *oday* = -1	Tail Probability	0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B11: The Net Export Equation (The Americas: 1980-2006)

Dependent Variable: *nx*

Explanatory Variables	**Mean Group**	**Pooled Mean Group**
	Long-Run Coefficients	
oecdcy	-0.168 (-0.70)	-0.005 (-0.41)
relp	-0.039 (-0.74)	-0.000 (-0.55)
resy (Lagged)	0.159 (0.17)	-0.909*** (-13.65)
ocfy	1.385 (0.82)	0.000 (0.00)
oday	3.030 (0.36)	-0.814*** (-5.86)
	Short-Run Coefficients	
EC	-0.695*** (-7.65)	-0.357*** (-5.13)
Δ *oecdcy*	0.064 (1.21)	0.111*** (3.33)
Δ *oecdcy* (Lagged)	-0.052 (-0.96)	-0.056 (-1.39)
Δ *relp*	0.033 (1.31)	0.004 (0.34)
Δ *relp* (Lagged)	0.029 (1.47)	-0.004 (-0.35)
Δ *relp* (Second Lagged)	0.012 (0.87)	-0.003 (-0.26)
Δ *resy* (Lagged)	0.195 (0.64)	0.128 (0.68)
Δ *ocfy*	0.083 (0.22)	-0.319** (-1.97)
Δ *ocfy* (Lagged)	0.335 (0.82)	0.006 (0.10)
Δ *oday*	0.023 (0.02	-0.693 (-0.61)
Constant	0.004 (0.13)	0.005 (1.03)
Number of Observations	431	431
Hausman Test:	χ2 Coefficient:	3.34
H0:Common coefficients (MG and PMG)	Tail Probability	0.6475
Wald Test:	χ2 Coefficient:	1.79***
H0: *oday* = -1	Tail Probability	0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B12: Estimates of Marginal Allocation of Foreign Aid to Reverse Flows (The Americas: 1980-2006)

The Marginal Allocation of Total Foreign Aid to:

Variables	**Coefficient**
c	Not Significant
i	Not Significant
rf = [1- (*c* + *i*)]	-
nx	0.81
rf = 1- *nx*	0.19

Table B13:The Consumption Equation (North Africa, Asia and the Pacific: 1980-2006)

Dependent Variable: *c*

Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Log of *pcy*	-1.774 (-1.74)	0.111 (0.98)
dep	0.464 (0.46)	-0.133** (-2.07)
ocfy	-0.868 (-0.66)	-0.109 (-1.05)
oday	-112.001 (-1.01)	0.356** (2.03)
	Short-Run Coefficients	
EC	-0.705*** (-7.97)	-0.359*** (-4.82)
ΔLog of *pcy*	0.630 (1.45)	0.174 (1.19)
ΔLog of *pcy* (Lagged)	-0.058 (-0.17)	-0.307** (-2.27)
Δ *dep*	2.857 (0.34)	-3.821 (-1.05)
Δ *dep* (Lagged)	-0.039 (-0.01)	4.232 (1.13)
dxpg	-0.043 (-1.21)	-0.023 (-1.31)
Δ *dxpg*	-0.026 (-1.62)	-0.037** (-2.25)
Δ *ocfy*	-0.192 (-1.27)	0.026 (0.58)
Δ *ocfy* (Lagged)	-0.032 (-0.31)	-0.023 (-0.33)
Δ *oday*	-3.416 (-1.03)	0.485 (0.87)
Δ *oday* (Lagged)	-0.978 (-0.52)	1.304* (1.97)
Δ *oday* (Second Lagged)	-0.958 (-0.86)	0.273 (0.75)
Constant	2.140** (1.73)	0.258*** (4.84)
Number of Observations	423	423
Hausman Test: H0:Common coefficients (MG and PMG)	χ2 Coefficient: Tail Probability	4.60 0.3303
Wald Test: H0: *oday* = 1	χ2 Coefficient: Tail Probability	13.38*** 0.000

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B14: The Investment Equation (North Africa, Asia and the Pacific: 1980-2006)

Dependent Variable: *i*

Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
debty	-0.115* (-1.81)	-0.124*** (-5.68)
Log of *cpig*	0.171 (0.43)	0.201*** (4.61)
rer	-0.084 (-0.86)	-0.071*** (-3.84)
ocfy	0.565 (0.69)	0.791*** (7.49)
oday	-0.937 (-0.38)	0.441*** (2.71)
	Short-Run Coefficients	
EC	-0.509*** (-6.01)	-0.229*** (-3.32)
Δ Log of *pcy*	0.351*** (3.42)	0.317*** (3.02)
Δ Log of *pcy* (Lagged)	0.122 (1.27)	0.094 (0.96)
Δ *debty*	0.052 (0.93)	0.025 (0.58)
Δ *debty* (Lagged)	-0.006 (-0.19)	-0.024 (-0.77)
Δ Log of *cpig*	-0.051 (-0.72)	-0.045 (-0.97)
Δ Log of *cpig* (Lagged)	-0.069 (-1.19)	-0.067 (-1.34)
Δ *rer*	0.046 (1.16)	0.038 (1.07)
Δ *rer* (Lagged)	-0.022 (-0.55)	-0.018 (-0.60)
Δ *ocfy*	-0.078 (-0.61)	-0.121*** (-2.89)
Δ *ocfy* (Lagged)	-0.070 (-0.66)	-0.145 (-1.52)
Δ *oday*	1.147** (2.03)	0.717** (2.21)
Δ *oday* (Lagged)	0.391 (0.72)	0.213 (0.46)
Constant	0.148*** (4.26)	0.060*** (3.02)
Number of Observations	428	428
Hausman Test: H0:Common coefficients (MG and PMG)	χ2 Coefficient: Tail Probability	0.87 0.9723
Wald Test: H0: *oday* = 1	χ2 Coefficient: Tail Probability	11.85*** 0.001

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B15: The Net Export Equation (North Africa, Asia and the Pacific: 1980-2006)

Dependent Variable: *nx*

Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
oecdcy	-0.036 (-0.34)	0.068*** (8.23)
relp	0.108 (1.11)	-0.001 (-1.48)
resy (Lagged)	-0.258 (-1.42)	-0.008 (-0.28)
ocfy	-0.475** (-2.13)	-0.131** (-2.09)
oday	-5.979 (-1.28)	-0.839*** (-11.91)
	Short-Run Coefficients	
EC	-0.715*** (-8.48)	-0.473*** (-4.45)
Δ *oecdcy*	0.047 (0.79)	0.047 (0.92)
Δ *relp*	-0.009 (-0.39)	0.004 (0.19)
Δ *resy* (Lagged)	0.173 (1.20)	0.029 (0.10)
Δ *ocfy*	-0.108 (-0.87)	-0.351** (-2.34)
Δ *oday*	2.225 (1.56)	0.139 (0.36)
Constant	-0.011 (-0.30)	-0.013 (-1.56)
Number of Observations	407	406
Hausman Test: H0:Common coefficients (MG and PMG)	$\chi2$ Coefficient:	17.11***
	Tail Probability	0.002
Wald Test: H0: *oday* = -1	$\chi2$ Coefficient:	5.24**
	Tail Probability	0.022

Notes: ***,**,* Indicates significance at the 1%, 5% and 10% level respectively. Figures in brackets are z-statistics.

Table B16: Estimates of Marginal Allocation of Foreign Aid to Reverse Flows (North Africa, Asia and the Pacific: 1980-2006)

The Marginal Allocation of Total Foreign Aid to:

Variables		Coefficient
c		0.36
i		0.44
rf = [1- (*c* + *i*)]		0.20
nx		0.84
rf = 1- *nx*		0.16
Wald Test: H0:Reverse Flow Estimates are Identical	$\chi2$ Coefficient:	0.30
	Tail Probability	0.582