

**THREE ESSAYS ON NON-MARKET FINANCIAL FLOWS TO
DEVELOPING COUNTRIES**

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DEVELOPING COUNTRIES**

By

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DECLARATION OF CO-AUTHORSHIP

I hereby declare that the second and third essays of this dissertation (Chapter 3 and 4) include material that is the result of joint research with Dr. John Serieux. The extent of the co-authorship for these essays is explained below.

Chapter 3: “Allocation of Foreign Aid: A Global Analysis”

In this chapter of the dissertation, I identified the suitable data sources, cleaned the data, and wrote the first and subsequent drafts of the manuscript: introduction, literature review, methods, results and conclusion. I also interpreted the results and finalized the manuscript.

In this chapter, Dr. Serieux provided the topic, research question and framework for the paper. Dr. Serieux estimated the econometric model, reviewed preliminary results, aided in their interpretation, and provided direction for further analysis. Dr. Serieux also guided the revisions of the manuscript, provided detailed comment, and rewrote some text.

Chapter 4: “Remittances and Reverse Flows in Developing Countries”

In this chapter, I provided the topic, performed the data cleaning, and estimated the econometric models. I also wrote the introduction, literature review, theoretical framework, methods, results and conclusions- therefore the first and subsequent drafts of the manuscript.

In this chapter, Dr. Serieux refined the research questions, formulated additional hypothesis, identified data sources and estimated econometric models. Dr. Serieux also advised on the appropriate econometric methodology, aided in revisions to drafts of manuscript, and re-wrote some texts.

Except for the above qualifications, I do hereby certify that this dissertation and the research therein is the product of my own work.

ABSTRACT

This dissertation consists of three essays on the impact of non-market financial flows in developing countries. The first essay answers two questions. First, to what extent are remittances (as private transfers) differentiable from grants (as public transfers) in their effects on capital formation and growth? Second, how might the motivations to remit inform the nature of the relationship between remittances and growth? Using a sample of four developing countries, results suggest that remittances and grants, in fact, do behave differently. Remittances have no significant relationship with investment for all but one country (remittances are positively correlated with growth for Bangladesh). Grants' impact on investment is negative in Egypt, positive in Pakistan and Syria and insignificant in Bangladesh. Migrants' motivations to remit are found to be different across countries. Enlightened self-interest motivation to remit is the most likely cause of growth impacts in Egypt. A combination of self-interest and enlightened self-interest explains the growth impact in Bangladesh. Finally, a combination of migrants' altruistic behavior and self-interest attitude explains the growth impact in Pakistan and Syria.

The second essay demonstrates the allocation of foreign aid between consumption and investment with special emphasis on the importance of reverse flows in developing countries. Using a panel of 61 countries from 1980 to 2006, results indicate that, on average, 23 to 25% of any increase in foreign aid has been directed towards financing reverse flows. 78% was consumed and an insignificant amount was invested. Additional investigation suggests that almost 50% of aid is

used for reverse flows in Sub-Saharan Africa, 19% in the Americas and 16 to 20% in North Africa, Asia and the Pacific.

The third essay examines how remittances are allocated between consumption, investment and reverse flows in developing countries. Using a panel of 36 countries from 1980 to 2006, results suggest that almost 80% of any increase in remittances/GDP was consumed. With respect to investment, remittances had no statistically discernable effect on rate of investment. Additionally, 20% of any increase in remittances was diverted as reverse flows and contributed neither to increase consumption nor to investment.

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THREE ESSAYS ON NON-MARKET FINANCIAL FLOWS TO DEVELOPING COUNTRIES

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CHAPTER 1

INTRODUCTION

Given the limited access to the international capital market and the relatively meager role of the private international capital flows, non-market financial flows, such as remittances and foreign aid (i.e. Official Development Assistance (ODA)), have become an increasingly prominent source of external funding for many developing countries (Chenery and Strout, 1966; Glytsos, 2002, Ratha, 2003). From 2000 to 2006, ODA in developing countries increased from US\$50 billion to US\$105 billion. These numbers are even larger for remittances. A 2006 report from the World Bank shows that recorded remittance flows in developing countries doubled in the five years after 2000 and has continued to increase since then. The amount of remittances has increased to \$251 billion in 2007, which is 11 per cent higher than 2006 (Ratha *et al.*, 2008a). Due to the ongoing world-wide recession, overall remittance flows might decelerate in 2009, however, the Migration and Remittances Team of the World Bank do not predict remittances to fall as much as the private flows in developing countries (Ratha *et al.*, 2008b).

Despite voluminous work in the area of non-market financial flows the relationship between these flows and other macroeconomic variables (such as consumption, investment and economic growth) is still inconclusive. Both claims and counter-claims exist with respect to the impact these non-market financial flows have on economic growth, capital accumulation and consumption. Durand and Massy (1992) and Arnold (1992) argue that remittances can positively affect

growth in at least two ways. They can increase growth either by increasing investment or by increasing consumption through the consumption multiplier. Opposing this view, Chami *et al.* (2003) suggest remittances may have detrimental effects on growth due to the moral hazard problem.

“In reality, the moral hazard problem can be manifested in many ways. Recipients can decrease their labor force participation, limit their job searches, reduce labor effort, or invest in riskier projects, among other actions. But no matter how the moral hazard manifests itself, its effort is to induce the recipients to act in ways that tend to decrease expected output.” (Chami *et al.*, 2003, 5)

The more voluminous literature addressing the impact of aid has generated even greater dissonance. The role of foreign aid on economic development has been criticized from both the left and the right. Aid is seen by some as a net deterrent to development. From the left, Andre Gunder Frank (1963) argued the net effect drew capital out of the receiving country and channeled this capital to direct investment in areas that did not enhance the country’s long-term growth but instead perpetuated the status of underdevelopment. Aid, in effect, is merely a tool for sustaining underdevelopment. From the right, Milton Friedman (1958) argued that the inflow of cheap capital into developing countries would in most cases result in the substitution of foreign resources for domestic resources. Therefore, aid inflows would lead to a commensurate increase in consumption.

A large part of the recent literature on non-market financial flows emphasizes its ultimate effect on growth and the specific mechanisms through

which it works. Indeed, a better understanding of these motivations would help for better policy formulation to use these external flows in the most productive way.

A popular belief among international organizations and policy-makers is that all non-market financial flows function in the same way (Van Dalen *et al*, 2005); remittances and grant-aid should have a similar effect on capital formation and economic growth. In principle, remittances may have a similar effect as grant-aid because both are external transfers. However, although both grant aid and remittances are foreign transfers from abroad, grants are mostly public transfers and remittances are private transfers. The use of remittances (whether to consume or to invest) is determined by more complex and different factors, such as the motivation to remit. If it can be shown that the same proportion of remittances and grants are consumed or invested then it is easier to argue that the “transfer” characteristic of these flows determines the usages. On the other hand, if a similar proportion of remittances and grants is not consumed (or invested), then it can be argued that the use of remittances is determined by the “private transfer” characteristic, while the use of grant-aid is determined by the “public transfer” characteristic. Therefore, distinguishing the effects of different types of non-market financial flows on the macro-economy is critical when public and private sectors behave dissimilarly in allocating resources between consumption and investment.

Beyond the consumption/investment choice of non-market financial resources, historically, some of these resources have been diverted as “reverse

flows” (i.e. debt amortization, reserve accumulation, or capital flight). Perhaps, this is truer during the 1980s and the 1990s when a large number of developing countries were burdened with increasing debt levels, high level of capital flight and the consequent need for reserve accumulation (Serieux, 2009; Ajayi and Khan, 2000). Given these countries have limited access to international capital markets, remittances and foreign aid flows are likely be the important source of resources for amortizing debt, financing capital flight and accumulating foreign reserves (Serieux, 2009; Rahman, 1967; Brown, 1992a, 1992b). This implies that the non-market external resources that are used to finance reverse flows will no longer be available to increase consumption and investment. Therefore, any growth effect of non-market flows that comes from allocating these resources between consumption and investment will be overestimated. In other words, the amount of external resources that is diverted toward the financing of reverse flows must be taken into account to explain the actual growth effect of these flows through boosting consumption or investment rates.

Through three essays this dissertation contributes to the literature on the macroeconomic impact of non-market financial flows in developing countries. The first essay is a comparative study between remittances and grant-aid and assesses whether remittances and grant-aid behave in a similar way in the macro-economy in their effects on investment and economic growth. The second essay evaluates how aid is allocated between consumption and investment in the global context when reverse flows are taken into consideration. The third essay examines what proportion of remittance flows have historically been diverted to reverse

flows. While the first essay looks at the direct growth effect of non-market financial flows the second and the third essay provide us with an approximation of the extent to which reverse flows may have constrained the effect of these non-market external flows on investment and consumption propensities and, therefore, their potential effect on growth through these aggregates.

In the first essay (Chapter 2), two questions are answered. First, to what extent are remittances (as private transfers) differentiable from grants (as public transfers) in their effects on capital formation and economic growth? Second, how might the motivations to remit inform the nature of the relationship between remittances and growth? These questions are addressed using a sample of four countries whose predominant source of remittances is from guest workers in the oil-rich Arab States. The results, derived from estimated growth, investment and consumption equations using both time series and panel methods, suggest that remittances and grants behave differently. Remittances have no significant relationship with investment for all but one country (remittances are positively correlated with growth for Bangladesh). Grants have a negative relationship with investment in Egypt, positive relationship in Pakistan and Syria and no impact in Bangladesh. Although the effects of remittances and grants on growth are similar in three out of four countries, these effects stem from different sources. The implication is that, although remittances and grants are both external transfers, they have quite different effects on capital formation and growth. A likely additional implication of the results is that the enlightened self-interest motivation to remit is the most probable cause of the growth impacts of remittances in Egypt,

while a combination of self-interest and enlightened self-interest motivation is the more probable explanation of the growth impact of remittances in Bangladesh. For Pakistan and Syria, the motivation to remit seems to be a combination of both migrants' altruistic behavior and self-interest.

The second essay (Chapter 3) examines the relationship between foreign aid, consumption and investment at the global and regional levels. However, it departs from the previous literature by abandoning the pervasive but untenable assumption that all aid is used to expand the trade deficit and thus applied wholly to consumption or investment. Our results from a panel of sixty-two countries indicate that for the period 1980 to 2006 approximately 23 to 25 per cent of each percentage point of increase in foreign aid has been directed towards financing reverse flows; 77 per cent of the aid is consumed and an insignificant amount of aid is invested. Thus, the dominant use of aid is not investment but spent on consumption and the financing of reverse flows. This investigation also attempts to capture the regional allocation of foreign aid. Results suggest approximately half of increases in aid is directed to financing reverse flows in Sub-Saharan Africa during 1980-2006. For the Americas, approximately 19 per cent of that increase in aid is used to finance reverse flows and for the rest of the developing countries (which covers countries from North Africa, Asia and the Pacific) the reverse flow effect of aid is approximately 16 to 20 percent.

The third essay (Chapter 4) demonstrates that when remittances are used for reverse flows (in the form of debt servicing, capital flight, or reserve accumulation) they will no longer be available for domestic resource

mobilization. The estimates from consumption, investment and net export functions for 36 developing countries during the period of 1980 to 2006 indicate that almost 80% of any increase in the rate of remittances is used to increase the consumption rate, while the impact of remittances on the investment rate is insignificant. Results suggest that nearly 20 to 27 per cent of remittances are used to finance reverse flows in these countries from 1980 to 2006. These findings have policy implications for developing countries.

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CHAPTER 2

THE EFFECT OF TRANSFERS ON INVESTMENT AND ECONOMIC GROWTH: DO REMITTANCES AND GRANTS BEHAVE SIMILARLY?

2.1 Introduction

For many developing countries, it is well documented that migrants' remittances constitute a large portion of external resources in labor exporting countries, even without considering the significant amount of flows through unofficial channels (El-Sakka and McNabb, 1999; Glytsos, 2005). A World Bank (2006) report shows that recorded remittance flows to developing countries doubled in the five years after 2000 and has continued to increase. The amount of remittances to developing countries increased to \$251 billion in 2007, which is 11 per cent higher than 2006 (Ratha *et al*, 2008). This large magnitude and significance of remittances flow has motivated many of the researchers and policy-makers to improve their understanding with regard to: a) the determinants of remittance flow; and b) its impact on economic growth.

International organizations and policy makers often view remittances in the same way as they do aid (Van Dalen *et al*, 2005; World Bank, 2004). This would tend to emphasize the current transfer aspects of remittance, which might result in higher rates of consumption. Thus, in principle, remittances could have similar effects to foreign grant aid since both are external transfers. However, although grant aid and remittances are both foreign transfers from abroad it should be noted that grants are mostly public transfers and remittances are private transfers. The private transfer characteristic of remittances suggests that the

determination of consumption and investment decisions are subject to different, and perhaps more complex factors.

Despite the large interest in remittances there is no single theory of remittance determination or its impact on macroeconomic variables. Remittance flow is often seen as a result of either migrants' altruistic behavior towards their families or self-interest. In addition to these opposing hypotheses remittance decisions which are mutually beneficial are also considered part of intertemporal and spatial contractual arrangement between migrants and their families. What ultimately motivates the flow of remittances is likely to have a direct impact on its potential effect on growth. If the decision to remit funds is motivated by a migrant's altruistic behavior, and if remittances are treated as current transfer, then it can be presumed most of it would be consumed. In that case, remittances' effect on growth (if there is any) would be driven by consumption.¹ On the other hand, if the motivation to remit is driven by migrants' self interest then a significant proportion of remittances will be used for investment purposes and the growth impact of remittances will be through investment.

Grant aid constitutes a large part of the official development assistance (ODA) for many developing countries. In the 1960s it was widely believed that the availability and inflow of ODA would help to expedite economic progress in developing countries (Bartels, 1975). Inflow of external resources would behave like a separate factor of production and make possible rapid and sustained economic growth (Chenery and Strout, 1966). However, Griffin (1970) argues

¹ It should be noted that the remittance effect of growth through consumption may not be necessarily positive. If increase in remittances increases savings propensity or if it reduces the participation of labor force, then growth could be zero or negative.

that a proportion of aid is likely to displace domestic savings by increasing the consumption expenditure of the recipient country. This would probably be more accurate for grant-aid compared to loan-aid because by definition grants do not need to be repaid. In this view grant-aid would not lead to more rapid growth but instead perpetuated underdevelopment. (Griffin, 1970; Griffin and Enos, 1970; Bauer 1971)

The aim of this essay is to determine to what extent, if at all, remittances (as private transfers) are differentiable from grants (as public transfers) in their effects on capital formation and growth. Additionally, if remittances have different impacts on investment and growth, then it will be interesting to analyze to what extent motivations to remit help to explain observed effects. This essay examines how important is the transfer aspect of both remittances and foreign grants. If it can be shown that the same proportion of remittances and grants are consumed (or invested) then it would be easy to argue that the “transfer” characteristic of such flows is the main determinant of their usages. However, if the transfer aspect is not important, i.e. if remittances and grants have different impacts on growth and capital accumulation, then perhaps motivations to remit (the “private transfer” attribute of remittances) would be useful in understanding the different nature of the growth effect.

To that end, this essay focuses on four developing countries from two different regions but for whom the dominant source of remittances are nearly identical. They are Bangladesh and Pakistan from South Asia and Egypt and the Syrian Arab Republic from the Middle East and North Africa region. The

selection of these countries is guided not only by the source of remittances (the oil-rich Arab countries) but by other similar characteristics. All of these countries are known to depend heavily on the inflow of external transfers. They also experience similar inflow of remittances and grants as a percentage of GDP. Since 1975, average migrant remittances as a percentage of GDP for Bangladesh, Egypt, Pakistan and Syria were 3.3%, 7%, 4.9% and 3% respectively. For all the countries, with the exception of Syria, total grants averaged around 3% of GDP during 1975 to 2006. The average grants to GDP for Syria is just above 1% during the same period.

The context, methodology and results of this essay are presented as follows. The next section reviews the literature. Section 2.3 presents the methodology used to determine the impacts of remittances and grants on investment and growth and if these transfers behave similarly. Section 2.4 presents the results. Section 2.5 provides analysis of results and the final section (i.e. section 2.6) concludes the essay.

2.2 Literature Review

2.2.1 Why Remit?

Glytsos (2001) presents a detailed review of the literature on the causes of immigrant remittances and argues that there is no single theory of remittance determination. Within the broader literature, one can, however, identify two sets of approaches that determine migrants' motivation to remit into the host country. The first approach, which is endogenous to migrants' decision making process, concentrates on the microeconomic aspects of the migrant-family relationship.

The second approach, which is a more recent one, takes macroeconomic variables into consideration and argues that migrants' portfolio decisions in response to macroeconomic variables may influence the flow of migrants' savings into their home country.²

Three views are prominent in the literature with respect to the endogenous approach. The first view suggests that remittance flow is a result of migrants' altruistic behavior towards their families. Johnson and Whitelaw (1974) first mentioned the idea of altruism and argued that the utility of a migrant partly depends on the consumption levels of other members of the "extended family" who were left behind. People who migrate from rural areas to urban areas often remit a part of their income back to friends and relatives in rural areas. Later on Lucas and Stark (1985) and Stark and Lucas (1988) presented this idea in a more systematic way. They specified a model of pure altruism where migrants derive utility from the utility of those left at home.

Another view, opposite to pure altruism, focuses on the self-interest behavior of the migrants. Although family is not the center in this theory the decision to remit is still based on the migrant-family relationship. Lucas and Stark (1985) provide three reasons to remit which use the relationship between migrants and their families but rely on the purely self-interest motivations of the migrants. First, a miser migrant sends money to parents in order to ensure their inheritance. Second, migrant remits money to invest in assets and entrust family members to

² While reviewing the empirical work on the determinants of remittances, Elbadawi and Rocha (1992) made that distinction and used the terms endogenous approach and portfolio approach respectively. Empirical literature and results related to these approaches will be discussed later in this section.

take care of these assets on the migrant's behalf. Finally, if the migrant works outside temporarily and intends to return home remittances will be used to promote investment in fixed capital (e.g. land) in order to enhance political influence or social assets (i.e. the relationship with family and friends).

In addition to these two opposite views Lucas and Stark (1985) also suggest another theory known as “tempered altruism” or “enlightened self-interest”. This theory is conceptualized as a “self-enforcing cooperative contractual arrangement” between the migrant and the family (Glytsos, 2001). Lucas and Stark (1985) provide two possible reasons for such contract. First it is assumed that more educated members of the family would migrate and might remit part of their income as a repayment of the cost that was previously borne by other members of the family (Glytsos, 1988). In a similar fashion Poirine (1997) suggests that families played the role of financial market and therefore financed investments in human capital that would be repaid later by remittances. Therefore, the magnitude of remittance flow would depend on the size of the investment that is undertaken while building human capital. Secondly, if the insurance and capital market is incomplete, mutually beneficial informal contracts between the migrant and the family can be seen as a diversification response in the presence of risks, such as crop failure, price fluctuations, insecurity of land tenancy, livestock diseases and inadequate availability of agricultural wage work (Stark and Levhari, 1982). Remittances would then flow to households during the period of crop failure. Similar assumptions are made by Gubert (2002) who suggests that remittances are a part of an insurance contract between the migrant and the family

where the family diversifies the source of income to protect against income shocks.

The first empirical study aimed at establishing the motivation of remittances was done by Lucas and Stark (1985) on Botswana. They argued that if remittances were motivated by migrants' altruism then there should be more transfers towards the low-income earning families. However, it is evident from their work that there exists a positive relationship between remittances received and the present income of the households. Lucas and Stark (1985) concluded that although altruism is an important motivation for remittance flows, investment has a stronger impact on the decision making process. Self-interest motivation might play a key role in determining remittance flows. An important implication of altruism is that there is a minimum level of "required" remittances determined by the terms of contract between the migrant and the family (Elbadawi and Rocha, 1992). Glytsos (1988) tested this view and found that the required amount of remittances would be at least equal to the average income differences between the remitter's family and the community. However, it could be higher than the income differential given the family has a stronger bargaining power.

The idea of tempered altruism or enlightened self-interest is also reflected in the empirical work of Lucas and Stark (1985). They show that the greater the degree of drought in the migrants' home area the more remittances were observed flowing from urban migrants to their rural home in Botswana. Urban migrants would provide insurance during the period of economic downturn. De la Briere *et al.* (2002) highlight the fact that male immigrants of Dominican Sierra to the

United States feel compelled to remit as an insurer when the parents back home experience a health crisis.

The above discussion on the determinants of remittances mainly concentrates on the microeconomic determinants or the individuals' motive to remit. Migrants' motivation that is determined by macroeconomic variables is known as the "portfolio approach" (Elbadawi and Rocha, 1992). At the macroeconomic level, remittances may be influenced by financial variables, such as the relative real rate of return on financial and real assets in the two countries (the home country and the host country), exchange rate policies, and any policy in the emigrant country that offer incentives for remittances (Swami, 1981). Remittances can also be affected by a high rate of domestic inflation. Two opposite views exist in the literature on the issue of domestic inflation as a determinant of remittances. The first view suggests that high rates of domestic inflation are responsible for lowering real income in the host country. More remittances may flow towards the labor-exporting country in order to maintain the same level of family consumption at home (Lianos, 1997). High rates of inflation often reflect increased risk and uncertainty. High inflation is a discouraging signal for investment and lead to a fall in total remittance flow towards labor-exporting countries. (Lianos, 1997)

2.2.2 Effect of Remittances

The literature on migration and growth mainly leads to three conclusions. First, instead of promoting economic growth remittances increases conspicuous consumption and creates the possibility for individual families to enjoy a higher

standard of living without creating the opportunity of sustained economic growth. This is also the conclusion from a review of thirty-seven papers by Durand and Massy (1992). These studies mainly show that families' standards of living are improved by using remittances on mostly consumer goods within migrant communities. Oberoi and Singh (1980), while explaining the net effect of remittances in rural areas, also mentioned the possibility that remittances may be used for conspicuous consumption or unproductively by an excessive degree of capital intensity in the agricultural sector which would have a negative impact on development.

The second important conclusion is that remittances exacerbate dependency of the recipients (Weist, 1984; Kapur, 2004). When the recipients become highly dependent on the "easy-money" they may simply decide not to participate in the labor market since the required amount of income is available even without the need for any effort from their part. This effect is also suggested by Chami *et al* (2003), who argued that there exists the problem of moral hazard between remitters and recipients such that recipients became more dependent on remittances causing them to reduce labor market participation. However, as recipients are price takers, they failed to see that such decision raised the probability of lowered output. Empirical results of Chami *et al*, based on their theoretical argument also suggest the effects of remittances on economic growth were negative.

The third view, in this regard, is that remittances are used for increasing savings or investment which is unproductive in terms of the overall economy. It is

important to make a careful distinction between productive and unproductive savings or investment. Chami *et al* (2003) argue that if remittances are used for purchasing houses, it is merely a transfer and should not be treated as productive investment. However, it should be noted that in most developing countries the housing market is dominated by new construction. Even if remittances are used for purchasing houses it may still be considered as productive investment since purchasing a house in developing countries will imply construction of new houses.

As opposed to the previous analysis, another branch of the literature believes that there is a strong and positive relationship between remittances and growth (Arnold, 1992; Durand and Massey, 1992). Remittances can affect growth in at least two ways. It can increase growth either by increasing investment or by increasing consumption through the consumption multiplier. Brown (1994) found a positive and significant relationship between remittances and business investment in Tonga and Western Samoa. Durand *et al* (1996) found that if migrants had access to resources (such as education, potential family workers, lands, businesses and real assets) they were more likely to invest their remittances in productive investment. A recent paper by Ziesemer (2006) argued that remittances would affect growth by not only increasing investment but also increasing the literacy rate. The main idea is that remittances increase savings which not only translated into investment by reducing interest rate but also increasing the rate of literacy. Investment and literacy together increase the level or growth rate of GDP per capita. Loxley and Sackey (2008) had suggested that

larger inflow of workers' remittances in Africa would contribute to its long-run sustained growth through raising domestic savings. Giuliano and Ruiz-Arranz (2006) analyzed the relationship between remittances and growth and its interaction with the financial development in the home country. Their findings suggest that if the financial sector is not improved in the home countries and if those institutions did not provide sufficient credit for investment, then remittances would promote growth by providing an alternative way to finance investment.

The findings of De Luna Martínez (2005) contradicted this result. He argued that if remittances were deposited in the formal sectors then it would be treated as formal savings and this would in turn increase growth through formal investment. The limited access to formal sector finance and the presence of bureaucratic arrangements forced migrants to remit their income in cash and use them for consumption purpose or kept "under the mattress" (De Luna Martinez, 2005, pp: 32). The author, in this case, implicitly assumes that remittances that come through formal channels have more chances of being invested compared to the remittances that enter the host countries through informal channels.

Even if a small fraction of remittances are used directly for investment purposes it can not be concluded that their potential contribution to economic growth is small. Inflows of remittance flow may contribute to the economy by increasing the demand for domestically produced consumption goods as well as intermediate products to support that increased consumption. In other words, migrants' home country may experience a positive multiplier effect from such a flow. Stahl and Arnold (1986), Stahl and Habib (1989) and Glytsos (1993)

showed how remittances might affect consumption and thus, growth by generating multiplier effects in home countries. Stahl and Habib (1989) calculated the multiplier for Bangladesh for the period of 1976-1988 and found that the value of the multiplier is 1.24. Furthermore, remittances in Bangladesh are spent within those sectors which have strong linkages with other sectors of the economy. Stahl and Arnold (1986) also agreed with the view that remittances spent on consumption purposes would create stimulus in the economy and provide a significant source of capital, but expressed a number of reservations concerning the effects of remittances. Two of them need to be mentioned. First, there might be a “demonstration effect” which would induce the remittance recipients not only to increase domestic consumption but also the consumption of imported goods. If such a demonstration effect is wide-spread then the savings and investment in the home country might be hampered and thus there might be a negative impact on growth. Second, they express their concern over demand pull inflation; although at least one study shows that the increase in remittances is not inflationary (Choucri and Lahiri, 1983). A more recent study by Glytsos (2005) suggests that imports generated by remittances have the potential to assist growth by bringing more capital goods into the home country for domestic production. Additionally, although imports are leakage of resources, they also “... help to export some of the inflationary pressures that the increasing demand out of remittances may create” (Glytsos, 2005, pp: 486).

2.2.3 Effect of Grants

For the last forty years a wide range of scholarly work has attempted to measure the impact of foreign aid on macroeconomic variables such as domestic savings rate, capital accumulation and growth in developing countries (Griffin, 1970; Levy, 1988; Weisskopf, 1972; Burnside and Dollar, 2000). No unanimous conclusion has been found from these papers. While Mosley *et al* (1987) and Boone (1994, 1996) argue that the impact of foreign aid on growth is insignificant, Burnside and Dollar (2000) suggest that foreign aid works positively in generating growth in a good policy environment.

Most of those studies have treated aid as if it were homogenous. But aid is not homogeneous and its impact on macroeconomic variables may well depend upon the type received by countries (Gyimah-Brempong, 1992; Cashel-Cordo and Craig, 1990). Disaggregating aid into its various types is important because it is more likely that different types of aid will have different effectiveness in promoting growth.³ The so called *fiscal response model* by Hellar (1975) assumed that governments maximized their utility by taking into account the allocation of different types of revenue among different expenditure categories.⁴ While testing the theory on eleven African countries Hellar (1975) found that the response of public consumption to aid depended on the type of aid; grant aid had a more pro-consumption bias whereas loans were pro-investment. Khan and Hoshino (1992) applied the same theoretical framework in their empirical

³ For example, even though some portion of the grants may be used for investment, there would be a greater tendency to consume grants aid than loan aid because grants do not need to be repaid.

⁴ Different types of revenue include domestic financing as well as external resources. External resources include both grants and loans.

research and found that both grants and loans were used for consumption and investment purpose with a significant amount of grants-aid contributed to increased consumption.

Gyimah-Brempong (1992) used cross-national time series disaggregated data and a least squares dummy variable model as well as a simultaneous equation model to analyze the impact of aid (separately for loans and grants) on growth rates in Sub-Saharan Africa. He found that grants are negatively related to the savings rate although the total effect of grants on growth is positive 0.0053. In other words a negative grant-savings relationship can still bring about a positive impact on growth as long as the "...aid's ability to increase output from existing resources exceeds any negative impacts (if any) on savings and investment" (Gyimah-Brempons, 1992, pp. 49). Using a sample of 40 member countries of the Africa Union, and estimating fixed effect growth models, Loxley and Sackey (2008) examined the aid-growth relationship over the period of 28 years. Their findings suggest that aid had both direct and indirect (via investment) positive effects on growth in the short run. Moreover, grant aid is found to be more effective in promoting growth compared to loan aid because future debt servicing obligations were entailed by concessional loans. Two studies on Bangladesh by Islam (1992) and Quazi (2005) decomposed aid into its various components. According to the first study loans and food aid have positive contribution to economic growth whereas grants' contribution to economic growth is insignificant. Two reasons were put forward for the poor performance of grant; some degree of collinearity between explanatory variables grant and domestic

savings-GDP ratio and the behavior of the government authority. Islam speculated that governments might allow administrative slack or tolerate a greater degree of corruption in utilizing grant aid requiring repayment. Quazi (2005) also reach a similar conclusion.

This is clear from the above discussion that empirical links from grant aid to economic growth could be either through consumption or through investment. However, existing literature suggests grants are more likely to be consumed.

2.2.4 Additional Considerations

The existing literature has investigated the investment and growth effect of remittances. What is not clear from the literature is how much weight should be given to the different attributes of remittances as a transfer from abroad. There are two salient features of remittances. First, it is a *current* (rather than capital) transfer and second, it is a *private* transfer. If remittances and grants have similar impact on investment and economic growth it could be argued the transfer characteristic is responsible for certain impacts. If the effect of remittances is not the same as grant-aid then the “private” attribute of remittances may be important in explaining such differences in its effect. In this case the motivation to remit will describe the private characteristic of remittances and provide a guide to the source and extent of the impact on growth and investment.

The existing literature seems to suggest that if pure altruism is the ultimate motive of the migrants to remit then most of the fund will be spent on consumption goods and the impact on growth will be negative (Oberoi and Singh, 1980). This presumption will be correct unless migrants’ families have a very

high marginal propensity to invest. Even if remittances are solely used for consumption purposes, as has been discussed in the above section, one may still expect a positive growth effect through the multiplier process if there is existing unused capacity in the economy. Although this effect will be a weaker one it supports the view that altruistic behavior of migrant does not necessarily lead to unfavorable outcomes of remittances on economic growth. One possible source of unfavorable outcomes on growth through increased consumption is if the recipients reduce their labor force participation and fail to see that such decision raises the probability of low output. (Chami *et al*, 2003)

On the other hand, if remittances are sent due to the pure self-interest motive then it can be expected that remittances will be used for investment and there will be a positive and strong impact on growth. If the motivation to remit is enlightened self-interest then it may be hard to predict its immediate effect on growth. One example of the enlightened self-interest motive is that a migrant sends remittances as a repayment of family's investment in his education (Rempel and Lobdell, 1978). If this fund is again used for the improvement of human capital in the home country then it should also have a positive impact on growth. In this case the impact on growth will be via human capital and such growth may only be observable in the long run. Under the concept of enlightened self-interest migration can be a diversification response in the presence of risk. This arrangement suggests that remittances will flow to the family at times of crop failure or to the migrant during periods of unemployment. In such a situation, the growth effect of remittances may be unclear; if remittance flows are counter-

cyclical in nature (i.e. remittance flow increases when economic growth falls) then remittances will be found to be negatively correlated with growth. If remittance flows towards the home country are the result of migrants' portfolio decisions then it should increase savings and investment rates and have a positive effect on growth. This effect is expected to be stronger than the consumption multiplier effect.

From the above discussion it can be argued that some motives would suggest an indirect positive growth effect via increased investment while others would impact growth weakly by increasing consumption or doing so in the long run via human capital. The possible negative impact on growth can be through consumption due to the reduction in labor force participation. The self-interest motive will suggest a positive growth effect by increasing the rate of investment. The enlightened self-interest motive may also affect growth positively by improving the stock of human capital, but this may not be measurable in the short-run. Pure altruism suggests a direct effect on growth through the consumption multiplier (See Table 2.1). While, theoretically, each motivation tends to suggest some specific impacts on macroeconomic variables (such as consumption, investment and growth), true verification of these theories (or the establishment of other motivations for remittances) will only be possible through micro-level analyses.

The nature of the effects of remittances may also depend on the "type" of migrant. One can distinguish at least three different types of migrants, namely emigrant, guest worker and seasonal worker. These types vary by their length of

stay, expectation of returning home and tie to the home and host countries. These factors can be expected to have some effect on the nature of remittances and the motivation for remittances. (See Table 2.2)

For guest workers and seasonal workers in particular the prediction of the permanent income hypothesis can be used to inform the nature of remittances. The permanent income hypothesis suggests that the marginal propensity to save is higher for transitory income compared to permanent income (Friedman, 1957; Paxson, 1992; Bhalla, 1980). For guest workers and seasonal workers, since they fully expect to return home, any income in the host country above the income that they would have expected at home will be considered transitory. We can expect that they will desire to save most or all of it. Both the marginal propensity to save and marginal propensity to invest will be higher for remittance income from this group (Glytsos, 2002; Adams, 1998; Galor and Stark, 1990). This suggests that large proportion of remittances will be saved if most of the migrants fall within either of these groups. If the migrants fall within the category of guest workers then remittances can be thought of as split income. Some of the remittances may then be used for consumption purposes by the family and the rest may be saved. None of these types of responses suggest any negative impact on growth. For long term emigrants who have a reasonable expectation of remaining in the host country remittance flows are more likely to be altruistic in nature and may attenuate over time (Galor and Stark, 1990). It may be much harder to classify these remittances in terms of motives as that may change over time as well as being quite idiosyncratic to migrants themselves.

One outstanding question which has yet to be fully explored in the empirical literature is whether some of that income will be invested in the host country or remitted to the home country for investment. Glytsos (2002) argued that although the marginal propensity to save out of remittances is high, the amount of savings and investments in the home country will depend on the relative yield on savings and relative profitability in the home country. It is important to understand the institutional factors in the host country before making such a prediction. If we accept the fact that guest workers mostly want to save, how much of that savings will be transferred to the home country will depend (at least in part) on the existing institutional framework in the host country. If the workers have means for saving in the host country then the magnitude of remittances could be low and the marginal propensity to save out of remittances may be low. It is often the case that the institutional arrangements in the host country do not allow guest workers and seasonal workers to save or invest in that country and as a result these workers may simply be forced to save (and/ or invest) in the home country. Ratha (2005) suggested that if the host country had a fear of exposing local workers to greater competition the country might be reluctant to provide incentives to the migrants. A positive growth effect can still be expected even when the relative profitability of savings is lower in the home country. This is unlikely to be true for the long-term emigrants. More opportunities and institutional supports are available for this group of migrants in their host countries. They are more likely to be in an advantageous position to make their investment decisions locally and these decisions may well depend on

relative yield on savings and relative profitability of investments in the home versus host country.

Given an unfavorable institutional structure in the host country guest workers whose income is merely a split income will decide to save and invest their income in the home country. The next question is whether the remittance flows towards the home country continuously throughout the time of present contract or migrants remit all their income once the contract period is over. If remittances are sent on a regular basis, then there are increased chances that the money will be deposited in the financial system in the home country. Any investment out of that income will be a part of formal investment and will be reflected in both investment and growth of the economy. On the other hand, if migrants transfer all their income in lump-sum, after the termination of contract period, then there is a possibility that it will not be captured in the formal sector investment and the effect of remittances will be underestimated while calculating the overall growth of the economy. It may be captured in the growth if the lump-sum remittances are invested in the formal sector.

2.3 Methodology

2.3.1 Selection of Countries

The selection of four countries (Bangladesh, Egypt, Pakistan and Syria) is specifically aimed at reducing some of the potential “noise” factors in anticipated estimation results. First, since different types of migrant are thought to behave differently (Glytsos, 2002) isolating migrants by type makes it easier to ascribe a single (or dominant) motivation to the group of migrants as well as increasing the

chances that such a motivation is sufficiently dominant among that group to produce statistically unambiguous results. Second, portfolio choice responses add another dimension to the migrant's actions without necessarily changing the underlying motivation. Estimating these effects will require an additional set of micro and macroeconomic data that is not available for most developing countries. These two "noise" factors were largely set aside by the choice of the oil-rich Arab States of the Middle East as the source countries (for remittances) and poorer countries of the Middle East and South Asia as the source countries of migrant. Typically migrant workers in the Middle-Eastern countries are guest workers hired for a fixed period of time with very little likelihood of eventual residency and do not have substantive access to capital markets in the host countries. We then have one type of migrant who does not face any substantive portfolio choice issues. Other labor-exporting countries that were possible candidates to be incorporated were Algeria, Morocco, Tunisia, Jordan, India, Sudan, Yemen and Lebanon. These countries were excluded for variety of reasons. Large proportions of the migrant populations from Algeria, Morocco and Tunisia work in Europe where a high proportion of migrants are expected to remain. The motivation to remit for these workers is expected to be significantly different from the motivation of the guest workers who work in the Middle-East. Jordan was not included because the average remittances to GDP ratio in this country is very large (almost 20%) compare to that of the other countries in our dataset – making it too much of an outlier. In the case of India, because of the size

of the economy, remittances as a component of total GDP are too small. Insufficient data is the reason for excluding Sudan, Yemen and Lebanon.

It should be noted that this choice does not control for the informal sector effect. It is very likely that a great deal of activity related to remittances will be missed altogether because the variables used here all refer to formal sector activity.⁵

2.3.2 The Investment Function

The specification for the investment equation is motivated by the flexible accelerator model of investment. A modified version of this model is presented in this essay to accommodate the impact of remittances (REM/Y) and grants (GAY) on the investment rate (INV/Y). According to that approach the investment rate is influenced by the desired level of capital, relative to existing levels. This is positively affected by the potential rates of return suggested by the (lagged) growth rate of output (g_{-1}) and negatively affected by the rate of inflation ($INFL$) (which is treated as a signal of macroeconomic stability). Other capital flow (besides grants) relative to GDP (OCF/Y) is expected to be positively related to the investment rate. The expected persistence of the investment rate is accommodated by including two lagged ratios as explanatory variables⁶ – making this a dynamic specification. Finally, the investment rate is assumed to be negatively affected by the rate of interest ($INTR$). It should be noted that the

⁵ Determining informal sector effects would require an investigation at the microeconomic level, which is beyond the scope of this essay.

⁶ While both first and second lag of investment-GDP ratios are used as explanatory variables in the time-series estimations, only the first lag of investment-GDP ratio is incorporated in the panel estimation. The second lag of investment rate was never found to be significant.

discount rate is used as a proxy for the interest rate in Bangladesh and Egypt. In the case of Pakistan the lending rate is used. The interest rate could not be incorporated in the time series equation for Syria because of unavailability of data. Due to problems of data availability, this variable could not be included in the panel specification.

$$INV/Y = f\left((g)_{-1}, (INV/Y)_{-1}, (INV/Y)_{-2}, (OCF/Y), (INFL), (REM/Y), (GA/Y), (INTR)\right)$$

2.3.3 The Consumption Function

The specification of the consumption function is measured by a generalized model that nests both the life-cycle and permanent income view of consumption and the habit-forming approaches such as the relative income hypothesis. External sector variables are included to test specific predictions with respect to those variables.

$$C/Y = f\left((C/Y)_{-1}, (YPC), (DEP), (OCF/Y), (DEXPG), (REM/Y), (GA/Y)\right)$$

In the above equation, it is assumed that consumption is influenced by per capita income (YPC), the dependency ratio (DEP) and other capital flows to GDP ratio (OCF/Y) and the innovation in export growth ($DEXPG$). The innovation in export growth represents the effect of transitory income in the consumption equation. The remittance-GDP ratio and grants-GDP ratio are denoted as REM/Y and GA/Y . Similar to the investment equation the expected persistence of the consumption (as suggested by the habit-forming approaches) is accommodated by including the lagged ratio as an explanatory variable – making this a dynamic specification.

2.3.4 The Growth Function

The growth equation examines the impact of remittances and grants on growth. The basic equation is based on the neoclassical formulation where growth (g) is determined by the investment-GDP ratio (INV/Y), the rate of growth in the labor force (g_L)⁷, other capital flows to GDP ratio (OCF/Y), remittance-GDP ratio (REM/Y) and the grant-GDP ratio (GA/Y).

$$g = f\left(\left(\frac{INV}{Y}\right), (g_L), \left(\frac{OCF}{Y}\right), \left(\frac{REM}{Y}\right), \left(\frac{GA}{Y}\right)\right)$$

2.3.5 Data and Estimation Issues

The models specified above are estimated using time series data set for four countries for the period 1975 to 2006. The data on grant-aid is derived from the OECD International Development Statistics Division (online). The data on investment, income, remittances and other aggregates are obtained from the World Development Indicators (CD-ROM, 2008), United Nations Statistics (online) and the International Financial Statistics (online), published respectively by the World Bank, the United Nations and the International Monetary Fund.

It has already been noted that the addition of the lagged ratio of investment as an explanatory variable in the investment equation and the lagged ratio of consumption in the consumption equation make these dynamic specifications. These suggest that the simple OLS estimation would be inconsistent (Greene, 2003). In case of the growth equation there is also the

⁷ The rate of growth in the economically-active population, as a proxy of labor force growth is used as the data on labor force for these countries is not available. Economically active population is defined as the number of people that belong to the age group from 15 years to 64 years.

presence of an endogenous variable (the investment ratio) which again suggests that OLS would be inconsistent. An instrumental variable approach is called for and in that regard the two-step (feasible, efficient) generalized method of moments (GMM) approach as described in Baum *et al* (2003, 2007) is employed. This approach is an information-efficient means of obtaining consistent coefficient estimates. This estimation method also outperformed the two stage least square technique, even with robust standard error.⁸

In addition to the time series estimations we also perform a panel estimation of investment, consumption and growth equations. To validate our time series results we perform a disaggregated country-specific panel procedure to estimate investment, consumption and growth equations for each country. Similar to the time series equations, there are lagged regressors and endogenous regressors as explanatory variables in the panel equations. Moreover the panel is long and narrow. Estimating a dynamic equation in a long-narrow panel by using ordinary least squares (OLS) would result in (asymptotically) inconsistent estimates of the relevant coefficients (Greene, 2003). Because of the types of the countries there is reason to believe that the problem of heteroskedasticity and autocorrelation may be present in all the specifications. Therefore, we employ the same two-step (feasible, efficient) generalized method of moments (GMM) approach that is used for estimating the times series equations.

It should be noted that the fixed effect option, rather than the random effect option, is used in all the three equations. It has been done because of the

⁸ We found strong correlation between two types of equation and theoretically the most important variables are found to be more consistently significant with the GMM technique

implicit assumption that there are country specific effects and these effects can be captured by the fixed effect option. Although the Hausman test suggests that there is no systematic difference between the results from the fixed effect and random effect estimations, random effect estimation did not produce significant results even for the basic equations. Results from random effect panel estimation are not presented in this essay (they are available upon request).

Most of the variables in the model are defined over a period of 32 years.⁹ This means that the panel data set could be categorized as having a large T. If the dependant variable is shown to be non-stationary for all or a majority of panels then a panel cointegration procedure is more appropriate than the strict GMM approach. To determine whether non-stationarity is a legitimate concern a Fisher panel unit root test is applied to the investment variable and the potential explanatory variables. As Table 2.3 shows the null hypothesis of full panel non-stationarity is rejected for all variables. A more thorough analysis of the variables (Table 2.3) using two separate tests (one with a null hypothesis of stationarity and two with null hypotheses of a unit-root) indicates that almost all the variables are either completely stationary or mostly stationary. The only exception is the growth in labor force which is found to be stationary only for Bangladesh. Other capital flows were found to be non-stationary for Egypt, remittances-GDP ratio for Bangladesh and Pakistan, consumption-GDP ratio for Syria and GDP growth for Syria.

⁹ One exception is the remittance variable for Bangladesh. Remittance-GDP ratio for Bangladesh is defined over the period of 30 years from 1975-2004. The reason why this is done will be discussed later in this section.

It is well-known in the econometric literature that unit-root tests may produce spurious results in the presence of structural break in time series. In order to test the unit root hypothesis taking into account the possibility of structural breaks in the data we perform the tests proposed by Clemente *et al* (1998). They propose a class of test statistics that captures two alternative forms of change; the “additive outlier” (AO) model, allowing for the possibility of a sudden change, and the “innovational outlier” (IO) model, appropriate for modeling a gradual shift in the mean of the series. The test statistics do not require a priori knowledge of the breakpoint, as their computation involves a two-dimensional grid search for breakpoints over the sample. Results (presented in Table 2.4) reject the null hypothesis of a unit root for all the variables that were found to be non-stationary earlier. The only exception is the remittances-GDP ratio for Bangladesh, which fails to reject the null hypothesis of a unit root even after the structural break in 2003. This series exhibits stationarity from 1975-2004. Specific consideration is given to this time period for the remittance variable for Bangladesh.

2.4 Results

2.4.1 Country Specific Results

Two types of country specific results have been presented in this essay for investment, consumption and growth equations. The first one stems from the time series estimation of each of the four countries separately. The second set of results is the disaggregated country specific panel results where the assumption of identical responses (for remittances and grants) across all countries is dropped.

We are thus able to differentiate the investment effect of remittances and grant aid across individual countries.

2.4.1.1 Bangladesh

Time series results for remittances' impact on investment (presented in Table 2.5) suggest that remittances have a positive and significant (at the 5% level) impact on investment rate. According to the panel estimation (Table 2.6), results in the second equation (where only remittances' affects are disaggregated by country) also suggest that remittances have a significant and positive relationship with investment for Bangladesh. These results are consistent with findings by Stahl and Habib (1989) who argued that remittances in Bangladesh are spent to those sectors which are firmly linked with the rest of the economy. Many sectors that do not receive any direct benefit from the remittance will still expand and stimulate demand for investment goods. While looking at the impact of grant-aid on investment in Bangladesh, time series results (Table 2.5) indicate that the coefficient for grant-aid is insignificant. The panel estimation of the third equation in Table 2.6 (where only grant-aid is disaggregated by country) produces the same result as time series. It is clear from these results that two types of transfers (remittances and grants) have significantly different impact on capital accumulation in Bangladesh. While remittances are positively and significantly related to investment, on average, grant-aid has a weak impact on capital accumulation in Bangladesh.

The impact of remittances on consumption is rather inconclusive for Bangladesh. Time series estimation (Table 2.7) suggests that remittances have

positive and significant (at the 10% level) relationship with consumption but according to the disaggregated panel results (presented in the third equation of Table 2.8), remittances' impact on consumption is strongly negative (at better than 1% level). Both time series and panel estimation suggest unanimous results on grants-consumption coefficient. Both results (Table 2.7 and Table 2.8) show that grant-aid has an insignificant impact on consumption in Bangladesh. Therefore, it can be argued that the behavior of remittances and grants on consumption is also different in the case of Bangladesh.

Detailed time series results on the impact of remittances on economic growth in Bangladesh are presented in Table 2.9. Remittances are found to have a strongly significant and negative impact on growth. Panel disaggregation across countries (Table 2.10) does not suggest any fundamental inconsistency with the time series results although the remittance-growth coefficient is found to be insignificant. With respect to grants both the time series and panel estimate (presented in Table 2.9 and Table 2.10) provide similar results- grants impact on growth is negative and significant at 1% level in Bangladesh. It can be argued that remittances and grants have similar effects on economic growth in Bangladesh in that both effects are negative. Whether the sources of these effects are same will be discussed later in this essay.

2.4.1.2 Egypt

Results from Table 2.5 and Table 2.6 suggest that, according to both time series and panel estimations, remittances have an insignificant impact on investment in Egypt. With respect to grants' impact on investment, time series

results suggest that grants have on average very little impact on investment (Table 2.5). Results from the third equation in Table 2.6 (where only grant-aid is disaggregated in the panel by country) indicate that the coefficient for grant-aid is negative and significant for Egypt.¹⁰ Remittances and grants have different impacts on investment in Egypt.

The remittances-consumption coefficients are found to be significant and negative in both time series as well as panel results (Table 2.7 and Table 2.8). Grants influence the consumption decision positively in Egypt. Both methods of estimation (results presented in Table 2.7 and Table 2.8) suggest that grants have a significant (1% level in time series and 5% level in panel) and positive impact on consumption in Egypt. Remittances and grants clearly have opposite effects on Egypt's economy.

Remittances and grants do have similar impact on economic growth- both affect growth negatively. Time series results (Table 2.9) suggest that remittances' impact on growth is negative and significant at the 1% level. The panel estimation does not contradict these results (the sign of the coefficient is the same), although it suggests that the impact of remittances on economic growth is rather weak and insignificant (Table 2.10). With respect to grants the coefficients are found to be negative and strongly significant (at 1% level) by both the time series and panel estimations (Table 2.9 and Table 2.10).

¹⁰ It should be noted that a negative coefficient for grants in the investment rate equation simply indicates that grants slow down the rate of increase of investment relative to output; not that absolute investment levels fall.

While remittances and grants behave differently in terms of investment decision (remittances' impact is insignificant and grants' impact is negative) in Egypt their impact on economic growth is similar (both are negative).

2.4.1.3 Pakistan

In Pakistan, the impact of remittances on investment is rather insignificant- a unanimous result found by both the estimation procedures used in this essay (Table 2.5 and 2.6). Grants' impact on investment in Pakistan is found to be strongly significant and positive (Table 2.5 and Table 2.6). According to the time series results, the grants-investment coefficient is significant (and positive) at the 1% level. Country-specific panel results are also consistent with this view although this result is significant only at the 5% level.

While time series results show that remittances have an insignificant impact on consumption in Pakistan panel estimations have found a strong and positive impact of remittances on the consumption decisions in Pakistan (Table 2.7 and Table 2.8). With respect to grants overall results suggest that grants' impact on consumption is negative. A negative and significant coefficient is found by the time series estimation. Panel results do not produce any inconsistency with time series results (that is, the coefficient found by panel estimation does not show any opposite significant impact) although the coefficient is found to be insignificant.

The Growth impact of remittances and grants are very similar in Pakistan. Both time series and panel results suggest that remittances and grants have a robust and positive impact on economic growth (all the coefficients are found to

be significant at better than 1% level). These results are presented in Table 2.9 and Table 2.10. The overall results suggest that remittances and grants have different impact on investment and consumption, but similar (positive) impact on GDP growth.

2.4.1.4 Syria

The Results seem to suggest that remittances have a rather weak and insignificant impact on investment in Syria. This is supported by both time series and panel estimations (Table 2.5 and Table 2.6). On the other hand grants' impact of investment is always robust and positive (at least at the 5% level). Similar to Bangladesh and Pakistan, remittances and grants have different impact on investment in Syria.

According to time series estimations remittances have an insignificant impact on consumption in Syria (Table 2.7). The panel estimation shows significant and positive impact of remittances on consumption (Table 2.8) without contradicting the earlier results (in both cases the signs of coefficients are the same). Similar results have been found when we analyze the impact of grant-aid on consumption. While the time series results suggest an insignificant impact, disaggregated panel results show significant and positive impact of grants on consumption in Syria (Table 2.7 and Table 2.8).

Results also suggest that remittances and grants have different effects on economic growth in Syria. Both time series and panel estimations produce similar results that remittances impact on growth is robust and positive in Syria (presented in Table 2.9 and Table 2.10). On the other hand, both time series and

country-specific panel estimations produce similar results that grants have insignificant impact on growth. Based on the results from Syria, remittances have an insignificant impact on investment but a positive impact on growth, while grants have positive impact on investment and an insignificant impact on growth.

2.4.2 Country Specific Results Summary

Country-specific results have been summarized and presented in Table 2.11 to Table 2.18. Overall results suggest that remittances have a strongly significant and positive impact on investment in Bangladesh. For the other three countries the impact is insignificant. The conclusion derived from the growth estimations suggest there is significant country variation in terms of the nature of the effect although both remittances and grants have a significant impact on economic growth. While there is a direct positive impact of remittances on growth in Pakistan and Syria, remittances have a significant positive impact on growth via investment in Bangladesh (since investment is an explanatory variable in the growth equation). The impact of remittances on economic growth in Egypt is negative.

The impact of grants on growth does not demonstrate unanimous results. Grants have an indirect impact on growth via investment in Pakistan and Syria. In the case of Bangladesh and Egypt grants have direct negative impact on growth.

2.4.3 Overall Panel Results

The results from estimating the panel data version of the investment equation are reported in Table 2.6. The Hanson J test of over-identifying

restrictions does not reject the hypotheses that the (GMM) instruments are valid and exogenous. For the investment equation, as anticipated, the coefficient for the lagged investment ratio is very significant (at better than the 1% level) and extremely robust to changes in the specification. The expected relationship between lagged GDP growth and the investment rate is statistically validated. The coefficients for other capital flows to GDP ratio and the coefficient for the rate of inflation are found to be insignificant. They possess expected signs when the full panel is estimated. The estimation results of the full panel when the coefficients for remittances and grants are assumed to be identical for all countries suggests that the remittances to GDP ratio and grants to GDP ratio are not significantly related to the investment rate.

Panel results for the consumption equation (presented in Table 2.8) provide strong support for the persistence model of consumption but only weak support for the life cycle thesis. However, there is a strong support for the permanent income hypothesis. The coefficient for lagged consumption is always positive and significant while the coefficient for the dependency ratio is only significant in one version of the equation. The estimated coefficient for other capital flows to GDP ratio is found to be positive and significant at the 5% level. The estimation of the full panel suggests that the impact of grants on consumption is positive while the effect of remittances on consumption is insignificant.

Table 2.10 records the results from the estimation of the growth equation. As anticipated, the rate of growth is found to be positively and significantly related to the rate of investment. The negative and insignificant relationship

between GDP growth and labor force growth is rather disappointing. However, it has already been noted that due to the problem of available data a proxy variable for growth in the labor force (the rate of growth economically active population) is used. This variable should be considered as a measurement of labor force growth with a large error. Overall panel results suggest that the effects of remittances and grants are both weakly significant (at the 10% level) to GDP growth; remittances are positively related to growth while grants are negatively related.

2.5 Analysis

There is a direct, positive, impact of remittances on growth in Pakistan and Syria and a direct negative impact in Egypt. In the case of Bangladesh, remittances have an indirect impact on growth through investment.¹¹ The overall results for Bangladesh are rather interesting. The coefficient for remittances on growth is found to be very significant and negative (in the time series equation). It suggests that the relationship between remittances and GDP growth is not immediately clear. There is a positive indirect effect on growth via investment but a negative direct relationship in Bangladesh. One possibility of this negative growth-remittances relationship may be due to the counter-cyclical nature of remittances flows (i.e. flow of remittances increase during the period of economic downturn to help families to avoid shortfalls - an assumption also made by Stark and Levhari (1982) or remittances increase in the aftermath of natural disaster (Mohapatra *et al*, 2009). To further examine this hypothesis, we have undertaken

¹¹ Remittances' impact on investment and the coefficient for investment has always found to be significant in the growth equation.

causality tests for Bangladesh and the other three countries to determine whether remittance flows are determined by the economic growth rates or vice versa (Table 2.19). Granger causality tests for Bangladesh confirm that growth causes remittance flows to move in the opposite directions. The overall results do not suggest remittances flows cause growth to fall. Similar results have also been found for Egypt. Results for Bangladesh and Egypt suggest that remittance flows go up during the period of economic downturn. In the case of Bangladesh, there will be some positive effect of remittances on growth via investment although this effect is not strong enough to dominate the total effect. For Pakistan, Granger causality test results suggest that growth causes remittance flows to increase and also remittance flows cause a rise in GDP growth. The causation moves from growth to increased remittance flows as well as remittance flows to increased growth. For Syria there is unidirectional causation from growth to remittance flows which suggests that remittance flow are pro-cyclical in this country.

Results on the grants-growth relationship from time series and panel estimations suggest that grants have a negative impact on growth in Bangladesh and Egypt. Granger causality test results in Table 2.20 confirm that there is a counter-cyclical relationship between the impact of grants and economic growth in these two countries. The negative grant-growth coefficients in these cases imply that grant flows go up during the period of economic downturn while it falls when economic conditions improves in Bangladesh and Egypt (Table 2.20). Foreign aid in these two countries plays an important role as an insurance device. These results are supported by Pallage and Robe (2001) and Collier and Dehn

(2001). Pallage and Robe (2001) argue that at least three fourths of the large welfare costs of macroeconomic fluctuations in developing countries can be alleviated by reallocating aid across time. More specifically, these welfare costs can be mitigated in developing countries through offsetting increase in aid. The counter-cyclical behavior of foreign aid will be very important for aid to be effective in the developing countries (Collier and Dehn, 2001). For the other two countries, i.e. Pakistan and Syria, causality tests find a positive causal relationship from growth to grants but not vice versa. (Table 2.20)

The reason why remittances may have different impacts and different types of impact on growth across countries could perhaps be related to the different motives to remit. In the case of Bangladesh, remittances' impact on investment is positive. Migrants remit their money to invest in assets, which in turn has an effect on economic growth via increased investment. The self-interest motivation of migrants seems to be a prominent factor in Bangladesh. We also find that remittance flows are likely being influenced by the economic situation. Remittance flows in Bangladesh increase during periods of economic down-turn or recession to support the migrants' families. Enlightened self-interest motivation of remittances could lead to a negative relationship between remittance flows and economic growth. In the case of Bangladesh, the most likely story is a combination of self-interest and enlightened self-interest or tempered altruism.

Similar to Bangladesh, remittance flows exhibit counter-cyclical behavior in Egypt. Because remittances have no positive impact on consumption and an insignificant impact on investment the negative remittances-growth coefficient

suggests that the workers remit more during periods of economic downturn. This would tend to suggest that the migrants' motivation to remit in Egypt is not purely self interest but enlightened self-interest.

Both Pakistan and Syria produce similar results in terms of the impact of remittances on investment, consumption and GDP growth. It is clear from the results that remittances have a strong and positive impact on consumption in Pakistan and a relatively weaker (but positive) impact on consumption in Syria. It can be argued from these results that migrants from these two countries are altruistic in nature. The insignificant impact of remittances on investment could not confirm if the self-interest motivation of the migrant plays any important role in these countries. A closer look at the behavior of remittances in terms of economic growth (as suggested by Granger causality tests) tells us that remittances are pro-cyclical in nature in these two countries; flows increase during periods of high economic activity at home and decrease during downturns and crises. A possible explanation for this pro-cyclical behavior, suggested by Luth and Ruiz-Arranz (2007) and Sayan (2006), may be due to migrants' response to investment opportunities and the business climate in the home country. Migrants may choose not to remit their income during economic downturn due to declining returns or reduced confidence in their country's financial system. It can be argued that migrants are not only altruistic in nature but also motivated by self-interest. If migrants are guided by self-interest one might question the insignificant impact of remittances on investment found in the regression results. It should be noted that given the large size of the informal

sector in Pakistan and Syria¹² remittances' may be invested in those sectors. It is not surprising that remittances impact on formal gross capital formation would be insignificant.

2.6 Conclusion

This essay has attempted to answer the following questions regarding remittances; first, to what extent are remittances and grants differentiable in their effect on investment and growth? Second, how might the motivations to remit inform the nature of the relationship between remittances and growth? Various specifications of investment, consumption and growth equations for a sample of four countries over the period of 1975 to 2006 are estimated. These equations are mainly estimated using time series methods for each country separately. Disaggregated country specific panel estimations are also performed to confirm the time series results.

The panel results indicate on an average that there is a negative relationship between grant-aid and economic growth. For Bangladesh and Egypt, the negative and significant coefficient between grant-aid and growth suggests that there is a counter-cyclical relationship between grant-aid and GDP growth in these countries. Grant flow increases during periods of economic downturn and decreases when economic conditions improve in Bangladesh and Egypt. In the case of Pakistan and Syria, grants are found to affect growth positively and indirectly via investment.

¹² See Guisinger and Irfan (1980) and Fadil (2000) for further discussion on the size of informal sector in Pakistan and Syria respectively.

Remittances have a positive impact on growth in Bangladesh, translated through investment. The negative relationship found for growth and remittances confirms that growth caused remittance flows to fall, however it fails to confirm that remittances also cause GDP growth to move in the opposite direction. The negative coefficient for remittances in the growth equation simply represents a counter cyclical relationship between remittances and GDP growth. Similar counter-cyclical relationship between remittances and GDP growth is found for Egypt. The impact of remittances on growth in Pakistan and Syria is also positive, although this impact appears to be via increased consumption. Additional results suggest that remittance flows move pro-cyclically in these two countries. In other words, remittance flows go up in these two countries when business confidence is relatively high during the period of an economic boom.

A key objective of this investigation is to determine whether remittances and grants have a similar impact on investment and economic growth. Since both remittances and grants are part of external transfers one can presume that their behavior in terms of capital accumulation and generating growth to be similar unless we assume the public and private sectors behave dissimilarly and to be unconnected by strong relational links such as Ricardian equivalence. The conclusion prompted by this investigation is that remittances do act differently from grants. Although remittances' effect on growth is similar to grants' effect in three out of four countries these effects stem from different sources. The effect of remittances and grants on capital accumulation is completely different across

countries. Although both remittances and grants are transfers from abroad the “private” characteristic of remittances is the critical attribute.

Results also suggest that different motivations to remit further distinguish these four countries. In the case of Bangladesh, results tend support the impact of remittances on growth via investment which explains self-interest motivation of migrants. The counter-cyclical relationship between remittances and growth also suggest that there is an enlightened self-interest or tempered altruistic motivation of the migrants. Migrants’ motivation to remit in Bangladesh, therefore, can be thought as a combination of self-interest and enlightened self-interest. Similar to Bangladesh, enlightened self-interest or tempered altruistic motivation is also a significant attribute of the Egyptian migrants, although remittances have no significant impact on capital accumulation in this country. Motivation to remit seems to be the one of enlightened self-interest in Egypt. Migrants are mostly altruistic in nature in Pakistan and Syria. Additional results also suggest migrants’ positive response to investment opportunities and business climate in these countries. Motivation to remit for Pakistan and Syria seem to be a combination of migrants’ altruistic behavior and self-interest attitude. Motivations to remit do not appear to be uniform and may be largely determined by social and economic factors and institutions within the home country.

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APPENDIX

Table 2.1: Relationship between Migrants' Motivation and Potential Growth Effect of Remittances

Motivation to Remit	Spending Choices	Potential Growth Effect
Pure altruism	Consumption	Positive through multiplier effect or negative due to reduce in labor force participation.
Self-interest	Investment	Positive
Enlightened self-interest or tempered altruism	1) Invest in human capital. 2) Consumption during the period of economic downturn.	Either positive or negative but not likely through investment.

Table 2.2: Types of Migrant by Length of Stay, Expectation of Returning Home and Tie to the Home and Host Country

Type of Migrant	Length of Stay	Expectation with respect to the Future	Ties to Home	Ties to Host
Migrant	Indefinite	May hope eventually to settle in the host country	Attenuates over time	Strengthen over time
Guest Worker	Short to medium term (typically 1 to 5 years)	Expects to return home eventually	Remains strong	Remains limited
Seasonal Worker	Short (usually a season)	Expects to return home immediately	No links are severed	Very few links are made.

Table 2.3: Stationarity Tests for Relevant Variables: Individual Tests by Panel (Country)

Variable	Fisher-type Test Statistics (Null of full panel non-stationarity)	Test Statistic (null hypothesis of all unit root)		
		KPSS (# of non-rejections of null of stationarity)	DFGLS (# of rejections of null of non-stationarity)	Determination
Investment/ GDP	17.54 ^{**}	4	2	Stationary
Other Capital Flows/ GDP	17.92 ^{**}	3	0	Mostly Stationary
Remittances/ GDP	16.45 ^{**}	2	0	Mostly Stationary
Grants/ GDP	62.90 ^{***}	4	0	Stationary
Inflation	168.99 ^{***}	4	0	Stationary
Consumption/ GDP	33.50 ^{***}	3	0	Mostly Stationary
Per Capita Income	23.21 ^{**}	4	0	Stationary
Dependency ratio	223.14 ^{***}	0	4	Stationary
Innovation in Export Growth	126.49 ^{***}	4	4	Stationary
Growth	108.79 ^{***}	3	2	Mostly Stationary
Growth in Labor Force	47.72 ^{***}	1	0	Mostly Non-Stationary

Notes: *** and ** indicate significance at the 1% level and 5% level respectively.

Table 2.4: Unit Root Test with Structural Break

Variables	Model	Optimal Breakpoint(s)	Coefficient(s)	Auto-regressive Lagged Order	T- Statistics	Determination
Other Capital Flows/ GDP (Egypt)	AO1	1986	-0.088 ^{***}	1	-3.864 (-3.560)	<i>Rejection of Null</i>
	AO2	1984, 1990	-0.077 ^{***} , -0.027 ^{**}	5	-3.609 (-5.490)	Non-Rejection of Null
	IO1	1982	-0.054 ^{***}	0	-4.112 (-4.270)	Non-Rejection of Null
	IO2	1983, 1988	-0.063 ^{***} , -0.050 ^{***}	0	-5.817 (-5.490)	Rejection of Null
Remittances/ GDP (Bangladesh)	AO1	2003	0.045 ^{***}	2	-2.429 (-3.560)	<i>Non-Rejection of Null</i>
	AO2	1983, 1999	0.014 ^{***} , 0.031 ^{***}	0	-2.756 (-5.490)	Non-Rejection of Null
	IO1	2000	0.015 ^{***}	2	-1.786 (-4.270)	Non-Rejection of Null
	IO2	1978, 2000	0.004, 0.016 ^{***}	0	-2.025 (-5.490)	-
Remittances/ GDP (Pakistan)	AO1	1988	-0.035 ^{***}	0	-4.202 (-3.560)	<i>Rejection of Null</i>
	AO2	1983, 1989	-0.006, -0.036 ^{***}	0	-3.690 (-5.490)	-
	IO1	1986	-0.025 ^{***}	0	-4.572 (-4.270)	Rejection of Null
	IO2	1986, 2000	-0.048 ^{***} , 0.028 ^{***}	4	-4.778 (-5.490)	Non-Rejection of Null

Table 2.4: Unit Root Test with Structural Break (cont.)

Variables	Model	Optimal Breakpoint(s)	Coefficient(s)	Auto-regressive Lagged Order	T- Statistics	Determination
Consumption/ GDP (Syria)	AO1	1995	-0.092 ^{***}	0	-3.725 (-3.560)	<i>Rejection of Null</i>
	AO2	1991, 1997	-0.045 ^{**} , -0.062 ^{***}	0	-3.630 (-5.490)	Non-Rejection of Null
	IO1	1992	-0.057 ^{***}	0	-3.712 (-4.270)	Non-Rejection of Null
	IO2	1992, 19998	-0.055 ^{***} , -0.022	0	-3.702 (-5.490)	-
Growth (Egypt)	AO1	1980	-0.050 ^{***}	10	-1.682 (-3.560)	Non-Rejection of Null
	AO2	1984, 1991	-0.044 ^{***} , 0.004	0	-5.031 (-5.490)	-
	IO1	1984	-0.040 ^{***}	0	-4.842 (-4.270)	<i>Rejection of Null</i>
	IO2	1980, 1984	-0.020, -0.035 ^{***}	0	-5.162 (-5.490)	-
Growth in Labor Force (Egypt)	AO1	2002	-0.000	10	-1.934 (-3.560)	-
	AO2	1983, 1989	0.004 ^{***} , 0.001	1	-3.518 (-5.490)	-
	IO1	2002	-0.000 ^{***}	2	-7.447 (-4.270)	<i>Rejection of Null</i>
	IO2	1977, 2002	0.000, 0.001 ^{***}	2	-5.864 (-5.490)	-

Table 2.4: Unit Root Test with Structural Break (cont.)

Variables	Model	Optimal Breakpoint(s)	Coefficient(s)	Auto-regressive Lagged Order	T- Statistics	Determination
Growth in Labor Force (Pakistan)	AO1	1982	-0.000	1	-4.413 (-3.560)	-
	AO2	1983, 2004	-0.001, 0.007	1	-3.640 (-5.490)	-
	IO1	1991	-0.001**	2	-4.317 (-4.270)	<i>Rejection of Null</i>
	IO2	1982, 1991	-0.000, -0.006	2	-4.341 (-5.490)	-
Growth in Labor Force (Syria)	AO1	1994	0.004***	1	-4.144 (-3.560)	<i>Rejection of Null</i>
	AO2	1983, 1992	0.004***, 0.003***	1	-6.186 (-5.490)	Rejection of Null
	IO1	1986	0.000**	6	-2.487 (-4.270)	Non-Rejection of Null
	IO2	1984, 1994	-0.000, -0.001***	6	2.813 (-5.490)	-

- Notes:**
- 1) *** and ** indicate significance at the 1% level and 5% level respectively to examine the existence of structural break.
 - 2) The unit-root tests are those proposed by Clemente et al. (1998) for the innovational outlier (IO) and additive outlier (AO) models of a unit root in the presence of single (1) or double (2) mean shifts.
 - 3) The null hypothesis is $H_0 =$ unit root in the series.
 - 4) H_0 is rejected if the *t-statistics* is smaller than the critical value.
 - 5) Value in the parentheses represents the critical value.

Table 2.5: Time Series Results for Investment Equation

Dependent Variable: Investment/ GDP				
	Bangladesh	Egypt	Pakistan	Syria
Constant	0.007 ^{***} (0.001)	0.004 ^{***} (0.000)	0.001 (0.896)	0.010 ^{***} (0.000)
Investment/ GDP First Lagged	1.051 ^{***} (0.000)	1.057 ^{***} (0.000)	1.318 ^{**} (0.016)	0.813 ^{***} (0.000)
Investment/ GDP Second Lagged	-0.446 ^{***} (0.000)	-0.518 ^{***} (0.000)	-0.466 ^{***} (0.006)	-0.280 ^{***} (0.001)
Other Capital Flow/ GDP	-0.072 ^{***} (0.000)	0.046 ^{***} (0.001)	-0.000 (0.982)	0.043 ^{***} (0.002)
Lagged GDP Growth	-0.010 [*] (0.067)	-0.010 (0.932)	0.025 ^{***} (0.000)	0.012 ^{***} (0.000)
Inflation	-0.001 (0.214)	0.015 ^{**} (0.043)	0.013 (0.225)	-0.024 ^{***} (0.000)
Interest Rate	0.000 ^{**} (0.012)	0.000 [*] (0.087)	-0.000 (0.263)	-
Remittances/GDP	0.035 ^{**} (0.038)	0.001 (0.924)	-0.006 (0.418)	0.020 (0.488)
Grant/GDP	-0.009 (0.538)	0.006 (0.652)	0.078 ^{***} (0.001)	0.034 ^{***} (0.006)
Hansen J Statistics (Over-identification test for all instruments)	2.459 (0.814)	2.515 (0.642)	2.306 (0.68)	2.469 (0.481)
Number of Observations	26	29	30	29

Notes: P-values are in the parenthesis. ^{***}, ^{**} and ^{*} indicate significance at the 1%, 5% and 10% level respectively.

Instrument variables: Lagged other capital flows/GDP, growth in money supply, lagged inflation, lagged interest rate, lagged remittances/GDP and lagged grants/GDP

Table 2.6: Panel Results for Investment Equation and Country Disaggregation

Dependent Variable: Investment/GDP			
	Investment Equation	Remittance Accounting for Countries	Grant Accounting for Countries
Investment/GDP Lagged	0.766*** (0.001)	0.674*** (0.000)	0.689*** (0.000)
GDP Growth Lagged	0.010*** (0.003)	0.013*** (0.000)	0.013*** (0.003)
Other Capital Flows/GDP	0.013 (0.148)	0.021** (0.021)	0.018*** (0.005)
Inflation	-0.002 (0.805)	0.001 (0.902)	-0.004 (0.469)
Remittances/GDP	0.010 (0.606)		0.010 (0.143)
Grant/GDP	-0.005 (0.411)	-0.002 (0.780)	
Remittances/GDP (Bangladesh)		0.085* (0.076)	
Remittances/GDP (Egypt)		0.015 (0.178)	
Remittances/GDP (Pakistan)		-0.004 (0.468)	
Remittances/GDP (Syria)		0.014 (0.514)	
Grant/GDP (Bangladesh)			-0.034 (0.198)
Grant/GDP (Egypt)			-0.028*** (0.005)
Grant/GDP (Pakistan)			0.051** (0.024)
Grant/GDP (Syria)			0.016** (0.016)
Hansen J Statistics (Over-identification test for all instruments)	1.372 (0.712)	2.263 (0.894)	2.828 (0.726)
Number of Observations	116	116	120

Notes: P-values are in the parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% level respectively.

Instrument variables: Lagged other capital flows/GDP, growth in money supply, lagged inflation, lagged interest rate, lagged remittances/GDP and lagged grants/GDP

Table 2.7: Time Series Results for Consumption Equation

Dependent Variable: Consumption/ GDP				
	Bangladesh	Egypt	Pakistan	Syria
Constant	0.030 (0.737)	0.414*** (0.000)	0.031 (0.737)	0.249*** (0.000)
Consumption/ GDP Lagged	-0.060 (0.578)	0.378*** (0.000)	1.034*** (0.000)	0.547*** (0.000)
Per Capita Income	0.000*** (0.000)	0.000*** (0.000)	0.000* (0.060)	0.000 (0.203)
Dependency Ratio	1.071*** (0.000)	0.150*** (0.000)	-0.083*** (0.000)	0.114 (0.103)
Other Capital Flows/ GDP	-0.086 (0.183)	0.112*** (0.000)	0.068 (0.378)	0.359 (0.159)
Innovation in Export Growth	-0.002 (0.561)	0.003 (0.723)	-0.005 (0.708)	0.006 (0.641)
Remittances/GDP	0.467* (0.052)	-0.306*** (0.000)	0.092 (0.447)	0.076 (0.751)
Grant/GDP	0.322 (0.149)	0.189*** (0.000)	-2.001*** (0.000)	0.081 (0.512)
Hansen J Statistics (Over-identification test for all instruments)	2.408 (0.790)	2.482 (0.779)	2.376 (0.795)	2.282 (0.809)
Number of Observations	28	29	30	29

Notes: P-values are in the parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% level respectively.

Instrument variables: Lagged per capita income, lagged innovation in export growth, lagged dependency ratio, lagged other capital flows/GDP, lagged remittances/GDP and lagged grants/GDP

Table 2.8: Panel Results for Consumption Equation and Country Disaggregation

Dependent Variable: Consumption/GDP			
	Consumption Equation	Remittance Accounting for Countries	Grant Accounting for Countries
Consumption/GDP Lagged	0.903*** (0.000)	0.521*** (0.000)	0.896*** (0.000)
Per Capita Income	0.000 (0.852)	0.000 (0.290)	0.000 (0.918)
Dependency Ratio	-0.020 (0.777)	0.107** (0.025)	-0.020 (0.671)
Other Capital Flow/GDP	0.105** (0.013)	0.106*** (0.001)	0.108** (0.020)
Innovation in Export Growth	-0.014 (0.123)	-0.007 (0.324)	-0.014* (0.090)
Remittances/GDP	0.067 (0.380)		0.048 (0.579)
Grant/GDP	0.201*** (0.003)	0.135*** (0.009)	
Remittances/GDP (Bangladesh)		-0.778*** (0.001)	
Remittances/GDP (Egypt)		-0.283*** (0.001)	
Remittances/GDP (Pakistan)		0.668*** (0.001)	
Remittances/GDP (Syria)		0.179** (0.061)	
Grant/GDP (Bangladesh)			0.395 (0.409)
Grant/GDP (Egypt)			0.203** (0.028)
Grant/GDP (Pakistan)			-0.993 (0.294)
Grant/GDP (Syria)			0.224*** (0.005)
Hansen J Statistics (Over-identification test for all instruments)	2.501 (0.776)	5.099 (0.747)	4.031 (0.854)
Number of Observations	116	116	116

Notes: P-values are in the parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% level respectively.

Instrument variables: Lagged per capita income, lagged innovation in export growth, lagged dependency ratio, lagged other capital flows/GDP, lagged remittances/GDP and lagged grants/GDP

Table 2.9: Time Series Results for Growth Equation

Dependent Variable: Growth of Output				
	Bangladesh	Egypt	Pakistan	Syria
Constant	0.171 ^{***} (0.000)	0.175 ^{***} (0.000)	-0.065 ^{***} (0.003)	-0.104 (0.142)
Investment/ GDP	1.533 ^{**} (0.040)	2.337 ^{***} (0.000)	4.895 ^{***} (0.000)	0.584 (0.611)
Other Capital Flow/GDP	0.040 (0.555)	-0.257 ^{***} (0.000)	-0.172 (0.169)	-0.010 (0.956)
Growth in Labor Force	-4.386 ^{***} (0.000)	-6.217 ^{***} (0.000)	0.146 (0.628)	2.811 (0.150)
Remittances/GDP	-0.609 ^{***} (0.000)	-0.076 ^{***} (0.003)	0.444 ^{***} (0.000)	0.867 ^{***} (0.001)
Grant/GDP	-0.915 ^{***} (0.000)	-0.255 ^{***} (0.000)	1.103 ^{***} (0.008)	0.004 (0.980)
Hansen J Statistics (Over-identification test for all instruments)	2.692 (0.846)	2.512 (0.867)	2.673 (0.849)	2.470 (0.872)
Number of Observations	28	29	30	29

Notes: P-values are in the parenthesis. ^{***}, ^{**} and ^{*} indicate significance at the 1%, 5% and 10% level respectively.

Instrument variables: Lagged investment rate, growth in food production index, growth in exports, lagged growth in labor force, lagged other capital flows/GDP, lagged remittances/GDP and lagged grants/GDP.

Table 2.10: Panel Results for Growth Equation and Country Disaggregation

Dependent Variable: Growth of Output			
	Growth Equation	Remittance Accounting for Countries	Grant Accounting for Countries
Investment/GDP	0.972* (0.058)	1.671*** (0.000)	0.561 (0.147)
Growth in Labor Force	-0.359 (0.265)	0.069 (0.813)	-0.145 (0.614)
Other Capital Flow/GDP	0.039 (0.250)	0.015 (0.678)	0.028 (0.439)
Remittances/GDP	0.158* (0.095)		0.204*** (0.001)
Grant/GDP	-0.102* (0.056)	-0.189*** (0.007)	
Remittances/GDP (Bangladesh)		-0.075 (0.666)	
Remittances/GDP (Egypt)		-0.015 (0.772)	
Remittances/GDP (Pakistan)		0.470*** (0.000)	
Remittances/GDP (Syria)		0.761*** (0.000)	
Grant/GDP (Bangladesh)			-0.635*** (0.000)
Grant/GDP (Egypt)			-0.326*** (0.000)
Grant/GDP (Pakistan)			1.786*** (0.001)
Grant/GDP (Syria)			0.048 (0.424)
Hansen J Statistics (Over-identification test for all instruments)	4.681 (0.699)	6.471 (0.774)	6.874 (0.737)
Number of Observations	116	116	116

Notes: P-values are in the parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% level respectively.

Instrument variables: Lagged investment rate, growth in food production index, growth in exports, lagged growth in labor force, lagged other capital flows/GDP, lagged remittances/GDP and lagged grants/GDP.

Table 2.11: Impact of Remittances on Investment, Consumption and Growth (Time Series)

Country	Investment Equation	Consumption Equation	Growth Equation
Bangladesh	+**	+**	-***
Egypt	NS	-***	-***
Pakistan	NS	NS	+***
Syria	NS	NS	+***

Notes: ^{***}, ^{**}, ^{*} indicate significance at the 1%, 5% and 10% levels respectively.
+, - and NS imply positive effect, negative effect and insignificant effect respectively.

Table 2.12: Impact of Grants on Investment, Consumption and Growth (Time Series)

Country	Investment Equation	Consumption Equation	Growth Equation
Bangladesh	NS	NS	-***
Egypt	NS	+***	-***
Pakistan	+***	-***	+*
Syria	+***	NS	NS

Notes: ^{***}, ^{**}, ^{*} indicate significance at the 1%, 5% and 10% levels respectively.
+, - and NS imply positive effect, negative effect and insignificant effect respectively.

Table 2.13: Impact of Remittances on Investment, Consumption and Growth (Panel)

Country	Investment Equation	Consumption Equation	Growth Equation
Bangladesh	+*	-***	NS
Egypt	NS	-***	NS
Pakistan	NS	+***	+***
Syria	NS	+*	+***

Notes: ^{***}, ^{**}, ^{*} indicate significance at the 1%, 5% and 10% levels respectively.
+, - and NS imply positive effect, negative effect and insignificant effect respectively.

Table 2.14: Impact of Grants on Investment, Consumption and Growth (Panel)

Country	Investment Equation	Consumption Equation	Growth Equation
Bangladesh	NS	NS	-***
Egypt	-***	+**	-***
Pakistan	+**	NS	+***
Syria	+**	+***	NS

Notes: ^{***}, ^{**}, ^{*} indicate significance at the 1%, 5% and 10% levels respectively.
+, - and NS imply positive effect, negative effect and insignificant effect respectively.

Table 2.15: Comparing Impacts of Remittances and Grants (Time Series)

Country	Investment	Consumption	Growth
Bangladesh	Different	Different	Similar (-)
Egypt	Similar (NS)	Different	Similar (-)
Pakistan	Different	Different	Similar (+)
Syria	Different	Similar (NS)	Different

Table 2.16: Comparing Impacts of Remittances and Grants (Panel)

Country	Investment	Consumption	Growth
Bangladesh	Different	Different	Different
Egypt	Different	Different	Different
Pakistan	Different	Different	Similar (+)
Syria	Different	Similar (+)	Different

Table 2.17: Overall Impact of Remittances on Investment, Consumption and Growth

Country	Investment Equation	Consumption Equation	Growth Equation
Bangladesh	+	Unclear	-
Egypt	No Measured Effect	-	-
Pakistan	No Measured Effect	+	+
Syria	No Measured Effect	+	+

Note: +, and – represent positive effect and negative effect respectively.

Table 2.18: Overall Impact of Grants on Investment, Consumption and Growth

Country	Investment Equation	Consumption Equation	Growth Equation
Bangladesh	No Measured Effect	No Measured Effect	-
Egypt	-	+	-
Pakistan	+	-	+
Syria	+	+	No Measured Effect

Note: +, and – represent positive effect and negative effect respectively.

Table 2.19: Granger Causality Tests for Remittances and Growth

Null Hypothesis	χ^2	Determination
<i>Bangladesh</i>		
Remittance/GDP does not Granger cause Growth	4.29 (0.117)	Remittance flow <i>does not</i> cause growth
Growth does not Granger cause Remittance/GDP	8.180** (0.016)	Growth causes remittance flow
<i>Egypt</i>		
Remittance/GDP does not Granger cause Growth	0.90 (0.637)	Remittance flow <i>does not</i> cause growth
Growth does not Granger cause Remittance/GDP	11.331*** (0.003)	Growth causes remittance flow
<i>Pakistan</i>		
Remittance/GDP does not Granger cause Growth	10.10*** (0.006)	Remittance flow causes growth
Growth does not Granger cause Remittance/GDP	12.29*** (0.002)	Growth causes remittance flow
<i>Syria</i>		
Remittance/GDP does not Granger cause Growth	1.78 (0.410)	Remittance flow <i>does not</i> cause growth
Growth does not Granger cause Remittance/GDP	11.18*** (0.003)	Growth causes remittance flow

Notes: P values are in the parenthesis.
 ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Table 2.20: Granger Causality Tests for Grants and Growth

Null Hypothesis	χ^2	Determination
<i>Bangladesh</i>		
Grants/GDP does not Granger cause Growth	1.45 (0.483)	Grant flow <i>does not</i> cause growth
Growth does not Granger cause Grants/GDP	4.86* (0.081)	Growth causes grant-aid flow
<i>Egypt</i>		
Grant/GDP does not Granger cause Growth	0.08 (0.960)	Grant flow <i>does not</i> cause growth
Growth does not Granger cause Grant/GDP	9.358*** (0.009)	Growth causes grant-aid flow
<i>Pakistan</i>		
Grant/GDP does not Granger cause Growth	0.47 (0.791)	Grant flow <i>does not</i> cause growth
Growth does not Granger cause Grants/GDP	6.27** (0.044)	Growth causes grant-aid flow
<i>Syria</i>		
Grant/GDP does not Granger cause Growth	0.77 (0.176)	Grant flow <i>does not</i> cause growth
Growth does not Granger cause Grant/GDP	6.60** (0.037)	Growth causes grant-aid flow

Notes: P values are in the parenthesis.
 ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

CHAPTER 3

ALLOCATION OF FOREIGN AID: A GLOBAL ANALYSIS

3.1 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 often contributes to

(or supports) capital flight from developing countries (Quazi, 2004) and is also used to increase the stock of foreign reserves (Aiyar *et al*, 2005). That part of aid that contributes to capital outflows (i.e. reverse flows) cannot contribute directly to increases in the rate of consumption or investment.¹³ 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 essay is to determine the importance of reverse flows in the allocation of aid across developing countries. This is done by estimating the long-run relationships between aid and consumption, investment and net exports. These relationships are then used to derive estimates of the proportion of aid diverted to reverse flows. This estimate is 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 3.2 presents the theoretical and empirical background to this research. Section 3.3 provides a basic national income accounting framework to revisit the allocation of foreign aid. Section 3.4 outlines the methodology to be used to derive relevant results. Section 3.5 presents those results and Section 3.6 concludes the chapter.

¹³ 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. Thus, 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.

3.2 Literature Review on Aid and Resource Mobilization

3.2.1 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 famous two-gap model of Chenery and Strout (1966) is the first formal model that attempts to explain the importance of foreign assistance in resource mobilization for growth. According to that model, developing countries may face two potential resource constraints in attempting to achieve desired rates of growth. First, these countries may not be able to generate sufficient amount of domestic savings to finance the necessary levels of investment (the savings constraint). Second, developing countries may not be able to generate sufficient foreign exchange to purchase the amount to capital and intermediate goods necessary to achieve the required rate of investment (the foreign exchange constraint). Foreign resource inflows may remove both of 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 if foreign assistance is sufficient 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 has been challenged. Rahman (1967) developed a 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 as long as 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 the country can allocate aid between consumption and investment without burdening the future generation. Based on Rahman's results, Griffin and Enos (1970) argue that if foreign resources arrive in the form of concessional loans and grants (aid) whose cost are, in all likelihood, much lower than the marginal rate of return on domestic investment, these resources will be preferred substitutes for domestic resources (savings). Even if aid is used wholly for investment purposes, its relationship to domestic savings will not be additional but substitutive. Increased foreign assistance will be used to accommodate an increase in domestic consumption and, by definition, reduce domestic savings, even if overall investment levels increase or remain the same. Even though aid is sufficient it will not bridge the savings gap.

Renewed interest in aid and aid effectiveness in developing economies over the past decade has led to some new contributions to the theoretical debate on the effect of foreign aid on investment. Like earlier studies these have not produced unanimous conclusions. Obstfeld (1999) extended the Cass-Koopmans-Ramsey optimal growth model by adding foreign aid and showed that foreign aid had some positive effects on investment in the short run. These short run effects would help to speed up the transition to the long run steady state. Once the long run steady state is achieved foreign aid has no effect on long run capital accumulation. Recent papers by Gong and Zou (2000 and 2001) examined the

relationship between foreign aid and investment in an infinite-horizon model of optimal allocation and found that a permanent rise in foreign aid raises investment in the short run but reduces long run capital accumulation. A temporal increase in foreign aid results in an increase in consumption and a reduction in investment. By contrast, Obstfeld (1999), Gong Zou (2000 and 2001), Xiaoyong and Gong (2008) found that an anticipated permanent increase in foreign aid would lead to an increase in both long-run capital accumulation and consumption. Investment also went up in the short run irrespective of the type of increase (whether it is permanent or temporary) in aid inflow.

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 scholars. Rahman argued that the foreign aid that could enhance domestic economic activity (i.e. consumption and investment) is what would be available after debt service payments had been financed.¹⁴ The implication is that the amount of each additional dollar of aid that can be used for consumption or investment will depend on how much of that dollar is remaining after debt service payments have been financed. 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 increased such potential losses needed to be taken into account in assessing the potential impact of aid. Reserve

¹⁴ This, of course, involves an implicit assumption, that there were no other major source of external flows and exports were required to finance necessary imports.

accumulation and capital flight provide similar potential diversions of external flows such as aid.

3.2.2 The Empirical Literature

In recent years two studies have reviewed the rather substantial literature 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 while Doucouliagos and Paldam (2006), in a meta-study, 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). Some suggested a negative but insignificant coefficient (for aid in an estimated savings equation) but 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 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. For 18 of those 39 studies the null hypothesis is rejected, suggesting instead that the aid coefficient is greater than -1 (meaning that 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.

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 led 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) then the investment-aid elasticity and the consumption-aid elasticity (the negative of the savings-aid elasticity) should add up to 1.¹⁵¹⁶ 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. Some scholars have pointed out the relevance of these flows. Loxley and Sackey (2008) used pooled cross-section time series data to estimate the aid-growth relationship for 40 member countries of the African Union. Their results suggest that aid does matter

¹⁵ If foreign assistance is used for consumption, by definition, it reduces domestic savings.

¹⁶ If investment and consumption are measured as ratios of output.

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. His results suggest that the inflow of foreign aid into that country has 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 concluded that the implication of using aid to accumulate foreign reserves is that "... aid was effectively not available to finance increased domestic spending" (Aiyar *et al*, 2005).

Recently a more comprehensive work by Serieux (2009) 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 (and sometimes explicit) 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.¹⁷

It is evident from Serieux (2009) 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). In the following section some basic accounting identities will be used to explain how reverse flows fit into the aid allocation decision at the macro-economy level.

3.3 National Income Accounting and the Allocation of Aid

Much of the existing literature, which sees foreign aid as simply allocated between consumption and investment, implicitly assumes 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 (Derivation 1, Appendix 3.2). 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 investment rate effect $\left(\frac{\partial i}{\partial a}\right)$ and its consumption rate effect $\left(\frac{\partial c}{\partial a}\right)$. If aid is indeed wholly used to expand the trade deficit then it is fully accounted for by increases in the rate of consumption and/or investment. The extent to which aid expands the trade deficit will depend on the

¹⁷ 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.

extent to which it is used to finance reverse flows. As is shown in Derivation 2 (Appendix 3.2), 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.

In Derivation 2, the current account balance (*CU*) and the capital account balance (*CA*) are disaggregated into their components to more directly explain the relationship between net exports (the trade balance) and reverse flows. 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).¹⁸ 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 (Derivation 3).

¹⁸ Aid in the form of grants has a one-to-one impact on net transfers because grants enter into the current account as transfer.

3.4 Methodology

3.4.1 Data and Estimation Issues

The results from the last section suggest that the proportion of foreign aid that is directed to reverse flows can be estimated in 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 (because 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 remittances on each of the major types of reverse flows (debt service flows, reserve accumulation and capital flight), behavioral equations for debt service flows and reserve accumulation are not well established in the existing literature. This essay will attempt to derive the estimates that are discussed above. The relationships between the aid-to-income ratio and the consumption rate, the investment rate, and the net export (trade balance) ratio will be estimated. The proportion of aid directed to reverse flows will be 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.

For this research consumption, investment and net export equations were estimated for 61 developing countries¹⁹ for the period of 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.

Since this panel dataset can be categorized as having a large T and large N, non-stationarity of some variables may become an issue. Moreover, a primary focus of this paper is the long-run relationship between aid and consumption, investment and net export. 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. This is the estimation procedure that will be employed to estimate the long-run equilibrium relationships between aid, consumption, investment and net exports.

¹⁹ Please see Table 3.1 (Appendix 3.1) for the list of countries.

PMG approach is designed specifically for panel data with large N and large T (Pesaran *et al.*, 1999). 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 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 Pooled Mean Group approach 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).

To determine the level of integration of the relevant variables we employed Hadri's panel stationarity test (Hadri 2002) to relevant variables. As Table 3.2 (Appendix 3.1) indicates, 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 (Table 3.2). 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 (with the exception of the innovation in export growth which would be related to short-run adjustments). However, 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 also used to determine the level of integration of the first difference of the dependency ratio. This test did 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 (Table 3.2). We therefore conclude that the dependency ratio is an I(1) variable.²⁰

3.4.2 The Behavioral Equations

3.4.2.1 The Consumption Function

The life-cycle-permanent income hypotheses, which argue 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

²⁰ 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.

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.

The consumption rate is thus assumed to have a long run relationship with per capita income, the dependency ratio, other external flows to GDP ratio and the aid to GDP ratio (Table 1). To address the short run dynamics (as suggested by the Permanent Income Hypothesis), a proxy for transitory income, the innovation in export growth,²¹ is added to the short run equation.

Table 1: The Determinants of the Rate of Consumption

Variables	Relevance	Expected Sign of Coefficient
Log of Per capita income ²²	Related to the proportion of the population above subsistence	Negative
Innovation in Exports Growth	Increase in perceived transitory income	Negative
The Dependency Ratio	Effect on population structure on consumption	Positive
Other External Flows/GDP	Increased access to private resources with significant future repayment burdens	Positive
ODA/GDP	Increased access to resources beyond that derived from domestic output with limited future repayment burdens	To be Determined

²¹ 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.

²² Per capita income (in \$US) is logged to reflect the presumption that the relationship is non-linear.

3.4.2.2 The Investment Function

To estimate the effect of the aid to GDP ratio on the investment rate a modified version of the flexible accelerator model of investment is employed. Per capita income and the real exchange rate are assumed to affect the desired capital stock and ODA and other external flows are assumed to affect the rate at which the gap between desired and actual capital stock is bridged. The rate of inflation and the debt-to-income ratio 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.

Table 2: Determinants of the Rate of Investment

Variables	Relevance	Expected Sign of Coefficient
Total External Debt/GDP	Import compression and debt-related disincentive effects	Negative
Log of Rate of Inflation	Proxy for macroeconomic instability	Negative
Per Capita Income	Affects profitability and, therefore, the rate of return on capital	Positive
Index of Real Exchange Rate	A depreciation (increase in the index) improves the competitiveness of domestically produced goods	Positive
Other External Flows	Direct contributions of public and commercial credit for investment	Positive
ODA/GDP	Increased access to resources beyond that derived from domestic output	Zero or Positive

3.4.2.3 The Net Export Function

The net export equation employed in the essay 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 well as the foreign exchange variables. This approach describes a long run relationship and is ideal for use in our research.

Table 3 explains the variables that enter into the net export equation. Since the dependent variable is the ratio of net exports to income (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. Foreign income is defined as the sum of the income of high-income OECD countries plus China. The index of relative prices is calculated as the ratio of the export price index of advanced economies and the domestic price index of each country. Since all the relevant variables are mostly non-stationary they enter the long run equation in levels and the short run equation in first differences.

Table 3: Determinants of the Net Exports

Variables	Relevant Effect	Expected Sign of Coefficient
Index of the Foreign income to Domestic Income	Affects the demand for net exports	Positive
Index of Relative Prices	Affects the demand for imports and supply of exports	Positive
Foreign Exchange Reserves/GDP	Influences the feasible supply of imports	Negative
Remittances/GDP	Influences the feasible supply of imports	Negative
Private Capital Flows/GDP	Influences the feasible supply of imports	Negative
ODA/GDP	Influences the feasible supply of imports	Negative

3.5 Results and Analysis

Estimated results from the PMG estimator of the full sample of 61 countries are presented in Table 3.3, 3.4 and 3.5 in Appendix 3.3. To check the consistency of PMG estimates we tested it against the MG estimates. These results are also presented in the same tables. While MG estimates are (theoretically) 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 to test the null that the PMG and MG estimators are not significantly different (in a statistical sense). If that null hypothesis is not rejected then the PMG results can be presumed consistent (and therefore the underlying assumption of common coefficients across panels is valid). It should be noted that the Hausman test is weak (because of a 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. The results presented in Appendix 3.3 tend to support that argument. 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 pooled mean group 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 ODA-GDP ratio (Table 3.3, Appendix 3.3). The other variables included in the long run equation are found to be insignificant. The error-correction term from the PMG estimator is strongly significant and suggests a modest speed of error correction. The strongest determinant of short-term movements in the consumption rate is the innovation in export growth (which approximates transitory income). This suggests that 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 long run consumption coefficient of 0.77 suggests that on average 77 per cent of additional aid is allocated to consumption in this set of countries. The null hypothesis that this coefficient is not differentiable from one is also strongly rejected - aid is not wholly used for consumption (Table 3.3).

The MG and PMG estimates of the investment rate equation are presented in Table 3.4 (Appendix 3.3). The Hausman test does not reject the null hypothesis of similar coefficient estimates across the two estimators. It is evident from the results that the long run investment rate is negatively influenced by total external

debt to GDP ratio, and positively influenced (at the 1 % level) by other external flows to GDP ratio (non-concessional loans, FDI and portfolio flows) and real exchange rates (at the 10 % level). In the short run equation the first difference of the inflation rate is significant and negative. The positive coefficient of this variable in the long run equation is contrary to expectation if one presumes that this variable proxies for macroeconomic stability. Since inflation 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. The other variable which is found to be significant in the short run equation is the change in (the log of) per capita income – which is as predicted by the subsistence income hypothesis.

More importantly the long run coefficient for aid in the investment equation is insignificant. This suggests that over the long-run an increase in the aid/GDP ratio does not have a 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.

Table 3.5 (in Appendix 3.3) presents the MG and PMG estimates of the net export equation. Results from the PMG estimates suggest that, over the long run, the trade balance to GDP ratio is positively affected by the foreign income to

domestic income ratio 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 index of relative prices 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 ODA/GDP 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 also supported by the Wald Tests which strongly rejects the null that the variable is distinguishable from minus one.

The next table (Table 3.6 in Appendix 3.3) 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 (Table 3.5) makes this a fairly robust result. Over the period of 1980 to 2000, about 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 tried to 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 would have been too small to validate the use of the PMG procedure (since the sample size (n) would not be “large”). The marginal effects of reverse flows for these regions were derived in the same manner as is done for the full sample above.

Table 3.7 in Appendix 3.3 presents the MG and PMG estimates of the consumption equation for Sub-Saharan Africa. The coefficients for the log of per capita and dependency ratio are significant and have the expected signs. The innovation in export growth is also found to be significant and negative in the short run equation supporting the transitory income hypothesis for Sub-Saharan Africa. PMG estimates indicate that the long run coefficient of ODA-GDP ratio is 0.40, suggesting that 40 per cent of increased aid is used to increase consumption in Sub-Saharan Africa during 1980 to 2006. The long run coefficient for the ODA-GDP ratio in the investment equation (presented in Table 3.8) 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. This implies the rest of the aid (approximately 47%) is directed to the financing of reverse flows.

When we look at the net export equation, the estimated long run coefficient for the ODA-GDP ratio 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 ODA went toward financing reverse flows - some combination of increases in reserves, capital flight or debt service payments. 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 3.10).

The impact of ODA on consumption, investment and net export in the Americas are shown in Table 3.11, 3.12 and 3.13. In the long run consumption equation, per capita income, dependency ratio and other external flows to GDP ratio were found to be significant. A negative dependency ratio suggests that high dependency ratios are correlated with a lower rate of consumption in these countries. While the coefficient estimate for long run per capita income is found to be positive, that for the innovation in exports growth is significant and negative (at the 5% level) in the short run equation. This suggests that short run consumption movements are strongly (and negatively) 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 other external flows 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 other external flows in the long run investment equation suggest that all other external flows (besides ODA but not including remittances) were used to increase investment in the Americas. The log of the inflation rate and real exchange rate were significant but do not have their expected sign. The positive sign (but significant) of the log of inflation rate 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 real exchange rate 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 (Table 3.11 and 3.12 in Appendix 3.3). Given the result from the net export equation we must take it 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 3.13), 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. Foreign

exchange reserves/GDP is the only other variable that is strongly significant in the export equation.

Table 3.15, 3.16 and 3.16 in Appendix 3.3 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. The dependency ratio 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 more strongly associated with fast-growing countries and thus high savings (low consumption) rates. The estimated coefficient for innovation in export growth is not found to be 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 ODA-GDP ratio in the consumption equation is 0.36 (Table 3.15) suggesting 0.36 per cent 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 total external debt to GDP ratio, real exchange rates and positively influenced by log of inflation rate and other external flows to GDP ratio. Although inflation and real exchange rates are found to be significant, these variables do not have their expected signs. The possibility of positive coefficients of inflation and the

negative coefficient for real exchange rate variables has already been discussed. The long run coefficient for the ODA-GDP ratio in the investment equation (presented in Table 3.16) is 0.44. This implies that 36 percent of additional aid is used for financing consumption and 44 percent for investment. The residual amount, 20 percent, is directed to finance the reverse flows in this set of countries (Table 3.18).

Results from MG and PMG estimators of the net export equation are presented in Table 3.17. 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 foreign income to domestic income ratio is significant (better than 1 percent level) in the long run net export equation and the other external flows-to-GDP ratio is also significant (at 5 percent level). The relative price and foreign reserve variables were not significant. The ODA/GDP coefficient in the net export equation is -0.84 suggesting additional foreign aid tends to expand the trade deficit by 84 percent of that increase. Approximately 16 percent of additional foreign aid is diverted to the financing of reverse flows in this set of developing countries.

The derived estimates for the reverse flow effect of changes in foreign aid ratios (Table 3.18) 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 (Table 3.17). 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.

3.6 Conclusion

According to development economists, that the large increase in the flow of aid to developing countries since 2000 has the potential to increase the rate of economic growth of these countries if these resources are directed towards enhancing economic activities. However, it is not unreasonable to suppose that some portion of these additional external resources will be used to finance debt servicing. The accumulation of foreign reserves and the 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 essay 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 percent to 25 percent of any increase in

foreign aid is directed towards financing reverse flows. According to these results 77 percent is consumed but no significant amount of increases in aid is shown to have been invested. Dominant use of aid, at the margins, is for consumption with the remainder used for financing reverse flows. Approximately one quarter of aid typically did not make it into the domestic economy.

This investigation 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 (2009).²³ 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 percent (or the foreign aid increase), suggesting that approximately 19 percent 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 to 20 percent. Approximately, 36 percent of each percentage point of increase in foreign aid was used to increase consumption, while approximately 44 percent was invested.

This essay demonstrates that foreign aid has three destinations in developing countries - consumption, investment and reverse flows (debt

²³ This is to be expected, of course, because the same country sample and sample periods were used.

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 3.1

Table 3.1: 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 3.2: Stationarity Tests for Relevant Variables: Full and Individual Panel (Country) Tests

Variable	Hadri Panel Stationarity Test (null of stationarity)	
	Level	Difference
Consumption/ GDP	30.24 ^{***}	-5.36
Per Capita Income (Atlas)	67.23 ^{***}	-1.97
Dependency Ratio	117.22 ^{***}	85.52 ^{***}
Dependency Ratio	97.16 [†]	214.12 ^{***†}
Innovation in Export Growth	-3.03	-
Other External Flows/GDP	18.30 ^{***}	-7.01
ODA/GDP	29.94 ^{***}	-6.00
Investment/ GDP	32.84 ^{***}	-3.90
Total External Debt / GDP	30.08 ^{***}	-1.35
Rate of Inflation	5.60 ^{***}	-6.92
Per Capita Income (Constant)	108.53 ^{***}	1.26
Index of Real Exchange Rate	6.60 ^{***}	-6.46
Trade Balance/ GDP	29.79 ^{***}	-2.87
Foreign income to Domestic Income Ratio Index	21.20 ^{***}	-2.35
Index of Relative Price	70.99 ^{***}	-2.41
Reserves/GDP	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: All series are non-stationary

Appendix 3.2

Derivation 1

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

Where:

Y = Gross Domestic Product
 C = Consumption
 I = Investment
 NX = Net exports
 a = Foreign Aid/GDP

Derivation 2:

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

Where:

CU = Current Account Balance
 CA = Capital Account Balance
 ntr = Net Transfers/ GDP
 nfi = Net Foreign Income/ GDP
 nf_o = Net official flows/GDP
 nf_p = Net private flows/GDP

Derivation 3:

From Derivation 1 and Derivation 2:

$$\begin{aligned}\frac{\partial i}{\partial a} + \frac{\partial c}{\partial a} &\equiv 1 - \frac{\partial rf}{\partial a} \\ \Rightarrow \frac{\partial i}{\partial a} + \frac{\partial c}{\partial a} + \frac{\partial rf}{\partial a} &\equiv 1\end{aligned}$$

Appendix 3.3

Table 3.3: The Consumption Equation (All Developing Countries: 1980-2006)

Dependent Variable: The Consumption Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Log of Per Capita Income	-0.382 (-1.04)	-0.045 (-0.91)
Dependency Ratio	-0.279 (-1.05)	-0.020 (-0.59)
Other External Flows/ GDP	-0.338 (-0.47)	-0.046 (-0.52)
ODA/ GDP	19.037 (1.16)	0.774 ^{***} (14.60)
	Short-Run Coefficients	
Error Correction Coefficient	0.660 ^{***} (12.85)	-0.300 ^{***} (-8.53)
Δ Log of Per Capita Income	0.196 (1.63)	0.044 (0.45)
Δ Dependency Ratio	-0.838 (-0.99)	0.479 (1.37)
Innovation in Export Growth	-0.045 ^{***} (-3.45)	-0.052 ^{***} (-4.64)
Innovation in Export Growth (Lagged)	-0.003 (-0.47)	-0.004 (-0.68)
Δ Other External Flows/ GDP	0.249 (1.35)	0.156 (0.91)
Δ Other External Flows/ GDP (Lagged)	0.101 (1.03)	0.087 (0.93)
Δ ODA/ GDP	-0.948 (-0.91)	0.779 (1.39)
Δ ODA/ GDP (Lagged)	-0.732 (-1.35)	0.123 (0.33)
Δ ODA/ GDP (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:	χ^2 Coefficient:	5.68
H0: Common coefficients (MG and PMG)	Tail Probability	0.2240
Wald Test:	χ^2 Coefficient:	18.26 ^{***}
H0: ODA/ GDP= 1	Tail Probability	0.000

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

Table 3.4: The Investment Equation (All Developing Countries: 1980-2006)

Dependent Variable: The Investment Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Total External Debt/ GDP	0.100 (1.06)	-0.021 ^{***} (-4.09)
Log of Inflation Rate	-0.087 (-0.63)	0.042 ^{***} (5.43)
Real Exchange Rate Index	-0.078 (-0.85)	0.001 [*] (1.88)
Other External Flows/ GDP	1.880 ^{**} (2.01)	0.340 ^{***} (7.44)
ODA/ GDP	1.469 (1.55)	0.028 (0.52)
	Short-Run Coefficients	
Error Correction Coefficient	-0.620 ^{***} (-15.24)	-0.320 ^{***} (-11.05)
Δ Log of Per Capita Income	0.245 ^{***} (4.82)	0.226 ^{***} (4.28)
Δ Log of Per Capita Income (Lagged)	0.027 (0.62)	0.006 (0.02)
Δ Total External Debt/ GDP	-0.017 (-0.84)	-0.016 (-1.12)
Δ Log of Inflation Rate	-0.008 (-0.26)	-0.034 [*] (-1.92)
Δ Log of Inflation Rate (Lagged)	0.001 (0.07)	-0.009 (-0.59)
Δ Real Exchange Rate Index	0.043 ^{**} (1.99)	0.006 (0.34)
Δ Other External Flows/ GDP	-0.143 (-0.90)	0.168 (1.40)
Δ Other External Flows/ GDP (Lagged)	-0.183 ^{**} (-2.06)	-0.049 (-1.10)
Δ ODA/ GDP	-0.136 (-0.51)	-0.048 (-0.21)
Constant	0.100 ^{***} (5.93)	0.058 ^{***} (10.71)
Number of Observations	1627	1627
Hausman Test:	χ^2 Coefficient:	8.89
H0: Common coefficients (MG and PMG)	Tail Probability	0.1134
Wald Test:	χ^2 Coefficient:	317.58 ^{***}
H0: ODA/ GDP= 1	Tail Probability	0.000

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

Table 3.5: The Net Export Equation (All Developing Countries: 1980-2006)

Dependent Variable: The Trade Balance/ GDP		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Index of the Foreign Income-Domestic Income Ratio	-0.148 (-1.24)	0.034*** (5.58)
Index of Relative Prices	0.111 (1.89)	-0.019** (-2.08)
Foreign Reserves/GDP (Lagged)	-1.214 (-1.16)	-0.086** (-2.58)
Other External Flows/ GDP	-1.482 (-1.22)	-0.094 (-1.48)
ODA/ GDP	-18.773 (-1.11)	-0.746*** (-17.52)
	Short-Run Coefficients	
Error Correction Coefficient	-0.666** (-16.60)	-0.356*** (-8.76)
Δ Index of the Foreign Income-Domestic Income Ratio	0.029 (1.12)	0.064** (2.28)
Δ Index of Relative Prices	-0.016 (-1.07)	-0.002 (-0.23)
Δ Foreign Reserves/GDP (Lagged)	0.105 (1.17)	-0.040 (-0.51)
Δ Foreign Reserves/GDP (Second Lagged)	-0.069 (-0.90)	-0.093** (-1.58)
Δ Other External Flows/ GDP	-0.173 (-1.46)	-0.602 (-1.90)
Δ ODA/ GDP	0.775* (1.71)	-0.021 (-0.11)
Constant	-0.023*** (-1.08)	-0.007* (-1.76)
Number of Observations	1605	1605
Hausman Test: H0: Common coefficients (MG and PMG)	χ^2 Coefficient: Tail Probability	7.44 0.1901
Wald Test: H0: ODA/ GDP= -1	χ^2 Coefficient: Tail Probability	35.37*** 0.000

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

Table 3.6: 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	
Consumption	0.77	
Investment	Not Significant	
<i>Reverse Flows</i> <i>[1 - (Consumption + Investment)]</i>	0.23	
The Trade Deficit	0.75	
<i>Reverse Flows</i> <i>[1 - Trade Deficit]</i>	0.25	
Wald Test:	χ^2 Coefficient:	0.30
H0: Reverse Flow Estimates are Identical	Tail Probability	0.583

Table 3.7: The Consumption Equation (Sub-Saharan Africa: 1980-2006)

Dependent Variable: The Consumption Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Log of Per Capita Income	-1.613 (-0.99)	-0.221 ^{***} (-2.51)
Dependency Ratio	-0.212 (-0.40)	0.215 ^{***} (3.25)
Other External Flows/ GDP	-2.011 (-0.78)	-0.156 (-1.30)
ODA/ GDP	-2.578 (-0.94)	0.395 ^{***} (7.69)
	Short-Run Coefficients	
Error Correction Coefficient	0.735 ^{***} (12.60)	-0.389 ^{***} (-7.01)
Δ Log of Per Capita Income	-0.110 (-1.08)	0.007 (0.05)
Δ Dependency Ratio	-1.149 (-0.96)	-0.208 (-0.29)
Innovation in Export Growth	-0.047 ^{***} (-3.96)	-0.585 ^{***} (-5.42)
Δ Other External Flows/ GDP	0.189 (0.69)	0.349 (1.00)
Δ ODA/ GDP	0.108 (0.96)	0.014 (0.19)
Constant	0.562 [*] (1.73)	0.421 ^{***} (6.72)
Number of Observations	776	776
Hausman Test:	χ^2 Coefficient:	6.65
H0: Common coefficients (MG and PMG)	Tail Probability	0.1554
Wald Test:	χ^2 Coefficient:	138.15 ^{***}
H0: ODA/ GDP= 1	Tail Probability	0.000

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

Table 3.8: The Investment Equation (Sub-Saharan Africa: 1980-2006)

Dependent Variable: The Investment Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Total External Debt/ GDP	-0.030 (-0.56)	-0.057 ^{***} (-6.74)
Log of Inflation Rate	-0.019 (-0.19)	-0.070 ^{***} (-4.23)
Real Exchange Rate Index	0.045 (0.88)	0.058 ^{***} (4.25)
Other External Flows/ GDP	-0.187 (-0.64)	0.430 ^{***} (5.67)
ODA/ GDP	0.448 [*] (1.83)	0.127 ^{***} (2.82)
	Short-Run Coefficients	
Error Correction Coefficient	-0.670 ^{***} (-13.36)	-0.367 ^{***} (-7.67)
Δ Log of Per Capita Income	0.116 [*] (1.66)	0.123 (1.48)
Δ Log of Per Capita Income (Lagged)	-0.033 (-0.54)	-0.036 (-0.79)
Δ Total External Debt/ GDP	-0.011 (-0.54)	-0.008 (-0.37)
Δ Log of Inflation Rate	-0.016 (-0.59)	0.003 (0.13)
Δ Real Exchange Rate Index	0.051 (1.33)	-0.015 (-0.47)
Δ Other External Flows/ GDP	0.214 (0.88)	0.260 (1.01)
Δ ODA/ GDP	-0.271 [*] (-1.65)	-0.047 (-0.72)
Constant	0.081 ^{***} (3.41)	0.064 ^{***} (6.59)
Number of Observations	768	768
Hausman Test:	χ^2 Coefficient:	7.70
H0: Common coefficients (MG and PMG)	Tail Probability	0.1734
Wald Test:	χ^2 Coefficient:	371.88 ^{***}
H0: ODA/ GDP= 1	Tail Probability	0.000

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

Table 3.9: The Net Export Equation (Sub-Saharan Africa: 1980-2006)

Dependent Variable: The Trade Balance/ GDP		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Index of the Foreign Income-Domestic Income Ratio	-0.160 (-0.88)	0.009 (0.97)
Index of Relative Prices	0.233* (1.81)	0.001 (0.21)
Foreign Reserves/GDP (Lagged)	0.114 (0.25)	-0.166** (-2.21)
Other External Flows/ GDP	-0.384 (-0.46)	-0.334*** (-2.71)
ODA/ GDP	1.830 (0.54)	-0.507*** (-7.83)
	Short-Run Coefficients	
Error Correction Coefficient	-0.638*** (-10.15)	-0.351*** (-8.03)
Δ Index of the Foreign Income-Domestic Income Ratio	0.019 (0.53)	0.073** (2.15)
Δ Index of Relative Prices	-0.056* (-1.91)	-0.030 (-1.30)
Δ Foreign Reserves/GDP (Lagged)	0.065 (0.63)	-0.058 (-0.61)
Δ Other External Flows/ GDP	-0.263 (-1.25)	-0.608 (-1.20)
Δ ODA/ GDP	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)	χ^2 Coefficient: Tail Probability	5.11 0.4025
Wald Test: H0: ODA/ GDP=-1	χ^2 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 3.10: 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	
Consumption	0.40	
Investment	0.13	
<i>Reverse Flows</i> <i>[1 - (Consumption + Investment)]</i>	<i>0.47</i>	
The Trade Deficit	0.51	
<i>Reverse Flows</i> <i>[1 - Trade Deficit]</i>	<i>0.49</i>	
Wald Test:	χ^2 Coefficient:	0.13
H0: Reverse Flow Estimates are Identical	Tail Probability	0.719

Table 3.11: The Consumption Equation (The Americas: 1980-2006)

Dependent Variable: The Consumption Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Log of Per Capita Income	0.529 (0.77)	0.171*** (3.26)
Dependency Ratio	-0.420 (-0.72)	-0.246*** (-4.52)
Other External Flows/ GDP	-0.283 (-0.41)	-0.220** (-2.24)
ODA/ GDP	-6.947 (-0.39)	-0.205 (-1.23)
	Short-Run Coefficients	
Error Correction Coefficient	-0.516*** (-4.44)	-0.385*** (-4.50)
Δ Log of Per Capita Income	0.218** (2.10)	0.202* (1.67)
Δ Log of Per Capita Income (Lagged)	-0.187** (-2.05)	-0.232 (-1.30)
Δ Dependency Ratio	1.595 (1.14)	-0.115 (-0.22)
Innovation in Export Growth	-0.042* (-1.80)	-0.049** (-2.45)
Δ Innovation in Export Growth	-0.001 (-0.09)	-0.002 (-0.24)
Δ Other External Flows/ GDP	0.368* (1.88)	0.119 (0.98)
Δ Other External Flows/ GDP (Lagged)	0.285 (1.38)	0.069 (0.79)
Δ ODA/ GDP	1.210 (0.59)	2.709 (1.30)
Δ ODA/ GDP (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:	χ^2 Coefficient:	5.93
H0: Common coefficients (MG and PMG)	Tail Probability	0.2047
Wald Test:	χ^2 Coefficient:	51.89***
H0: ODA/ GDP= 1	Tail Probability	0.000

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

Table 3.12: The Investment Equation (The Americas: 1980-2006)

Dependent Variable: The Investment Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Total External Debt/ GDP	0.228* (1.87)	0.003 (0.57)
Log of Inflation Rate	-0.074 (-0.41)	0.083*** (9.96)
Real Exchange Rate Index	-0.015 (-0.30)	-0.011*** (-7.70)
Other External Flows/ GDP	0.440 (0.75)	0.396*** (10.03)
ODA/ GDP	-1.328 (-0.43)	-0.154 (-1.09)
	Short-Run Coefficients	
Error Correction Coefficient	-0.756 (-7.79)	-0.478*** (-5.73)
Δ Log of Per Capita Income	0.361*** (3.39)	0.304*** (4.34)
Δ Log of Per Capita Income (Lagged)	0.164 (1.53)	0.033 (0.51)
Δ Total External Debt/ GDP	-0.134** (-2.07)	-0.018 (-0.69)
Δ Total External Debt/ GDP (Lagged)	-0.013 (-0.50)	-0.004 (-0.25)
Δ Log of Inflation Rate	0.061 (0.61)	-0.037 (-0.98)
Δ Real Exchange Rate Index	0.001 (0.02)	0.010 (0.83)
Δ Real Exchange Rate Index (Lagged)	0.021 (0.91)	-0.007 (-0.80)
Δ Other External Flows/ GDP	-0.074 (-0.19)	0.064 (0.49)
Δ Other External Flows/ GDP (Lagged)	-0.077 (-0.99)	-0.096 (-0.86)

Table 3.12: The Investment Equation (The Americas: 1980-2006) (cont.)

Dependent Variable: The Investment Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Δ ODA/ GDP	-0.287 (-0.15)	-1.442 (-1.43)
Δ ODA/ GDP (Lagged)	-0.214 (-0.21)	-0.957*** (-3.12)
Δ ODA/ GDP (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:	χ^2 Coefficient:	7.76
H0: Common coefficients (MG and PMG)	Tail Probability	0.1702
Wald Test:	χ^2 Coefficient:	66.81***
H0: ODA/ GDP = -1	Tail Probability	0.000

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

Table 3.13: The Net Export Equation (The Americas: 1980-2006)

Dependent Variable: The Trade Balance/ GDP		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Index of the Foreign Income-Domestic Income Ratio	-0.168 (-0.70)	-0.005 (-0.41)
Index of Relative Prices	-0.039 (-0.74)	-0.000 (-0.55)
Foreign Reserves/GDP (Lagged)	0.159 (0.17)	-0.909*** (-13.65)
Other External Flows/ GDP	1.385 (0.82)	0.000 (0.00)
ODA/ GDP	3.030 (0.36)	-0.814*** (-5.86)
	Short-Run Coefficients	
Error Correction Coefficient	-0.695*** (-7.65)	-0.357*** (-5.13)
Δ Index of the Foreign Income-Domestic Income Ratio	0.064 (1.21)	0.111*** (3.33)
Δ Index of the Foreign Income-Domestic Income Ratio (Lagged)	-0.052 (-0.96)	-0.056 (-1.39)
Δ Index of Relative Prices	0.033 (1.31)	0.004 (0.34)
Δ Index of Relative Prices (Lagged)	0.029 (1.47)	-0.004 (-0.35)
Δ Index of Relative Prices (Second Lagged)	0.012 (0.87)	-0.003 (-0.26)
Δ Foreign Reserves/GDP (Lagged)	0.195 (0.64)	0.128 (0.68)
Δ Other External Flows/ GDP	0.083 (0.22)	-0.319** (-1.97)
Δ Other External Flows/ GDP (Lagged)	0.335 (0.82)	0.006 (0.10)
Δ ODA/ GDP	0.023 (0.02)	-0.693 (-0.61)
Constant	0.004 (0.13)	0.005 (1.03)
Number of Observations	431	431
Hausman Test:	χ^2 Coefficient:	3.34
H0: Common coefficients (MG and PMG)	Tail Probability	0.6475
Wald Test:	χ^2 Coefficient:	1.79***
H0: ODA/ GDP = -1	Tail Probability	0.000

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

Table 3.14: Estimates of Marginal Allocation of Foreign Aid to Reverse Flows (The Americas: 1980-2006)

The Marginal Allocation of Total Foreign Aid to:	
Variables	Coefficient
Consumption	Not Significant
Investment	Not Significant
<i>Reverse Flows</i> <i>[1 - (Consumption + Investment)]</i>	-
The Trade Deficit	0.81
<i>Reverse Flows</i> <i>[1 - Trade Deficit]</i>	<i>0.19</i>

Table 3.15: The Consumption Equation (North Africa, Asia and the Pacific: 1980-2006)

Dependent Variable: The Consumption Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Log of Per Capita Income	-1.774 (-1.74)	0.111 (0.98)
Dependency Ratio	0.464 (0.46)	-0.133** (-2.07)
Other External Flows/ GDP	-0.868 (-0.66)	-0.109 (-1.05)
ODA/ GDP	-112.001 (-1.01)	0.356** (2.03)
	Short-Run Coefficients	
Error Correction Coefficient	-0.705*** (-7.97)	-0.359*** (-4.82)
Δ Log of Per Capita Income	0.630 (1.45)	0.174 (1.19)
Δ Log of Per Capita Income (Lagged)	-0.058 (-0.17)	-0.307** (-2.27)
Δ Dependency Ratio	2.857 (0.34)	-3.821 (-1.05)
Δ Dependency Ratio (Lagged)	-0.039 (-0.01)	4.232 (1.13)
Innovation in Export Growth	-0.043 (-1.21)	-0.023 (-1.31)
Δ Innovation in Export Growth	-0.026 (-1.62)	-0.037** (-2.25)
Δ Other External Flows/ GDP	-0.192 (-1.27)	0.026 (0.58)
Δ Other External Flows/ GDP (Lagged)	-0.032 (-0.31)	-0.023 (-0.33)
Δ ODA/ GDP	-3.416 (-1.03)	0.485 (0.87)
Δ ODA/ GDP (Lagged)	-0.978 (-0.52)	1.304* (1.97)
Δ ODA/ GDP (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:	χ^2 Coefficient:	4.60
H0: Common coefficients (MG and PMG)	Tail Probability	0.3303
Wald Test:	χ^2 Coefficient:	13.38***
H0: ODA/ GDP= 1	Tail Probability	0.000

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

Table 3.16: The Investment Equation (North Africa, Asia and the Pacific: 1980-2006)

Dependent Variable: The Investment Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Total External Debt/ GDP	-0.115* (-1.81)	-0.124*** (-5.68)
Log of Inflation Rate	0.171 (0.43)	0.201*** (4.61)
Real Exchange Rate Index	-0.084 (-0.86)	-0.071*** (-3.84)
Other External Flows/ GDP	0.565 (0.69)	0.791*** (7.49)
ODA/ GDP	-0.937 (-0.38)	0.441*** (2.71)
	Short-Run Coefficients	
Error Correction Coefficient	-0.509*** (-6.01)	-0.229*** (-3.32)
Δ Log of Per Capita Income	0.351*** (3.42)	0.317*** (3.02)
Δ Log of Per Capita Income (Lagged)	0.122 (1.27)	0.094 (0.96)
Δ Total External Debt/ GDP	0.052 (0.93)	0.025 (0.58)
Δ Total External Debt/ GDP (Lagged)	-0.006 (-0.19)	-0.024 (-0.77)
Δ Log of Inflation Rate	-0.051 (-0.72)	-0.045 (-0.97)
Δ Log of Inflation Rate (Lagged)	-0.069 (-1.19)	-0.067 (-1.34)
Δ Real Exchange Rate Index	0.046 (1.16)	0.038 (1.07)
Δ Real Exchange Rate Index (Lagged)	-0.022 (-0.55)	-0.018 (-0.60)
Δ Other External Flows/ GDP	-0.078 (-0.61)	-0.121*** (-2.89)
Δ Other External Flows/ GDP (Lagged)	-0.070 (-0.66)	-0.145 (-1.52)

Table 3.16: The Investment Equation (North Africa, Asia and the Pacific: 1980-2006) (cont.)

Dependent Variable: The Investment Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Δ ODA/ GDP	1.147** (2.03)	0.717** (2.21)
Δ ODA/ GDP (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)	χ^2 Coefficient: Tail Probability	0.87 0.9723
Wald Test: H0: ODA/ GDP= 1	χ^2 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 3.17: The Net Export Equation (North Africa, Asia and the Pacific: 1980-2006)

Dependent Variable: The Trade Balance/ GDP		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Index of the Foreign Income-Domestic Income Ratio	-0.036 (-0.34)	0.068*** (8.23)
Index of Relative Prices	0.108 (1.11)	-0.000 (-1.48)
Foreign Reserves/GDP (Lagged)	-0.258 (-1.42)	-0.008 (-0.28)
Other External Flows/ GDP	-0.475** (-2.13)	-0.131** (-2.09)
ODA/ GDP	-5.979 (-1.28)	-0.839*** (-11.91)
	Short-Run Coefficients	
Error Correction Coefficient	-0.715*** (-8.48)	-0.473*** (-4.45)
Δ Index of the Foreign Income-Domestic Income Ratio	0.047 (0.79)	0.047 (0.92)
Δ Index of Relative Prices	-0.009 (-0.39)	0.004 (0.19)
Δ Foreign Reserves/GDP (Lagged)	0.173 (1.20)	0.029 (0.10)
Δ Other External Flows/ GDP	-0.108 (-0.87)	-0.351** (-2.34)
Δ ODA/ GDP	2.225 (1.56)	0.139 (0.36)
Constant	-0.011 (-0.30)	-0.013 (-1.56)
Number of Observations	407	406
Hausman Test:	χ^2 Coefficient:	17.11***
H0: Common coefficients (MG and PMG)	Tail Probability	0.002
Wald Test:	χ^2 Coefficient:	5.24**
H0: ODA/ GDP= -1	Tail Probability	0.022

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

Table 3.18: 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	
Consumption	0.36	
Investment	0.44	
<i>Reverse Flows</i> <i>[1 - (Consumption + Investment)]</i>	0.20	
The Trade Deficit	0.84	
<i>Reverse Flows</i> <i>[1 - Trade Deficit]</i>	0.16	
Wald Test:	χ^2 Coefficient:	0.30
H0: Reverse Flow Estimates are Identical	Tail Probability	0.582

CHAPTER 4

REMITTANCES AND REVERSE FLOWS IN DEVELOPING COUNTRIES

4.1 Introduction

The role of remittances has been of increasing interest to researchers and policymakers over the last decade. This is not surprising in light of the fact that recorded remittance flows to developing countries doubled in the five years after 2000 and continued to increase through 2008 despite the challenges to the global economy in that year. Ratha *et al* (2009) present data suggesting remittance flows to developing countries reached \$328 billion in 2008 – 15 percent higher than the 2007 amount of \$281 billion. Among the developing regions of the world, South Asia registered the highest growth in remittance flows in 2008 (33%). In contrast, Latin America and Caribbean experienced a mere 2% growth in remittance flows in the same year.

A large part of the motivation for much of the recent research has been the possibility that these large and increasing remittance flows could potentially become an important tool for economic development. A better understanding of the motivation and effect of these flows would make for better policy formulation in finding ways to channel more remittance flows into productive investment (Chami *et al*, 2003). The research questions have centered on the allocation of remittance receipts within the domestic economy (Adams, Jr., 1991, p. 695). Researchers have tried to address the questions of allocation from two standpoints

(Chami *et al*, 2003; Taylor, 1999). One strand of the literature uses a microeconomic approach to examine the effects of remittances on households and communities - typically based on assumptions of individual (or household) utility maximizing behavior. The other strand deals with the macroeconomic effects of remittances, and forms part of a broader literature that focuses on the effects of external flows on economic activity. Concerns about the macroeconomic effects of remittance flows derive largely from concern about its ultimate effect on growth and the mechanisms through which this occurs.

Giuliano and Ruiz-Arranz (2006) argued that remittances have been important in generating output growth by increasing investment in countries with less developed financial sectors. Remittances in those countries provided alternative means for financing investment and reducing liquidity constraints. Stahl and Habib (1989) and Glytsos (1993) argued that although remittances are mostly used for consumption purposes, the recipient economies can still benefit in terms of growth if these remittances are used to purchase domestically produced goods and services. Beyond the consumption/investment choice, policy makers have often suggested that remittance flows to developing countries allow them to maintain adequate foreign reserves (Bdnews24, 2009a; Bdnews24, 2009b; Bdnews24, 2009c; Amjad, 2004, Joshi and Sanyal, 2004), service debt (Ratha, 2007) or finance capital flight (Brown 1992a; Brown, 1992b). Remittances that are used for such reverse flows (i.e. debt amortization, reserve accumulation, or capital flight) are no longer available for consumption or investment, placing a

limit on the direct potential growth effect. This last consideration has not been well recognized or researched in the literature.

This essay attempts to bridge the gap in the literature by determining, for a sample of remittance-receiving developing countries, what proportion of remittance flows have historically been diverted to reverse flows. This is done by first estimating the effect of remittances flows on consumption, investment, and net exports, then using the estimated magnitude for these (the remittance coefficients in the relevant equations) to derive estimates of the proportion of remittance flows diverted to reverse flows. This provides an approximation of the extent to which reverse flows may have constrained the effect of remittance flows on investment and consumption propensities and their potential effect on growth through these aggregates.

It should be noted that this study deals with the allocation of remittances only from a macroeconomic perspective. While it is clear that remittances are used only for consumption or savings/investment at the household level this is not necessarily the case at the macroeconomic level. The transfer of foreign exchange from recipients of remittances to other economic agents (as well as crowding out and crowding in effects) means that the final economy-wide dispensation can be quite different from the microeconomic choices of remittance recipients. The greater the amount of remittance-based foreign exchange used for financing reverse flows, the smaller will be the effect that remittances can have on consumption and investment rates for the macro-economy. There is no suggestion

here that the use of remittances for reverse flows is a purely negative phenomenon. The argument is that the diversion of remittances toward the financing of reverse flows affects the degree to which these flows can generate growth by directly boosting investment and consumption rates.

The rest of the essay is organized as follows. Section 4.2 presents the theoretical and empirical background to this research. Section 4.3 uses national income and balance of payments identities to establish the potential choices in the allocation of remittances and the critical role of reverse flows. Section 4.4 outlines the methodology to be used to derive relevant results. Section 4.5 presents and analyzes those results and Section 4.6 concludes the essay.

4.2 The Allocation of Remittance Flows from a Macroeconomic Perspective: A Literature Review

The role of savings in development is a major focus in the field of development economics. Lewis (1954), for example, argued that an underdeveloped country begins the process of development, when a voluntary savings rate of 4 to 5 per cent increases to about 12 or 15 per cent of national income. In reality developing countries are often unable to generate the rates of domestic savings that are required for funding the levels of investment necessary for generating and sustaining rapid growth (McGuire, 1994).

Chenery and Strout (1966), in their famous two-gap model, argued that foreign resource inflows such as foreign aid could remove the gap between

domestic savings and required investment by providing needed foreign exchange to developing countries. An explicit assumption of the two-gap approach is that all of foreign assistance is directed toward investment. Using a model that assumes aid receiving countries attempt to attain a target rate of national income (within a finite time period) while maximizing a social preference function, Rahman (1967) concludes foreign aid is likely to be used to increase both consumption and investment if the marginal output- capital ratio is higher than the rate of interest on external borrowing. This is almost certainly true for aid. Griffin and Enos (1970), using the same model results, went one step further to argue cheap concessional credit would simply be used as an alternative to more expensive domestic credit, accommodating lower domestic savings while leaving investment largely unchanged (i.e. aid would mostly cause increased consumption).

Remittances also generate a flow of external resources and a similar debate regarding the allocation of these resources has taken place in recent years. Giuliano and Ruiz-Arranz (2006) argued that remittances have been important in generating output growth by increasing investment in countries with less developed financial sectors. Remittances in those countries have provided an alternative means for financing investment and reducing liquidity constraints. Their results suggest inflow of remittances help alleviate credit constraint in developing countries where credit markets are inefficient or non-existent; thus, contributing to improve the allocation of capital boosting economic growth. Stahl and Habib (1989) and Glytsos (1993) argued remittances are mostly used for

consumption. Through the Keynesian multiplier mechanism recipient economies can still benefit in terms of growth if these remittances are used to purchase domestically produced goods and services.

Beyond the consumption/investment choice policy makers have often suggested that remittance flows to developing countries, by boosting foreign exchange receipts, allow them to maintain adequate foreign reserves (Bdnews24, 2009b; Bdnews24, 2009c; Amjad, 2004, Joshi and Sanyal, 2004), service debt (Ratha, 2007) or finance capital flight (Brown 1992a; Brown, 1992b). Remittances that are used to finance reverse flows (i.e. debt amortization, reserve accumulation, or capital flight) are no longer available for consumption or investment. That would appear to place a limit on the potential direct growth effect. This last consideration has not been well recognized or researched in the literature.

Though the issue of potential resource loss from the diversion of external resource flows to reverse flows (in the form of debt servicing, reserve accumulation or capital flight) is noted early in the aid literature it has largely been ignored until recently. Rahman (1967) observed that the amount of aid that would be available for financing consumption or investment would depend on the aid available after financing debt service payments. Loxley and Sackey (2008) emphasized the need for Africans to strategize to reduce future dependence on aid since future debt service obligations were entailed by aid in the form of concessional loans. Serieux (2009) and Serieux and Das (2009) showed that aid that is used to service debt, finance capital flight or accumulate reserves cannot

contribute directly to either consumption or domestic investment. Using a panel data set of 29 countries over the period 1980 to 2006 Serieux's results suggested nearly 50 percent of any increase in aid went towards the financing of reverse flows. The intuition behind this result 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 to be used for either consumption or investment. An extension of this paper by Serieux and Das (2009) suggests that, in a panel of 61 developing countries from across different regions for the period 1980-2006, any increase in foreign aid is not only used for consumption and investment but also to finance reverse flows.

To what extent do the challenges of financing reverse flows apply to remittances as well? Loxley and Sackey (2008) suggest in the long run some countries need to rely on other financial flows such as workers' remittances to overcome the future debt servicing obligations that come with aid in the form of concessional loans. Though many developing countries carried high debt burdens in an environment of falling aid flows in the 1980s and 1990s whether this scenario has indeed come to pass is yet to be investigated.

The existing literature on remittances focuses on the use of remittances at two different levels - the microeconomic and macroeconomic levels (Chami *et al*, 2003). The microeconomic approach examines the use of remittances by employing datasets based on household surveys. Durand and Massy (1992) reviewed thirty-seven papers based on research carried out at the community-level

and argued that remittances increased conspicuous consumption and thus, created a possibility for individual families to enjoy a higher standard of living. Additional papers finding similar results (that remittances mostly are used for consumption at the household level) include Rempell and Lobdell (1978), Oberoi and Singh (1980), Durand *et al* (1996) and Glytsos (1993).

These findings are far from unanimous. A large number of research studies suggest that a significant part of remittances is used by households for the purpose of investment. Lucas and Stark (1985), Brown (1994), Adams, Jr. (1991) and Adams, Jr. (1998) were among the ones who concurred with these results.

The macroeconomic literature on the use of remittances is concerned primarily with the ultimate effect of remittance flows on growth. Thus the debate on the allocation of remittances at the macroeconomic level is focused on the same question that pre-occupies the microeconomic literature - whether remittance flows are used to increase consumption or investment. The nature of the growth effect is presumed to be determined by that choice. Stahl and Arnold (1986), Stahl and Habib (1989) showed remittances were mostly used for consumption and affected growth positively via the consumption multiplier. Brown (1994), Zieseimer (2006) and Giuliano and Ruiz-Arranz (2006) argued remittances would promote growth by promoting investment. At the macroeconomic level, the relationship between the allocation of remittances and growth is far more complex than a simple story of investment or consumption.

While it may at first seem that the allocation of remittances at a household (micro) level and at the economy-wide (macro) level should be the same it may not be the case in the reality. Remittances represent a transfer of foreign purchasing power from external agents to agents in the domestic economy. When the foreign currency, in which it is denominated, is exchanged for domestic currency purchasing power is transferred from remittance recipients to other domestic agents (via financial institution, the monetary authority or directly). The degree to which this potential increase in purchasing power is translated into a real increase in absorption (and not simply increase in the domestic money supply) will depend on the proportion of purchasing power abroad that is actually utilized to purchase goods and services. Remittance flows result in a one to one increase in absorption (and, therefore, consumption and investment propensities) only if all remittance flows are used to increase imports (expand the trade deficit). If some of this purchasing power is used to finance reverse flows (reserve accumulation, debt service or capital flight), the effect on investment and consumption ratios is less than would be suggested by the size of remittance flows. Therefore, although remittances are private flows and the microeconomic allocation of remittances is privately determined the final economy-wide (macroeconomic) allocation is affected by decisions about how to allocate the implied foreign exchange receipts.

As noted earlier, it is clear that policy makers from many developing countries see remittance flows as a potential resource for maintaining healthy reserves at their central banks (Bdnews 24, 2009b; Bdnews24, 2009c). It is also

very likely that remittance flows make it easier to finance capital flight because much of it enters the country through informal channels. Brown (1992a; 1992b) asserted that because of the pervasive presence of informal markets a significant amount of migrants' remittance disappeared from Sudan through informal channels. It seems likely that reverse flows are an important part of the allocation of remittance flows. In the last three sections of this essay an initial attempt will be made to determine the level of importance. Preceding this empirical analysis it is necessary to clarify the accounting relationships on which the macroeconomic allocation issue is predicated.

4.3 Basic Accounting and Allocation of Remittances

The basic national income identity tells us total output is composed of consumption, investment and net exports. From this identity a simple derivation (Derivation 1 in Appendix 4.2) shows that the negative of the net export ratio (the trade deficit) effect of remittances

$\left(-\frac{\partial nx}{\partial rem}\right)$ is identical to the sum of its

investment rate effect $\left(\frac{\partial i}{\partial rem}\right)$ and the consumption rate effect $\left(\frac{\partial c}{\partial rem}\right)$.

Remittances affect the rates of investment and consumption to the extent that they enable the widening of the trade deficit (increase import) relative to output. The intuition is that remittance flows can only expand consumption or investment, relative to output, when the foreign purchasing power inherent in remittance flows is utilized for one of these purposes. The existing literature, which works on the presumption that remittances are simply allocated between consumption and

investment rates, implicitly assume that all remittance flows are eventually used to expand the trade deficit. The proportion of remittances that is used to expand the trade deficit will depend on the proportion that is used to finance reverse flows.

As Derivation 2 (Appendix 4.2) indicates, whenever remittances are used to finance reverse flows they are no longer available for expanding the trade deficit or increasing investment or consumption rates directly. In this derivation the current account balance (*CU*) and the capital account balance (*CA*) are disaggregated into their respective components. Remittance flows are transfers, the differential of net transfers with respect to remittance flows is one. The foreign exchange provided by remittance flows can be used to finance interest payments on foreign debt (part of net foreign income), principal payments on foreign debt and reserve accumulation (part of net official flows) and capital flight (part of net private flows). The derivative of all of these flows with respect to remittance flows is potentially non-zero. Since these flows are outward (and therefore negative) they compete with net exports for the scarce resource provided by remittance flows. The larger the effect of remittances on these (reverse) flows the smaller is the net export effect. Given the relationship between the trade deficit and consumption and investment ratios this also implies that the allocation of remittance flows is fully summarized by its consumption, investment and remittance flow effects (when these are measured relative to output). (Derivation 3)

4.4 Methodology

4.4.1 Estimation Issues

While it is possible, at least theoretically, to estimate the direct effects of remittances on each of the major types of reverse flows (debt service flows, reserve accumulation and capital flight), there are no generally established (i.e. theoretically based) behavioral models for debt service flows and reserve accumulation. Though there are behavioral models for capital flight, time series data for that aggregate is not generally available. As the previous section indicates accounting identities allow us to estimate the proportion of remittances flows directed to reverse flows because it is the residual after the effect of remittance flows on consumption and investment have been taken into account. It is also the residual once the effect of remittance flows on net exports has been accounted for. Two ways of approximating the degree to which remittance flows are diverted to reverse flows are presented. This essay will attempt to derive both of these estimates. To that end consumption, investment and trade balance equations will be estimated and from these estimates the implied share of reverse flows (in the allocation or remittances) will be derived.

The dataset employed for this research will cover 36 countries²⁴ for the period 1980 to 2006. Since the panel data set can be categorized as having a large T and large N, the likelihood of non-stationarity of some of the variables becomes an issue. A primary focus of this essay will be the long-run relationship between remittances and consumption, investment and the trade balance. These challenges

²⁴ See Table 4.1 (in Appendix 4.1) for the list of countries.

(estimating long run relationships across a large group of countries and over an extended period of time) can be appropriately addressed using the Pooled Mean Group (PMG) approach of Pesaran *et al.*, (1999). This is an error-correction approach specifically designed for panel data with large T and large N where non-stationarity is a concern.

The PMG approach estimates a single, cointegrating, long-run equation for the full panel but panel-specific short-run equations. This procedure requires an assumption of homogeneity of the long-run coefficients across panels (countries). This approach is restrictive relative to the Mean Group (MG) approach which allows for individual (panel specific) long and short-run relationships. Pesaran *et al.* (1999) argued that the high degree of sensitivity of MG estimates to outliers, measurement errors and omitted variables at the panel level make the PMG approach preferable even if the assumption of homogeneity of long-run coefficients may not be valid. Our estimation results suggest that the significant efficiency gains in the PMG approach over the MG approach in this context justifies this additional assumption.

To determine the level of integration of the (dependent and potential explanatory) variables we employed Hadri's panel stationarity test (Hadri 2002) to relevant variables. As Table 4.2 (Appendix 4.1) indicates the null hypothesis of full panel stationarity is rejected for all but one variable - the innovation in export growth. In effect all but one of these variables appears to be mostly non-stationary at the panel level. Applying the same tests to the first differences of these variables leads to non-rejection of the null of stationarity (Table 4.2). 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 (with the exception of the innovation in export growth which would be related to short-run adjustments). The first difference of the dependency ratio at the overall panel level is found to be non-stationary. A more detailed examination of the unit root test (KPSS test, suggested by Kwiatkowski *et al.*, 1992) of this variable at the panel (country) level is applied. Results from this test suggest that the first difference of the dependency ratio could be considered as a stationary variable since the null of stationarity is not rejected for 27 out of 36 countries.

4.4.2 The Behavioral Equations

4.4.2.1 The Consumption Function

The consumption function estimated in this study is a combination of the life-cycle-permanent-income hypothesis and the subsistence income model. While the permanent income model and the life-cycle model provide invaluable insights into consumption behavior in both developed and developing countries by arguing that individual attempts to smooth consumption over their lifetime (Friedman, 1957; Modigliani and Brumberg, 1954), these models do not suggest a role for per capita income in the determination of consumption. That variable has been shown to have a strong relationship with the rate of savings (and therefore, consumption) in developing countries (Schmidt-Hebbel and Servén, 1997). The subsistence income model does provide a justification for including per capita income in the equation for consumption. The thesis argues that below a certain level of income

the need to use all income to meet basic subsistence levels of consumption constrains or precludes savings (Ogaki *et al*, 1996). In low and middle income countries as per capita income goes up and some households are released from this (subsistence consumption) constraint the rate of consumption falls as the savings rate increases. Given that all of the countries in this sample are low or middle income countries it is appropriate to include (the log of) per capita income in the long run equation (and its rate of growth in the short run equation).

According to this specification the ratio of consumption to income has a long run (equilibrium) relationship with per capita income, the dependency ratio, the private capital flows to GDP ratio, the foreign aid or official development assistance (ODA) to GDP ratio, and the remittance flow to GDP ratio (Table 1). The innovation in export growth as a proxy for transitory income is presumed to affect short run consumption decisions and is part of the short-run dynamics within the error correction framework. This variable is measured as the difference between the current rate of export growth and the average export growth rate of the previous three years.

Table 1: The Determinants of the Rate of Consumption

Variables	Relevance	Expected Sign of Coefficient
Log of Per capita income ²⁵	Related to the proportion of the population above subsistence	Negative
Innovation in Exports Growth	Increase in perceived transitory income	Negative
The Dependency Ratio	Effect on population structure on consumption	Positive
Remittances/GDP	Increased access to resources beyond that derived from domestic output with limited no future repayment burdens	To be determined
Private Capital Flows/GDP	Increased access to private resources with significant future repayment burdens	Positive
ODA/GDP	Increased access to resources beyond that derived from domestic output with limited future repayment burdens	Positive

4.4.2.2 *The Investment Function*

The specification for the investment equation is motivated by the flexible accelerator model of investment. A modified version of this model is presented in this essay to accommodate the impact of remittances on the investment rate. Total external debt to GDP ratio and per capita income are assumed to affect the desired capital stock. Remittances to GDP ratio, private capital to GDP ratio and ODA to GDP ratio are assumed to affect the rate at which capital gap between desired and actual capital stock is bridged. The rate of inflation and the real exchange rate index are assumed to affect both the desired capital stock as well as the rate at which actual capital stock reaches at its desired level. All variables are presumed to enter the long run (cointegrating) equation in levels and the short-run equation in first difference form.

²⁵ Per capita income (in \$US) is logged to reflect the presumption that the relationship is non-linear.

Table 2: Determinants of the Rate of Investment

Variables	Relevance	Expected Sign of Coefficient
Total External Debt/GDP	Import compression and debt-related disincentive effects	Negative
Log of Rate of Inflation	Proxy for macroeconomic instability	Negative
Per Capita Income	Affects profitability and, therefore, the rate of return on capital	Positive
Index of Real Exchange Rate	A depreciation (increase in the index) improves the competitiveness of domestically produced goods	Positive
Remittances/GDP	Increased access to resources beyond that derived from domestic output	Zero or positive
Private Capital Flows	Direct contributions of commercial credit for investment	Positive
ODA/GDP	Increased access to resources beyond that derived from domestic output	Zero or Positive

4.4.2.3 *The Net Export Function*

The net export or the trade balance equation employed in this research is a combination of the gross export equation and the import equation. The traditional import equation employed in the developed country context suggests that imports are determined by domestic output and relative prices. In the developing country context the underlying presumption that the market for imports (and foreign exchange) clear is not very tenable and not surprisingly this simple model has not performed well for developing countries (Mirakhor and Montiel, 1987; Moran 1989). Hemphil (1974) suggested an approach that assumes foreign exchange is rationed and imports are constrained by foreign exchange availability. Availability of foreign exchange reserves becomes explicit determinant of imports in Hemphil's model. This model has performed better for developing countries. Moran (1989) proposed a more generalized version where imports are determined by the price and income variables as well as the foreign exchange variables. In our present study, this generalized import equation by Moran (1989) is combined

with the traditional export equation (which suggests that exports are determined by the income of export-destination countries and the real exchange rate) to estimate the net exports or trade balance equation.

Table 3 explains the variables that enter the net exports equation used in this research. The dependent variable is the net exports (or the trade balance) relative to GDP (rather than simply the value of net exports). The relevant foreign income variable is the ratio of foreign income to domestic income rather than the level of that variable. The index of OECD incomes to domestic income is used to capture the impact of foreign income. The Index of relative prices is calculated as the ratio of the export price index of advanced economies and the domestic price index of each country. The determinants of foreign exchange availability are foreign exchange reserves to GDP ratio, remittances to GDP ratio, private capital flows to GDP ratio and ODA to GDP ratio. All variables enter the long run equation in levels and the short run equation in differenced form.

Table 3: Determinants of the Net Exports

Variables	Relevant Effect	Expected Sign of Coefficient
OECD income to Domestic Income Index	Affects the demand for net exports	Positive
Index of Relative Prices	Affects the demand for imports and supply of exports	Positive
Foreign Exchange Reserves/GDP	Influences the feasible supply of imports	Negative
Remittances/GDP	Influences the feasible supply of imports	Negative
Private Capital Flows/GDP	Influences the feasible supply of imports	Negative
ODA/GDP	Influences the feasible supply of imports	Negative

4.4.3 Data Issues

It has already been noted that the models specified above would be estimated using a panel data set for 36 developing countries from all developing regions of the world and covering the period 1980 to 2006. Average remittance flows as a percentage of GDP for all these countries lie between approximately half of one percent to ten percent from 1980-2006. Other labor-exporting countries that were possibly candidates to be incorporated in our dataset included Jordan and Lesotho. The average rate of remittance flows to GDP for Jordan and Lesotho over the specified period was close to 20% and 53% respectively. We presumed that countries with such high receipts might behave differently from those with low receipts. The relevant tests indicate that the coefficients are not similar to the coefficients of our general equations.

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 the International Monetary

Fund, UNDATA by the United Nations and OECD Online Library of Statistical Database by OECD.

4.5 Results and Analysis

Results from the PMG estimates of consumption, investment and net exports functions are presented in Tables 4.3, 4.4 and 4.5 of Appendix 4.3. To check the consistency of PMG estimates we tested it against the MG estimates. These results are also presented in the same tables. While, theoretically, MG estimates are always consistent, as suggested by Pesaran *et al.* (1999), they are very sensitive to outliers and errors-in-variables and thus the coefficients from MG estimates are often large and insignificant. The presumed consistency of the MG estimator allows us to test for the consistency of the PMG estimation by employing the Hausman Test (which tests the null that the MG and PMG coefficients are not systematically different against the alternative that they are). If the null is not rejected the PMG estimator can be presumed consistent. Pesaran *et al.* (1999) note this test is weak but this must be juxtaposed against the extreme sensitivity of the MG estimator (to extreme values and measurement errors). They suggest the PMG estimator may provide better estimates of mean (long run) coefficient values even when the underlying assumption of common coefficients is not valid. This allows for a great deal more comfort with the results of the Hausman Tests which is one of the factors used in choosing the final specification (in terms of the number of short-run lags).²⁶

²⁶ The other factor used is the significance of lagged differenced variables. Additional lags are not added to differenced variables in the short run equation if the last lag of that variable is not statistically significant (at the 10 percent level or better) and the Hausman Test does not reject the

The PMG estimators of the consumption equation (Appendix 4.3, Table 4.3) indicate most of the long run variables (i.e. dependency ratio, non-concessional capital flows to GDP ratio, ODA to GDP ratio and remittances to GDP ratio) have significant impact on the rate of consumption. The coefficient for private capital flows (i.e. the non-concessional capital flows to GDP ratio) is surprisingly negative and significant. Moreover, this result is robust to changes in the (short or long-run) specifications of the consumption equation.²⁷ Thus, on average non-concessional capital flows in these developing countries displace consumption and increase the domestic savings rate.

The error-correction term from the PMG estimator is strongly significant but most of the (differenced) variables in the short run equation are not significant. The exceptions are the constant term (which averages the country-specific fixed effects) and the innovation in export growth. The negative coefficient for the innovation in exports growth supports the presumption of the Permanent Income Hypothesis that short run consumption rates are strongly and negatively responsive to changes in transitory income (as savings rates increase).

The coefficient for remittances to GDP ratio, our main variable of interest, is 0.80. It is significantly positive (at better than 1 percent level) suggesting that on average each additional dollar of increased remittances is used to increase

null of consistent estimates. However, in some cases, the adding a lag to the differenced variable cause a failure to converge in the likelihood estimate (i.e. the error correction model fails). In this case no additional lags are added even if the contemporaneous differenced variable (or the first lag) is significant.

²⁷ We experimented with different specifications such as more parsimonious long-run equations (such as removing the dependency variable), modification of the definitions of some variables (defining private flows separately from public flows) and changing the number of lags in the short run equation.

consumption by 80 cents. In a similar manner, a positive and significant ODA-to-GDP ratio coefficient (0.65) suggests that approximately 65 percent of official assistance is used to increase consumption. It should be noted that although the signs of ODA/GDP and Remittance/GDP coefficients were persistently positive regardless of the specification the magnitude of these coefficients were quite sensitive to the equation specification (in terms of the number of lags in the short run equation). Our confidence in this result will have to rest in part on the results for the net export equation which indirectly includes the consumption effect.

To determine whether non-market financial flows (i.e. ODA and remittances) have similar effects on the consumption rate, we employed the Wald Test. This test does not reject the null hypothesis that these two coefficients are indistinguishable. This result suggests that on average remittances and ODA had similar effects on the rate of consumption in this set of developing countries during the period from 1980 to 2006.

The PMG estimates of the investment rate equation are presented in Table 4.4. These results are robust to change in the specification of the equation. The long run PMG coefficient estimates suggest that the investment rate is influenced negatively by the debt-to-GDP ratio and the rate of inflation²⁸ and positively by the index of the real exchange rate and non-concessional capital flows.

²⁸ This result is different from the result found in Essay 2 (where inflation rate was found to be positively related to investment rate for the full sample (see page 91)). However, when the equation from Essay 2 was estimated for this same sample of countries the coefficient for inflation was also negative. This indicates that the difference in result was due solely to differences in the country samples. (It should be noted too that, in Essay 2, when the sample is limited to Sub-Saharan African countries the coefficient is also negative). This is not a worrisome issue because both signs can be justified on theoretical grounds (negative if inflation proxies for macroeconomic instability, positive if its (negative) correlation with the real lending rate is the critical factor).

Coefficients for both the ODA-to-GDP ratio and remittances-to-GDP ratio were found to be insignificant. Implications are that over the long run changes in the ODA/GDP ratio and the remittances/GDP ratio have no significant impact on the investment rate in these countries.²⁹

It is clear from the above results that on average any increase in non-market financial flows (as a percentage of GDP) in these 36 developing countries led to significant and large increases in the rate of consumption but no substantial change in the investment rates. This result (that remittances are used mostly for consumption in developing countries) is similar to the results reported by Stahl and Arnold (1986) and Stahl and Habib (1989).

The general results from the estimation of the net export equation are presented in Table 4.5. Results obtained from the long run estimation indicate that the trade balance has a negative and statistically significant relationship with the (lagged) foreign reserves/GDP ratio, the ODA/GDP ratio and the remittances/GDP ratio and a positive and significant relationship with the index of foreign income to domestic income (calculated as OECD income/domestic income ratio) as anticipated. The coefficient for the index of relative price is found to be significant but did not have the expected sign. As noted in the previous chapter this result is likely an indication of an inelastic response to import prices (as reported by Oteng-Abayie and Frimpong (2008) for Ghana, for

²⁹ Given the result from the previous chapter the most credible inference is that the effect is not large for most countries (and likely zero often) with too wide a variation to lend statistical support the presumption of a common coefficient.

example) which causes import expenditure to move with the price of imports causing the trade balance to deteriorate (hence the negative sign).

The negative coefficient for remittances/GDP ratio suggests that an increase in the flow of remittances tends to cause a deterioration of the trade balance. An increase in remittances as a share of GDP results in increased purchases of foreign goods and services (at least in relative terms). The coefficient of negative 0.73 does not suggest a one-to-one relationship between the remittances/GDP ratio and net exports/GDP ratio. Instead it suggests that a one dollar increase in the flow of remittances tends to expand the trade deficit by only 73 cents. Similarly, a negative (-0.70) ODA/GDP ratio suggests that, on an average a one dollar increase in the amount of foreign aid flowing to these countries increases their trade deficit by 70 cents. These results are supported by the Wald Tests (Table 4.5) which strongly reject the null hypothesis that these coefficients are indistinguishable from minus one.

The actual amount of remittances that is diverted to reverse flows is derived and presented in Table 4.6. When the reverse flow effect is estimated as a residual after the consumption and investment effects have been accounted for, the estimated value is 0.20. When the reverse flow effect is calculated as a residual after the net exports effect has been accounted for the estimated value is also 0.27. To find out if these two coefficients can be treated as estimates of a common (true) value we again employed the Wald test (Table 4.6). This test did not reject the null hypothesis that the difference between these two estimates is

zero. It can be argued, based on the above analysis, that a positive (non-zero) proportion of remittances was used to finance reverse flows and that this proportion was in the neighborhood of 20-27 percent for these thirty-six developing countries (over the period of 1980 to 2006). It can also be argued that the proportion of ODA and remittance flows directed to reverse flows were very similar (i.e. not statistically different) for this group of countries.

When countries are disaggregated according to their average level of debt service to GDP ratio³⁰ results from the net export equation (presented in Table 4.7, Appendix 4.3) suggest that the only dummy which is positive and significant (at 10% level) in the short run equation is the dummy for countries with high level of average debt service to GDP ratio. Dummies for medium and low level of average debt service to GDP ratio are insignificant. The significantly positive coefficient for this dummy suggests that movements in the trade balance tended to be more biased in favor of a surplus (or smaller deficit) than is the case for the other countries. This result lends support to the hypothesis that, in countries with high debt service payments relative to income the short term response of the trade balance is biased in favor of a surplus even when changes in foreign and domestic income, relative prices and foreign exchange availability and deviation from long-term equilibrium conditions are taken into account. This behavior is consistent with pressures imposed by debt service obligations.

³⁰ Dummies represent the average of the absolute value of the deviation. These dummies enter in the short run net exports equation. We are thus able to demonstrate if these dummies have different intercepts in the net exports equation.

Estimated correlation coefficients for the first difference of the remittances-GDP ratio and the first difference of the debt service-GDP ratio (for individual countries) are presented in Table 4.8. Notably, only eleven out of the 36 countries had correlation coefficients that were negative. More importantly, of the seven correlation coefficient estimates that were significant (at least at the 10 percent level) all were positive. This suggests that for some countries an increase in remittance flows is (statistically) correlated with an increase in debt service payments while the opposite is never true. The country type, in terms of debt service burden, did not seem to matter. This type of result is consistent with the situation where many countries use remittance flows to finance debt service payments, as suggested above.

We further examine the reverse flow-remittance relationship by disaggregating countries according to the rate of growth in the foreign reserves to GDP ratio and adding dummy variables for these groups to the short run trade balance equation.³¹ The results are reported in Table 4.9. None of the dummies for country groups were found to be significant. This suggests that reserve accumulation is not consistent with any additional bias in favor of trade surpluses once changes in domestic and foreign income, relative price, foreign exchange availability and deviation from long-run equilibrium have been taken into account. This may be due to the fact that unlike debt service obligations reserve accumulation is more discretionary.

³¹ Three dummies are used (based on the average of the absolute value of the deviation) to represent countries with high, medium and low reserves to GDP ratio. These dummies enter in the short run net exports equation so that we can examine if these dummies have different intercepts in the net exports equation.

The estimated correlation coefficients for changes in the remittances/GDP ratio and change in the reserves/GDP ratio are overwhelmingly positive (27 out of 36) and of the fourteen that are statistically significant (at the 10% level or better) only one is negative. 12 of the 14 significant coefficients are for countries that demonstrated high or medium rates of reserve accumulation during the sample period (1976 – 2006).³² These results are consistent with the situation where countries divert remittance receipts to reverse flows such as reserve accumulation.

4.6 Conclusion

The relatively rapid rise in remittance flows in developing countries in recent years indicates that these flows have the potential become an important tool for economic development. A better understanding of the macroeconomic effect of remittances can help the policy-makers to develop policies and design institutions that ensure that these external resources are used optimally given country objectives. To date, research questions have generally centered on the allocation of remittance receipts within the domestic economy (Adams, Jr., 1991: 695). While the existing economic literature suggests that remittance flows are either used to increase consumption or investment, policy-makers have often argued that a significant portion of remittance flows to developing countries are used to service debt, increase foreign exchange reserves and finance capital flight. Remittance flows that are diverted to these ‘reverse flows’ cannot contribute to increased consumption or investment within the domestic economy (at least not directly). Consumption and investment do not necessarily constitute the

³² The sample period for the correlations is longer than the sample period for the regressions because there are fewer restrictions from data availability.

summation of the allocation of remittances. It is likely that part of remittance flows are diverted to reverse flows and never add to the domestic rates of consumption or investment.

This essay first sought to demonstrate the relationship between remittance flows and consumption, investment and reverse flows (at the macroeconomic level) by utilizing some basic national accounting and balance of payment identities. By also estimating consumption, investment and trade balance equations estimates of the marginal effect of remittances on reverse flows were derived.

The marginal effect of remittance flows on the rate of consumption, investment and net exports for 36 developing countries (over the period of 1980 to 2006) were found to be 80 percent, zero and 73 percent respectively. In effect, a one percentage increase in the rate of remittance flows increased the rate of consumption by roughly 0.8 percent, expanded the trade balance/GDP ratio by roughly 0.73 percent and had no statistically discernable effect on the rate of investment. These results suggest that 0.2 to 0.27 percent of that percentage increase (in the rate of remittance flows) went to reverse flows. The hypothesis that this proportion is zero is very strongly rejected. Changes in the rate of remittance flows tend to be positively correlated with changes in debt service payment-to-income ratios and the rate of reserve accumulation relative to income. Many of the correlation estimates were also statistically significant. For this group of countries the summary distribution of remittances at the macroeconomic level is dominated by consumption but includes reverse flows. This investigation found

that the proportion of remittance flows used to finance reverse flows is not very different (statistically speaking) from the proportion of aid flows used for the same purpose.

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APPENDICES

Appendix 4.1

Table 4.1: List of the Countries in the Sample

Number	Country	Region
1	Algeria	Middle East and North Africa
2	Bangladesh	South Asia
3	Benin	Sub-Saharan Africa
4	Botswana	Sub-Saharan Africa
5	Burkina Fuso	Sub-Saharan Africa
6	Colombia	Latin America and the Caribbean
7	Costa Rica	Latin America and the Caribbean
8	Cote d'Ivoire	Sub-Saharan Africa
9	Dominican Republic	Latin America and the Caribbean
10	Egypt, Arab Rep.	Middle East and North Africa
11	El Salvador	Latin America and the Caribbean
12	Fiji	East Asia and Pacific
13	Gambia, The	Sub-Saharan Africa
14	Guatemala	Latin America and the Caribbean
15	Haiti	Latin America and the Caribbean
16	Honduras	Latin America and the Caribbean
17	India	South Asia
18	Indonesia	East Asia and Pacific
19	Jamaica	Latin America and the Caribbean
20	Kenya	Sub-Saharan Africa
21	Malaysia	East Asia and Pacific
22	Mali	Sub-Saharan Africa
23	Mexico	Latin America and the Caribbean
24	Morocco	Middle East and North Africa
25	Niger	Sub-Saharan Africa
26	Nigeria	Sub-Saharan Africa
27	Pakistan	South Asia
28	Panama	Latin America and the Caribbean
29	Philippines	East Asia and Pacific
30	Rwanda	Sub-Saharan Africa
31	Senegal	Sub-Saharan Africa
32	Sri Lanka	South Asia
33	Swaziland	Sub-Saharan Africa
34	Thailand	East Asia and Pacific
35	Togo	Sub-Saharan Africa
36	Tunisia	Middle East and North Africa

Table 4.2: Stationarity Tests for Relevant Variables

Variable	Hadri Panel Stationarity Test (null of stationarity)	
	Level	Difference
Consumption/GDP	45.79 ^{***}	-2.85
Per Capita Income (Atlas)	80.98 ^{***}	1.46
Dependency Ratio	89.93 ^{***}	69.57 ^{***}
Innovation in Export Growth	-2.81	-
Private Capital Flows/GDP	18.67 ^{***}	-3.71
ODA/GDP	18.70 ^{***}	-4.97
Remittances/ GDP	48.10 ^{***}	0.62
Investment/ GDP	38.01 ^{***}	-1.72
Total External Debt / GDP	35.69 ^{***}	0.84
Rate of Inflation	18.15 ^{***}	-4.98
Per Capita Income (Constant)	89.09 ^{***}	0.93
Index of Real Exchange Rate	40.82 ^{***}	-2.20
Trade Balance/ GDP	35.13 ^{***}	-2.85
Index of OECD income to Domestic Income Ratio	41.57 ^{***}	1.14
Index of Relative Price	34.76 ^{***}	-2.41
Reserves/GDP	52.72 ^{***}	1.25

Notes: ^{***}, ^{**} and ^{*} Indicates significance at the 1%, 5% and 10% level significantly.

Appendix 4.2

Derivation 1

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

Where: Y = Gross Domestic Product
 C = Consumption
 I = Investment
 NX = Net exports
 rem = Remittances/GDP

Derivation 2:

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

Where:
 CU = Current Account Balance
 CA = Capital Account Balance
 ntr = Net Transfers/ GDP
 nfi = Net Foreign Income/ GDP
 nf_o = Net official flows/GDP

$nf_p = \text{Net private flows/GDP}$

Derivation 3:

From Derivation 1 and Derivation 2:

$$\begin{aligned} \frac{\partial i}{\partial rem} + \frac{\partial c}{\partial rem} &\equiv 1 - \frac{\partial rf}{\partial rem} \\ \Rightarrow \frac{\partial i}{\partial rem} + \frac{\partial c}{\partial rem} + \frac{\partial rf}{\partial rem} &\equiv 1 \end{aligned}$$

Appendix 4.3

Table 4.3: MG and PMG Estimates of the Consumption Equation (1980-2006)

Dependent Variable: The Consumption Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Log of Per Capita Income	0.054 (0.64)	-0.011 (-1.55)
Dependency Ratio	0.473 (0.89)	0.157*** (3.93)
Private Capital Flows/GDP	-1.484 (-1.22)	-0.265*** (-2.97)
ODA/GDP	33.295 (1.25)	0.653*** (12.59)
Remittances/GDP	1.930 (0.77)	0.802*** (8.32)
	Short-Run Coefficients	
Error Correction Coefficient	-0.748*** (-9.61)	-0.338*** (-6.36)
Δ Log of Per Capita Income	0.035 (1.01)	0.000 (0.02)
Δ Dependency Ratio	-1.706 (-0.51)	-0.015 (-0.02)
Innovation in Export Growth	-0.032* (-1.94)	-0.041*** (-3.43)
Δ Innovation in Export Growth	0.005 (0.64)	0.010 (1.39)
Δ Private Capital Flows/ GDP	0.086 (0.65)	0.087 (1.62)
Δ Private Capital Flows/ GDP (Lagged)	0.046 (0.46)	0.069 (1.67)
Δ ODA/ GDP	-0.932 (-0.67)	0.440 (1.11)
Δ ODA/ GDP (Lagged)	-0.068 (-0.08)	-0.131 (-0.27)
Δ Remittances/GDP	-0.485 (-0.52)	-0.125 (-0.33)

Table 4.3: MG and PMG Estimates of the Consumption Equation (1980-2006) (cont.)

Dependent Variable: The Consumption Rate		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Δ Remittances/GDP (Lagged)	0.529 (0.65)	0.198 (0.59)
Constant	0.766** (2.14)	0.233*** (6.16)
Number of Observations	954	954
Hausman Test: H0: Common coefficients (MG and PMG)	χ^2 Coefficient: Tail Probability:	1.67 0.893
Wald Test: H0: Equality of remittances and ODA coefficients	χ^2 Coefficient: Tail Probability:	1.69 0.193

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

Table 4.4: MG and PMG Estimates of the Investment Equation (1980-2006)

Dependent Variable: Investment/GDP		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Total External Debt/GDP	-0.149 ^{***} (-2.81)	-0.051 ^{***} (-5.15)
Log of Inflation Rate	-0.227 (-1.49)	-0.169 ^{***} (8.45)
Real Exchange Rate Index	0.115 [*] (1.82)	0.039 ^{***} (4.85)
Private Capital Flows/GDP	0.439 ^{**} (2.22)	0.363 ^{***} (5.94)
ODA/GDP	-5.306 (-0.68)	-0.032 (-1.00)
Remittances/GDP	0.429 (0.48)	0.026 (0.77)
	Short-Run Coefficients	
Error Correction Coefficient	-0.708 ^{***} (-10.59)	-0.323 ^{***} (-7.03)
Δ Total External Debt/GDP	0.114 (1.43)	0.031 (0.72)
Δ Log of Per Capita Income (Lagged)	0.204 ^{***} (2.88)	0.210 ^{***} (4.21)
Δ Log of Per Capita Income (Second Lagged)	0.097 (1.45)	-0.010 (-0.23)
Δ Log of Inflation Rate	-0.018 (-0.41)	-0.027 (-1.11)
Δ Real Exchange Rate Index	-0.013 (-0.36)	-0.012 (-0.48)
Δ Private Capital Flows/ GDP	-0.195 ^{***} (-2.64)	-0.032 (-0.65)
Δ ODA/GDP	-0.867 (-0.97)	0.102 (0.33)
Δ Remittances/ GDP	-0.299 (-0.47)	0.590 (1.31)
Δ Remittances/ GDP (Lagged)	-0.337 (-0.69)	0.439 [*] (1.68)
Constant	0.142 ^{***} (4.32)	0.059 ^{***} (6.98)
Number of Observations	961	961
Hausman Test:	χ^2 Coefficient:	6.04
H0: Common coefficients (MG and PMG)	Tail Probability:	0.419

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

Table 4.5: MG and PMG Estimates of the Net Export Equation (1980-2006)

Dependent Variable: The Trade Balance/GDP		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
OECD Income-Domestic Income Ratio Index	0.019 (0.21)	0.054 ^{***} (4.84)
Index of Relative Prices	0.156 (0.80)	-0.038 ^{***} (-4.55)
Foreign Reserves/GDP (Lagged)	-0.343 [*] (-1.93)	-0.225 ^{***} (-3.95)
Private Capital Flows/GDP	-0.431 (-1.10)	-0.031 (-0.44)
ODA/GDP	-11.425 (-1.10)	-0.703 ^{***} (-6.38)
Remittances/GDP	-0.771 (-0.46)	-0.730 ^{***} (-11.78)
	Short-Run Coefficients	
Error Correction Coefficient	-0.909 ^{***} (-13.48)	-0.319 ^{***} (-7.59)
Δ OECD Income-Domestic Income Ratio Index	0.054 (1.15)	0.088 ^{**} (2.12)
Δ OECD Income-Domestic Income Ratio Index (Lagged)	-0.004 (-0.14)	0.018 (0.49)
Δ Index of Relative Prices	0.025 (1.09)	-0.001 (-0.06)
Δ Foreign Reserves/GDP (Lagged)	0.150 (1.58)	-0.167 ^{**} (-2.01)
Δ Foreign Reserves/GDP (Second Lagged)	0.006 (0.10)	-0.030 (-0.67)
Δ Private Capital Flows/GDP	-0.113 (-0.78)	-0.222 ^{***} (-3.58)
Δ Private Capital Flows/GDP (Lagged)	-0.117 (-1.19)	-0.151 ^{**} (-1.99)
Δ Private Capital Flows/GDP (Second Lagged)	-0.028 (-0.47)	-0.023 (-0.44)
Δ ODA/GDP	0.206 (0.23)	-1.052 (-1.05)

Table 4.5: MG and PMG Estimates of the Net Export Equation (1980-2006) (cont.)

Dependent Variable: The Trade Balance/GDP		
Explanatory Variables	Mean Group	Pooled Mean Group
	Long-Run Coefficients	
Δ Remittances/GDP	-0.644 (-1.01)	-0.204 (-0.78)
Constant	-0.005 (-0.17)	0.005 (1.45)
Number of Observations	962	962
Hausman Test: H0: Similar Coefficient Estimates (MG and PMG)	χ^2 Coefficient: Tail Probability:	10.37 0.110
Wald Test: (Remittance/GDP coefficient = -1)	χ^2 Coefficient: Tail Probability:	18.91*** 0.000
Wald Test: (ODA/GDP coefficient = -1)	χ^2 Coefficient: Tail Probability:	7.28*** 0.007

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

Table 4.6: Estimates of Marginal Allocation of Remittances to Reverse Flows (1980-2006)

The Marginal Allocation of Total Remittances to:		
Variables	Coefficient	
Consumption	0.80	
Investment	Insignificant	
Reverse Flows [1- (Consumption + Investment)]	0.20	
The Trade Deficit	0.73	
Reverse Flows [1 - Trade Deficit]	0.27	
Wald Test H⁰: Equality of Coefficient Estimates	χ^2 Coefficient: Tail Probability:	1.26 0.262

Table 4.7: PMG Estimates of the Net Export Equation with Debt Service Dummies (1980-2006)

Dependent Variable: The Trade Balance/GDP	
Explanatory Variables	Long-Run Coefficients
OECD Income-Domestic Income Ratio Index	0.054 ^{***} (4.84)
Index of Relative Prices	-0.038 ^{***} (-4.55)
Foreign Reserves/GDP (Lagged)	-0.225 ^{***} (-3.95)
Private Capital Flows/GDP	-0.031 (-0.44)
ODA/GDP	-0.703 ^{***} (-6.38)
Remittances/GDP	-0.730 ^{***} (-11.78)
	Short-Run Coefficients
Error Correction Coefficient	-0.319 ^{***} (-7.59)
Δ OECD Income-Domestic Income Ratio Index	0.088 ^{**} (2.12)
Δ OECD Income-Domestic Income Ratio Index (Lagged)	0.018 (0.49)
Δ Index of Relative Prices	-0.001 (-0.06)
Δ Foreign Reserves/GDP (Lagged)	-0.167 ^{**} (-2.01)
Δ Foreign Reserves/GDP (Second Lagged)	-0.030 (-0.67)
Δ Private Capital Flows/GDP	-0.222 ^{***} (-3.58)
Δ Private Capital Flows/GDP (Lagged)	-0.151 ^{**} (-1.99)
Δ Private Capital Flows/GDP (Second Lagged)	-0.023 (-0.44)
Δ ODA/GDP	-1.052 (-1.05)
Δ Remittances/GDP	-0.204 (-0.78)
Dummy for Countries with High Debt Service Payments	0.002 [*] (1.67)
Dummy for Countries with Medium Debt Service Payments	0.002 (1.25)
Dummy for Countries with Low Debt Service Payments	-0.000 (-0.02)
Number of Observations	962

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

Table 4.8: Correlation Coefficients between Remittances/GDP and Debt Service Payments/GDP (1976 -2006)

Country	Type According to Average Debt Service Payments	Correlation Coefficient	Significance Level
Algeria	High	0.26	
Bangladesh	Low	0.00	
Benin	Low	0.06	
Botswana	Low	-0.24	
Burkina Fuso	Low	0.30	*
Colombia	Medium	0.52	***
Costa Rica	Medium	-0.01	
Cote d'Ivoire	High	0.34	*
Dominican Republic	Medium	0.48	***
Egypt, Arab Rep.	Medium	0.06	
El Salvador	Medium	0.18	
Fiji	Medium	-0.02	
Gambia, The	Medium	0.19	
Guatemala	Low	-0.06	
Haiti	Low	0.25	
Honduras	Medium	-0.04	
India	Low	0.07	
Indonesia	Medium	0.32	
Jamaica	High	0.18	
Kenya	Medium	0.06	
Malaysia	Medium	0.14	
Mali	Medium	0.51	***
Mexico	Medium	0.16	
Morocco	Medium	0.02	
Niger	Medium	-0.03	
Nigeria	Medium	-0.31	
Pakistan	Medium	0.33	*
Panama	High	-0.01	
Philippines	Medium	-0.09	
Rwanda	Low	0.35	*
Senegal	Medium	-0.01	
Sri Lanka	Medium	0.15	
Swaziland	Medium	0.29	
Thailand	Medium	-0.06	
Togo	Medium	0.11	
Tunisia	Medium	0.23	

Notes: 1) A country is considered high (low) type when the average value of debt service to GDP is higher (lower) than the absolute value. Any country otherwise is medium.
2) ***, ** and * Indicates significance at the 1%, 5% and 10% level respectively.

Table 4.9: PMG Estimates of the Net Export Equation with Reserve Growth Dummies (1980-2006)

Dependent Variable: The Trade Balance/GDP	
Explanatory Variables	Long-Run Coefficients
OECD Income-Domestic Income Ratio Index	0.054 ^{***} (4.84)
Index of Relative Prices	-0.038 ^{***} (-4.55)
Foreign Reserves/GDP (Lagged)	-0.225 ^{***} (-3.95)
Private Capital Flows/GDP	-0.031 (-0.44)
ODA/GDP	-0.703 ^{***} (-6.38)
Remittances/GDP	-0.730 ^{***} (-11.78)
	Short-Run Coefficients
Error Correction Coefficient	-0.319 ^{***} (-7.59)
Δ OECD Income-Domestic Income Ratio Index	0.088 ^{**} (2.12)
Δ OECD Income-Domestic Income Ratio Index (Lagged)	0.018 (0.49)
Δ Index of Relative Prices	-0.001 (-0.06)
Δ Foreign Reserves/GDP (Lagged)	-0.167 ^{**} (-2.01)
Δ Foreign Reserves/GDP (Second Lagged)	-0.030 (-0.67)
Δ Private Capital Flows/GDP	-0.222 ^{***} (-3.58)
Δ Private Capital Flows/GDP (Lagged)	-0.151 ^{**} (-1.99)
Δ Private Capital Flows/GDP (Second Lagged)	-0.023 (-0.44)
Δ ODA/GDP	-1.052 (-1.05)
Δ Remittances/GDP	-0.204 (-0.78)
Dummy for Countries with High Growth in Reserves/GDP	0.001 (0.84)
Dummy for Countries with Medium Growth in Reserves/GDP	0.002 (0.89)
Dummy for Countries with Low Growth in Reserves/GDP	0.002 (0.81)
Number of Observations	962

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

Table 4.10: Correlation Coefficients between Remittances/GDP and Growth of Reserves/GDP (1976-2006)

Country	Rate of Growth in Reserves	Correlation Coefficient	Significance Level
Algeria	Medium	0.18	
Bangladesh	Medium	0.34	*
Benin	High	0.33	*
Botswana	Low	-0.17	
Burkina Fuso	Medium	0.19	
Colombia	Low	0.38	**
Costa Rica	Medium	0.18	
Cote d'Ivoire	High	0.12	
Dominican Republic	High	0.03	
Egypt, Arab Rep.	Medium	0.40	**
El Salvador	Medium	0.03	
Fiji	Low	-0.07	
Gambia, The	High	-0.40	**
Guatemala	Medium	0.03	
Haiti	High	-0.09	
Honduras	Medium	0.31	*
India	Medium	0.23	
Indonesia	Medium	0.38	*
Jamaica	Medium	0.49	**
Kenya	High	-0.17	
Malaysia	Medium	0.09	
Mali	Medium	-0.06	
Mexico	High	0.33	*
Morocco	Medium	0.39	**
Niger	Medium	0.08	
Nigeria	Medium	0.33	*
Pakistan	Medium	0.58	***
Panama	Medium	0.14	
Philippines	Medium	-0.29	
Rwanda	Medium	0.18	
Senegal	Low	0.29	
Sri Lanka	Low	-0.21	
Swaziland	Low	0.35	**
Thailand	Medium	-0.22	
Togo	Medium	0.11	
Tunisia	Medium	0.38	**

Notes: 1) A country is considered high (low) type when the average value of debt service to GDP is higher (lower) than the absolute value. Any country otherwise is medium.
2) ***, ** and * Indicates significance at the 1%, 5% and 10% level respectively.

CHAPTER 5

CONCLUSION

This dissertation examines the macroeconomic impact of non-market financial flows in developing countries. Given the limited access to the international capital market non-market financial flows such as remittances and foreign aid are considered as important sources of external funding for many developing countries. While there is a general perception that the amount of these flows is significant and growing, the macroeconomic impact of these flows is a highly debated topic in the development literature.

A large part of the existing literature on non-market flows discusses the specific mechanisms through which these resources may affect growth. Whether it does have any impact will depend on the degree to which these resources can be directed toward enhancing economic activity. A better understanding of these motivations would improve policy formulation to use these external flows in the most productive way.

The first essay attempts to answer the following questions. First, to what extent are remittances and grants different in terms of their effect on capital accumulation and economic growth? Second, how might the motivation to remit inform the nature of the relationship between remittances and growth? To answer these questions various specifications of consumption, investment and growth equations are estimated for four developing countries from two different regions but for whom the dominant source of remittances are nearly identical. These countries are Bangladesh, Pakistan (South Asian region), Egypt and Syrian Arab

Republic (Middle East and North Africa region). Both time series and panel procedures are applied to estimate these equations.

Results suggest that there is a counter-cyclical relationship between grants and economic growth in Bangladesh and Egypt. Grants flows increase during the period of economic downturn and decrease when economic conditions improve in these two countries. In the case of Pakistan and Syria grants affect growth positively through capital accumulation.

Remittances affect investment and thus growth positively in Bangladesh. A direct counter-cyclical relationship between remittances and economic growth also suggests that decreases in economic activities cause remittance flows to rise in this country. Similar results have been found for Egypt. For Pakistan and Syria remittance flows are found to increase during periods of economic boom when business confidence is high. The positive impact of remittance flows on economic growth also comes from their effect on consumption in these two countries.

The conclusion prompted by these results is that remittances, in fact, fo act differently from grants on the one hand, while the effect of remittances on growth is similar to the effects of grants in three out of four countries, these effects stem from different sources. The effect of remittances and grants on capital accumulation is completely different across countries. Although both remittances and grants are transfers from abroad the “private” characteristic of remittances is its critical attribute.

Results also suggest that different motivations to remit exist among the four countries. The motivation of migrants to remit in Bangladesh is a

combination of self-interest and enlightened self-interest. In Egypt the motivation to remit seems to be the one of enlightened self-interest. Motivations to remit for Pakistan and Syria seem to be a combination of migrants' altruistic behavior and self-interest attitude. Motivations to remit do not appear to be uniform and may be largely determined by social and economic factors and institutions within the home country.

The second essay departs from the assumption made by the previous literature that all aid is used to expand the trade deficit and thus allocated only to consumption and investment. The empirical analysis, using estimates of consumption, investment and net export functions for a sample of 61 developing countries covering the period of 1980 to 2006 suggests that 77% of each percentage point of aid was used for consumption but no significant amount of increases in aid was invested. This also implies that on average 23 to 25 per cent of aid was directed towards financing reverse flows (i.e., debt amortization, capital flight and reserve accumulation). Almost one fourth of the aid inflows did not make it into the domestic economy during that time period. The essay also attempts to capture how foreign aid is allocated in different region during 1980 to 2006. Results suggest almost half of the aid was directed into financing reverse flows in Sub-Saharan Africa, 40% was consumed and only 13% was invested. For the Americas, there was no significant impact of ODA on either consumption or investment. Foreign aid in this region reduced the trade balance by 81 percent (or the foreign aid increase) suggesting that approximately 19 percent of that increase in aid was used to finance reverse flows. For the third group of developing

countries (which covers North Africa, Asia and the Pacific) results suggest that approximately 36% of each percentage point of increase in foreign aid was used to increase consumption while 44% was invested. On average, 16 to 20 percent of ODA were used as reverse flows in this group of countries. This paper demonstrates 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.

The third essay examines the relationship between remittances consumption, investment and reverse flows at the macroeconomic level. This is done by employing some national income and balance of payments identities. The marginal effect of remittances on reverse flows is derived by estimating consumption, investment and trade balance equations. The dataset employed for this research covers 36 developing countries over the period from 1980 to 2006. The effect of remittances flows on consumption, investment, and net exports are found to be 80%, zero and 73% respectively. This suggests that each percentage increase in the rate of remittances flows increased the consumption rate by 0.8 percent and trade balance to GDP ratio by 0.73 percent and had no significant impact on the rate of investment. 0.2 to 0.27 percent of that percentage increase (in the rate of remittance flows) went to reverse flows. Results from this examination also show that changes in the rate of remittance flows tend to be positively correlated with changes in debt service payment-to-income ratios and the rate of reserve accumulation relative to income. Use of remittance flows in

these countries is dominated by consumption and reverse flows. The proportion of remittance flows used to finance reverse flows in these countries were not different from the proportion of aid flows, this would imply that the non-market flows had similar impact on reverse flows in these countries from 1980-2006.

This dissertation underscores the importance of non-market financial flows in developing countries, Results from this dissertation have policy implications for developing nations that confront dilemmas and debates on the impact of remittances and foreign aid on economic growth. One important result derived from the estimations shows that the impact of remittances on capital accumulation is rather small, although many developing countries design policies to encourage investment. One possible reason is that most of these policies are targeted towards the big investors (Siddiqui, 2004). Since a large proportion of migrants belong the group of guest workers, policies in developing countries may need to be designed to encourage small scale industries. Home countries also need to improve the financial system to encourage more remittances through the formal sector. Many developing countries, including Bangladesh, have recognized the need of setting up branches in host countries. Successful implementation of this policy explains the large inflow of remittances in Bangladesh in recent years. It has been shown that remittances flow in many developing countries rises during the period of economic downturn or in the aftermath of natural disasters. Economists and policy-makers have emphasized on measure in countries that face recurrent devastating cyclones to reduce the ex-ante vulnerability of natural disasters (Mohapatra *et al*, 2009). These measures include green houses for

horticulture that can be easily reassembled after hurricanes (United Nations, 2008). Additional policies may also include assistance for embassies and financial institutions in the host countries to ease the money transfer policies to channel the remittances into the affected areas.

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