ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

EFFECTIVENESS OF FOREIGN AID IN SUB-SAHARAN AFRICA: A LESS AGGREGATED ANALYSIS

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Effectiveness of Foreign Aid in Sub-Saharan Africa: A Less Aggregated Analysis

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LIST OF ABBREVIATIONS AND ACRONYMS

ADB	African Development Bank
AfDF	African Development Fund
CFA	Commission for Africa
CIA	Central Intelligence Agency
CIP	Commodity Import Program
DAC	Development Assistance Committee
EC	the European Commission
EFW	Economic Freedom of the World
FDI	Foreign Direct Investment
GDF	Global Development Finance
GDP	Gross Domestic Product
GNI	Gross National Income
GODA	Gross Official Development Assistance
HDI	Human Development Index
HIPCs	Highly Indebted Poor Countries
IAV	Interacting Variable
IDA	International Development Association
IMF	International Monetary Fund
JOECF	Japan's Overseas Economic Cooperation Fund
LDCs	Less/Least Developed Countries
MCA	Millennium Challenge Account
M_2	Broad Money

NAT	Net Aid Transfers
NGOs	Non-Governmental Organizations
NODA	Net Official Development Assistance
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
OEEC	Organization for European Economic Cooperation
OLS	Ordinary Least Squares
SSA	Sub-Saharan Africa
UK	United Kingdom
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNRRA	United Nations Relief and Rehabilitation Agency
UNTA	United Nations Regular Program of Technical Assistance
US(A)	The United States (of America)
USD	United States Dollar
USAID	United States Agency for International Development
WB	World Bank
WDI	World Development Indicators
WFP	World Food Program
WGI	Worldwide Governance Indicators

ABSTRACT

Inspired by the contradicting findings of studies on aid effectiveness and the recently emerging dissatisfaction of scholars with the methodologies of earlier works, this study has taken up the examination of the effectiveness of bilateral and multilateral aids on economic growth. To this end, the estimation technique of Difference-GMM – along with other techniques for comparison – has been applied to a panel data from 42 Sub-Saharan African countries for the years 1980 through 2007.

For the data at hand, no evidence is found for the – conditional or unconditional – effectiveness of both kinds of aid. This result is robust to the alternatives of using the augmented Solow type growth models and the 'modern' models which emphasize the roles of institutional, policy and geographical factors at explaining growth differences. Bilateral aid on its own or in an interaction with policy is ineffective at enhancing economic growth, regardless of whether it is measured relative to the recipients GDP or in per capita terms. The same holds for multilateral aid.

The concluding point of this study which says that both bilateral and multilateral aids are ineffective at influencing economic growth is confined to the data at hand and thus gives no evidence about the effectiveness of the recently emerging aid modalities. Research on aid effectiveness remains to be extended along high level of disaggregating aid and testing for the effectiveness of the new approaches of delivering aid which are argued to possess elements of better government accountability, better transparency and better recipient-ownership.

CHAPTER ONE

INTRODUCTION

1.1 Background

Foreign aid is a transfer of resources on concessional terms undertaken by official agencies in order to support the economic, social and political development of the developing world (Sharma, 1997; Radelet, 2006). The concessionality of the transfer is reflected in that a transfer is considered as foreign aid if it has a grant element of 25 percent or more. The supporting (official) agencies comprise of country governments and international organizations such as the World Bank. This definition of foreign aid more accurately reflects development aid (commonly known as Official Development Assistance, ODA). However, the term foreign aid also includes such other resource transfers as humanitarian aid and military aid (Tarnoff and Nowels, 2004).

What distinguishes development aid from humanitarian aid is that development aid is aimed at alleviating poverty in the long-term while the focus of humanitarian aid is the alleviation of suffering in the short term. Military aid is given for donors' strategic reasons in forms like military equipment and training to military officers and personnel (ibid).

ODA is essentially aid from the governments of the developed nations to promote the development of the third world. Hence, it does not include private contributions or private capital flows and investments. Since 1970, private financial flows are greater in volume although they are heavily concentrated in a few countries (World Bank, 1998; Shah, 2007).

One way to divide ODA is to distinguish between bilateral and multilateral types. Bilateral ODA is administered by agencies of donor governments (such as the U.S. Agency for International Development – USAID or Japan's Overseas Economic Cooperation Fund – JOECF). In contrast to this, multilateral assistance while funded by contributions from wealthy countries is administered by international agencies such as the United Nations Development Programme (UNDP) and the World Bank (WB). Historically, bilateral ODA has usually represented the higher proportion (about two-thirds) of the total ODA (Boone, 1995; World Bank, 1998).

Foreign aid (in a broader sense) has been provided (delivered) in various forms. These forms include: cash grant (transfers) to governments; provision of food commodities; weapons systems, generators or computers; expert advice to government and private sector organizations; training to government officers and citizens; commodity import programs [1]; and small grants to indigenous or other organizations to further their developmental purposes (Tarnoff and Nowels, 2004).

The total ODA to developing countries has experienced changing trends. In particular, it experienced a large fall in the 1990s – after the Cold War ended (Boschini and Olofsgard, 2005; Radelet, 2006). Recently, the volume of ODA has been rising though with an enlarged number of constituents. Mostly, the trend of ODA from Organization for Economic Co-operation and Development – Development Assistance Committee (OECD-DAC) members is used to show the trends in ODA. Although the level of ODA from non-DAC countries could be significant at least

[1] Commodity Import Program (CIP) is the form of aid delivery managed by USAID. This program allows indigenous private sector business in foreign country to gain access to U.S. dollars in order to import eligible American goods. The local currency paid by these businesses in exchange for the dollars go to a host government account and is then programmed for development purposes by both the host country and the United States.

for some recipients, availability of well-organized data for the DAC members might have contributed to the popularity of this convention. At any rate, the following summary of the Development Co-operation Report provides a valuable depiction of the most recent figures (OECD, 2007a):

> Total official development assistance (ODA) from DAC member countries rose by 32% in 2005 to USD 106.8 billion – a record high. This represents 0.33% of members' combined gross national income in 2005, up from 0.26% in 2004, and the highest ratio since 1992. But the lion's share of the increase came from debt relief grants (particularly to Iraq and Nigeria), which more than tripled, and from humanitarian aid, which rose by 15.8%.

In Sub-Saharan Africa (SSA), development aid has been the central issue of concern on the subjects of the region as the target for huge volume of aid flows and the region as where the effectiveness of such efforts has been very debatable (more on this later).

1.2 Statement of the Problem

Economists seldom agree on the way they interpret an issue or on the answers they give to a question. One among such issues or questions is the effectiveness of foreign aid. Even using the same data set and similar econometric techniques of estimation, different researchers have come up with different and contrasting findings and conclusions.

Some praise the effectiveness of foreign aid and argue for more aid flows to developing countries. For instance, Crosswell (1998), Hansen and Tarp (2000), CFA (2005), Reddy and Minoiu (2006), and Tarp (2006), argue that aid is generally effective at meeting the objectives it has been intended for.[2]

Others like Kanbur (2000), Easterly (2003), Easterly et al. (2003), Ranis (2006), Murphy and Tresp (2006), strongly stress the complete failure of foreign aid. They argue that aid has failed to meet what it was aimed at.

Still others inhabit the middle position: aid has been effective in some cases and has failed in others – the triumph of aid is conditional on other factors. Included in this group are World Bank (1998), Burnside and Dollar (2000), Denkabe (2003), and Collier (2006).

Yet, for Moss et al. (2006), Fielding (2007), Killick and Foster (2007), aid has negatively affected the developing world via real appreciation of domestic currency (of the South) and the resulting loss of competitiveness ("Dutch Disease"), encouraging corruption and harming institutional development, etc..

Thus, it deserves enormous attention and endeavor to join this debate on the effectiveness of foreign aid (above all to SSA) in this era of massive aid flows to developing countries in general and to SSA in particular.

[2] The objectives of aid – implicit and explicit – and some groundwork issues related to foreign aid and not included in the background section will be detailed in the chapter of literature review.

There are emerging and hot criticisms on the studies in the area of aid effectiveness in general – regardless of whether the findings reflect aid-pessimism or aid-optimism. The majority of these critics call attention to the weaknesses in the approach or methodology that has been in use in the past.

Harms and Lutz (2004) – after summarizing the literature on the contradicting findings of the effectiveness of foreign aid – emphasize the need for a new approach. The approach they proposed is to take a more disaggregated view both with regard to the different components of aid and to the various aspects of policies/institutions. Clemens et al. (2004) also came up with a similar proposal – disaggregating aid to different components, and testing a relationship between the correct component of aid and economic growth, rather than arguing that aid is effective or ineffective with analysis based on a wrong variable (usually, total ODA).

The sensitivity of the measures of the effectiveness of aid to changing data sets is another important problem that has also motivated researchers in the area to question the techniques of analysis. One prominent evidence in this regard revolves around the pitfalls of drawing strong conclusions from cross-country regressions using interaction variables. After critically scrutinizing the works of (i) Burnside and Dollar (2000), (ii) Easterly (2003), and (iii) Rajan and Subramanian (2005), Pattillo et al. (2007:11) put their conclusion as follows: “Where the impact on the dependent variable of one of the components of the IAV [interacting variable] is statistically dominant, the IAV may do little else than duplicate that variable, providing little or no information on the influence of the other component.”

Moreover, some also criticize the majority of the studies in the area for evaluating the effectiveness of foreign aid using growth in (per capita) GDP. For instance, Masud and Yontcheva (2005) argue that the very objective of foreign aid is poverty reduction, which is measured better by other human development indicators (like improvements in health care and educational achievements) than by the growth in per capita GDP.

The above points of criticism require a work along new lines of research. Thus, it would be vital to assess the effectiveness of foreign aid by incorporating one or more of these recently emerging critics and proposals in the area – both in cross-country comparisons and in a country-specific analysis.

Hence, this study is carried out in the light of this argument. It approaches the aid effectiveness question by disaggregating aid into bilateral and multilateral components.

1.3 Objectives of the Study

The general objective of this paper is to assess the effectiveness of foreign aid (bilateral and multilateral) at influencing economic performance in the context of Sub-Saharan Africa.

Specifically, the study takes up the following objectives.

1. It tries to evaluate the unconditional effectiveness of bilateral and multilateral foreign aids at fostering economic growth for a sample of forty-two countries in Sub-Saharan Africa.

2. It attempts to assess if the effectiveness of bilateral and multilateral aids to these countries depends on the macroeconomic stance of the countries – i.e., to see if there is a conditional effectiveness.

1.4 Significance of the Study

The current state of literature in the area points to the analyses of aid effectiveness at disaggregated levels: country-specific or sector-specific analysis, as well as studies based on different components of aid. This study is believed to call forth such disaggregated level researches with more human and financial resources, and aiming at policy measures.

1.5 Scope of the Study

As is introduced in an earlier section, foreign aid comprises of development aid, military aid, and humanitarian and emergency aid types. This paper considers the effectiveness of the first one – development (economic) aid.[3] In addition, while the effectiveness of foreign aid could be tested with various measures (or components) of economic development, economic growth (specifically, growth in per capita real GDP) is used in this study. The study covers forty-two countries in Sub-Saharan Africa for the period 1980 to 2007[4]. Again, though alternative methods of measuring aid flows exist, bilateral and multilateral net aid transfers (both relative to GDP and in per capita terms) will be utilized in the econometric analysis.

[3] From now onwards, through out this paper, foreign aid is used interchangeably with foreign development assistance, unless indicated otherwise.
[4] The list of these countries is included in Annex 1.

1.6 Limitations of the Study

The unavailability of data for some of the countries in the region (for instance, for Somalia, Djibouti, Namibia and Liberia) has forced me to leave these countries out. However, this may not bring about a big trouble as the descriptive analysis in the fourth chapter shows that there is a considerable similarity between the data of the forty-two countries and that of the region (Sub-Saharan Africa) at large. As the degree of reliability on the findings of this study highly depends on data quality, the questionable reliability of the data used here (mainly because there are missing observations and the data sources for this study compile data from different ultimate sources) presents a limitation to be unveiled.

1.7 Organization of the Paper

This thesis is organized into five chapters. *The first one*, which is already brought to a close, is an introductory one. *The second chapter* presents a critical review of the aid-effectiveness literature – both theoretical and empirical. The sources and description of the data used, the specification of econometric models and the method of analysis are detailed in *the third chapter*. *Chapter four* presents data and the descriptive analysis of the data as well as the econometric support for the descriptive analysis. The *fifth* chapter summarizes the main findings and concludes the paper.

CHAPTER TWO

LITERATURE REVIEW

The introductory chapter has briefly dealt with the definition, components, forms of delivery, and some related issues of foreign (development) aid. This chapter reviews the literature on: (i) the origin and historical evolution of foreign aid (Section 2.1), (ii) the logical explanations or models which have been in use for claiming the necessity of foreign aid (Section 2.2), (iii) the donors' decisions of aid allocation (Section 2.3), and (iv) the effectiveness of foreign aid (Section 2.4).

2.1 The Origin and Evolution of Foreign Aid

This section expounds the following two questions. When and how did foreign development assistance emerge? What trends (in terms of volume, types and components) has foreign development assistance experienced since its birth?

The basis for the initiation of foreign aid and its development to today's structure was historically laid by the international actions just after the Second World War. Specifically, the disruption in Europe that followed World War II arranged the ground for the emergence of foreign aid in its modern form. The Marshall Plan – the European Recovery Programme – was designed as a response to the acute need for capital and physical reconstruction. The United States transferred about two to three percent of its national income to assist Europe, of course, for its own interests as well. Among the US's self-interests were: controlling communism around the Soviet block, trying to secure access to raw materials and gain a leading role in the global trade and investment

system. The success of this Marshall Plan led to very optimistic outlooks regarding the upcoming effectiveness of foreign aid (Hjertholm and White, 2004; Tarp, 2006).

Then, the success of Marshall Plan began to be seen as a model for development everywhere and this same approach was reaffirmed in latter efforts of the donors directed to South and South-East Asia and other underdeveloped regions/nations. As the attention of industrialized nations then turned to the developing countries, the administrator of the plan – the Organization for European Economic Cooperation (OEEC) – extended to the present day Organization for Economic Co-Operation and Development, OECD (Tarp, 2006). In fact, several institutions have evolved from organizations originally created to contribute to post-war reconstruction. Among these were the United Nations Relief and Rehabilitation Agency (UNRRA) and the International Bank for Reconstruction and Development (the World Bank) (Ehrenfeld, 2000; Hjertholm and White, 2004).

The 1950s and 60s were the decades of the 'trickle down' effect where economic growth was seen as a key objective and was assumed to solve the problems of poverty and inequality. According to Hjertholm and White (2004) and Tarp (2006), this period was characterized by the following events.

- A rapidly increasing bilateral flows (mainly from US).
- The emergence of a range of new bilateral donor agencies (for instance, in Nordic countries).
- The emergence of multilateral relations and the creation of International Development Association (IDA), the European Commission and regional development banks and,

- The substitution of program aid by project aid (to support advances in infrastructure and productive sectors) as a dominant aid modality.

In the 1970s, multilateral agencies expanded their activities significantly to the extent that the share of multilateral aid in total aid rose close to thirty percent. Many developing countries borrowed heavily as credit (accompanied by a high inflation) was very cheap, which made eminent sense at the time. This was a decade of high growth with little debt-servicing difficulty for these developing countries (ibid).

By 1980s, alongside with the reliance on market forces, financial program aid (balance of payments and sector budget supports) and adjustment loans (and eventually debt relief) became fashionable and policy conditionality turned out to be common. Economic stabilization policies in the developed countries, higher oil prices, import compression, and decrease in exports due to slower overall global growth all contributed to the international debt crisis and macroeconomic imbalances in many LDCs leading to a long lasting downturn. However, aid continued to grow steadily in real terms until the early 1990s (Hjertholm and White, 2004; Tarp, 2006).

The 1990s was a decade of eminent drop in the volume of total foreign aid to the developing world. The decline in aid in absolute terms set in after 1992[5]. The failure of conditionality to promote policy reform began to prove itself at about the same time as the fear that aid could lead to aid-dependency – beginning from the second part of 1990s. Aid flows began to rebound only in the late 1990s; for contrast, ODA in 2002 was about the same as in 1992. The recent recovery in ODA is only a slight one when measured in real terms. The pledge of donors in 2005 to

[5] Here, only the trend is summarized and the reasons for the trend are illuminated in Section 2.3.

continue to increase aid and particularly to double aid to Sub-Saharan Africa (by 2010) may be undermined by growing budget tensions in donor countries (Radelet, 2006; Tarp, 2006).

The content of ODA has also changed over time. By 1970, ODA was understood to comprise of bilateral grants and loans on concessional terms, and official contributions to multilateral agencies. Through time, donors have put a broader interpretation on what constitutes development assistance, which included categories that bear little relationship to the need of the developing countries for the long-term development of capital. The South Centre (1999) and Shah (2007) put the core additional categories as: debt relief, payments for care and education of refugees in donor countries, food aid which disposes of (donor countries') agricultural surpluses resulting from government subsidies, technical co-operation (technical assistance) grants which pay for the services of nationals of the donor countries, subsidies on exports to developing countries, and grants to Non-Governmental Organizations (NGOs) and to domestic agencies to support emergency relief operations.

This broadened interpretation of what constitutes foreign aid would have strong implications, which should be taken account of whenever one tries to examine the effectiveness of foreign aid.

2.2 Arguments in Favour of the Continued Flow of Foreign Aid to LDCs

This section elucidates the economic explanations that have so far been given for the necessity of aid flows to developing nations.

The argument in favor of the need for aid to support the development of the South was originally explained based on the gap models. Overtime, however, as the gap models came under severe critics, other alternative explanations were put in place. Since the objective of economic development revolves around poverty alleviation in one way or the other, these explanations are also offered in relation to the poverty of the third world.

In this regard, economists have postulated different reasons for the poverty of the poor (particularly Africa), which could have differing implications for designing the allocation and type of foreign aid. However, all of these lines of reasoning have a common inference in that they all justify the necessity of foreign aid flows to third world countries. Below is a short summary of these views as discussed by Sharma (1997), Dollar and Easterly (1999), Harms and Lutz (2004), and Easterly (2005).

i. Big push models say that poor nations remain poor because they are stuck in a "poverty trap" – a situation where subsistence consumption and low savings result in low income, which in turn perpetuates low income … and so on. To get out of this poverty trap, they need a large (aid-financed) increase in investment – a "Big Push".
ii. Based on the Harrod-Domar growth model, if saving is too low to keep up with population growth and the depreciation of capital, then per capita growth rate will be zero or negative. Early development economists in the 1950s and 1960s postulated a desirable per capita growth rate and calculated the "investment requirement" to meet this target. In addition to the shortage of domestic savings, shortage of foreign exchange may play a prominent role in determining the fate of an economy. Whether domestic savings or foreign exchange is a binding constraint, insufficient acquisition of domestic and/or

imported capital goods hampers the economic growth of developing countries. The difference between the low actual domestic saving rate and the "investment requirement" is termed the "Financing Gap". The role of aid was meant to fill this Financing Gap.

iii. Poverty has resulted from low human capital (poor health and education) and infrastructure; and therefore, foreign aid is needed to improve human capital and infrastructure (for sustained economic growth).

iv. Poor nations are poor because their governments have chosen bad policies; and thus, foreign aid is required to induce better policies.

v. Poor nations are poor because they have poor institutions – lack of property rights, dictatorship, weak courts and contract enforcement, political instability and violence, a hostile regulatory environment for private business, and high corruption. In order to end poverty, in this view, the West needed to promote good institutions through channeling aid.[6]

The above arguments have usually been applied to the conditions prevailing in Sub-Saharan Africa. Whether one or more of the above arguments are the real causes of African poverty or not, and whether or not the aid to the region has served the implied purpose are areas of severe controversy. (More on this is covered in Section 2.4).

6 The third argument derives from the endogenous growth theories in which human capital plays a prominent role in economic growth (and development); whereas the fourth and fifth points are the reflection of the more recent weight placed on the roles of good policies and good institutions.

2.3 Determinants of Foreign Aid Allocation

Although all the arguments in favor of foreign aid discussed in the previous section (Section 2.2) are in relation to the economic bottlenecks of the recipients, scholars witness that, in practice, aid is provided for a variety of reasons. This section reviews the literature on these determinants which actually drive the aid provision and allocation decision of donors.

In words of Radelet (2006: 6), "Donors have a variety of motivations for providing aid, only some of which are related to economic development." Tarp (2006) discusses that the ways in which the allocations of aid have been justified include pure altruism (needs of poor countries), shared benefits of economic development in poor countries, political ideology, foreign policy and commercial interests of the donor country. Economic performance of the recipient countries has also joined these justifications as a late comer (Cooray and Shahiduzzaman, 2004). The literature generally puts the motives under three broad categories: donor-interest, recipient-need and recipient's performance variables (ibid).

Which one of these three categories actually plays the dominant role in explaining donors' behavior has been the subject of deep scrutiny by economists. Quite a large number of the studies find that contrary to what donors' policy documents state and what many people might perceive, the rationale for aid is explained more by donor-interest variables than by fighting poverty (Alesina and Dollar, 1998; Neumayer, 2003; Cooray and Shahiduzzaman, 2004; Radelet, 2006; Berthèlemy, 2006).

Although it seems that there is no disagreement on the dominance of donor-interest in explaining aid provision, there are differences among donor countries as well as between bilateral and multilateral donors as discussed below.

In their work, which explains the behavior of bilateral donors (as a whole and individually), Alesina and Dollar (1998: 1-2) came up with the following evidence on what dictates aid giving:

> An inefficient, economically closed, mismanaged non-democratic former colony politically friendly to its former colonizer, receives more foreign aid than another country with similar level of poverty, a superior policy stance, but without a past as a colony. … Certain donors (notably the Nordic countries) seem to respond more to the "correct" incentives, namely income levels, good institutions of the receiving countries, and openness. Other countries (notably France) give to former colonies tied by political alliances, without much regard to other factors, including poverty levels or choice of politico-economic regimes. The United States's pattern of aid giving is vastly influenced by that country's interest in the Middle East.

This same study points out that political factors (like colonial links and strategic interests) explain much of the cross-country differences in the amounts of bilateral aid received. However, for a particular country over time, there is a tendency for good policies (democratization and openness) to be rewarded though this tendency is only subsidiary. This final point is in contrast with the claim of Burnside and Dollar (2000) that recipient's policy explains the allocation of neither total ODA nor bilateral ODA.

Berthèlemy (2006) provides another evidence for the dominance donor-interest variables in determining bilateral aid allocation. Here, while all the three sets of variables are found to play significant role, the self-interest of donors and particularly the commercial interest appears to be the primary motive. This study finds a critical point, which is in contrast with the finding of earlier studies claiming that colonial-link is the major determinant of aid allocation that favored Sub-Saharan Africa. To the contrary, Berthèlemy (2006) finds that Sub-Saharan Africa has been the biggest loser from bilateralism bias – the practice of aid allocation in which donors' commercial interests explains aid allocation. In addition, even if there are differences among donors, only a minority of donors (Nordic countries) with a small weight in total aid flows happen to be less influenced by donor commercial interests.

Moreover, passing on to aid allocation by European Commission and other multilaterals, Berthèlemy (2006) points out that these donors themselves are not immune from the influence of donor self-interests. British commercial interests are found to influence European Commission while the United States' and Japan's commercial interests exert significant influence on the rest of the multilaterals. However, the recipient-need variables play the primary role for the case of other multilaterals unlike the European Commission's aid, which is insensitive to recipient needs.

The above finding, which states that the shareholders of multilateral donors influence the aid allocation behavior of these multilaterals, is consistent with the findings of other studies. For example, Harrigan et al. (2004), and Fleck and Kilby (2005) argue that the two Washington-based big multilaterals – the World Bank (WB) and the International Monetary Fund (IMF) – are strongly influenced by the economic and political needs of their major western shareholders, especially the United States.

Neumayer (2003) presents a detailed analysis of the determinants of aid allocation by regional multilateral development banks and three United Nations agencies (UNDP, UNICEF and UNTA). According to this analysis, there are not many differences among these multilateral donors and between multilateral and bilateral donors. Specifically, many of these multilateral donors do share the bilateral donors' bias in giving more aid to less populous countries and to countries with lower per capita incomes. However, with few exceptions, (this study points out that) higher military expenditures and arms imports do not significantly induce multilateral aid donors to provide more aid. Respect for political freedom – a significant factor for aggregate multilateral aid allocation (in the same article) – and corruption do not appear to influence aid allocation by these multilateral donors considered individually.

Geographical proximity and colonial links also play an important role at influencing bilateral aid allocation decisions. With regard to whether multilateral donors share such behavior, Neumayer (2003: 25) concludes the following:

> [These multilateral donors] do not share the geographical proximity bias of bilateral donors and only some of them share the bias towards countries with former colonial experience. However, the amount of aid distributed by these agencies is of course much smaller [than the amount distributed by bilateral donors] … so that on an aggregate more aid clearly goes to countries with larger colonial experience and geographically closer to the centers of the developed world.

Another phenomenon indicating, or at least supporting, the dominance of donor-interests in the aid allocation practice is provided by the impact the end of the cold war had on aid flows. Boschini and Olófsgard (2005), after accounting for the other explanations suggested for the substantial drop in aid to developing countries during the 1990s, find the end of the cold war to be a fundamental explanatory variable[7]. Their explanation goes a bit beyond the 1990s and considers some recent evolutions of US aid. They point to the emphasis that the announcement of the Millennium Challenge Account (MCA) placed on good governance and sound economic policies as a basis for the allocation of funds and some signs of movement in the opposite direction. These signs of movement in the opposite direction could manifest that strategic issues continue to be influential determinants of aid allocation. They made two points in support of this argument. Firstly, the United States' terrorism-related assistance rose by about $3.3 billion in the same year the MCA is announced (in 2002). The second point is the decision (again in the same year) to include countries like Jordan, Egypt, Russia and China which are important to US in the pool of countries eligible for the MCA. Ranis (2007) also shares this second point and its implication of undermining the effectiveness of the MCA.

An important determinant of aid allocation that received less attention in the literature on aid allocation is captured by the hypothesis of defensive lending and granting. On this issue, Marchesi and Missale (2004) have examined the determinants of net loans and grants to low income countries with particular emphasis on the Highly Indebted Poor Countries (HIPCs). They find a strong support for defensive lending and granting. The amount of net transfers from each

[7] The other explanations forwarded for the downturn in 1990s include (Boschini and Olófsgard, 2005): fiscal imbalances in many of the donor countries, aid fatigue, dispersion of colonial ties, crowding out from new recipients in the former Eastern bloc, and a reduction in the lobbying power of beneficiaries of high aid disbursements in the donor countries.

type of donor (bilateral or multilateral) to the HIPCs increases with the donor's debt-share. These greater net transfers (Marchesi and Missale, 2004: 19) "have taken the form of loans from multilateral organizations and grants in exchange for loans from bilateral institutions." Their main conclusion is that the concern for keeping debt sustainable and avoiding debt crisis by HIPCs' creditors and donors might have hindered the assignment of grants and loans to needy countries. Thus, they deduce that, a strong debt stock reduction should encourage a greater selectivity in assigning aid in favor of the countries in need.

To sum up, recipient needs, donor interests, and less importantly policy and institutional performance variables all happen to explain the aid allocation decision of donors. Whereas the dominance of donors' interests has somewhat gained acceptance for bilateral donors, multilateral donors are generally found to emphasize recipient needs. Nevertheless, multilateral donors do also share at least some of the biases of bilateral donors and these biases seem to be seen in total ODA allocation as (even the total) multilateral ODA has a smaller share in total ODA. The hypothesis of 'defensive lending and granting' also finds a support though a lot has to be done in this area.

This issue of aid allocation is important in assessing aid effectiveness since the purpose for which aid is provided in the first place could be one explanation for its success or failure. For instance, at least hypothetically, aid given to a country for fighting terrorism (on behalf of the United States) is not expected to raise the growth rate of this recipient economy. Nor is it supposed to improve this recipient's score on human development index (HDI).

2.4 Effectiveness of Foreign Aid

The literature in the area of economic growth suggests that a number of factors explain the economic growth of a country (or a region). In Section 2.2, it has been stated that foreign aid is generally argued to supplement one or more of these factors (explanatory variables). This section explores the literature on whether foreign aid has successfully served these intentions or not.

Although there is an unresolved debate on whether the aid flow to a particular region or country has actually helped or hindered economic performance, what the literature in the area generally shows is that foreign aid has both positive and negative effects. A positive impact of foreign aid on economic growth is argued to come via (Radelet et al., 2004): enhancing investment, increasing the capacity to import goods or technology, increasing productivity of capital, and promoting endogenous technical change and reforms. On the other hand, the negative impacts of foreign aid include:

- undercutting incentives for revenue collection, undermining government accountability to their citizens and lessening the pressure on governments to maintain popular legitimacy (Moss et al., 2006; Killick and Foster, 2007);
- encouraging rent seeking and corruption, and dampening bureaucratic quality and the rule of law (Radelet et al., 2004);
- reducing long-run labor supply and capital accumulation incentives (Harms and Lutz, 2004); and,
- its adverse effects on export performance through appreciating real exchange rates (of the South) resulting in loss of competitiveness and undermined production of tradable goods

("Dutch Disease") (Radelet et al., 2004; Rajan and Subramanian, 2005; Munemo et al., 2007).

Studies on effectiveness of foreign aid (particularly studies before the 1990s) were based on the Harrod-Domar growth model and the Rostow model, and on some modified versions (the gap models). The gap models – the two-gap and the three-gap models – in the Harrod-Domar tradition assume a linear relationship between output and capital. They have served as the basis for the flow of financial assistance to LDCs despite the criticisms on a number of grounds.[8] According to these models, aid either raises savings and investment (and thus growth rates) of LDCs to their desired levels (the Harrod-Domar line of argument) or helps an economy in a poverty trap to take off and permanently reach a higher level of per capita income (the Rostow line of argument). Such models rely on an exogenously given saving rate, and linear relationships between aid and investment, and investment and growth (Harms and Lutz, 2004). Studies based on the neoclassical (Solow) model – which replaces the fixed-proportions Leontief type production functions by the Cobb-Douglass type production functions – still focused on the centrality of (physical) capita accumulation for economic growth. Here as well, the link from aid-to-saving (investment)-to-growth was overemphasised (Hansen and Tarp, 2000).

Recent studies on the effectiveness of foreign aid – by going further than the earlier (standard) analyses based on Harrod-Domar and simple neoclassical growth models – hinge on to new growth theories. Among the improvements of these recent studies over the previous ones, measures of economic policy and the institutional environment are included in growth

[8] For a detailed discussion of the gap models, see for example Easterly (2003), Harms and Lutz (2004), and Tarp (2006).

regressions. In addition, working with panel data (for a number of years and a large number of countries) became a common task. Moreover, endogeneity of aid and other variables in growth regressions as well as the non-linearity in aid-growth relationship are explicitly addressed in (at least some of) these studies (ibid).

Turning to the empirics on aid effectiveness, the report of the Commission for Africa (CFA, 2005) entitled *Our Common Interest* presents a number of sectoral success stories from Africa. This report reveals that there is indeed a strong positive link between aid and investment. Particularly (according to this report) 'short-impact'[9] aid has raised growth in Africa by more than one percent. The report further states that aid is effective regardless of differences in recipient country circumstances such as institutions, policy and governance – though it is more effective with better institutions, and more conducive policy and governance. Karras (2006) makes exactly the same point as this last statement. Michael Crosswell (1998) tries to make a similar point even though less boldly. For Crosswell, the predominantly successful development record provides powerful, positive circumstantial evidence for the effectiveness of foreign aid. Reddy and Minoiu (2006: 19-20) also found that foreign aid has a strong, positive and unconditional impact on growth over long periods. In their words: "…[there is] no evidence that aid is more effective in "good" policy environments, that aid is more effective in countries belonging to a particular income group, or that there are diminishing returns to aid." While trying to present the literature on effectiveness of aid as a neutral body, Tarp (2006: 23-24) put himself in this category saying, "…the single most common result in the modern aid-growth literature is that aid has a positive impact on per capita growth."

[9] According to the sources of this report, 'short-impact' aid embraces budget and program support, and aid to infrastructure development, agriculture and other productive sectors.

With the leading acceptability of the failure of foreign aid, there came a group of researchers who attribute this failure (and some undeniable successes) to the presence or absence of certain conditions. The World Bank, recognizing both the success and failure stories (of foreign aid) in the past, came up with the view that financial aid works in a good policy environment and in a good institutional environment – "Aid Can Be the Midwife of Good Policies" and "Aid Can Be the Midwife of Good Institutions" (World Bank, 1998; Radelet, 2006). The influential paper of Burnside and Dollar (1997) entitled *Aid, Policies and Growth* was at the back of the World Bank (1998) as is reflected in the latter's frequent mentioning of the of the former. The main finding of this influential paper reaffirmed in a later version (Burnside and Dollar, 2000: 847) – published under the umbrella of the World Bank – is that: "… aid has a positive impact on growth in developing countries with good fiscal, monetary, and trade policies but has little effect in the presence of poor policies."[10] The role of good macroeconomic policy for the effectiveness of foreign aid is also claimed by Denkabe (2003: 15) who stated that "… the better the policy the higher the likelihood that aid will affect growth positively." Collier (2006) also shares that aid effectiveness is conditional – though 'governance conditionality' replaces the above 'policy conditionality' for Collier. Even if the World Bank and the IMF disclaim that the views in the works published under them do not reflect their views (but that of the authors), the views have usually been at least 'coinciding'[11].

Towards the other end of the spectrum are those who have concluded that aid has generally been ineffective in helping LDCs. In a study on the issues of aid and debt in Africa, Kanbur (2000) –

[10] They were motivated by Boone's study, which examined the role of political and institutional variables in determining the effectiveness of foreign aid and came up with no significant impacts for these variables. See Harms and Lutz (2004).

11 Who knows, may be they are selective at sponsoring or publishing works. Alternatively, possibly, the authors tilt towards such conclusions to be sponsored by these institutions.

using a principal-agent analysis between donors and recipients – concluded that aid and aid conditionality have failed in Africa and indicated that there is very little chance of recovery from the failure if things continue the way they are. Ranis (2006: 9) also characterizes aid operations in the past as: “a rather time-consuming and expensive ritual dance” where annual dances have been held by the two parties (donors and recipients) regardless of whether the conditionalities – imposed on the recipients by donors – are complied to or not.

A chief critic to foreign aid is William Easterly, with a great contribution to the literature on foreign aid. In his works, he has relied on cross-country comparisons and case studies to point out that he found no strong relationships between aid and investment, investment and growth, and aid and growth. Examining the paper by Burnside and Dollar cited above, following a similar methodology but with more data and alternative definitions of some variables, Easterly (2003) showed that their result disappears as more data are added and/or as some variables are defined differently. Later, to consider this criticism by Easterly, Murphy and Tresp (2006) re-examined the data set originally used by Burnside and Dollar (2000) with a modification on the econometric technique of estimation. What they found out was a reaffirmation of Easterly’s result that good policy hardly increases the effectiveness of foreign aid.

It seems that there is some truth in all the views above. A possible implication is that the positive macroeconomic effects of foreign aid could less/more than outweigh the negative effects. A situation of zero effects of foreign aid is accordingly a logical outcome of positive and negative effects canceling out each other. This type of argument is expected to hold only if there is not anything wrong with the methodology of these studies. However, strong critics are emerging regarding methodological issues.

Pattillo et al. (2007), among others, have criticized the custom of drawing strong conclusions from cross-country regressions using fragile interaction variables – a criticism which is essentially directed to the influential work of Burnside and Dollar (2000). They argue that it is not correct to take the significance of the aid-policy interaction variable as revealing the conditional effectiveness of aid – as Burnside and Dollar (2000) did –. when the policy variable is a significant explanatory variable by itself. Hence, the interaction term might be simply duplicating the policy variable.

Clemens et al. (2004), argue that all aid is not the same and that it is a mistake to try to find a relationship between total aid flows and growth over a short period (typically the commonly used four years). Disaggregating aid into three categories (humanitarian aid, short-impact aid and long-impact aid) and testing for a relationship between what they termed 'short-impact' aid and growth, they claimed to have found a strong, positive and robust causal relationship.

As one of the core arguments advanced to explain the unsatisfactory results of most aid effectiveness studies, Masud and Yontcheva (2005) forward that aid effectiveness should not be measured by its impact on GDP growth. In their own words (Masud and Yontcheva, 2005: 5), "Aid could be increasing consumption rather than investment, which would explain the disappointing results of studies on growth, but still reduce poverty through either 'higher consumption of the poor or greater provision of services to the poor'." They pointed to the evolution of the objectives of donor community from industrialization programs to poverty reduction (as the adoption of Millennium Development Goals reflects) as a support of their methodology. Their findings portray that NGO aid significantly reduces infant mortality while bilateral aid does not – though their regression of illiteracy turned out to be insignificant. While

this idea of testing aid effectiveness with the usually ignored human development indicators might be beneficial, it does not rule out the use of GDP growth in such endeavors. Here, it is constructive to have a glance at what Tarp (2006: 2) argues: "… economic growth should neither stand alone nor be perceived as an obstacle to poverty reduction as argued from contrasting ideological perspectives."

The view that aid quality matters a lot for aid effectiveness is also gaining a currency. Sharma (1997) argues that the quality of aid depends on whether the aid one talks about is tied, partially untied, or untied. After summarizing the various ways of tying aid, Sharma (1997) has shown that bilateral aid tends to be more tied than multilateral aid due to donors' interests. This is in harmony with the conclusion of Section 2.3. The difference between bilateral and multilateral aids is also reflected in their grant and loan shares. For instance, the grant share of gross bilateral ODA from DAC countries to Sub-Saharan Africa was about 94.9% for the period 2001 to 2003, while that of multilateral ODA to this same region was only about 42.8% for the same period. In terms of grant share, Bilateral ODA led multilateral ODA for the period 1980 to 2003 (Nunnenkamp et al., 2005). While these differences could or could not materialize into (significant) differences in the degree of effectiveness, they do substantiate such a suspicion.

Whatsoever the case may be, it pays to consider the two types of aid (bilateral and multilateral) differently and examine the effectiveness of each. Hence, this study is an attempt to push further the debate on aid effectiveness by assessing the effectiveness of bilateral and multilateral aids. To this end, it takes into consideration the advice of Pattillo et al. (2007) on the interpretation of interactive terms. The descriptive and econometric analyses of this issue appear in the fourth

chapter. However, before that should be handled the development of the methodology and description of data – to which the next chapter is devoted.

CHAPTER THREE

METHODOLOGY

This chapter develops the model for testing aid effectiveness (Section 3.1) and reviews the estimation techniques implemented to this end (Section 3.2) by hinging on the theoretical and empirical literature on economic growth. In its final section, Section 3.3, it tries to enlighten issues of sample selection and brief the sources of data.

3.1 Model Specification

This section has two sub-sections. In the first sub-section, Sub-section 3.1.1, the theoretical framework is built up from theories of economic growth. The other sub-section (Sub-section 3.1.2), puts the models from the previous sub-section into their empirically utilizable counterparts.

3.1.1 Theoretical Framework

Examining the effectiveness of foreign aid (or of its components) at enhancing economic growth requires a theoretical link between the two variables – economic growth and aid. One way to establish such a link is to introduce aid as one source of capital formation into the growth theories. This sub-section attempts to link aid and growth through the neoclassical growth models. In addition, it considers the more recently employed framework.

In the neoclassical model of economic growth, an economy is described by two fundamental equations – one for the production function and the other for the accumulation of capital. The basic equations and derivations in this specification, which rely on these fundamental equations, fundamentally follow the works of Jones (2002), Arnold et al. (2007), and Fingleton and Fischer (2008).

The production function is assumed to be a constant-returns-to-scale Cobb-Douglas one:

$Y = K^{\alpha}(AL)^{1-\alpha}$ …… (a)

where Y is total output, K is physical capital, α is the elasticity of output with respect to capital, A is (labor-augmenting) technological shift parameter, and L is labor. In terms of output (Y) per efficient labor (AL), equation (a) would be rewritten as:

$\tilde{y} = \tilde{k}^{\alpha}$…… (b)

where $\tilde{y} = Y/AL$ and $\tilde{k} = K/AL$.

The capital accumulation equation is given as:

$\dot{K} = I - \delta K$

$\Rightarrow \dot{K}/K = \frac{I}{K} - \delta$ …….……..…..... (c)

where I is investment, δ is the rate of depreciation (usually assumed as a constant) and $\dot{K} = dK/dt$ – the change (evolution) of capital (K) over time (t).

Taking the natural logarithm of $\tilde{k} = K/AL$ and differentiating the resulting equation with respect to time:

$\ln(\tilde{k}) = \ln(K) - [\ln(A) + \ln(L)]$

$$\Rightarrow \frac{d(\ln \tilde{k})}{dt} = [\frac{d(\ln K)}{dt}] - [\frac{d(\ln A)}{dt}] - [\frac{d(\ln L)}{dt}]$$

$$\Rightarrow \dot{\tilde{k}}/\tilde{k} = \dot{K}/K - \dot{A}/A - \dot{L}/L \quad \text{..... (d)}$$

Substituting (c) into (d):

$$\dot{\tilde{k}}/\tilde{k} = \frac{I}{K} - \delta - \dot{A}/A - \dot{L}/L$$

$$\Rightarrow g_{\tilde{k}} = \dot{\tilde{k}}/\tilde{k} = \frac{I}{K} - \delta - g_A - n \quad \text{[where } g \text{ stands for growth rate.]}$$

$$\Rightarrow g_{\tilde{k}} = \frac{I}{K} - (\delta + g_A + n) \quad \text{..... (e)}$$

[assuming that labor grows at the rate of population growth, n].

Equation (e) tells us that the growth rate of capital per efficient labor depends on the difference between investment-to-capital ratio (I/K) and the sum of population growth rate, rate of depreciation and the rate of technological progress ($\delta + g_A + n$). Capital per efficient labor rises if the first term in equation (e) is greater than the second, declines if the first term is less than the second, and remains unchanged if the two are equal. The third case where the units of capital per efficient labor remains constant is termed the steady-state.

From equation (b),

$\tilde{y} = \tilde{k}^{\alpha} \Rightarrow Y/AL = (K/AL)^{\alpha} \Rightarrow Y/L = A.(K/AL)^{\alpha}.$

$\Rightarrow \frac{Y}{L} = A.\ (\frac{K}{AL})^{\alpha}$

$\Rightarrow \frac{Y}{L} = A\ .(\frac{K}{L})^{\alpha}\ A^{-\alpha}$

$\Rightarrow y = k^{\alpha} A^{1-\alpha}$ [where y is output per capita and k is capital per capita]

$\Rightarrow \ln y = \alpha \ln k + (1-\alpha)(\ln A)$

$\Rightarrow \frac{d(\ln y)}{dt} = \alpha [\frac{d(\ln k)}{dt}] + (1-\alpha) [\frac{d(\ln A)}{dt}]$

$\Rightarrow \dot{y}/y = \alpha\ \dot{k}/k + (1-\alpha) [\dot{A}/A]$

$\Rightarrow g_y = \alpha\ g_k + (1-\alpha) [g_A]$ …….…….…….. (f)

Similarly, using the identity $k \equiv K/L$ and solving for g_k gives:

$g_k = \dot{K}/K - \dot{L}/L = \dot{K}/K - n$

This last equation, together with equation (c) above, implies that:

$g_k = \frac{I}{K} - \delta - n$ ……..……. (g)

Substituting (g) into (f) gives:

$g_y = \alpha\ g_k + (1-\alpha) [g_A]$

$\Rightarrow g_y = \alpha [\frac{I}{K} - \delta - n] + (1-\alpha) [g_A]$

$$\Rightarrow g_y = \alpha \left(\frac{I}{K}\right) - \alpha (\delta + n + g_A) + g_A$$

$$\Rightarrow g_y = \alpha \left[\left(\frac{Y}{K}\right)\left(\frac{I}{Y}\right) - (\delta + n + g_A)\right] + g_A \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(h)}$$

One extension of the neoclassical model of economic growth is through incorporating the role of human capital to the growth analysis above. Suppose, in accordance with such a consideration, investment (I) in equation (h) above includes investments in both physical and human capital. Hence, equation (h) conveys that growth in output per capita depends on investment (the accumulation of physical and human capital), the rate of technological progress, population growth rate, the rate of depreciation, the capital-elasticity of output, and the initial condition of an economy (reflected in the difference between the two terms within the square brackets which define the steady-state).

Secondly, the neoclassical model of economic growth assumes investment to be equal to savings, which is in turn taken as some fraction of output. In the context of a real open economy, however, domestic savings cannot be considered as the sole source of investment funds as there are additional sources. If investment is split into investment from domestic sources (domestic savings, S_d) and investment from foreign sources (I_f), and if it is also assumed that foreign sources comprise of aid and foreign direct investment (FDI), equation (h) above becomes:

$$\Rightarrow g_y = \alpha \left[\left(\frac{Y}{K}\right)\left(\frac{I}{Y}\right) - (\delta + n + g_A)\right] + g_A$$

$$\Rightarrow g_y = \alpha \left[\left(\frac{Y}{K}\right)\left(\frac{\beta.AID}{Y} + \frac{FDI}{Y} + \frac{S_d}{Y}\right) - (\delta + n)\right] + (1 - \alpha)\,[\,g_A\,] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(i)}$$

where β is the fraction of foreign aid actually turned into investment by the government. This is intended to capture the possible (and of course the practically observed issue of) aid fungibility. [See Devarajan and Swaroop (1998) for a detailed discussion on aid fungibility.]

Equation (i) tells us that growth in per capita income depends on the rate of technological progress (g_A); the levels of aid, FDI and domestic savings; the marginal propensity to invest out of aid (β); the capital-elasticity of output (α), the initial conditions of an economy which define the steady-state, the rate of depreciation (δ); and the rate of population growth (n).

Hence, one possible way to analyze the effectiveness of foreign aid is to regress a variant of the following general function.

Economic Growth = f (Domestic Savings, FDI, Aid, Technological Progress, Population Growth, Depreciation Rate, Initial Conditions) ……..... (*3.1*)

The discussion on model specification gone through so far captures only a part of the story in the literature of growth regressions – particularly dominant before the 1990s. Other lines of explaining cross-country income and growth differences have emerged since the 1990s (Hansen and Tarp, 2000; Gwartney et al., 2004).

Gwartney et al. (2004) give details on the three approaches (categories of explanations) that the economics literature has offered for income and growth disparities among countries. The three approaches are: (i) the production-function-based approach, (ii) the institutions approach, and (iii) the geography and location approach.

The first approach, as Gwartney et al. (2004) discuss, stresses that increasing the amount of inputs into the production process (such as labor, and physical and human capital) and shifting the production function (via technological improvements) are the means to generate higher income and growth. These scholars characterize this approach, which is based on the work of Solow (1956), as the most well-established explanation in the literature. This explanation could be considered as a correspondent of what Hansen and Tarp (2000) termed the 'Second-Generation Studies' of aid-effectiveness. These Second-Generation Studies are based on growth regressions that include different components of investment financing (domestic savings, aid and other foreign capital inflows) as explanatory variables[12].

The second approach, Gwartney et al. (2004) carry on, is built on the idea that the institutional and policy environments influence the availability and productivity of resources. Hence, this approach advises governments – for the objective of economic growth and prosperity – to follow actions supporting secure property rights and freedom of exchange, to make convincing and credible policy commitments, and to strengthen the role of legal and political institutions, among others. According to Hansen and Tarp (2000), this approach of growth explanations – corresponding to the 'Third-Generation Studies' of aid-effectiveness – has emerged recently with a number of advancements over earlier works. Among these improvements are: working with panel data, direct inclusion of institutional environment and economic policy in the reduced form growth regressions, recognizing the endogeneity of aid and other variables in growth regressions, and explicit recognition of the non-linearity of the aid-growth relationship.

[12] While these second-generation studies emphasize the link between aid and investment, and investment and growth or the direct inclusion of aid in growth regressions, the 'First-Generation Studies' consider aid-savings-growth linkages. In addition, whereas the first-generation studies are based on the Harrod-Domar model, the second-generation studies are based on Solow type models. However, they both consider aid as exogenous variable and they both consistently predict that aid is effective (ibid).

Instead of including aid into growth regressions along with the explanatory variables derived from the Solow type growth models as in equation (*i*) above, the studies in line with this second approach go further and look for variables influencing such items as domestic saving and investment, FDI (and along with it technological transfer), and resource accumulation and resource productivity in general. The explanatory variables of growth in this second approach include policy variables like macroeconomic stability, institutional factors comprising of such components as property rights and the rule of law, financial deepening, and political instability. Burnside and Dollar (1997, 2000), Daglaard and Hansen (2000), Easterly (2003), and Fielding and Knowles (2007) represent some of the studies that use such a framework.

The third approach focuses on the importance of 'geographic-locational factors' – the term used by Gwartney et al. (2004) – as the main determinants of variations in income and growth across economies. These factors, discussed in Gwartney et al. (2004), include a *tropical climate* which is associated with diseases such as malaria and the negative impact of hot-and-humid climate on labor productivity, *access to an ocean port* the lack of which results in higher transaction costs and less international trade, and *distance from the world's major trading centers* – distant location being characterized by reduced trade. According to Gwartney et al. (2004), less trade in turn has the implication of reduced gains from division of labor, specialization and economies of scale. Besides, location in the tropics, landlockedness and longer distance from the world's major trade centers could all retard the attractiveness of a nation as a base for production and consequently retard the inflow of FDI.

While Gwartney et al. (2004) have tested the explanatory power of the three categories of variables separately, they have also enlightened that there is no inconsistency among these approaches and that the models could be reinforcing each other.

Particularly, the second and the third classes of variables are the deep parameters of economic growth as they affect the variables claimed to be growth determinants in the standard growth theories. As the discussion in chapter two shows, one justification for aid to LDCs is to tackle the institutional and infrastructural bottlenecks of these countries. Aid is included to the set of these explanatory variables along such lines. The inclusion of initial conditions and aid into growth regressions along with the combination of the above two sets of variables gives the general function below.

Economic Growth = f (Initial Conditions, Financial Deepening, Institutional Quality, Policy, Political Instability, Aid, Geographic Location) ……..(*3.2*)

The models shown in equations (3.1) and (3.2) above are so general that the variables in these equations should be replaced by quantifiable proxies. This is the concern of the next sub-section.

3.1.2 Empirical Models

In line with the theoretical framework presented in Sub-section 3.1.1 above, this paper tests the effectiveness of bilateral and multilateral aids at enhancing economic growth by incorporating these two types of aid into both the 'second-generation' and the 'third-generation' types of

models. This sub-section thus develops versions of the above models which are tangible for empirical estimation, along with brief justifications for the variables from the literature.

The following specific model is a correspondent of the general 'second-generation' type model in equation (3.1).

$$RGDPPCGR_{it} = \theta_0 + \theta_1 (InitialRGDPPC)_{it} + \theta_2 (Multilateral\ Aid)_{it} + \theta_3 (Bilateral\ Aid)_{it} + \theta_4 (FDI)_{it} + \theta_5 (National\ Savings)_{it} + \theta_6 (Period)_{it} + \theta_7 (Popgr)_{it} + \theta_8 (LifeEAB)_{it} + \varepsilon_{it} \quad \ldots\ldots (3.3)$$

Where *RGDPPCGR* is the growth rate of real per capita GDP, *InitialRGDPPC* is the level of real per capita GDP (in constant PPP dollars) at the start of each period, *Popgr* is the rate of population growth, *LifeEAB* is life expectancy at birth (in years), *FDI* if the net inflow of foreign direct investment (relative to the recipient's GDP), and ε is the stochastic disturbance term. The subscripts ***i*** and ***t*** stand for country and time, respectively.

Comparing equation (3.1) in Sub-section 3.1.1 and equation (3.3) above reveals some minor alterations introduced in the movement from the former to the latter one.

One amendment here is the split of aid into bilateral and multilateral components. Each of these two components is captured by net aid transfers (NAT) of its type relative to the recipient's GDP. The use of net aid transfers (NAT) where there are different measurements of aid such as gross official development assistance (GODA) and net official development assistance (NODA), draws

from the extensive criticism of these alternatives by Roodman (2006a). According to Roodman (2006a), the GODA which treats all grants and ODA loans extended as aid, includes such items as the debt forgiveness grants (cancellations of non-ODA loans called "Other Official Finance" loans). These items, Roodman (2006a) argues, either lack enough concessionality (the minimum requirement of 25% grant element) or are originally provided to assist a non-developmental purpose. In addition, as "the capitalization of interest arrears" accompanying debt rescheduling does not imply any actual movement of money (development assistance), its treatment as a new aid flow overstates the true value of development aid. Netting the repayments on ODA (principal and net interests), in addition to rescheduled debts and debt forgiveness grants, out of GODA gives the preferable net aid transfers (NAT). The other alternative – NODA – which nets out principal repayments out of GODA is criticized for neglecting the netting out of interest repayments. In words of Roodman (2006a), "To the extent that donors are lending to cover interest payments they receive on concessional loans, net ODA counts makes the circulation of money on paper look like an aid increase."

In order to check the robustness of the coefficients of the two aid types to alternative definitions of aid, multilateral aid per capita and bilateral aid per capita are used as alternatives for multilateral aid relative to GDP and bilateral aid relative to GDP, respectively.[13]

Another is the substitution of *period* (period dummies) for *technological progress.* While variables like openness (to the rest of the world) and access to oceanic ports could be candidate

[13] This consideration of aid relative to GDP and aid per capita as alternatives of aid measures has been motivated by the work of Fielding and Knowles (2007: 5) which discusses the plausibility of using both measures and finds that "The sign and significance of coefficients on foreign aid variables in cross-country panel growth regressions is very sensitive to the way that aid is measured."

proxies for technological progress, a deterministic trend or time variable is empirically found to capture it well (Fingleton and Fischer, 2008).

Thirdly, the national savings in equation (3.3) above is the net national savings (as a percentage of GDP), which captures the difference between the gross domestic savings plus net income and net current transfers from abroad and the rate of depreciation – two variables from equation (3.1). As the net national savings (from WB, 2006a) is not adjusted for the accumulation of human capital, a separate proxy for human capital is needed to be included. With the assumption that investment in human capital in general raises labor efficiency and thus positively contributes to economic growth – the centerpiece of endogenous growth theories – life expectancy at birth (*LifeEAB*) is included to equation (3.3) as a proxy for human capital. The use of LifeEAB as a proxy for human capital is justified on the grounds of data availability. That is, data on alternative proxies for human capital such as school enrolment ratios, as well as data on expenditure shares of education and heath, are not available on continuous basis.

Tuning to the specification of an empirical model matching up the general equation (3.2), where the effectiveness of aid is evaluated by including aid into a model with deep parameters of economic growth, equation (3.4) gives one variant in the literature of economic growth. The paragraphs just below this equation are devoted to the explanation and justification of the variables in the equation.

$$RGDPPCGR_{it} = \psi_0 + \psi_1 (InitialRGDPPC)_{it} + \psi_2 (Bilateral\ Aid)_{it} + \psi_3 (Multilateral$$

$$Aid)_{it} + \psi_4 (M_2/GDP)_{it} + \psi_5 (Institutional\ Quality)_{it} + \psi_6 (Policy\ Index)_{it} + \psi_7 (Assassinations)_i + \psi_8 (Prevalence\ of\ Malaria)_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.4)$$

The variables in this equation, which have not been explained above (in relation to equation (3.3)), are explained as follows.

M_2/GDP is the ratio of broad money to GDP which is a proxy for the level of economy's financial development. In the literature (for instance, in Denkabe, 2003; Easterly, 2003; Clemens et al., 2004; Murphy and Tresp, 2006), this proxy has been used as its value lagged one period.

The simple average of the political rights and the civil liberties components of country ratings from the Economic Freedom of the World (EFW) are used as indicators of institutional quality. These country ratings of the Freedom House are based on five areas of about twenty-three components (some of these with sub-items) and the index ranges from 1 (the best) to 7 (the worst). The areas are: government size; legal structure and security of property rights; access to sound money; freedom to trade internationally; and regulation of credit, labor, and business (Gwartney et al., 2007). An alternative measure of institutional quality based on hundreds of individual indicator variables and a variety of sources is provided by the Worldwide Governance Indicators (WGI) research project. These indicators measure six dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption (Kaufmann et al., 2007). This alternative reports the six dimensions separately and thus makes the use of any one dimension possible.

Despite this advantage of the alternative, the former index is used because WGI is available only since 1996 while the first is there since 1972.

Following the works of Burnside and Dollar (1997, 2000) and most subsequent studies on foreign aid (such as Daglaard and Hansen, 2000; Easterly, 2003; and Roodman, 2005) the policy index is constructed from measures of budget surplus (for fiscal policy), inflation (for monetary policy) and openness (for external policy). Budget surplus is measured as a percentage of GDP, and inflation as the percentage change in GDP deflator. Openness is measured in different ways: commonly as an open-closed dummy variable, and as the share of trade (exports plus imports) in GDP. The second one is adopted as it fits the estimation techniques of this study. Specifically, the panel data models (to be discussed below) automatically drop the open-closed dummy.

Assassinations are commonly taken to proxy the role of political instability in the growth literature. Easterly and Levine (1997), Burnside and Dollar (1997, 2000), Daglaard and Hansen (2000) and Easterly (2003) are among the studies of foreign aid and economic growth where this variable is included as an explanatory variable.

As compared to the variables seen so far, it seems that geographical factors appear less frequently in growth regressions. In cases where such factors have been explicitly considered, their roles on economic growth or development have been found very important. For instance, Gallup et al. (1998), McCarthy et al. (2000), Sachs (2003), and Gwartney et al. (2004) all witness the vital role such variables play. In addition to location in the tropics and access to oceanic ports explained earlier, malaria prevalence which is associated with tropical location, has been claimed to have a negative and robust effect on economic growth. Particularly, McCarthy et al. (2000) and Sachs

(2003) present two empirical works in which such robust impact of malaria on economic growth is detected. This study uses the prevalence of malaria to proxy the growth impacts of geographical factors. This variable is preferred to the other two variables as both the proportion of a country within the tropics and the landlockedness dummy for the countries in the sample at hand do not show much variation. Only fifteen out of the forty-two countries in the sample are landlocked (CIA, 2002). As the data in Sachs and Warner (1997) reveal, the proportion of a country in the tropics variable as well takes the value of 1 (or 100%) for most of these countries.

In order to account for the possibility of diminishing returns to an explanatory variable in general and aid in particular, and to allow for non-linear relationship between economic growth and (at least some of) the explanatory variables, polynomials such as aid-squared, policy-squared, and interaction variables like (aid)x(growth) are included in most of the empirical works described above. So, such variables are also incorporated into the models of this study.

3.2 Techniques of Estimation and Econometric Tests

This section tries to examine the techniques of estimation that are commonly used in growth regressions and come up with a preferred technique. It also tries to shed light on the econometric tests to be implemented.

The advantages of using panel data over the usage of time-series and cross-sectional data have been covered in a number of recent works. Some of the major advantages of using panel data are the possibility of parameter identification in the presence of endogenous regressors or

measurement error (through its provision of internal instruments for such regressors), the robustness of panel data based models to omitted variables (via introducing individual-specific effects with unknown parameter), and the efficiency of parameter estimates because of the larger sample size with explanatory variables changing over two dimensions (Verbeek, 2000). The choice of this study to rely on panel data in examining aid effectiveness is in line with these advantages of panel data over the other types.

Works on the econometric techniques of estimation largely criticize the adoption of OLS in panel data analysis – particularly where the lagged dependent variable enters the set of explanatory variables. For instance, Bond et al. (2001), Bond (2002) and Roodman (2006b) discuss that the correlation between the lagged value of the dependent variable or any endogenous explanatory variable and the individual-specific, time-invariant effect(s) makes the OLS estimates biased and inconsistent. It is also pointed out that this inconsistency of pooled OLS persists even if serial correlation of the error term is assumed away (Bond, 2002). However, this paper reports the results of this technique for the purpose of comparing with the results of other techniques.

On the grounds of allowing for country-specific (individual) heterogeneity and considering the potential gain in efficiency, the fixed effects, the between effects and the random effects models are employed. To discriminate between the fixed effects (the consistent) estimator and the random effects (the conditionally more efficient) estimator, Hausman test is applied.

But still remains the question of reliability of these static panel data techniques under some conditions; the works cited above do share a point in this respect. This point is that while the transforming techniques of these models could provide lags of the variables as their instruments

and imply the consistency of such estimates, such a consistency is not applicable to short panels – panels with many individuals (large N) observed over short periods (small T) (Bond, 2002; Buhai, 2003). Besides, while the use of the Within Groups estimation eliminates individual heterogeneity, it does not account for the issue of dynamism/persistency of the dependent variable (growth rate of GDP per capita in this case) (ibid). Again, keeping the results of such estimators is useful for the purpose of comparison. In this regard, the literature on panel data analysis shows that the OLS and the Within Groups estimates are likely to be biased in opposite directions (which are upwards and downwards, respectively), and this fact provides a criterion to evaluate the outcome of an alternative consistent estimator (Bond, 2002).

Thus, the regression of the models in equations (3.3) and (3.4) above requires a better method of estimation in the situations where one expects the presence of endogenous regressors, where there is the possibility of individual-specific patterns of heteroskedasticity and serial correlation of idiosyncratic disturbances[14], where the time dimension of the panel data is small, and where there is no much hope for good exogenous instruments. As Roodman (2006b) explains in detail, the Difference Generalized Method of Moments (Difference-GMM) estimator is developed to suit panel analysis under such conditions. Hence, an estimation technique of the Difference-GMM approach (commonly called the Arellano-Bond method) is applied to the variants of the above models.[15]

[14] In a model of type $y^*_{it} = \beta_i' X^*_{it} + \varepsilon^*_{it}$, where the error term ε^*_{it} is composed of individual specific component u_i and another component v_{it} that varies both over time and across individuals, the idiosyncratic disturbance refers to the latter component (v_{it}).

[15] Another kind of the GMM estimator – System-GMM – has been argued (for instance, in Bond et al., 2001; Bond, 2002; and Roodman, 2006b) to fit growth regressions better than the Difference-GMM. Lack of the software to implement this technique limited this study to the use of Difference-GMM. The Stata I have access to (versions 9.0 and 9.2) does not recognize the xtabond2 command.

The t/z statistic for testing the significance of an individual variable, the F statistic for testing the significance of some or all variables (taken together), the Sargan test of over-identifying restrictions (for the internally generated instruments), and the Arellano-Bond tests of serial autocorrelation are reported and interpreted in the econometric analysis (of Section 4.5).

3.3 Sample Selection and Sources of Data

This section endeavors to justify why this study has chosen to concentrate on Sub-Saharan Africa and how the specific countries are selected to be included into the sample. Besides, it briefly describes the sources of data utilized and the calculation applied to the raw data on the focus variables.

A large number of studies on aid effectiveness have come up with one or the other of the following two conclusions. Studies like that of Easterly (2003, 2005) point out that aid has been most ineffective in Sub-Saharan Africa (SSA). Others, who advocate the (unconditional or conditional) effectiveness of foreign aid, do accept that it has been less effective in SSA. This latter assertion relies on the negative and significant SSA dummies in the studies of Burnside and Dollar (2000) and World Bank (1998).

Riddell (1999) and Collier (2006) predict that the future playfield of aid is Africa. The first study bases its prediction on the success of the other developing countries (those in Asia and Latin America) in becoming able to attract other forms of capital flow – perhaps foreign direct investment (FDI). The prediction of the second study relies on the existing political commitments, and the economic performance of the rest of the developing world with an

implication of their graduation from the pool of aid recipients. Kanbur (2000) also shares the idea that SSA is the region where the issues of aid and aid effectiveness remain unsettled yet.

The above discussions demonstrate that SSA deserves to be a focus for studies on aid-related issues henceforth. Within the region, the list of the specific countries (forty-two in number) included in the sample for this particular study is solely established on availability of data. Specifically, only those countries which miss the entire data (observation) at least for a crucial variable are dropped.

The data utilized in this study are mainly from the World Development Indicators (WDI) and the Global Development Finance (GDF) of the World Bank (2006a), African Development Bank (2002, 2006), reports and online database of OECD, Freedom House, reports of the Commission for Africa and some articles especially those from the Center for Global Development.

The sources of all the data used in the main body for descriptive analysis are disclosed immediately. The disclosure of the sources of the data employed in the econometric analysis – along with short description of the variables – appears in the annex.

But, at this point, it is worthwhile to elaborate the data on focus variables a little bit further. The data on Gross Official Development Assistance (GODA), Net Official Development Assistance (NODA) and Net Aid Transfers (NAT) are calculated from the comma-delimited files of Roodman (2005). This source provides data by donors and recipients. Hence, the aid figures (amounts) for each recipient country are aggregated over the set of donors. In addition, the data for total bilateral aid to the sample of countries are generated by summing the figures for the

individual sources – bilateral donors. So are the data for total multilateral aid flows. Then these data on bilateral and multilateral aid receipts, like the data on all other time-varying variables, are averaged over four-year periods: 1980-83, 1984-87, 1988-91, 1992-95, 1996-99, 2000-03 and 2004-2007[16]. The conversion of these aid data into per capita terms and into percentages of GDP is undertaken by dividing the aid data by mid-year population and real GDP, respectively. The data on these two variables serving as denominators are obtained from the WDI of the World Bank (2006a), and are averaged over four-year periods.

[16] The seventh period does not always cover the years from 2004 through 2007. In cases where data are not available for all these years, only the figures for 2004 or the averages over the years for which data are available are utilized.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

This chapter is organized into three sections. Section 4.1 tries to sketch out Sub-Saharan Africa's past aid profile. This is intended to facilitate the proper discussion in subsequent sections. Section 4.2 is concerned with the descriptive analysis of the relationship between aid flow and economic performance of the sample countries. The last section tests for the effectiveness of foreign aid at enhancing economic growth of these countries. It presents the crucial and more vigorous econometric analysis of the issue of aid effectiveness.

4.1 The Profile of Aid Flow to Sub-Saharan Africa

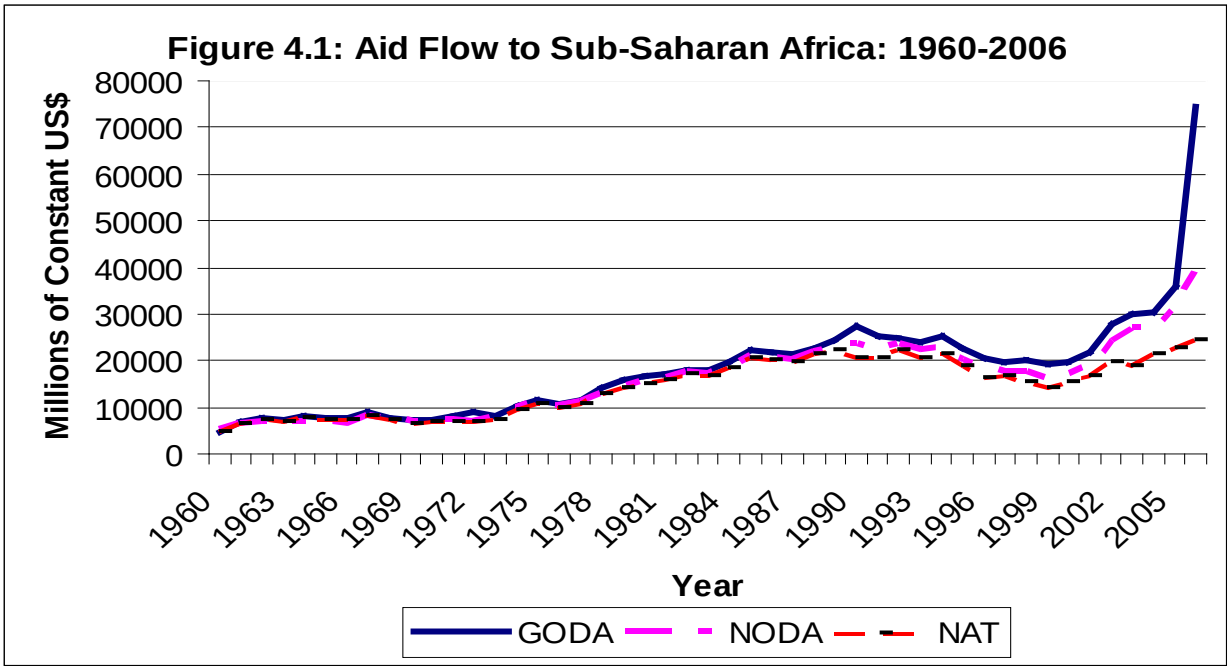
This section describes the trends of aid flow to Sub-Saharan Africa in general and to the sample of forty-two countries in particular since 1970. In addition, it discusses the major donors to Sub-Saharan Africa as well as the top aid recipients within the region.

4.1.1 Trends of Aid Flow to Sub-Saharan Africa

This sub-section attempts to shed light on the trends of aid flow (bilateral, multilateral and total) to Sub-Saharan Africa in absolute terms, relative to GDP, and in per capita terms for the period 1980 to 2006. Based on availability of data, some parts of the discussion push the period of analysis back to an earlier year, and in some cases, the most recent year for which data are available happens to be 2004. In addition, the sub-section tries to touch upon the changes in the shares of bilateral and multilateral aids (in the total aid to the region) over time, and the sectoral allocation of aid.

The flow of development aid to Sub-Saharan Africa has experienced a fluctuating trend over time. As the discussion to follow illuminates, the exact pattern of this fluctuation itself depends on the specific measure of aid flow adopted.

One such measure commonly used is the flow of official development assistance (ODA) in constant US dollars. If this measure is taken as the measure of aid, aid to the region rose steadily from 1960 to 1990, followed by a considerable drop beginning from 1991(See Figure 4.1 below). As such, the recovery in aid volume starts only in 2001, with a sharp rise in 2005.

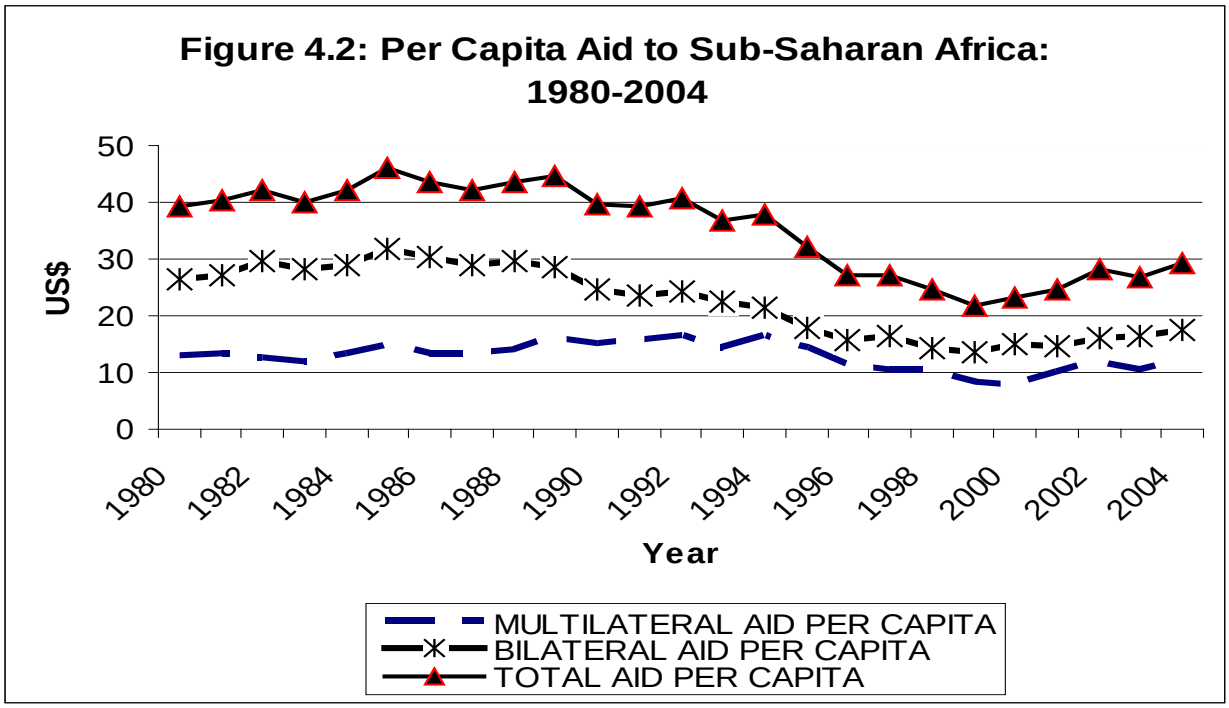


Source: Constructed Based on Data from Roodman (2005)

In addition to the general trend of aid flow to Sub-Saharan Africa, Figure 4.1 also portrays another fact. That is, while the flows of net official development assistance (NODA) and the net aid transfer (NAT) to the region were moving closely and tightly with the gross ODA (GODA) before 1990s, there appears a considerable divergence among these three measures afterwards. The divergence between GODA and NODA manifests the rise in the amounts of offsetting entries (discussed in Sub-section 3.1.2); and, the divergence between NODA and NAT shows the rise in the share of debt relief in the aid to the region.

The path that per capita aid flow to Sub-Saharan Africa (depicted in Figure 4.2 below) has been following is different from the path of aid in millions of constant US dollars. That is, contrary to the rise in volume of aid in dollar amounts shown in Figure 4.1 above, aid per capita generally followed a downward trend. Common to both kinds of measures is the sign of slight recovery

towards the end of the period (after 2000). This point can easily be understood by comparing Figure 4.1 above and Figure 4.2 below[17].

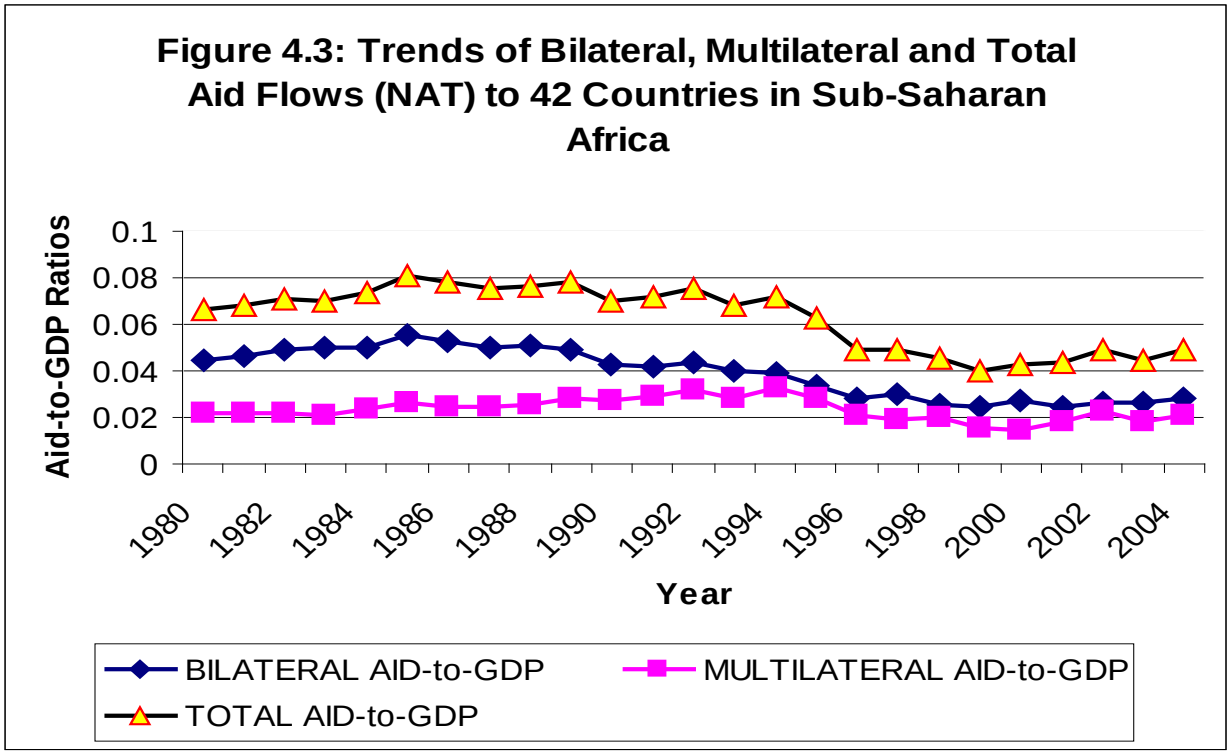


Source: Constructed Based on Data from Roodman (2005) and WB (2006a)

The third alternative of measuring aid, in addition to the methods of measuring it in absolute dollar units and in per capita terms, is to use aid-to-GDP ratio. Figure 4.3 below depicts the patterns of net bilateral, multilateral and total aid transfers since 1980 by adopting this method of measuring aid relative to GDP (of the recipient). As shown in this figure, both bilateral and total aids have experienced more or less declining trends – particularly after 1994. Multilateral aid followed a slightly rising trend between 1980 and 1994, then a slighter drop until 2000 and levelling off at about two percent of GDP. It seems that the tendency of bilateral and multilateral

[17] Replacing the values for the sample of forty-two countries (in the region), in place of the values for the region as a whole (depicted in Figures 4.1 and 4.2), reproduces exactly the same pattern.

aids relative to GDP to converge (which is observed between the years 1980 and 1994) has disappeared since then.

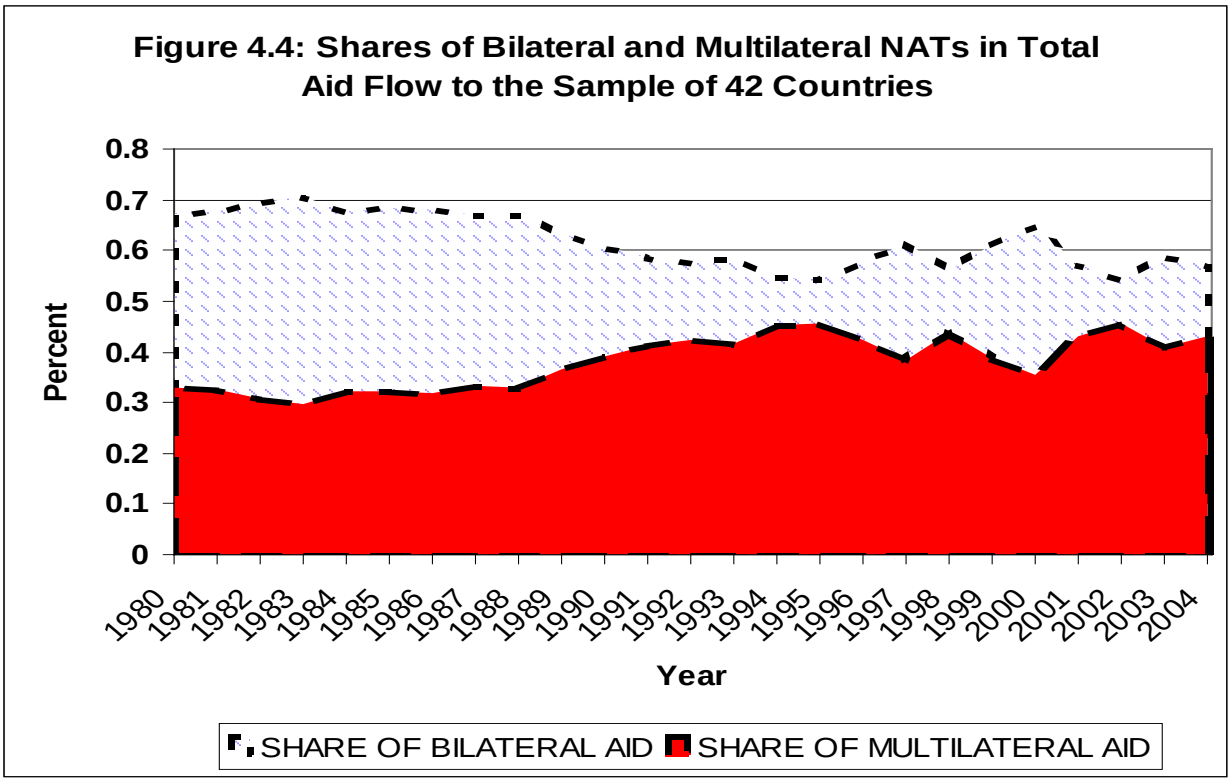


Source: Constructed Based on Data from Roodman (2005) and WB (2006a)

As Figure 4.4 below shows the shares of aid from bilateral and multilateral sources to the sample of countries in the region have generally been falling and rising respectively. Yet, bilateral donors still remain the major sources of aid to these countries on aggregate. Looking at the shares of bilateral and multilateral aids to individual countries, however, there are some exceptions to this dominance of bilateral aid.[18]

[18] Based on the data of four-year averages (constructed from Roodman's (2005) raw data), these exceptions – where multilateral aid claims a larger share than bilateral aid – are: Burundi (3,6,7) [for periods 3, 6 and 7], Benin (1), Central African Republic (3,7), Cote d'Ivoire (5), Cameroon (6,7), Republic of Congo (7), Comoros (6), Ethiopia (1,4), Gabon (7), Ghana (2,3), Guinea (4,5), Gambia (5,6,7), Guinea Bissau (6,7), Lesotho (6,7), Madagascar (6,7), Mauritania (4,5,6,7), Mauritius (5,6,7), Malawi (2,3,4), Niger (6,7), Nigeria (1,4,5), Rwanda (7), Sudan (4), Sierra Leone (4,7), Swaziland (3,6,7), Chad (5,6), Uganda (1,2,3,4), Democratic Republic of Congo (6,7), Zambia (4), and Zimbabwe (6).

Figure 4.4: Shares of Bilateral and Multilateral NATs in Total Aid Flow to the Sample of 42 Countries



Source: Constructed Based on Data from Roodman (2005)

Whatever the trend of aid to the region (or to the sample of countries under consideration) might look like in terms of aid-to-GDP ratio, or in absolute dollar amounts, or in terms of per capita measures, the region has usually been receiving the largest share of the total aid to all developing countries. As Figure B1 in the annex portrays, with the exception of the period 1998-2001 (approximately) when Asia ranked first, Africa has always been securing the largest share.

Regarding the sectoral composition of aid flows to Africa, the trend from 1990 to 2003 (refer Figure B2 in the annex) exposes that the weight given to each specific sector has been shifting – some sectors gaining currency and others losing over time. Generally, economic and production

sectors (comprising of transport/communications, energy, agriculture/forestry/fishing, industry/mining/construction, banking/business services, and trade/tourism), multi-sector and general program aid has each commanded lower and lower shares of total aid over time. In contrast, social sector (which includes education, health, population programs, government and civil society, and water supply and sanitation), and emergency have had the opposite fortune. Debt, which received a declining weight throughout the 1990s, has attracted attention after the year 2000. The social sector has particularly been the priority sector throughout the period under consideration.

The sectoral allocation of aid to African countries for the year 2004 is also given in the OECD's (2006) *Development Aid at a Glance*: S*tatistics by Region*. These figures (for 2004) show that the social sector represents the number-one aid receiving sector for twenty-seven countries out of the forty-two countries under consideration, followed by debt which is a priority for ten countries. Only in five (out of forty-two) countries is the priority sector different: emergency for three countries (Burundi, Chad and Sudan), general program aid for one country (Uganda), and economic sector just for one country (Guinea). For the forty-two countries on aggregate, about thirty-four percent (34.4%) of the aid flow goes to the social sector. For the totality of Africa, the corresponding figure is about thirty-six percent (35.6%).

Within the social sector, education and health sub-sectors have experienced rising volumes of bilateral and multilateral official development assistance (aggregate for Africa). ODA to aid water supply has been subjected to falling bilateral aid (starting from the second half of 1990s) and rising multilateral ODA (which set in towards the end of 1990s). Figure B3 in the annex depicts this scenario.

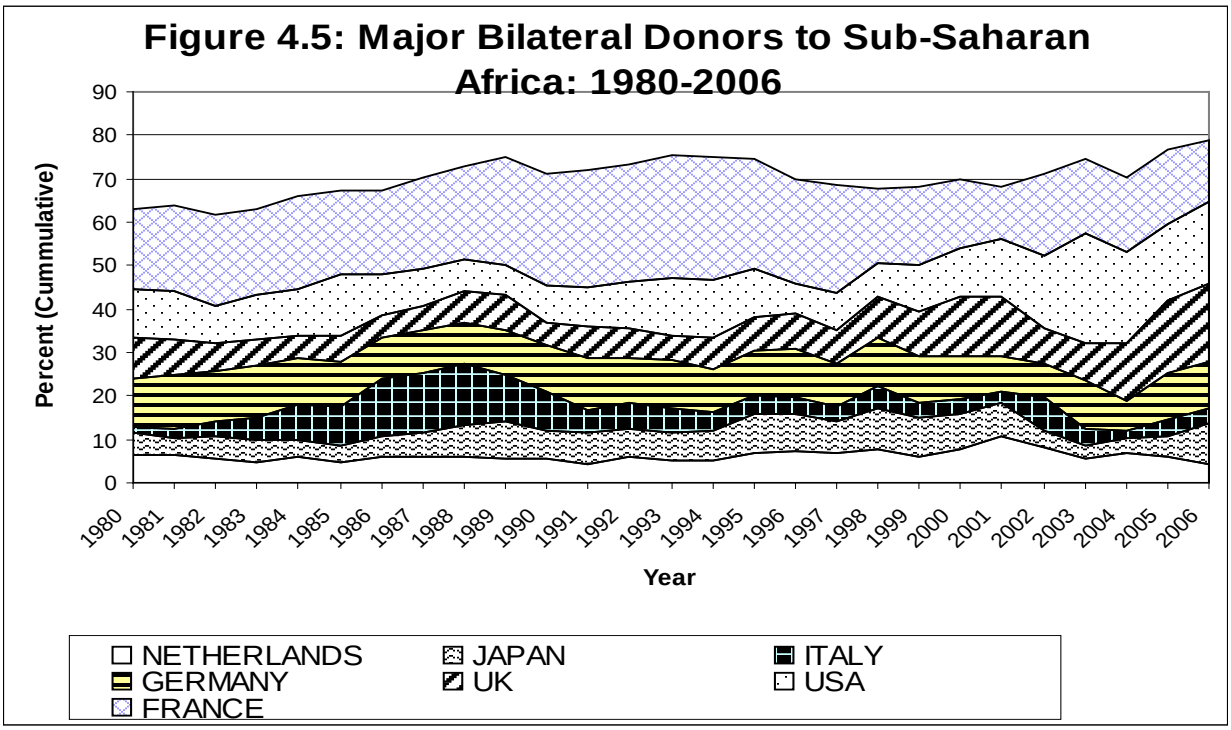
To wind up this section, the volume (or the dollar amount) of aid to Sub-Saharan Africa – the region with the highest share of total aid for most of the time – has followed an upward trend with a considerable slump in the 1990s. This is in contrast with the trends portrayed by aid-to-GDP ratio and aid per capita. While the aid to the region has largely been from bilateral donors, over time, multilateral aid has been able to take away the share of bilateral aid (to some extent). More and more proportions of the aid to the region have been channeled to the social sector, and more specifically to education and health sub-sectors, since 1990. This final point is perhaps a reflection of the attention that the global policy arena paid to improvements in these sub-sectors, which have been seen as the vital roots to achieve the targets of structural adjustment, economic management and policy reforms and the ultimate goals of economic growth and poverty reduction.

4.1.2 Major Donors to the Region

This section discusses the major bilateral and multilateral donors to the region (Sub-Saharan Africa) over the period of 1980-2006.

The data on net ODA disbursements (from Roodman, 2005) provides the set of major bilateral donors to Sub-Saharan Africa in terms of the total dollar amounts, for the period 1980 -2006. For the most part of the period (1980 - 2001), France was by far the leading donor. After 2001, this position has been taken over by USA. By 2006, France was in the third position preceded by USA and United Kingdom. For the most recent year – 2006 – Germany, Japan, the Netherlands,

Italy, Belgium and Arab countries join the group of major bilateral donors in that order. Figure 4.5 below shows the historically major bilateral donors to the region.



Source: Constructed Based on Data from Roodman (2005)

Using an alternative criterion of aid as a percentage of donors Gross National Income (GNI), Luxembourg, Norway, Denmark, Portugal and Belgium are the top donors ranking from first to fifth in that order. Countries like the United States and Japan are found towards the end of the list as table 4.1 below depicts. Each donor in the list has given less than one percent of its gross national income to Sub-Saharan Africa. Particularly, each of the donors appearing as in the list of the major donors to the region in dollar terms (Figure 4.5 above), gives less than 0.02% of its GNI.

Table 4.1: DAC Donors' Net Disbursements of ODA to Sub-Saharan Africa (Measuring ODA as a Percentage of the Donor's Gross National Income): 2003-2005 Average

Donor	ODA to SSA as a Percentage of the Donor's GNI: 2003-05 Average	Donor	ODA to SSA as a Percentage of the Donor's GNI: 2003-05 Average
Luxembourg	0.27	Germany	0.07
Norway	0.22	Finland	0.07
Denmark	0.22	Canada	0.06
Portugal	0.22	Italy	0.04
Belgium	0.21	Austria	0.04
Netherlands	0.21	Spain	0.04
Sweden	0.20	United States	0.04
Ireland	0.19	Japan	0.02
France	0.17	New Zealand	0.02
UK	0.12	Australia	0.01
Switzerland	0.07	Greece	0.00
		TOTAL DAC	0.06

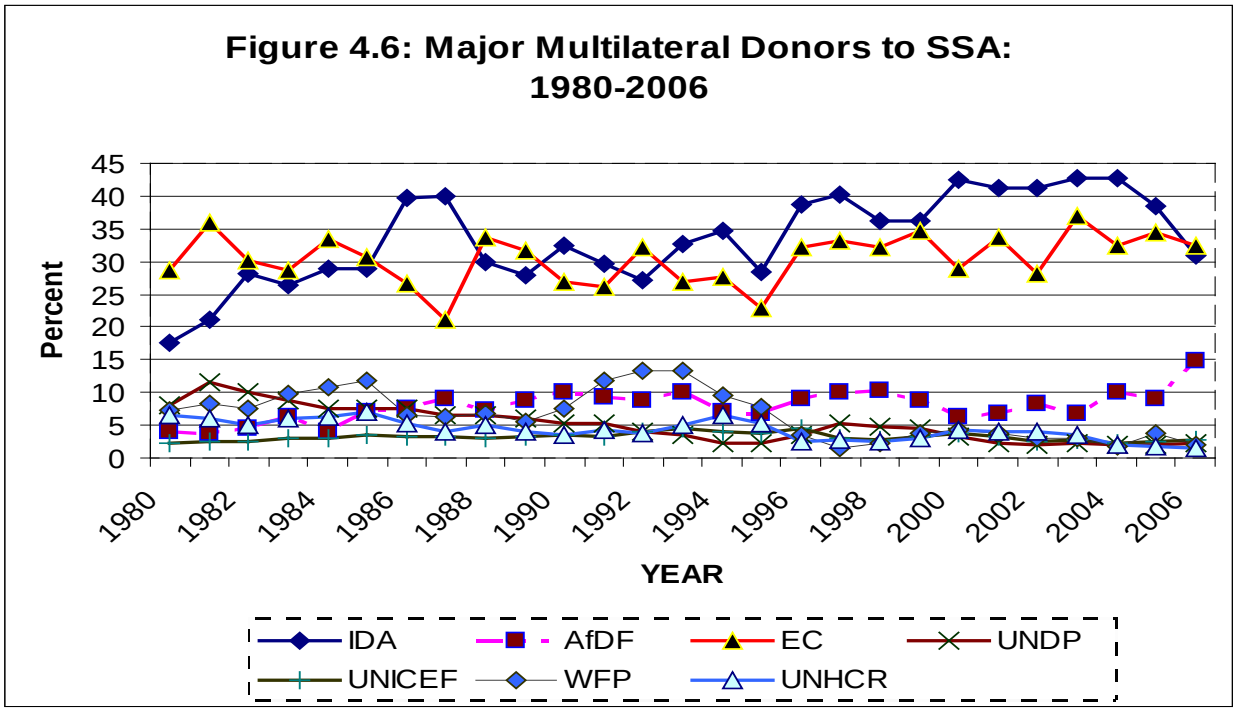
Source: Constructed Based on Data from Tables 29 and 38 of OECD (2007b).

The data for the period from 2002 to 2004 show that Ireland is at the top of the bilateral donors in terms of channelling the greatest proportion of its total aid to LDCs toward Sub-Saharan Africa – allocating about eighty-five percent of its aid to the region. In accordance with this criterion, Portugal (84%), Belgium (83%) and Italy (82%) rank from second to fourth, respectively. USA – the primary donor in dollar amounts – does not appear in the list of top ten donors here (OECD, 2007b). Comparing the data for periods 1994-1995, 1999-2000 and 2004-2005 from the same report of OECD gives an evidence for changing shares of aid allocated to Sub-Saharan Africa in the aid of these leading donors. Accordingly, the proportion of total gross ODA disbursements by

Ireland and Portugal devoted to the region (taken individually) declined between the first and the second periods with a sign of incomplete recovery in the third period. The trends for aid from France and aggregate aid from total DAC donors are similar to that of Ireland and Portugal, the only difference being the recovery in the share of aid from France and aggregate aid from total DAC donors to Sub-Saharan Africa in the third period is to a point above the initial level. The trends in the shares of aid from Belgium, Germany, the Netherlands, and United Kingdom have been upward.

Sweden, Luxemburg, Norway, the Netherlands and Denmark which are generally well-known for allocating large shares of their GNI (Gross National Income) to aid – ranked from one to five in Roodman's (2005) donor performance index – each directed less than fifty-five percent of its gross ODA disbursements (average of 2004-2005) to Sub-Saharan Africa (OECD, 2007b). However, Africa's share in aid from each of these five donors is consistently above that of any other region for the periods: 1994-95, 1999-2000 and 2004-05 (ibid).

Turning away from bilateral donors and to the discussion of the major multilateral donors to the region, International Development Association (IDA) of the World Bank has been at the top for most of the period (1980-2006). This is depicted in Figure 4.6 below. However, European Commission (EC) – which had been the leading donor to the region between 1980 and 1985 – had at least occasionally taken back the lead (1888, 1989, 1992 and 2006). On average (for 1980-2006), these two multilateral donors (IDA and EC) together have accounted for about sixty-four percent of the total multilateral aid to Sub-Saharan Africa. Individually, the share of IDA is about 33.5%, which is slightly above that of EC (about 30.5%).



Source: Constructed Based on Data from Roodman (2005)

Another point from Figure 4.6 that captures attention is the rise in the share of the African Development Fund starting towards 2003, in contrast with the decline in the shares of IDA and EC.

On the basis of allocating a greater share of their aid to Sub-Saharan Africa, the statistical annex of the report of OECD (2007b) reveals that African Development Fund is at the top (channeling 99.9% of its funds to the region), followed by Arab Agencies (84.4%), the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) (67.2%), Nordic Development Fund (64.6%) and World Food Program (WFP) (62.1%) in that order. These figures are for the year 2005. In fact, the African Development Fund is set up to serve the region and its position here doesn't reflect the better comparative generosity of this institution.

To sum up, in terms of total dollar amounts, the major bilateral donors to Sub-Saharan Africa comprises of France and lately USA, United Kingdom, Germany and Italy. On the grounds of allocating larger quotas of their aid to the region, Ireland, Portugal, Belgium and Italy are the major ones – each allocating more than eighty percent of its aid. The list of major multilateral donors to the region is led by IDA, EC and recently African Development Fund (in that order) in terms of dollar amounts; and, by African Development Fund, Arab Agencies, GFATM, Nordic Development Fund and WFP in terms of allocating larger proportions of their aid to the region.

4.1.3 Major Recipients of Bilateral and Multilateral Aids

The distribution of development aid among the countries in the region could actually be determined by one or more of the various factors discussed in Chapter two (Section 2.3). As the issue of the factors determining aid allocation is beyond the scope of this paper, the aim of this section is just to show the distribution of aid within the region – SSA. To this end, the messages conveyed by alternative measures of aid – dollar amounts of aid, aid-to-GDP ratio and aid per capita – are compared and contrasted.

Table 4.2 below gives a list of top ten aid receivers along with their shares in the total aid to Sub-Saharan Africa since 1970. As the table displays, the set of countries in the list of top ten recipients (based on their shares in total net ODA disbursement to the region) has changed very little from one decade to another. With the exception of Niger and Madagascar appearing only in one of the four lists (Niger in the list of 1970-79 and Madagascar in that of 2000-04), every other country in the table appears in at least two of the four lists. The overall average for the entire

period of 1970-2004 reveals that Tanzania and Ethiopia – both of which were consistently in the list of top ten recipients for all the sub-periods – took the first and second places, respectively.

Restricting the period of analysis to 1980-2004, changes the last column of Table 4.2 only slightly[19]. Ethiopia and Mozambique, and Sudan and Zambia exchange places. Uganda enters as the ninth top recipient pushing down Ghana and Cote d'Ivoire to tenth and eleventh positions, respectively.

[19] This restriction is just to enhance comparison with what comes later

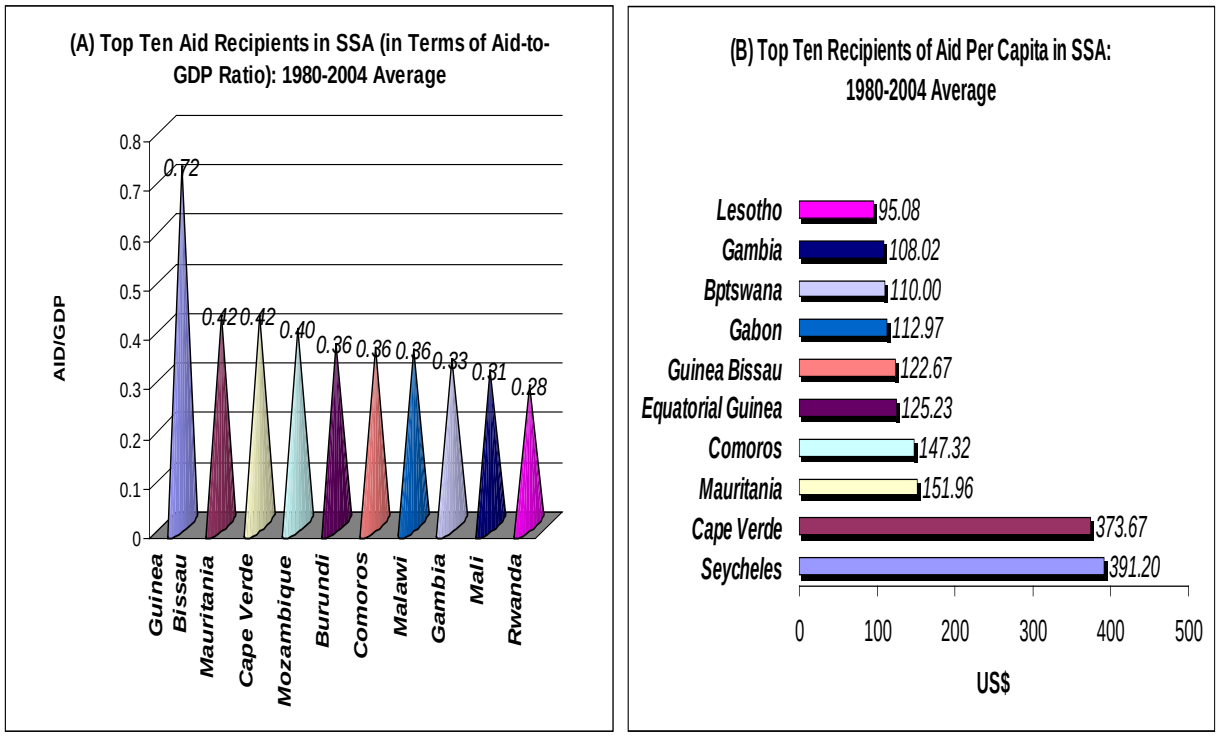
Table 4.2: Top Ten Aid Recipients in Sub-Saharan Africa with Their Shares in Net ODA Disbursements to SSA: 1970-2004

Period	1970-79		1980-89		1990-99		2000-04		1970-2004	
Rank	Country	Share (%)	Country	Share (%)	Country	Share (%)	Country	Share (%)	Country	Share (%)
1	Tanzania	*4.32*	Sudan	*6.49*	Mozambique	*5.04*	Congo, D.R.	*7.67*	Tanzania	*5.20*
2	Congo, D.R.	*4.09*	Tanzania	*5.62*	Tanzania	*4.76*	Tanzania	*6.35*	Ethiopia	*3.96*
3	Sudan	*3.81*	Kenya	*4.15*	Ethiopia	*4.24*	Mozambique	*5.96*	Mozambique	*3.69*
4	Kenya	*3.10*	Ethiopia	*3.84*	Cote d'Ivoire	*3.86*	Ethiopia	*5.87*	Congo, D.R.	*3.58*
5	Senegal	*2.55*	Congo, D.R	*3.47*	Zambia	*3.75*	Uganda	*4.10*	Kenya	*3.35*
6	Cameroon	*2.36*	Senegal	*3.37*	Uganda	*3.28*	Ghana	*3.75*	Sudan	*3.16*
7	Ethiopia	*2.15*	Mozambique	*3.01*	Kenya	*3.28*	Zambia	*3.13*	Zambia	*2.89*
8	Niger	*2.11*	Zambia	*2.60*	Ghana	*2.91*	Cameroon	*2.93*	Senegal	*2.86*
9	Mali	*1.98*	Mali	*2.53*	Senegal	*2.75*	Senegal	*2.50*	Ghana	*2.59*
10	Cote d'Ivoire	*1.90*	Ghana	*2.21*	Cameroon	*2.42*	Madagascar	*2.49*	Cote d'Ivoire	*2.46*
	Total SSA	*100*	*Total SSA*	*100*	*Total SSA*	*100*	*Total SSA*	*100*	*Total SSA*	*100*

Source: Constructed Based on Data from OECD (2006)

Nevertheless, this list of top ten recipient countries cannot withstand the change of the variable used to measure aid flows. If this list of major aid recipients in Sub-Saharan Africa is to be drawn based on either aid-to-GDP ratio or aid per capita, the above image changes radically. According to the criterion of measuring aid relative to GDP, only Mozambique survives in the list of top ten recipients (Panel (A) of Figure 4.7 below). Evident from panel (B) of the same figure, no single country considered as a major recipient in terms of total amounts of aid appears in the list of top ten aid recipients when aid is measured in per capita terms. Surprisingly most of those countries in the last column of Table 4.2 above are found towards the bottom of the list (comprising of forty-two countries) according to the approach of measuring aid in per capita terms.

Figure 4.7: Top Ten Aid Recipients When Aid is Measured as Net Aid Transfers: (A) Relative to GDP, and (B) Per Capita



Source: Constructed Based on Data from Roodman (2005) and WB (2006a)

Moreover, disaggregating aid into bilateral and multilateral components, while shuffles the ranks above, does not produce any change to the list of countries according to the aid-to-GDP ratio criterion. Comparing the list generated by using bilateral and multilateral aids per capita to the list resulting from using total aid per capita (discussed above), however, produces some minor changes to the list in addition to the shuffling of ranks within the list. While Senegal (eleventh top recipient in terms of total aid per capita) replaces Lesotho as the tenth country in the list for the movement from total to bilateral aid per capita, Zambia and Swaziland join the list, by replacing Botswana and Gabon, in the case of multilateral aid per capita. The list of top ten bilateral and multilateral aid recipients (according to the above criteria) is included in the annex – Figures B4 and B5.

Generally, using different measures of aid flow does not give a consistent list of countries as the major recipients of aid in the region. Countries that happen to be at the top according to total aid amounts disappear once the criterion of aid per capita or that of aid-to-GDP ratio is considered as a measure of aid. Such inconsistency is, however, immaterial in disaggregating aid into bilateral and multilateral components.

4.2 Aid versus Economic Performance – Descriptive Analysis

This section presents a rough sketch of the matter only – the descriptive analysis of the effectiveness of aid on economic growth. A detailed and more proper analysis of the inter-linkage and causal relationship between bilateral or multilateral aid on the one hand and economic performance of a country (or a region) on the other is handled in Section 4.5.

This section, specifically uses two approaches in dealing with the association between aid receipts (bilateral and multilateral) and economic performance of the forty-two countries encompassed in the sample. The first approach compares the average growth in per capita GDP of the countries receiving above-average aid (relative to GDP and in per capita terms) with the average growth in per capita GDP of those countries characterized by below-average aid-to-GDP ratio or below-average aid per capita. The second approach compares the aggregated average economic growth rate of the entire set of countries for periods with higher aid receipts to the economic growth rates for periods with lower aid receipts. Like the first approach, the second approach makes a distinction between bilateral aid and multilateral aid as well as between aid-to-GDP ratio and aid per capita measures.

Table 4.3 below summarizes the information for the average bilateral and multilateral aids (both relative to GDP and in per capita terms) and the average growth rate for the two groups of countries stated earlier.

In each of the four cases Table 4.3 presents, the number of countries in the below-average category is greater than the number of countries in the other category. This means that, a greater number of countries account for less than the overall average of bilateral or multilateral aid receipts regardless of the specific measure of aid used. In particular, less than one-third of the countries account for more than the overall average of aid per capita receipts (the case both for bilateral and multilateral aids).

Table 4.3: Bilateral and Multilateral Aid Flows to Sub-Saharan Africa and the Economic Performance of the Region: Country Averages over 1980-2004

Type of Aid with its Variable of Measurement	*Group*	*Number of Countries*	*Average Aid*	*Average Growth Rate of GDP Per Capita*
1. Bilateral Net Aid Transfer (Aid-to-GDP Ratio)	Group with Below Average Aid	24	0.0594	0.8082
	Group with Above Average Aid	18	0.1968	0.1341
2. Multilateral Net Aid Transfer (Aid-to-GDP Ratio)	Group with Below Average Aid	22	0.0325	0.7614
	Group with Above Average Aid	20	0.1287	0.2531
3. Bilateral Net Aid Transfer (Per Capita)	Group with Below Average Aid	29	25.9605	0.0156
	Group with Above Average Aid	13	102.9801	1.6430
4. Multilateral Net Aid Transfer (Per Capita)	Group with Below Average Aid	31	16.3572	0.1333
	Group with Above Average Aid	11	55.3654	1.6072

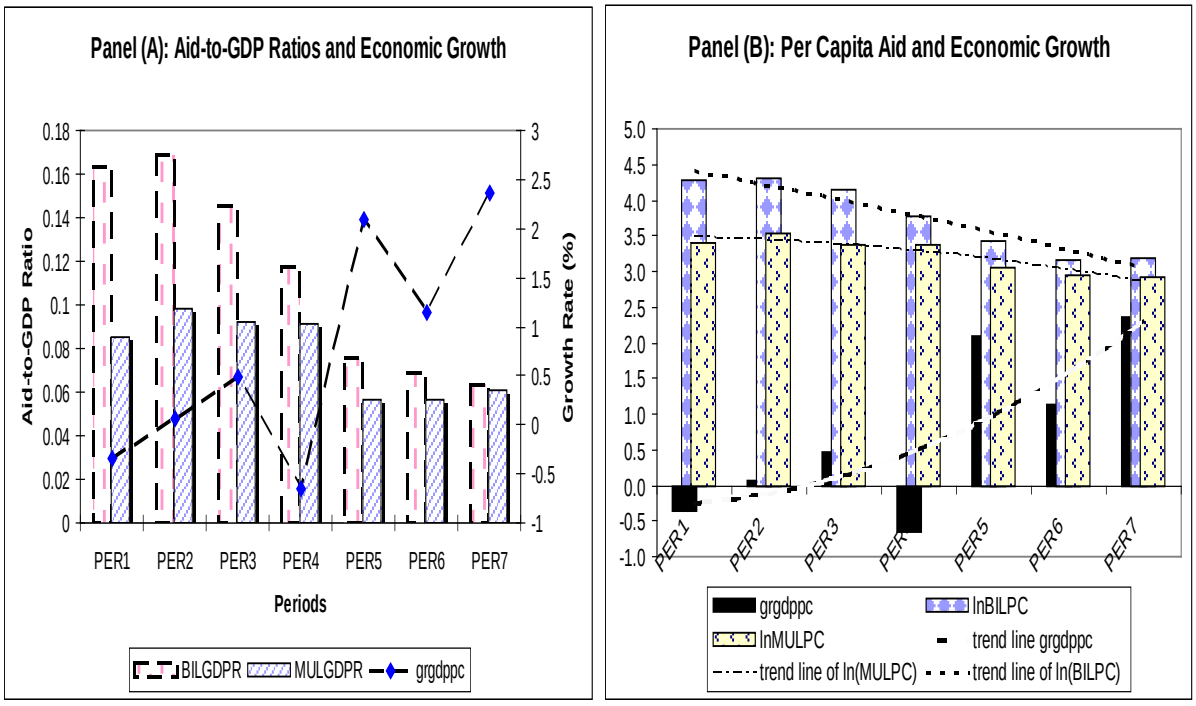
Source: Constructed Based on Data from Roodman (2005) and WB (2006a)

The relationship between average aid receipts (bilateral or multilateral) and the growth rate of per capita GDP is mixed. On one hand, both bilateral and multilateral aids measured relative to recipient's GDP, exhibit a negative relationship with economic growth (the first two rows of Table 4.3). On the other hand, both above-average bilateral and above-average multilateral aids in per capita terms are associated with greater growth rates (the third and fourth rows).

The controversy on the relationship between aid receipts and economic growth revealed above (based on the comparison of cross country averages) disappears when the comparison is made among period averages. Such a comparison is represented by the two panels of Figure 4.8 below, for the seven four-year averages (1980-83, 1984-87, 1988-91, 1992-95, 1996-99, 2000-03 and 20004-07).

As panel (A) of Figure 4.8 below illuminates, the average aid-to-GDP ratios for both bilateral and multilateral flows have declined as time passes. In contrast, the average growth rate of per capita GDP (for the sample of countries) has shown an upward move though with irregularities. Panel (B) depicts a similar relationship between the period-average bilateral and multilateral aid receipts, this time in per capita terms, on one hand and economic growth on the other. Unlike the country-average-based comparison (from Table 4.3) which results in contrasting images, the period-average-based comparison gives a consistent outcome. In this later case, periods with lower average aid inflows are generally associated with higher growth rates according to both aid-to-GDP ratio and per capita criteria of measuring aid receipts.

Figure 4.8: Bilateral and Multilateral Aid Flows to Sub-Saharan Africa and the Economic Performance of the Region: Period Averages over 1980-2004



Source: Constructed Based on Data from Roodman (2005) and WB (2006a)

As a concluding remark to this section, no causal relationship between aid receipts and economic growth can be established. An inverse association between aid receipts and economic growth could possibly mean that slower economic growth has attracted more bilateral and/or multilateral aids to the region, or could equally possibly mean that lowering the aid receipts enhances economic growth. Given the possibility of reverse causality – aid flows impacting economic performance or vice versa – the descriptive analysis of this section cannot and should not be used to establish a causal relationship, of whatever direction, between aid and economic growth. It, however, serves as a frame of reference for the results of the econometric analysis, which is the concern of the next section.

4.3 Aid versus Economic Performance – Econometric Analysis

This section examines the effectiveness of bilateral and multilateral net aid transfers at influencing economic growth – touched up on in Section 4.4 above – by applying the econometric techniques discussed in the third chapter (Section 3.2).

The following table summarizes the results of applying different techniques of estimation to equation (3.3) – where the growth rate of real GDP per capita (grgdppc) is explained by the various determinants of growth in line with the augmented Solow model. For recapitulation, these factors are net national savings (gross domestic savings plus net income and net current transfers from abroad net of depreciation), FDI, bilateral aid and multilateral aid (these three together capturing the external sources of investment), the rate of population growth, initial conditions and life expectancy at birth (a proxy for human capital).

The application of OLS to this set of variables – in the first column of Table 4.4 – indicates what follows. The net accumulation of physical capital from domestic savings and FDI as well as the levels of human capital and bilateral aid receipts (relative to GDP) appear to explain economic growth significantly. While domestic savings, human capital and FDI are a priori expected to be positively related to growth, the positive contribution of bilateral aid shown by the OLS estimation is surprisingly in sharp contrast to what is shown in the scatter plot of Figure B6 (in the annex). In a simple linear model where bilateral aid is included as the only explanatory variable, the slope coefficient turns out to be negative though insignificant at any conventional

level of significance. (The scatter plots for multilateral as well as total aid in Figures B7 and B8 also depict a similar pattern – no impact of these aid kinds on economic growth.)

Table 4.4: Regression Results of the Augmented Solow Growth Model Using Different Estimation Techniques

The dependent variable is the growth rate of real GDP per capita in all cases						
	Estimation Techniques					
Explanatory Variables	**(1) OLS**		(2) Fixed Effects	(3)Random Effects	(4)Between Effects	(5) GMM
$Dependent_{t-1}$	0.232***		0.102	0.232***	0.923***	0.189***
Initial Condition	-0.621*		-1.433	-0.621*	-0.457*	-1.552
FDI (fdi)	0.443***		0.484***	0.443***	0.130**	0.385**
Population growth Rate	-0.244		-0.097	-0.244	-0.586**	-0.022
Human Capital (lifeeab)	0.045*		0.079	0.045*	- 0.020	-0.054
Physical Capital (nns)	0.109***		0.107***	0.109***	0.025	0.123***
Bilateral Aid (bilgdpr)	5.685**		6.469*	5.685**	-3.297	9.447
Multilateral Aid (mulgdpr)	-0.474		5.497	-0.474	3.519	-3.233
Constant	2.958		6.481	2.958	7.919***	0.439**
R^2	*0.5491*	*Within* R^2	*0.4615*	*0.4379*	*0.0224*	
Adj R^2	*0.5234*	*Between* R^2	*0.6800*	*0.8549*	*0.9745*	
		Overall R^2	*0.4840*	*0.5491*	*0.0403*	
Sargan (p-value)						*0.4068*
abAR(1)(p-value)						*0.0001*
abAR(2)(p-value)						*0.7064*
Number of Observations	***261***		***261***	***261***	***261***	***189***

Notes:

a. *, **, and ***show the significance of the corresponding variable at 10%, 5%, and 1% levels, respectively.

b. *ab*AR(i) Arellano-Bond test statistic for autocovariances in errors of order i. (i = 1,2)

c. Time dummies are included in all of the estimation techniques.

d. The inclusion of the squares of bilateral and multilateral aids does not change the significance of the coefficients under all the techniques.[20]

The comparison of the within groups estimates (the second column) with the OLS estimates reveals the following. While FDI and net accumulation of physical capital from domestic sources retain their significance, the initial condition and the lag of the dependent variable lose their significance but retain their signs. The loss of significance by the human capital variable is a marginal one (with p-value of 0.132). Bilateral aid still appears to be a significant factor though, this time, at 10% level of significance.

The random effects estimates are very similar to the OLS estimates. This possibly indicates that the relative inefficiency of OLS estimation (as compared to the random effects technique) in combining the within and between variations is not considerable. Comparing the three techniques of static panel data analysis shows that much of the variation explaining the differences in growth comes from the between country variations as reflected in higher between R^2 (and lower within R^2) for all the three estimators: between, fixed and random effects.

FDI seems to be a significant determinant of growth differences both across countries and over time. On the other hand, differences in population growth rates and initial conditions – which are insignificant at explaining the within (over time) variations in growth – significantly explain

[20] Annex C1 provides the stata results of the GMM technique which could be cross-checked with this point.

growth differences among countries. (Compare the differences in the significances of these variables under the columns of fixed effects and between effects).

One variable of focus, multilateral aid relative to GDP, has always had an insignificant coefficient and experienced changes in sign. The other variable of focus, bilateral aid relative to GDP – like the net accumulation of capital – appears to be a significant explanatory for the growth differences over time. At any rate, bilateral aid appears as a significant variable in the random effects estimation which is (theoretically) supposed to combine the within and between variations efficiently. This technique of random effects is favored to the fixed effects by Hausman test, given the data at hand. The significance of this aid component in these static panel data models despite what has been shown by the descriptive analysis (of Section 4.4) and the scatter plot of Figure B6 (in the annex), might be due to the correlation between some omitted time-invariant individual-specific variables on the one hand and the lagged dependent variable on the other, which remains troublesome even after transformations in small panels (as described in Section 3.3 of the third chapter).

The last column of the table presents the results of Difference-GMM, a technique of estimation argued to be better under such circumstances. One witness of this betterment is the fact that the GMM estimate of the lagged dependent variable (0.189) lies between its OLS (0.232) and Within Effects (0.102) estimates. Moreover, the Sargan test statistic (with a p-value of 0.4068) shows that the null hypothesis of over-identification cannot be rejected at any reasonable level of significance. The Arellano-Bond tests for autocovariances in residuals of order one and order two are also compatible with the application of the technique. The first order residuals of the

undifferenced growth equation display autocovariances, which disappear in the second order residuals – the basic assumption of the estimation technique.

Despite all these empirical supports for the GMM results, the significance of bilateral aid is rejected only marginally. One suspect behind this is multicollinearity. As bilateral and multilateral aids are highly correlated with each other – manifested in the highly significant (at 5%) pair-wise correlation coefficient of 0.8105 and the regression fit of bilateral aid over multilateral aid of Figure B9 in the annex – the exclusion of one of the two when the other is included has been tried. The outcome of this experiment turned out to be substantial for the OLS, the fixed effects, and the random effects models. In each of these cases, bilateral aid appears to be highly significant without discrediting the qualitative meaning of any part of the discussion so far. While multilateral aid has also not discredited any of the discussion above, now it claims a positive and significant coefficient in all the three cases. Under the fourth estimation technique of the between effects, both bilateral and multilateral aids turned out to be negatively related to economic growth, though none is significant. However, the questionable reliability of the results of these techniques is what motivated the use of GMM from the very beginning.

More interestingly, this action raises Sargan's test statistic for over-identifying restrictions, and rejects the significance of both types of aid more comfortably without introducing any significant change to the above analysis. The only alteration caused is the change in the sign of multilateral aid (even if insignificant) and the rise in the significance level of FDI (from 5% to 1%).[21]

[21] In order to check the robustness of these findings to alternative definitions of aid, the GMM technique has been repeated using bilateral and multilateral aid per capita. This has not changed any of the above outcomes and inferences; everything has remained intact. The results are included in Annex C2.

As mentioned towards the beginning of this section, the entire story gone through above is based on the augmented Solow type models of economic growth. However, the framework for testing the effectiveness of foreign aid – and growth determinants in general – has shifted away from the implementation of such models. As have been discussed in the third chapter in detail, analyses based on a variant of equation (3.4) – where the deep parameters of economic growth and development are emphasized – have gained currency. In what follows, and in a parallel way to what has been said so far, the effectiveness of bilateral and multilateral aid components is analyzed along such a popular framework.

Accordingly, equation (3.4) is subjected to the techniques of the Ordinary Least Squares, the static panel data models, and the Arellano-Bond Dynamic Panel Model (the Difference GMM).

For convenience, the variables in equation (3.4) are briefly recapitulated here. These variables include: the real GDP per capita at the start of each (four-year) period to capture initial conditions; a measure of institutional quality; lagged value of broad-money to GDP ratio as a proxy for financial depth; assassinations to capture political instability; the policy index (to be constructed yet); and the prevalence of malaria to capture the role of geographical location. The two categories of aid under consideration enter as additional explanatory variables following the arguments in the third chapter.

Before running the model of ultimate goal (i.e., equation (3.4)), however, the policy index needs to be constructed. In line with the discussion in Sub-section 3.1.2, this index is constructed from three variables: fiscal balance (budget surplus), inflation and openness. As a first step to this end, the growth rate of real GDP per capita is regressed on the above variables excluding the aid

variables. The pooled OLS result of this regression for constructing the policy index (with *p*-values in braces) is[22]:

RGDPPCGR = – 0.723 (InitialRGDPPC) + 0.179 (Fiscal Balance) + 3.508 (Openness)

(0.055) (0.001) (0.090)

– 0.0005 (Inflation) – 18.851 (Assassinations)

(0.020) (0.077)

Thus, evaluating *assassinations* and *initialRGDPPC* at their mean values, gives the policy index as:

Policy = (0.723 x 7.329531) – (18.851 x 0.0104367) + 0.179 (Fiscal Balance)

+ 3.508 (Openness) – 0.0005 (Inflation)

= *- 5.496 + 0.179 (Fiscal Balance) + 3.508 (Openness) – 0.0005 (Inflation)*

The policy index generated in this way is then used in the regressions of ultimate objective (of this section) explained below. Table 4.5 below gives a summary of the estimation results of a variant of equation (3.4).

[22] Institutional quality, prevalence of malaria and financial depth are insignificant (but each with the expected sign).

Table 4.5: Regression Results of Equation (3.4) Using Different Estimation Techniques

The dependent variable is the growth rate of real GDP per capita in all cases						
	Estimation Techniques					
Explanatory Variables	(1) OLS		(2) Fixed Effects	(3)Random Effects	(4) Between Effects	(5) GMM
Dependent$_{t-1}$	0.282**		0.0998	0.282**	0.927***	0.109
Initial Condition	-0.738		-2.0457	-0.738	-1.103**	-4.579***
Policy	1.130**		1.676***	1.130**	0.297	1.393***
Policy^2						0.0798**
Bilateral aid	17.384		5.130	17.384	5.667	1.359
(Bilateral aid)^2	-23.756		-7.163	-23.756	-15.968	5.475
Policy x Bilateral aid	2.869		1.099	2.869	4.478	0.165
Multilateral aid	-8.389		-10.062	-8.389	-8.245	-21.562
(Multilateral aid)^2	4.426		38.685	4.426	-0.365	59.563
Policy x Multilateral aid	-8.402		-8.748	-8.402	-6.867	-9.267
Institutional Quality	-0.067		-0.479*	-0.067	-0.088	-0.663**
Financial Depth	0.003		-0.007	0.003	.004	-0.014
Assassinations	-7.332			-7.332	-15.545	
Malaria Prevalence	-0.002			-0.002	.0007	
constant	5.927		17.388	5.927	2.624	
R^2	0.3454	*Within* R^2	0.3176	0.2857	0.0043	
Adj R^2	0.2842	*Between* R^2	0.2072	0.4390	0.9404	
		Overall R^2	0.2719	0.3454	0.0202	
Sargan (p-value)						0.8547
abAR(1)(p-value)						0.0527
abAR(2)(p-value)						0.9537
Number of Observations	***223***		***256***	***223***	***223***	***185***

Notes: See notes **a**, **b** and **c** to Table 4.4

The first column shows that the growth impacts of all variables (seen individually), with the exception of policy and the lag of the dependent variable (growth in real GDP per capita), are insignificant. The variables initial condition, institutional quality, financial depth, political instability (as measured by assassinations) and geographical location (proxied by prevalence of malaria) all have the expected signs, but none is significant under the pooled OLS.

Although insignificant, the coefficients associated with bilateral aid and its polynomials appear to reflect positive impact of this aid with diminishing returns and better effectiveness when coupled with a good policy. On the other hand, coefficients corresponding to multilateral aid tend to reflect the opposite. That is, multilateral aid has a negative result with this return becoming positive at high aid levels and helps better in situations of bad policies. These coefficients, like their bilateral aid counterparts, are all insignificant. However, as explained for the estimation of the augmented Solow type model earlier, multicollinearity could have made the identification of these coefficients difficult. This issue will be raised after describing the other columns in the table briefly.

Under fixed effects (FE), while the policy variable becomes more significant (as compared to the OLS results), the lagged value of the dependent variable is no more significant. Instead, institutional quality is now a very significant explanatory variable. The only change in sign is seen for financial depth – a change from a positive to a negative coefficient. But, it is insignificant in both cases. Considering the outcomes of the between technique (BE) reveals that policy is not a significant explanatory variable for the growth differences across the sample countries. The random effects (RE) estimation technique produces identical results as the OLS

estimation – the lag of the dependent variable and policy each exerting a positive and significant influence on economic growth.

A possible reconciliation of the difference between the result of the between effects (BE) and the results for the other three models (OLS, FE and RE) is the following. While the growth of a country over time is significantly influenced by changes in policy performance (FE), the growth of countries compared at a time does not reflect any significant influence of policy differences (BE). Overall, the comparison along both dimensions (cross-sectional and time series) tells us that the positive association between policy and economic growth is significant. Similar arguments apply to the differences in the significance of institutional quality observed amongst the results of these three estimation techniques.

The last column of the table presents the results of the theoretically preferred estimation technique – the Difference-GMM method. As an empirical test for the quality of this method, the coefficient of the lag of the dependent variable lies between the corresponding estimates provided by OLS and fixed effects. This is one indicator that the GMM method is a better method to apply. According to this GMM technique, initial condition, policy stance and institutional quality are the significant determinants of growth variations. Unlike under the other estimation techniques in which case $(policy)^2$ is highly insignificant and dropped, this method of GMM shows that the effects of good policy increases at an increasing rate.

In all of the estimation results given in Table 4.5 above, multilateral aid and bilateral aid as well as the terms in which they appear are generally insignificant. But, this should not be taken

seriously and as an irrefutable result. The robustness of these results to some alternatives has to be confirmed.

The confirmation of the robustness of this ineffectiveness of aid implied by the models in Table 4.5 above is what comes next. Comparable to the robustness checks applied to the results of equation (3.3) in Table 4.4, the verification here also involves experimenting by avoiding the simultaneous use of both aid types and dealing with only one of the two types at a time. Similarly, the substitution of the aid-to-GDP ratio aid measurements by aid in per capita terms is also considered. The following paragraphs are devoted to the analysis of the results of these experiments, in the order they appear above, using the GMM technique.

As Table 4.6 below shows, there are no considerable changes in the coefficients and significance levels of all the variables except those involving aid terms. The initial condition, policy and policy squared all retain their significance in both equations – one equation involving bilateral aid and its polynomials and the other involving multilateral aid and its polynomials. The p-values of the Sargan statistics are now, in both cases, higher than the corresponding statistic in the previous case.

Regarding the terms involving aid, the aid and aid squared terms are insignificant for both bilateral and multilateral types. In contrast to what has been found for the earlier analysis where the two types of aid are treated simultaneously (Table 4.5), the coefficients of aid-policy interactions are significantly different from zero. From this, it seems that low aid levels (bilateral or multilateral) are preferred to high aid levels for countries with poor policy environment. Or equivalently, higher levels of aid to countries with good policy environments are

counterproductive. This is against the predictions of Burnside and Dollar (1997, 2000) and the World Bank (1998) which state that aid is effective in good policy environments. It might as well tempt to say that this significance of the interactive variables reflects that aid could destroy the benefits of good policy.

Table 4.6: GMM Results of Equation (3.4) Taking Bilateral and Multilateral Aids Separately

Explanatory Variable	***Coefficient***	***p-value***	***Explanatory Variable***	***Coefficient***	***p-value***
$Dependent_{t-1}$	0.116	0.192	$Dependent_{t-1}$	0.123	0.179
Initial Condition	**-4.675**	0.002	Initial Condition	**-4.235**	0.005
Policy	**1.392**	0.000	Policy	**1.236**	0.000
$Policy^2$	**0.079**	0.044	$Policy^2$	**0.084**	0.033
Institutional Quality	**-0.616**	0.035	Institutional Quality	**-0.575**	0.057
Financial Depth	-0.015	0.369	Financial Depth	-0.015	0.386
Multilateral Aid	-20.954	0.251	Bilateral aid	-6.985	0.587
$(Multilateral\ aid)^2$	63.613	0.257	$(Bilateral\ aid)^2$	22.839	0.369
Policy x Multilateral aid	**-9.504**	0.018	Policy x Bilateral aid	**-4.297**	0.062
Sargan	5.78	0.8879	4.13	0.9661	
abAR(1)	-2.06	0.0398	-2.19	0.0287	
abAR(2)	0.04	0.9659	0.11	0.9094	
Number of Observations	***185***		***185***	***185***	

Notes: See notes **b** and **c** to Table 4.4.

Significant coefficients are in bold.

However, at this point, it is very crucial to revisit the work of Pattilo et al. (2007) which criticizes the practice of relying on fragile interaction variables for drawing strong conclusions. This made

me suspicious about the significance of the aid-policy interactions above, and I consequently checked if these interactive terms are really correlated with both terms. For both bilateral and multilateral aid types, the interaction terms are highly correlated with the policy variable but not with the aid variable. To be concrete, the regression of the interaction term – (Bilateral aid) x (Policy) – on the policy variable gives a coefficient of *0.0653889* that is highly significant (at 1% level of significance). On the other hand, the significance of the aid coefficient in an equivalent regression of (Bilateral aid) x (Policy) on bilateral aid requires a significance level as high as 51%. Similarly, the interaction term involving multilateral aid is highly correlated with the policy variable (a coefficient of *0.0411054* in a simple bi-variate regression – significant at the 1% level) but not with the aid variable. Thus, the significance of the interaction terms has less to do with the contribution of the aid components. These diagnostic regressions and the pair-wise correlations for the discussion in this paragraph are portrayed in Annex C3.

For the second robustness check where aid measured as a percentage of GDP is replaced by aid in per capita terms, Table 4.7 below exhibits that there is a favorable change (an increase) in the p-value of the Sargan statistic. This is an indication of a better overall over-identification of the model.

The initial condition, policy and policy squared all remain highly significant. The coefficient of the square of the policy index even becomes more significant in this case – a change in its p-value from 0.043 to 0.001. The significance of institutional quality, on the other hand, drops as the corresponding p-value rises from 0.027 to 0.113. Lag of the dependent variable and financial deepening do both remain insignificant with no change in sign.

Table 4.7: GMM Results of Equation (3.4) under the Alternative Definitions of Aid – Aid Per Capita versus Aid Relative to GDP

Explanatory Variables	**Results for the Case of Aid Defined in Per Capita Terms**	**Results When Aid-to-GDP Ratio is Used (Reproduced from Table 4.5)**
$Dependent_{t-1}$	0.127	0.109
Initial Condition	-4.637***	-4.579***
Policy	2.240***	1.393***
$Policy^2$	0.169***	0.0798**
Bilateral aid	1.450	1.359
$(Bilateral\ aid)^2$	-0.032	5.475
Policy x Bilateral aid	-0.138	0.165
Multilateral aid	0.738	-21.562
$(Multilateral\ aid)^2$	-0.251	59.563
Policy x Multilateral aid	-0.412	-9.267
Institutional Quality	-0.480	-0.663**
Financial Depth	-0.017	-0.014
Sargan (p-value)	0.8982	0.8547
abAR(1)(p-value)	0.0452	0.0527
abAR(2)(p-value)	0.9244	0.9537
Number of Observations	***181***	***185***

Note: See notes **a**, **b** and **c** to Table 4.4.

Regarding the aid variables, while both bilateral aid per capita and multilateral aid per capita have positive coefficients, the coefficients of their squares as well as their interactions with the policy index are all negative. However, consistent with the results from Table 4.5, none of these variables involving aid is significant. This shows that, for the sample at hand, the effectiveness of aid does not depend on whether aid relative to GDP or aid per capita is used in the growth

regressions. This contrasts with the conclusion of Fielding and Knowles (2007) which claims that the effectiveness of aid is 'definition-dependent'.

In general, the econometric analysis of the effectiveness of bilateral and multilateral aids on economic growth shows the following. Along the lines of both the Solow type and the more recent frameworks of analyzing aid effectiveness, the data set at hand does not support any significant effect of foreign aid on the growth of GDP per capita. This result is robust to the use of alternative definitions of aid (aid relative to GDP and aid per capita) and to the analysis of each aid type separately. Rather, the economic performance of the countries under consideration (and for the time covered) is explained by: net national savings (the accumulation of physical capital); initial condition (distance from steady-state); good policy as manifested in higher budget surplus (or lower fiscal deficit), less inflation and more openness to the rest of the world; net inflow of FDI and good institutional quality. The importance of these factors found here is in harmony with the findings of previous studies like that of Sachs and Warner (1997) and Dollar and Easterly (1999). But, this point is not taken forward, say, to explain the relative importance of these factors as the objective is to examine the effectiveness of bilateral and multilateral aid.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

The flow of foreign aid to the developing world has been justified on a number of arguments. These arguments range from bridging the financing gap and giving a big push for taking these countries out of poverty trap to inducing better policy and institutional environments. Whether one or more of these objectives have been met is highly controversial. Generally, studies on aid effectiveness find themselves in one or the other of the following categories: aid promotes economic growth, aid spurs growth in the presence of good policy and/or institutional environments, aid doesn't have any significant impact on growth, and aid affects growth negatively.

The majority of these works on aid effectiveness are criticized on some grounds. Besides relying on the results of OLS techniques of estimation, the use of fragile (mainly, aid-policy) interacting variables has captured attention. Moreover, the argument that not all aid is alike and that different aid types should be seen differently is generally becoming a commonplace.

This paper has examined the effectiveness of aid by disaggregating it into bilateral and multilateral components. With its leading share in total aid to LDCs and with the largely supported prediction that other regions are graduating from the aid industry, Sub-Saharan Africa turns out to be the concern of this study. For the 42 countries covered in the sample and the period 1980-2007, there is no evidence for claiming a link between bilateral or multilateral aid on the one hand and economic growth on the other.

Specifically, at least as a diagnostic test, the descriptive analysis Section 4.2 doesn't show any positive link between aid (bilateral or multilateral) and growth. If at all, it seems that they are inversely related. Moreover, the econometric analysis along the lines of the Solow type models fails to show a significant relationship. The application of the more recent framework in which deep parameters of growth/development are focused on, doesn't make any difference. The insignificance of the aid-growth relationship is robust to two alternative measures of aid – aid-to-GDP ratio and aid per capita. Exceptionally, the experiment of treating bilateral and multilateral aids (both relative to GDP) separately happens to yield significant aid-policy interacting variables. However, assessing the behavior of these interacting variables shows that the contributions of the aid components to the interacting variables are immaterial. Even if the interacting terms were to be take as healthy, this exceptional result tends to support the view that aid undermines the growth effectiveness of good policy.

In general, disaggregating aid into bilateral and multilateral components doesn't show a difference between the effectiveness of these two types. Both types turned out to be insignificant determinants of economic growth. However, this doesn't put the debate on aid effectiveness to an end. In the literature, there is an indication that the behavior of donor countries vary significantly.[23] Hence, research on aid effectiveness remains to be extended along such high level of disaggregating. In addition, new approaches for delivering aid which are argued to possess elements of better government accountability, better transparency and better recipient-ownership have been designed. Whether such attempts make any difference or not has yet to be tested[24]. The concluding point of this study which says that both bilateral and multilateral aids

[23] For instance, Roodman (2005, 2006a) gives rankings of donors according to their commitment to development.
[24] Yamada (2002) presents a critical review of different aid modalities with reference to Africa.

are ineffective at influencing economic growth is confined to the data at hand and thus gives no evidence about the effectiveness of the recently emerging aid modalities.

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ANNEX A

Table A1: List of Countries in the Sample of the Study

1. Angola	15. Ethiopia	29. Niger
2. Benin	16. Gabon	30. Nigeria
3. Botswana	17. Gambia, The	31. Rwanda
4. Burkina Faso	18. Ghana	32. Senegal
5. Burundi	19. Guinea	33. Seychelles
6. Cameroon	20. Guinea-Bissau	34. Sierra Leone
7. Cape Verde	21. Kenya	35. South Africa
8. Central African Republic	22. Lesotho	36. Sudan
9. Chad	23. Madagascar	37. Swaziland
10. Comoros	24. Malawi	38. Tanzania
11. Congo, Dem. Rep.	25. Mali	39. Togo
12. Congo, Rep.	26. Mauritania	40. Uganda
13. Cote d'Ivoire	27. Mauritius	41. Zambia
14. Equatorial Guinea	28. Mozambique	42. Zimbabwe

Table A 2: Short Description of the Variables Used in the Econometric Analysis

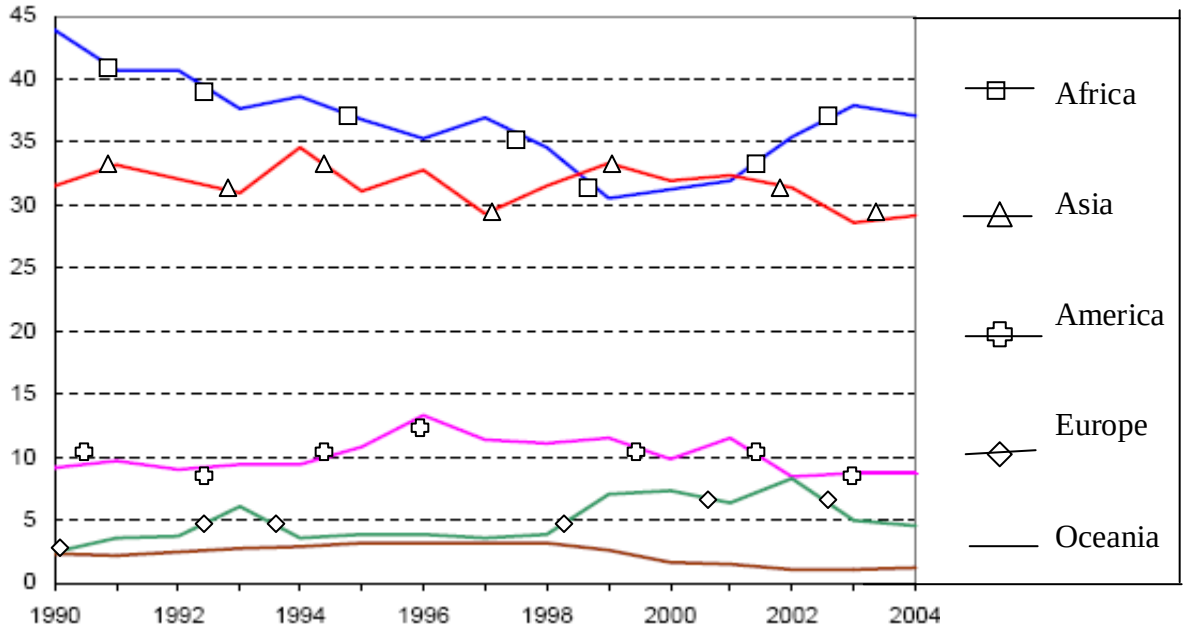
Variable	Description	Source
Growth Rate of GDP Per Capita	Annual percentage change in real GDP per capita, four year average	WB (2006a). WDI
$Dependent_{t-1}$	Growth rate of GDP per capita, lagged one period.	WB (2006a). WDI
Initial condition	Real GDP per capita, for the first year of each period	WB (2006a). WDI
Bilateral Aid Relative to GDP	Net aid transfers (NAT) from bilateral donors divided by real GDP, both averaged over four years.	Roodman (2005) WB (2006a)
Multilateral Aid Relative to GDP	Net aid transfers (NAT) from multilateral sources, divided by real GDP, both averaged over four years.	Roodman (2005) WB (2006a)
Bilateral Aid Per Capita	The natural logarithm of net aid transfers (NAT) from bilateral donors divided by mid-year population, both averaged over four years.	Roodman (2005) WB (2006a)
Multilateral Aid Per Capita	The natural logarithm of net aid transfers (NAT) from multilateral sources divided by mid-year population, both averaged over four years.	Roodman (2005) WB (2006a)
Malaria Prevalence	Risk of endemic malaria (% of population). Data for the most recent year within the range 1997-2004	WB (2006b). ADI
Institutional Quality	The average of the political rights and civil liberties measures of the Freedom House. Each is measured on a 1-7 scale, with one representing the highest degree of	Gwartney et a. (2007)

Table A2 Continued

	freedom and seven the lowest.	
Political Instability	Number of assassinations, average over three decades 1960, 1970 and 1980).	Easterly and Levine (1997)
Financial Depth	M2 (Broad money) to GDP, lagged one period	WB (2006a)
Human Capital	Life Expectancy at Birth in years (total)	WB (2006a)
Net National Savings/Physical Capital	Gross domestic savings plus net income and net current transfers from abroad less the value of consumption of fixed capital.	WB (2006a)
FDI	Net inflows of foreign direct investment, (% of GDP)	WB (2006a)
Population Growth	Annual percentage change in total population.	WB (2006a)
Inflation	The annual growth rate of the implicit GDP deflator.	WB (2006a)
Openness to the Rest of the World	Trade (the sum of exports and imports of goods and services) measured as a percentage share of gross domestic product.	WB (2006a)
Fiscal Balance (Budget Surplus)	Total revenue and grants received less total expenditure and net lending as a percentage share of gross domestic product.	ADB (2002,2006)

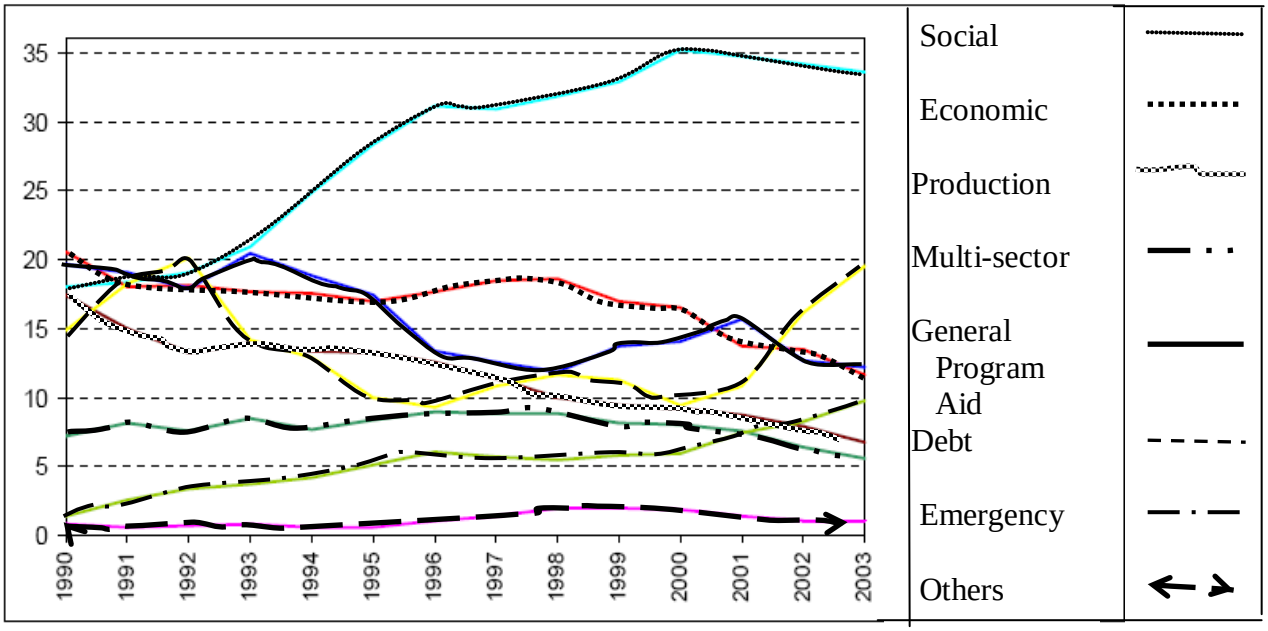
ANNEX B

Figure B1: Regional Shares of Net ODA (As a Percentage of World Total): 1990-2004



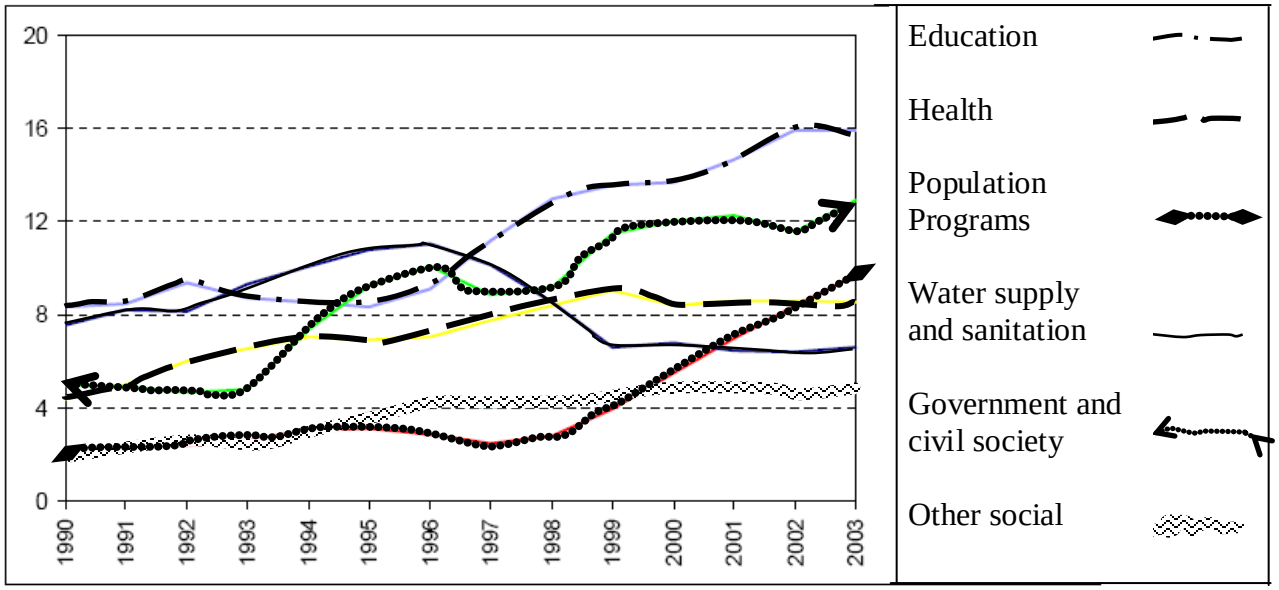
Source: OECD (2006)

Figure B2: Sectoral Shares of ODA Commitments to Africa (As a Percentage of Total ODA to Africa): 1990-2003



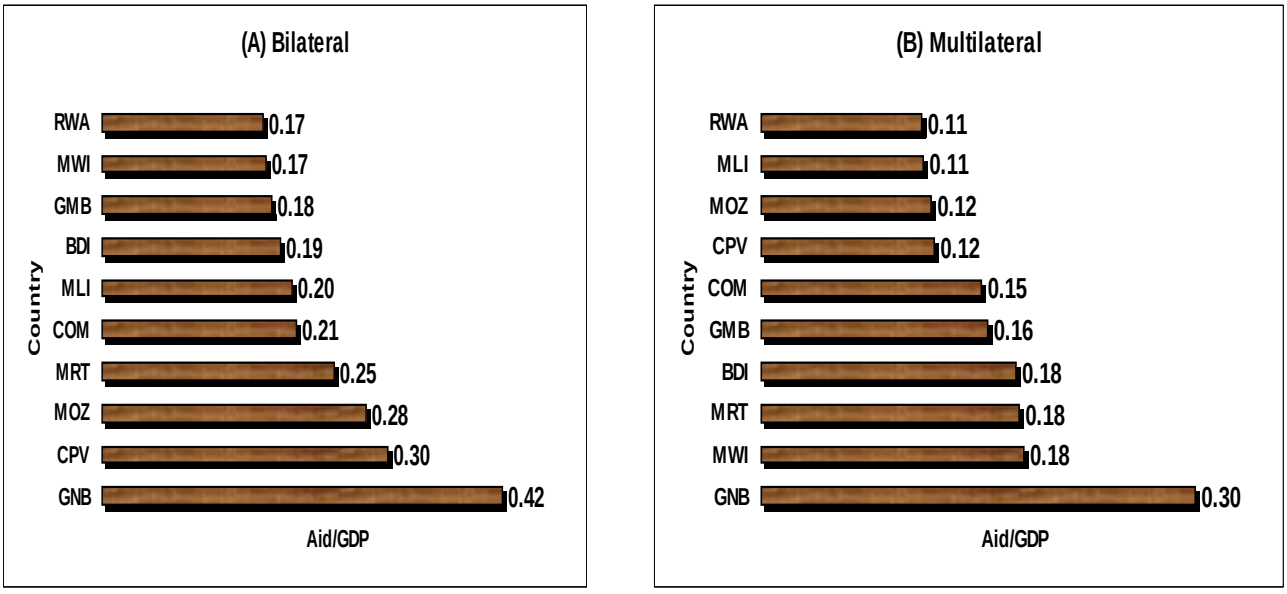
Source: OECD (2006)

Figure B3: Distribution of Social Sector ODA Commitments to Africa among Sub-sectors (Percentage of Total ODA to the Sector): 1990-2003



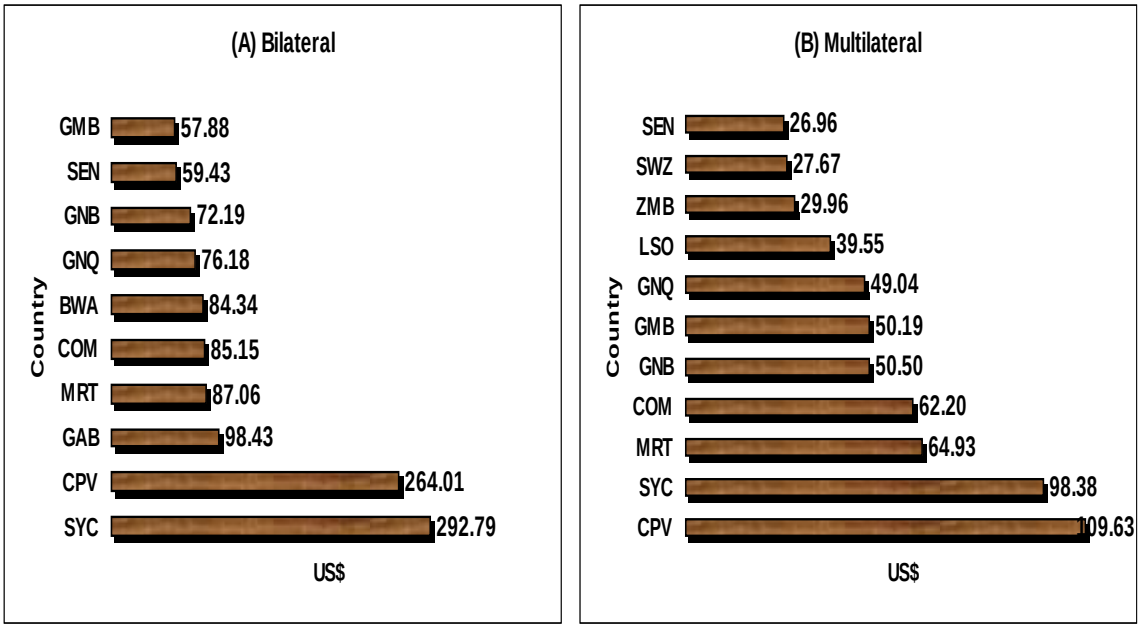
Source: OECD (2006)

Figure B4: Top Ten Bilateral and Multilateral Aid Recipients When Aid is Measured as Net Aid Transfers Relative to GDP



Source: Constructed Based on Data from Roodman (2005) and WB (2006a).

Figure B5: Top Ten Bilateral and Multilateral Aid Recipients When Aid is Measured as Per Capita Net Aid Transfers



Source: Constructed Based on Data from Roodman (2005) and WB (2006a).

Figure B6: A Scatter Plot of Bilateral NAT (Net Aid Transfers) and Economic Growth for the Sample Countries (Based on Four Year Averages)

Figure B7: A Scatter Plot of Multilateral NAT (Net Aid Transfers) and Economic Growth for the Sample Countries (Based on Four Year Averages)

Figure B9: Regression Fit of Bilateral Aid on Multilateral Aid

ANNEX C

C1: Robustness Checks of Equation (3.3) in Table (4.3) to the Inclusion of Squared Terms for Aid

Regression 1

```
xtabond grgdppc lninitgdppc fdi popgr lifeeab nns bilgdpr bilg2 mulgdpr mulg2 d1
d2 d3 d4 d5 d6, lags(1) maxldep(3) maxlags(3) artests(2)
Arellano-Bond dynamic panel-data estimation     Number of obs      =       189
Group variable (i): ctry                        Number of groups   =        41
                                                Wald chi2(14)      =    112.40
Time variable (t): period                       Obs per group: min =         1
                                                               avg =  4.609756
                                                               max =         5
One-step results
------------------------------------------------------------------------------
   D.grgdppc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     grgdppc |
         LD. |   .1939455   .0805507     2.41   0.016      .036069    .3518219
 lninitgdppc |
         D1. |  -1.670215   1.416375    -1.18   0.238     -4.44626    1.105829
         fdi |
         D1. |   .3833147   .0606343     6.32   0.000     .2644737    .5021557
       popgr |
         D1. |  -.0291369   .2347967    -0.12   0.901      -.48933    .4310561
     lifeeab |
         D1. |  -.0484456   .0774304    -0.63   0.532    -.2002064    .1033152
         nns |
         D1. |   .1234367   .0333314     3.70   0.000     .0581084     .188765
     bilgdpr |
         D1. |   18.04163   14.54896     1.24   0.215    -10.47381    46.55706
       bilg2 |
         D1. |  -17.31267   26.48287    -0.65   0.513    -69.21814    34.59281
     mulgdpr |
         D1. |  -17.37497   16.91648    -1.03   0.304    -50.53066    15.78071
       mulg2 |
         D1. |   45.42541   47.61662     0.95   0.340    -47.90145    138.7523
          d3 |
         D1. |  -.2709387   .5248297    -0.52   0.606    -1.299586    .7577085
          d4 |
         D1. |   -1.65166   .5033559    -3.28   0.001    -2.638219   -.6651006
          d5 |
         D1. |   .1224739   .5281403     0.23   0.817     -.912662     1.15761
          d6 |
         D1. |  -1.381667   .5390436    -2.56   0.010    -2.438174   -.3251613
       _cons |   .4765317   .1795417     2.65   0.008     .1246364     .828427
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(11) =    12.11      Prob > chi2 = 0.3556
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z =  -4.02   Pr > z = 0.0001
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =  -0.20   Pr > z = 0.8409
```

C2: Robustness Checks of Equation (3.3) in Table (4.3) to the Inclusion of Only One Type of Aid at a Time, and to the Alternative of Using Aid Per Capita

Regression 1

```
xtabond grgdppc mulgdpr lninitgdppc fdi popgr lifeeab nns d1 d2 d3 d4 d5 d6 d7,
lags(1) maxldep(3) maxlags(3) artests(2)
Arellano-Bond dynamic panel-data estimation     Number of obs      =       189
Group variable (i): ctry                        Number of groups   =        41
                                                Wald chi2(11)      =    108.24
Time variable (t): period                       Obs per group: min =         1
                                                               avg =  4.609756
                                                               max =         5
One-step results
------------------------------------------------------------------------------
   D.grgdppc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     grgdppc |
         LD. |   .1993874   .0806108     2.47   0.013     .0413932    .3573816
     mulgdpr |
         D1. |   1.093937   6.764997     0.16   0.872    -12.16521    14.35309
 lninitgdppc |
         D1. |  -1.865715   1.406153    -1.33   0.185    -4.621724     .890295
         fdi |
         D1. |     .38119   .0601732     6.33   0.000     .2632528    .4991273
       popgr |
         D1. |  -.0596187   .2349087    -0.25   0.800    -.5200314     .400794
     lifeeab |
         D1. |  -.0794045   .0750787    -1.06   0.290    -.2265562    .0677471
         nns |
         D1. |   .1205893      .0331     3.64   0.000     .0557144    .1854642
          d3 |
         D1. |  -.2512917   .5223878    -0.48   0.630    -1.275153    .7725696
          d4 |
         D1. |  -1.798735   .4964964    -3.62   0.000     -2.77185   -.8256201
          d5 |
         D1. |  -.0767174   .5178124    -0.15   0.882    -1.091611    .9381763
          d6 |
         D1. |  -1.478892    .537751    -2.75   0.006    -2.532865   -.4249199
       _cons |   .2723315    .141124     1.93   0.054    -.0042665    .5489295
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
        chi2(11) =    11.34      Prob > chi2 = 0.4150
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
        H0: no autocorrelation   z =  -4.11   Pr > z = 0.0000
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
        H0: no autocorrelation   z =  -0.40   Pr > z = 0.6866
```

Regression 2

```
xtabond grgdppc bilgdpr lninitgdppc fdi popgr lifeeab nns d1 d2 d3 d4 d5 d6 d7,
lags(1) maxldep(3) maxlags(3) artests(2)
Arellano-Bond dynamic panel-data estimation     Number of obs      =       189
Group variable (i): ctry                        Number of groups   =        41
                                                Wald chi2(11)      =    112.21
Time variable (t): period                       Obs per group: min =         1
                                                               avg =  4.609756
                                                               max =         5
One-step results
------------------------------------------------------------------------------
   D.grgdppc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     grgdppc |
         LD. |   .1835942   .0789472     2.33   0.020     .0288606    .3383278
     bilgdpr |
         D1. |   8.042243   5.273466     1.53   0.127     -2.29356    18.37805
 lninitgdppc |
         D1. |  -1.505208   1.368972    -1.10   0.272    -4.188344    1.177929
         fdi |
         D1. |   .3873156   .0597357     6.48   0.000     .2702359    .5043954
       popgr |
         D1. |  -.0185258   .2312431    -0.08   0.936     -.471754    .4347024
     lifeeab |
         D1. |  -.0514162   .0764978    -0.67   0.502     -.201349    .0985167
         nns |
         D1. |   .1223017   .0327364     3.74   0.000     .0581394     .186464
          d3 |
         D1. |  -.2679802   .5164738    -0.52   0.604     -1.28025    .7442898
          d4 |
         D1. |  -1.732072   .4903221    -3.53   0.000    -2.693086   -.7710586
          d5 |
         D1. |   .1153821   .5168567     0.22   0.823    -.8976385    1.128403
          d6 |
         D1. |  -1.355227   .5266603    -2.57   0.010    -2.387462    -.322992
       _cons |   .4299108    .171118     2.51   0.012     .0945257    .7652959
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(11) =    10.75      Prob > chi2 = 0.4644
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z =  -3.95   Pr > z = 0.0001
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =  -0.45   Pr > z = 0.6521
```

Regression 3

```
xtabond grgdppc mulpc bilpc lninitgdppc fdi popgr lifeeab nns d2 d3 d4 d5 d6 d7,
lags(1) maxldep(3) maxlags3) artests(2)
Arellano-Bond dynamic panel-data estimation     Number of obs      =       189
Group variable (i): ctry                        Number of groups   =        41
                                                Wald chi2(12)      =    114.12
Time variable (t): period                       Obs per group: min =         1
                                                               avg =  4.609756
                                                               max =         5
One-step results
------------------------------------------------------------------------------
   D.grgdppc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     grgdppc |
         LD. |   .1944731   .0789713     2.46   0.014     .0396923    .3492539
       mulpc |
         D1. |  -.0302044   .0211022    -1.43   0.152    -.0715639    .0111552
       bilpc |
         D1. |   .0141002   .0085922     1.64   0.101    -.0027401    .0309406
 lninitgdppc |
         D1. |  -1.561037   1.424371    -1.10   0.273    -4.352753    1.230679
         fdi |
         D1. |   .3663616   .0603093     6.07   0.000     .2481576    .4845656
       popgr |
         D1. |  -.0421012   .2333222    -0.18   0.857    -.4994043    .4152019
     lifeeab |
         D1. |  -.0882651   .0729956    -1.21   0.227    -.2313339    .0548037
         nns |
         D1. |   .1241129   .0327565     3.79   0.000     .0599113    .1883145
          d3 |
         D1. |  -.3168594   .5191182    -0.61   0.542    -1.334312    .7005936
          d4 |
         D1. |   -1.60893   .5029875    -3.20   0.001    -2.594767   -.6230926
          d5 |
         D1. |   -.034232   .5143807    -0.07   0.947      -1.0424    .9739357
          d6 |
         D1. |  -1.453738   .5333892    -2.73   0.006    -2.499162   -.4083144
       _cons |   .3349141   .1558874     2.15   0.032     .0293805    .6404477
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(11) =    11.97      Prob > chi2 = 0.3658
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z =  -3.88   Pr > z = 0.0001
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =  -0.43   Pr > z = 0.6682
```

Regression 4

```
xtabond grgdppc mulpc lninitgdppc fdi popgr lifeeab nns d2 d3 d4 d5 d6 d7, lags(1)
maxldep(3) maxlags(3) artests(2)
Arellano-Bond dynamic panel-data estimation     Number of obs      =       189
Group variable (i): ctry                        Number of groups   =        41
                                                Wald chi2(11)      =    110.24
Time variable (t): period                       Obs per group: min =         1
                                                               avg =  4.609756
                                                               max =         5
One-step results
------------------------------------------------------------------------------
   D.grgdppc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     grgdppc |
         LD. |   .2071321   .0795301     2.60   0.009     .0512561    .3630082
       mulpc |
         D1. |  -.0242127   .0202116    -1.20   0.231    -.0638268    .0154014
 lninitgdppc |
         D1. |  -2.150777   1.366807    -1.57   0.116     -4.82967    .5281161
         fdi |
         D1. |   .3717228   .0606236     6.13   0.000     .2529027    .4905429
       popgr |
         D1. |  -.0696538   .2347418    -0.30   0.767    -.5297394    .3904317
     lifeeab |
         D1. |  -.0948898   .0733578    -1.29   0.196    -.2386685     .048889
         nns |
         D1. |   .1200198   .0330405     3.63   0.000     .0552615    .1847781
          d3 |
         D1. |  -.2953433   .5224818    -0.57   0.572    -1.319389    .7287022
          d4 |
         D1. |  -1.792023   .4938312    -3.63   0.000    -2.759914   -.8241312
          d5 |
         D1. |   -.211031   .5081653    -0.42   0.678    -1.207017    .7849547
          d6 |
         D1. |  -1.611296   .5313726    -3.03   0.002    -2.652767   -.5698251
       _cons |   .2098431   .1423829     1.47   0.141    -.0692224    .4889085
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(11) =    11.83      Prob > chi2 = 0.3764
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z =  -4.10   Pr > z = 0.0000
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =  -0.22   Pr > z = 0.8289
```

Regression 5

```
xtabond grgdppc bilpc lninitgdppc fdi popgr lifeeab nns d2 d3 d4 d5 d6 d7, lags(1)
maxldep(3) maxlags(3) artests(2)
Arellano-Bond dynamic panel-data estimation     Number of obs      =       189
Group variable (i): ctry                        Number of groups   =        41
                                                Wald chi2(11)      =    111.86
Time variable (t): period                       Obs per group: min =         1
                                                               avg =  4.609756
                                                               max =         5
One-step results
------------------------------------------------------------------------------
   D.grgdppc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     grgdppc |
         LD. |   .1894454   .0790673     2.40   0.017     .0344763    .3444145
       bilpc |
         D1. |   .0111599   .0080683     1.38   0.167    -.0046538    .0269735
 lninitgdppc |
         D1. |  -1.444203   1.424258    -1.01   0.311    -4.235696    1.347291
         fdi |
         D1. |    .379665   .0597717     6.35   0.000     .2625146    .4968153
       popgr |
         D1. |  -.0321917   .2337592    -0.14   0.890    -.4903514     .425968
     lifeeab |
         D1. |  -.0759323   .0726686    -1.04   0.296    -.2183601    .0664956
         nns |
         D1. |   .1231941   .0328228     3.75   0.000     .0588625    .1875256
          d4 |
         D1. |  -1.140766   .9646747    -1.18   0.237    -3.031494    .7499615
          d5 |
         D1. |   .8165643   1.493615     0.55   0.585    -2.110867    3.743996
          d6 |
         D1. |  -.3438992   2.046966    -0.17   0.867    -4.355878     3.66808
          d7 |
         D1. |   1.262273   2.590348     0.49   0.626    -3.814717    6.339262
       _cons |   .1231841   .5818269     0.21   0.832    -1.017176    1.263544
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(11) =    11.15      Prob > chi2 = 0.4308
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z =  -3.94   Pr > z = 0.0001
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =  -0.55   Pr > z = 0.5834
```

C3: Diagnostic Tests for the Aid-Policy Interaction Terms

Regression 1a

```
regress polinetbilg bilgdpr
```

```
      Source |       SS       df       MS              Number of obs =     280
-------------+------------------------------           F(  1,   278) =    0.44
       Model |  .015932357     1  .015932357           Prob > F      =  0.5082
    Residual |  10.0929595   278   .03630561           R-squared     =  0.0016
-------------+------------------------------           Adj R-squared = -0.0020
       Total |  10.1088918   279  .036232587           Root MSE      =  .19054
------------------------------------------------------------------------------
 polinetbilg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     bilgdpr |  -.0715068   .1079429    -0.66   0.508     -.283996    .1409825
       _cons |   .0383044   .0167395     2.29   0.023     .0053522    .0712567
------------------------------------------------------------------------------
```

Regression 1b

```
regress polinetbilg polinet
```

```
      Source |       SS       df       MS              Number of obs =     280
-------------+------------------------------           F(  1,   278) =  147.11
       Model |  3.49819813     1  3.49819813           Prob > F      =  0.0000
    Residual |   6.6106937   278  .023779474           R-squared     =  0.3461
-------------+------------------------------           Adj R-squared =  0.3437
       Total |  10.1088918   279  .036232587           Root MSE      =  .15421
------------------------------------------------------------------------------
 polinetbilg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     polinet |   .0653889   .0053912    12.13   0.000     .0547762    .0760016
       _cons |  -.0161119   .0099745    -1.62   0.107    -.0357471    .0035233
------------------------------------------------------------------------------
```

Regression 2a

```
regress polinetmulg mulgdpr
```

```
      Source |       SS       df       MS              Number of obs =     280
-------------+------------------------------           F(  1,   278) =    0.20
       Model |  .002958364     1  .002958364           Prob > F      =  0.6526
    Residual |  4.04945858   278  .014566398           R-squared     =  0.0007
-------------+------------------------------           Adj R-squared = -0.0029
       Total |  4.05241695   279  .014524792           Root MSE      =  .12069
------------------------------------------------------------------------------
 polinetmulg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     mulgdpr |   .0452281   .1003595     0.45   0.653    -.1523331    .2427893
       _cons |   .0177171    .010625     1.67   0.097    -.0031986    .0386328
------------------------------------------------------------------------------
```

Regression 2b

```
regress polinetmulg polinet
```

```
      Source |       SS       df       MS              Number of obs =     280
-------------+------------------------------           F(  1,   278) =  143.93
       Model |   1.3823984     1   1.3823984           Prob > F      =  0.0000
    Residual |  2.67001855   278  .009604383           R-squared     =  0.3411
-------------+------------------------------           Adj R-squared =  0.3388
       Total |  4.05241695   279  .014524792           Root MSE      =    .098
------------------------------------------------------------------------------
 polinetmulg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     polinet |   .0411054   .0034262    12.00   0.000     .0343607      .04785
       _cons |  -.0078651   .0063391    -1.24   0.216    -.0203438    .0046136
------------------------------------------------------------------------------
```

Correlation 1

```
pwcorr polinetbilg bilgdpr polinet, print(10) star(5)
```

```
             | poli~ilg  bilgdpr  polinet
-------------+---------------------------
 polinetbilg |   1.0000
     bilgdpr |            1.0000
     polinet |   0.5883* -0.2789*  1.0000
```

Correlation 2

```
pwcorr polinetmulg mulgdpr polinet, print(10) star(5)
```

```
             | poli~ulg  mulgdpr  polinet
-------------+---------------------------
 polinetmulg |   1.0000
     mulgdpr |            1.0000
     polinet |   0.5841* -0.2751*  1.0000
```

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all source materials used for the thesis have been duly acknowledged.

Declared by:

Name: _____

Signature: _____

Date: _____

Confirmed by Advisor:

Name: _____

Signature: _____

Date: _____

Place and Date of Submission: _____