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A close look at foreign aid fungibility and government spending: Evidence from Sub Saharan Africa

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Eastern Illinois University

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A CLOSE LOOK AT FOREIGN AID FUNGIBLITY AND

GOVERNMENT SPENDING

(EVIDENCE FROM SUB SAHARAN AFRICA)

(TITLE)

BY

SEIFU ZERIHUN GEBREHANNA

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Abstract

Foreign aid in different times and at different places has been highly effective, totally ineffective, and everything in between. Primarily, aid is intended to boost public spending in social and economic sector of the recipient government. However, foreign aid, in some cases used for 'non-productive' or 'wasteful' forms of recurrent expenditure such as enlarging the army or paying off the debts of parastatal organizations, increases of salaries of government officials. Hence, aid has a fungible portion in which it will be difficult to determine its impact on government spending. In this study, nine countries panel data were used for the annual observation of 1980-2003 to investigate the effect of foreign aid on aggregate and sectoral public spending.

At aggregate level, foreign aid is found to be fungible for both total foreign aid and concessional loans. The study also found that a good part of the non fungible portion of aid is going to government consumption. In sectoral analysis, aid is fully fungible in educational sector and partially fungible in agriculture. While in health sector, aid is fully non fungible. Still, fungibility may not be inherently bad for development but results in the study reveal that aid has no significant effect on economic growth. Perhaps, this is due to the fact that the non fungible portion of foreign aid finances government consumption over public investments.

To my grandmother

(1913-2006)

Acknowledgment

I would like to thank my thesis adviser, Dr. Mukti Upadhyay for his guidance, patience and being a true mentor. Without his support, this thesis would not have been possible. I have greatly benfited from his profound knowledge on develeopment economics. I also wish to acknowledge the excellent cooperation of Dr. Eric Hake and Dr. Hui Li in my thesis comettee.

To make it complete, I would like to express my appreciation to my two loving parents who have always been my biggest advocates. I am also truly grateful for my friends for their unfailing support.

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Abbreviations

CPI   Consumer Price Index

DAC   Development Assistance Committee

EC   European Council

FDI   Foreign Direct Investment

GDP   Gross Domestic Product

GFS   Government Finance Statistics (of the IMF)

GLS   Generalized Least Squares

GNP   Gross National Product

IBRD   International Bank for Reconstruction and Development (of the World Bank)

IDA   International Development Agency (of the World Bank)

IDS   International Development Statistics, (of the OECD)

IFS   International Financial Statistics, (of the IMF)

IFAD   International Finance for Agricultural Development

IGLS   Iterative Generalized Least Square

IMF   International Monetary Fund

ODA   Official Development Assistance

OECD Organization for Economic Cooperation and Development

OLS   Ordinary Least Squares

SAP   Structural Adjustment Program

SSA   Sub Saharan Africa

UN   United Nations

UNDP United Nations Development Program

WDI   World Development Indicator

1 Introduction

The practice of sharing wealth with impoverished people has emerged as a norm among industrialized countries and nearly every state in the world has participated as a donor and/or recipient of foreign aid since World War II. The World Bank estimates the aid flow since 1960 to nearly $2 trillion (measured in 1995 dollar) and has flown from rich to poor countries as foreign aid.

Essentially, foreign aid is directed to alleviate resource hurdles in a needy country and in most cases designed to stimulate policy reform. According to the World Bank (2001), donors have three basic instruments that they can use to encourage the adoption of good economic policies in developing countries: money /technical assistance, conditionality, and policy dialogue. To this effect, donors created permanent aid bureaucracies and international development agencies established explicit qualitative standards for aid flows that recipients are required to adhere.

In retrospect, countries seek foreign aid when they are faced with low level of savings that do not permit a margin over subsistence needs which consequently makes it difficult to increase their saving rates. Thus the low level of saving and the required increase in investment precipitate the widening resource gap. At frequent times such economies have never been out of budgetary and balance of payment deficit. In fact, these deficits have been widening overtime. These countries are usually very poor with little or no foreign reserve to relief the capital demand.

Sub Saharan African (SSA) countries come into this category where foreign capital is overshadowed by widening resource gaps. In the 1990s, growth in the SSA economies was not fast enough to reduce poverty. The yearly average GNP growth amounted to 4% with the economic base dominated by the subsistence agricultural sector which is characterized by low productivity, limited use of modern technology, very low marketable surplus and industrial sector at its infancy.

Despite the dramatic increase in foreign aid over the past three decades, economic indicators for SSA economies have been below satisfactory level. In many developing countries foreign aid is an important source of revenue. According to the World Bank, the 15 most aid-dependent SSA economies the mean value of aid as share of central government expenditures for the period 1975–95 was averaged 53.8 percent (World Bank, 2003). In spite of this vast resource transfer, a number of empirical studies have shown that the macroeconomic effects of aid are, at best, ambiguous.

Several possible contentions have been directed to address the fundamental question: "what happened to the windfall of aid in this region?" The World Bank, for instance, reports that the rapid increase in foreign capital, mainly due to large concessional flows, has greatly expanded the opportunities of malfeasance (World Bank, 1989, pp. 27, 61), and Klitgaard (1990) gives a vivid description of aid-related corruption in Africa.

Boone (1996) concluded that aid primarily goes to consumption and that there is no relationship between aid and growth, nor does it benefit the poor as measured by improvements in human development indicators. Burnside and Dollar (1997) found that

aid has a positive impact on growth in countries with ''good'' fiscal, monetary and trade policies, while Svensson (1998a) shows that the long-run growth impact of aid is conditional on the degree of political rights. Svensson (2000) showed that an increase in government revenues may lower the provision of public goods and did not necessarily lead to increased welfare.

However in history, foreign aid in different times and at different places has been highly effective, totally ineffective, and everything in between. In majority cases aid works to boost public spending in the recipient government. In the light of this, government officials that regulate the public spending will basically have the role of determining the fate of the foreign aid and consequently its effectiveness. The spending pattern of a government could be detrimental to nations economy if it is ill conceived and useful if it is prudently designed. Thus the concern of the paper would fundamentally be studying the spending pattern of the public sector in the presence of foreign aid and specifically deal with the issue of foreign aid fungibility: hence keen in producing valuable insight from group of countries hindsight.

If 10 million dollar is given as aid to a developing country, say to help build a highway, the question that floats is 'does every dollar of that grant contribute to the realization of building a highway?' and What if the government's spending plans, prior of the grant of aid, contained any sum for building that highway, then that sum can be switched to any other purpose: other capital projects, 'productive' forms of recurrent expenditure which will augment income in the future, 'non-productive' or 'wasteful' forms of recurrent expenditure such as enlarging the army or paying off the debts of parastatal

organizations, increase of salaries of government officials. This is a classical example of aid fungibility: earmarked resources are diverted, directly or indirectly, to other projects, sectors or uses.

The paper will analyze the effect of foreign aid on aggregate as well as sectoral public spending in seven heavily aid indebted African countries. In aggregate level, government spending was treated for both capital and recurrent expenditure (government consumption) in order to see the direct impact of foreign financial flow. Furthermore examine the issue of aid fungibility in light of good policy environment to address aid effectiveness. To this end, the paper will provide an empirical background to the consensus on 'aid boost government consumption and not necessarily result in better economic performance'.

The paper proceeds as follow. In the next chapter, literatures written on foreign aid and fungiblity were reviewed. In Chapter 3, the sampled countries political and economic backgrounds are outlined. Under Chapter 4, the methodology and model framework are discussed. Following is the chapter that discuss about the data and the source of data. Chapter 6 details the empirical findings. Chapter 8 concludes.

2 *Literature Review*

In this chapter, pertinent literatures on foreign aid fungiblity are discussed extensively. The literatures, which are included for this discussion, are selected for the merit they contributed to study of foreign aid relationship to public spending in developing nations.

Earlier comprehensive aid fungiblity studies start from Pack and Pack (1990, 1993) investigation on foreign aid and public expenditure in selected country; first in 1990 a study on Indonesia and later in 1993 on Dominican Republic. Basically, they noted that fungibility is an important phenomenon while it remained to be largely theoretical. They used three types of equations to estimate non development current expenditure, development expenditures and revenue. They included GDP, and total categorical development aid per capita for each sector they considered in both recurrent and development expenditure. Other categorical aid to other sectors and time, which is included to capture the possibility that expenditure may benefit from scale economies or learning by doing, are in the later estimating function. The equations are not independent and hence this implies that the error terms are also not independent. To this end, they use seemingly unrelated regression (SUR) (Zellener, 1962).

For Indonesia, five categories that were estimated for period 1966 to 1986 are agriculture and irrigation, industry, mining and electric power, transportation and tourism, education, health, housing, and water supply, and other development expenditures. For Dominican Republic (DR), the period observed was from 1968 through 1986 for agriculture, public works, president/finance, health and education and all other real investment expenditures.

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They reached to strikingly different results in terms of sectoral fungibility at the national level. In Indonesia, they find significant fungibility for the education, health, housing, and water supply sectors; however, they find no fungibility in the two largest aid sectors: the mining and electricity sector and the transportation and tourism sector. This is in stark contrast to the Dominican results, in which Pack and Pack find fungibility in all aid-recipient sectors. In the Dominican Republic, in fact, each additional dollar in development assistance results in a 5 cent *decrease* in development expenditure. Pack and Pack find that aid in Indonesia is largely spent on its intended targets but that the government allocates additional revenues to the areas least favored by aid (such as current expenditures), partly confirming the fungibility hypothesis. In the Dominican Republic, they find a major shift of funds away from development expenditures and a trend toward the use of aid for debt repayments and deficit reduction, further confirming the hypothesis.

A Panel Data Analysis of the Fungibility of Foreign Aid, Tarhan Feyzioglu, Vinaya Swaroop, and Min Zhu (1998)

Feyzioglu et al 1998 article studies the relationship between foreign aid and aggregate as well as sectoral public spending in recipient countries. In particular, it focuses on the relationship between aid and components of public expenditure: current and capital expenditures as well as education, health, infrastructure, and defense expenditures. It also analyzes the impact of foreign aid on some human development indicators namely infant mortality and school enrollment.

The focus of the empirical analysis is the link between foreign aid and government spending. Hence, they drew three models to estimate the impact of aggregate foreign aid on total government spending to examine whether foreign aid is associated with any effort to mobilize resources on the part of the recipient country, to estimate the effect of foreign aid on the government's investment and consumption spending and the third to estimate the impact of earmarked sector specific aid on components of government spending.

They basically derived their models by maximizing the utility function of the agent which is to be similar to the Stone-Geary form (Stone 1954) subjected to budget constraint that the government faces. In the utility function, there is a parameter that reflects the subsistence quantities of various public goods—by social and other variables which capture the underlying differences in preferences across countries and at the same time reduce the problem of simultaneity. Hence they included single period lagged variables of military expenditure, infant mortality, average schooling in labor force, share of agriculture output and the sizes of governments.

To this end, they constructed a panel database with information along three dimensions: the aid variable, the public spending variable, and control variables. They used two variables for foreign aid—official development assistance (ODA) and concessionary loans. For total aid to a country, they use the series on annual net disbursement of ODA that is put together by the Organization of Economic Co-operation and Development (OECD 1994). For sectoral aid, they used the net disbursement of concessionary loans from all bilateral and multilateral sources—a component of ODA—by sector, over time,

and across countries. Hence for their analysis of sectoral aid fungibility, they used concessional lending to developing countries.

Their result was based on a sample of 128 observations: annual time-series data from 1971 through 1990 on 14 countries for aggregate fungibility results.

Their results indicate that they found evidence of foreign aid fungibility at the aggregate level for both total official aid and concessional loans. In addition, net disbursement of concessional loan stimulates total government expenditures better than total ODA.

Their sectoral model result indicates that loans to the transport and communication sector are fully nonfungible, that is, a dollar in concessionary loans given to the sector is fully spent in the sector. They give a possible explanation for this as donors' restrictions designed to reduce fungibility have been more effective in this sector than in others. And two reasons for this. First, concessionary loans to this sector frequently have matching requirements; the recipient country has to finance a significant part of the project from its own sources in order to receive foreign assistance. Second, transport and communication investments are lumpy in nature, providing little scope for reduced government spending.

In addition, they found out loans to the transport and communication sector appear to stimulate public spending in the health and energy sectors and to dampen public spending on education. Loans to the agriculture and energy sectors are fungible in the sample countries. However, for the education and health sectors, they didn't reject any of the null

expenditure of domestic resources and foreign aid, independently of each other, they controlled the impact of aid on total domestic resources.

On the macro level, they find that an additional dollar in ODA increases government spending by 89 cents, concluding that the remaining 11 cents is either extra-budgetary aid or is used as tax relief. This provides some evidence for a low level of macro fungibility in Africa. The study's model was designed to assume that governments have the same incentive to divert aid toward tax reduction as toward other expenditures; the amount and direction of diversions will depend on the productivity of expenditures and the costs of taxation.

After disaggregating the additional spending, the authors find that it divides almost evenly between capital expenditures (28 percent), current expenditures (30 percent) and loan principal repayments (31 percent). Additionally, they note that the impact upon different types of spending is the same for concessionary loans and grants, with the exception that only grants are used for loan principal repayments.

The authors conclude that education aid demonstrates near-total non-fungibility, aid to the energy sector and the transportation and communication sectors is partially fungible, and that there is no evidence that aid to the three remaining sectors (agriculture, industry and health) increases spending in those sectors at all. The results of the Devarajan, Rajkumar and Swaroop research regarding these sectors should therefore be read with the caveat that their analysis was based only on concessionary loan data, and the number of observations for these sectors may be non-representative of ODA as a whole.

Special Interest Politics and Aid Fungibility by Sajal Lahiri and Pascalis Raimondos-Miller

Lahiri and Miller (2000) developed a stylized model of foreign aid in which a donor gives aid for the benefit of a specific group in a recipient country. However, an organized interest group lobbies the recipient government (with political contributions and/or bribes) on behalf of the donor, and diverts part of the aid away from the target group. In other words, they tried to explain the allocation of aid within the recipient country by a domestic political process. Basically aid is designed by the donor to go and help the poor in the recipient country. However, rich people in the recipient country lobby the government by making political contributions to political party in power (bribes) and obtain a part of it. Hence the allocation of this aid between poor and rich in the recipient country is endogenous. Although in deciding the allocation, the recipient government takes consideration possible sanctions that the donor country may impose by lowering the volume of aid that had to go to the poor.

They implemented similar approach as Dixit, Grossman and Helpman (1997) in specifying political equilibrium, a political contributions approach, which is derived from the common agency problem. Then, they considered two benchmark cases that are when the government is passive and active player, to examine how the behavior of the donor affects the allocation of aid between the poor and rich in the recipient country.

In the case of passive donor, they propose that when aid is exogenous special interest group will have more to lobby for and therefore will make larger political contributions. The government then pays relatively less attention to social welfare and more to its political funds.

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For the case of active donor, they dichotomized the timing of the two governments' decisions into two; the recipient government and the donor act simultaneously; simultaneous game and the recipient chooses the allocation of aid taking into account the reaction of the donor; sequential game. Thus they proposed that the total amount of aid reaching the poor people in the recipient country, and thus their welfare level, is larger in the sequential game than in the simultaneous game. The proportion of aid going to poor is also higher in the sequential game. The donor is better of in the sequential game than in the simultaneous game provided its reaction function is sufficiently elastic.

3 *Economic Background of Sample Countries*

The sub Sahara Africa (SSA) is the most widely poverty stricken and heavily aid dependent region in the world. Although the region has received substantial aid in the past five decades, results were varied across countries enormously. In some cases, aid has contributed to positive economic endeavors and helped countries from their misty past to bright future. Certainly, in many other countries aid bail out rent seeking governments and in turn exacerbating economic progress. Recently, as natural resource, aid is also coined as a curse than helpful hand (Simeon et al 2005, Boone, 1995). Despite some nations like Botswana, Ghana and Mauritius defy the paradigm by demonstrating an impressive economic growth and showing successful proven track record of aid success. On the other hand, aid in Cameroon, Senegal and Zambia had an overall mediocre impact in the past. For countries like Ethiopia, Kenya and Sierra Leon aid had minimal effect in economic progress at worst created a rent seeking corrupted government.

Mainly, foreign aid impact varies across nations accordingly to its utilization by the public sector, which oversees the allocation of aid. Government decision makers will be faced with important tasks of allocating aid in either in capital projects, 'productive' form of recurrent expenditure, 'non-productive' or 'wasteful' as it is mentioned in Chapter 1; these fiscal adaptations to aid inflows will in turn exert an influence on the rest of the macro economy. Hence, the role of government is crucial in this respect.

For discussion purpose the countries are dichotomized into three categories viz., fast grower, mediocre grower and minimal economic grower. Under fast grower category, Botswana, Mauritius and Ghana are listed as leading growing countries in sub-Saharan

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countries in their overall performance in the past two decades. Cameroon, Senegal and Zambia are the other category of countries with a mediocre economic performance in the sample period. The last group of countries are Ethiopia, Kenya and Sierra Leon with very disappointing performance for the majority of the time period.

The country mix in the study is an interesting one in which all geographical locations and policy experiences are tried to be covered in the study. Botswana, Mauritius and Ghana, even though the latter haven't shown a consistent economic performance as the two, impressive economic growth has been mustered. Aid has its role in helping building up a much acclaimed good governance rather than rent seeking one.

Below is the sampled countries economic performance and political orientation is briefly outlined, (Sources: UN Economic Commission for Africa, Chernoff and Warner 2002, Aryeetey, 2001)

Botswana is a landlocked predominantly tropical country which gained independence in 1966 from colonial Britain. It started merely from scratch with only 12 kilometers of paved road, 22 Batswana who had graduated from University and 100 from secondary school. State and private predation have been quite limited. Despite the large revenues from diamonds, this has not induced domestic political instability or conflict for control of this resource. The government sustained the minimal public service structure that it inherited from the British and developed it into a meritocratic, relatively non-corrupt and efficient bureaucracy. The parastatal sector has never been large and to the extent it has existed, it has faced hard budget constraints. Botswana had a PPP-adjusted income per

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capita of $11,200 in 1998, almost four times the African average, and between 1965 and 1999, it grew at an annual rate of 9 percent and 8 percent in real growth.

Major problem faced by Botswana currently is the AIDS epidemic which is believed to be the highest AIDS prevalence in the world with 25-30% of adult being HIV positive.

Ghana's economy has seen growth in the region of 4%-5.5% for almost two decades. Despite Ghana's growth has been one of unevenness. Ghana has adopted various reform policies in the past four decades since independence in 1957. The main reforms in the sample period include the adoption of Structural Adjustment Programme (SAP) and Economic Recovery Program (ERP) in 1980's. The economy responded positively to ERP/SAP soon after inception. It recovered from its negative growth rate of about 5% in 1983 to a hefty positive rate of 8% in 1984. The favorable growth has continued since that time, with relatively little variance, even if there is a slight slowdown in the rate of growth since 1990.

Mauritius: since independence in 1968, Mauritius has developed from a low-income, agriculturally based economy to a middle income diversified economy with growing industrial, financial, and tourist sectors. Mauritius is geographically remote. Its climate is tropical, with attendant disease burdens and problems with tropical agriculture. The size of the domestic market is tiny, with little scope for exploiting domestic economies of scale. Nevertheless, Mauritius grew and recorded a sustainable fast economic growth in more than two decades with annual growth has been of the order of 5% to 6%. This has

been reflected in increased life expectancy, lowered infant mortality and a much improved infrastructure.

Estimated at $16.28 billion for 2005, Mauritius has the 2nd highest GDP per capita in Africa only second to Equatorial Guinea.

Cameroon and Senegal

In colonial times, western Cameroon and eastern Cameroon were administered separately by Britain and France respectively. At the time of independence in 1960, the northern part of western (British) Cameroon decided to be part of neighboring Nigeria, whereas the southern part of western (British) Cameroon and French Cameroon joined to form the Republic of Cameroon.

Because of its oil resources and favorable agricultural conditions, Cameroon has one of the best-endowed primary commodity economies in sub-Saharan Africa. Its economy was annually growing of an average of 3% -4% in the past three decades. The development of the oil sector led to rapid economic growth between 1970 and 1985. Growth came to an abrupt halt in 1986, precipitated by steep declines in the prices of major exports: petroleum, coffee and cocoa. Since 1990, the government has embarked on various IMF and World Bank programs designed to spur business investment, increase efficiency in agriculture, improve trade, and recapitalize the nation's banks. It was after the devaluation of CFA franc in 1994 that the economy began to recover. Cameroon has extensive deposits of natural gas, bauxite, iron ore, uranium rutile, cobalt and nickel which are awaiting exploitation. Timber from natural forests has become one of the

leading export commodities. In the political scene, Cameroon embarked in a multiparty democratic reform in the 1990s after a period of an authoritarian rule.

A former French colony, Senegal gained its independence in 1960. Its economy is the fourth largest in Western Africa, after those of Nigeria, Ghana and Côte d'Ivoire. The agricultural sector contributes one-fifth of GDP and supports 75% of the working population. The marine fishing industry is the leading exporter, followed by groundnuts and phosphate products. Tourism is also a major foreign exchange earner. In January 1994, Senegal undertook an economic reform program with the support of the international donor community. This reform began with a 50% devaluation of Senegal's currency, the CFA franc, which is linked at a fixed rate to the French franc. Government price controls and subsidies have been steadily dismantled. This brought a real growth in GDP of 5.6% in 1996 and 4.7% in 1997 after a sluggish economic growth in the years before. In the political scene, multiparty system was restored in 1970 in Senegal after many years of a single party system, and long before the present wave of democratization in Africa.

Kenya

A former British colony, Kenya gained its independence in 1963, and since then the country has become one of the more economically advanced countries in sub-Saharan Africa. The economy is based mainly on tourism and the export of a wide range of agricultural and manufactured goods. Tea is the primary export, followed by coffee and other commodities such as cut flowers for export to the European market and livestock

products. Kenya has a well-developed tourist infrastructure and the tourism sector is the largest source of foreign exchange.

Kenya had a $420 GDP per capita in 2003 and annual average real GDP growth of 3% from 1980 to 2003.

Sierra Leon is one of best example of ample natural resources turned to be curse to the people. Sierra Leon gained its independence in 1961. However since the dawn of independence days the country has been impoverished by ethnic strife, mismanagement, corruption and war. Sierra Leone's economy centers on substantial mineral, agricultural, and fishery resources. Bauxite, rutile (titanium oxide) and diamonds are the principal exports. However, the economic and social infrastructure is not well developed, and serious social disorders continue to hamper the exploitation of these mineral resources. Most of the mines have been shut down by civil strife. The corrupted Sierra Leone's ruling elites, needing new ways of exercising power, used foreign firms to consolidate power and stave off threats from political rivals. In the process, rulers have found it advantageous to "destroy state agencies, to 'cleanse' them of politically threatening patrimonial hangers-on and use violence to extract resources from people under their control"

Sierra Leon has seen a lot of down turns in the past three decades and the economy had an annual average growth rate of 0.75% from 1980-2003. The country has one of the poorest living conditions in the world for most of the nineties and well into the millennium had a ranking of 177 of 177 countries.

Ethiopia and Zambia

Ethiopia is a landlocked country in East Africa, the second populous country in Africa with over 70 million people of whom 80% live in rural areas. Its economy is based on agriculture, which accounts for more than half of GDP, 90% of exports, and 80% of total employment; coffee generates 60% of export earnings.

The seventeen year civil war (1974-1991) has devastated the economy and the huge cost of the war left little money for maintenance let alone development of the existing infrastructure. In May 1991, a new government started out with implementing IMF/World Bank SAP and free market oriented economic system in its shattered post command Marxist economy. Its development policies, strategies and programs were designed to achieve rapid economic development and poverty reduction within the framework of free market economy. Yet Ethiopian economy has still not developed and it highly depends on foreign aid even to feed its people.

Ethiopia's average annual GDP per capita growth for 1980 to 1992 was about -3 %, however in years post of 1992, a lot of improvements were recorded and in fact GDP per capita has an average annual growth of 2.5 %.

Zambia is a landlocked plateau country in Southern Africa which gained independence in 1964 from British colonial rule. It has a great potential for agricultural development and tourism which has not yet been realized. The economy revolves around the large copper mining industry which was nationalized after independence. The fall in 1970 of the international copper price, combined with ill-advised state policies and the armed conflict

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in neighboring countries, led to economic decline. Zambia was compelled to borrow heavily from abroad until it found itself saddled with a huge debt burden. The democratic elections since 1991 and the promises by government for reforms and rapid development have so far failed to bring economic recovery. Current economic plans focus on structural adjustment programmes, including privatization of state corporations (parastatals) to revive the entire economy.

Zambia had annual GDP per capita of $ 320 and in average the GDP was growing 1.4 % for the time span of 1980 to 2003.

4 Model

4.1 Theoretical Framework

Perhaps the model framework used in the study is extensively implemented in almost all quantitative analysis that examine fungiblity problem. It is in fact an effective method to understand the relationship between aid and aid spending on the face of recipient's choice which is subjected to constraints.

In the study, the relationship of public spending and foreign aid inflow alongside with other controlled variables including a polity variable was estimated using OLS regression model. Two separate regression models are implemented in the study each to see the public spending in macro and sectoral level.

Before discussing the characters of the model, let's scrutinize first the scenario in which this model is established. First suppose that developing governments' decision makers face with homothetic indifference curve, expressing their preference for combinations of spending on public goods. The government buys two public goods (hospitals and military equipments), both normal (non-inferior), in the market to provide to its citizens. Consequently, it pays for these goods by means of domestically generated resources. In addition, foreign donor agencies provide assistance toward the purchase of education.

The mentioned circumstance can be best illustrated using an indifference and budget constraint mapping graph. In the figure below, the budget line $B'B$ represents public spending choices that can be financed by domestic resources mainly from tax revenue. Given the preferences of the recipient-country government, point A represents the optimal

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mix of the two goods, military equipments and hospitals, in the absence of aid. A foreign donor agency gives an amount $\overline{B'C'}$ of earmarked aid to building hospitals assuming price remains constant after aid received. The post-aid budget line is $B'C'C$. The government can now choose A_1 which exhibits the same Military-Hospital ratio as that of A_0 in this case the recipient country treat a portion of the earmarked aid as if it were a pure revenue supplement, then the aid is fungible. However, if the recipient government chose 'D_1' then aid was spent for its intended purpose so aid is fully non-fungible. Anything between the two points is 'aid is partially fungible'.

Military Equipments

B'

C'

A_1

A_0

D_1

U_2

U_1

U_0

B

C

Hospitals
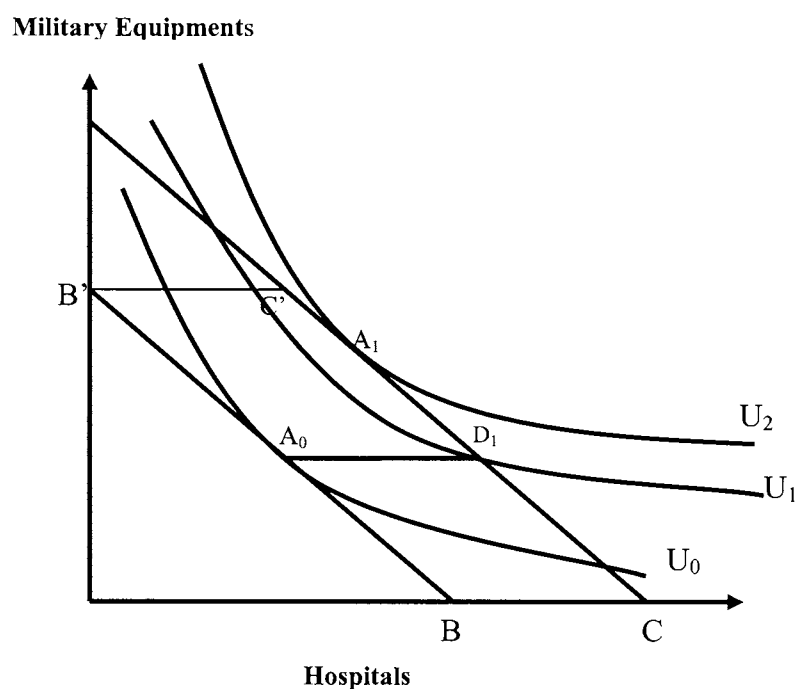
Generally monitoring aid progress is a grueling and complex task faced by donor agencies. It is difficult to precisely monitor the recipient country spends aid funds in the targeted sector and to prevent any switching of funds at the margin especially, the case for all sampled countries, when relative size of own source revenues is significant to aid.

Feyzioglu et al (1998) mentioned another shortcoming in customary aid monitoring of donor agencies which involve closely watching the developing country revenues and treating past years' composition of spending as the pre-aid composition. This may not be meaningful if the change in domestic resources is large relative to foreign aid and if large fluctuations in revenues exist. In such situations, recipient countries can easily switch aid funds among expenditure categories. Other is when there are several sources of aid in a country and donor coordination is not good, monitoring aid becomes extremely difficult. Finally, not all aid goes through the recipient country's budget. In many developing countries, particularly in Sub-Saharan Africa, a portion of foreign aid bypasses the government budget. In such cases, it might be difficult to pinpoint the spending requirement for the government.

Basically, the model adopted for the paper shares its framework from Feyzioglu et al (1998), Pack and Pack (1993) and McGuire (1978), the aid recipient government buys S public goods ($g_1, g_2, \ldots, g_S$) in the market to provide them to its citizens. It pays for these goods with the fungible portion of the foreign assistance and all other sources, at its disposal alongside with purchase from the non fungible portion of the foreign aid. Assuming that, by design, all foreign assistance is earmarked by purpose toward the purchase of K ($\leq S$) specific public goods so that $\phi \, a_k$ is the fungible portion of aid earmarked for good k by the donor will while $(1-\phi) \, a_k$ is the non fungible portion.

One important assumption directly adopted from Feyzioglu et al (1998) is the assumption that aid affects the government's choice of S goods ($g_1, g_2, \ldots, g_s$) only through the fungible portion; public goods purchased from the non fungible part do not affect this choice because in reality governments always leave out a certain portion of aid to its targeted sector. Otherwise government will chose S goods sub optimally to its preference curve as it considers all aid came as a pure lump-sum revenue supplement. In such a case, aid is always fully fungible where in the figure represented by point 'A$_1$'.

Hence the model is estimated from a maximized utility function subjected to a budget constraint. The utility function is derived from Stone-Gary function (Stone 1959) which is a consumer at a given time has to buy a set of "subsistence purchases" (γ) and then allocates remaining spending according to a set of "marginal expenditure shares" (β), irrespective of its price or the consumer's income.

The model implemented below is similar to Feyzioglu et al (1998) adoptions of Stone-Gary function and found it to be appropriate for my study.

$$U\left[c_p, g_1, g_1^{NF}, \ldots g_k, g_k^{NF}, g_{k+1}, \ldots g_s\right] = F(c_p) + H\left(\sum_{k=1}^{K} g_k^{NF}\right) + \prod_{s=1}^{S}(g_s - \gamma_s)^{\beta_s}$$

The budget constraint faced by the government is:

$$p_1 g_1 + p_2 g_2 + \ldots + p_s g_s = G^{Net} + \sum_{k=1}^{k} \phi_k a_k \qquad \text{(b)}$$

Maximizing equation (a) subject to the budget constraint in equation (b) yields, if the solution exists and is interior, the following system of linear expenditure equations useful for the study will be derived:

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$$p_s \bar{g}_s = (1 - \phi_s + \beta_s \phi_s)a_s + \beta_s \left[G^N + \sum_{k \neq s}^{K} \phi_k a_k - \sum_{j=1}^{S} p_j \gamma_j \right] \quad s=1, ..., S$$

Explaining some of the components of the above model:

$p_s \bar{g}_s$ Government purchase of public good from both domestic and foreign source which include the nonfungible spending on public goods.

γ , Minimum quantities of various public goods requirement, by social and other economic variables. These variables also capture the underlying differences in preferences across countries.

G^N , Total government spending net of foreign aid which is equivalent to all source of finance, domestic and foreign, except foreign aid.

a_s , indicates the amount of aid for sector 's'.

β_s refers to the proportion of the spending on the sector from all the government disposable resource, hence $\sum \beta_s$ =1.

If β_s and $(1 - \phi_s + \beta_s \phi_s)$ are the same then aid earmarked for good s is fully fungible as $\phi = 1$. (Provided β_s, the coefficient of G^N, is not equal to 1 for any sector s, in which case the concept of fungibility is not meaningful because it indicates a complete matching of the donor's and the recipient's preferences for that sector.) If the coefficient of a_s is 1, then aid for good s is fully nonfungible and $\phi = 0$. A coefficient of a_s less than 1 but greater than the coefficient of G^N would indicate partial fungibility of aid, that is, $0 < \phi_s < 1$. Finally, the coefficient of a_k ($k \neq s$) indicates how much of aid earmarked for good k is spent on good s.

4.2 Empirical Framework

Equations in the study are carefully chosen to reflect the basic models. All in all, five sectoral panel models (chosen depending on the data availability of the sector under scrutiny), four macro and one growth model were estimated. The five sectors included are agriculture, education, health, transport and communication and, defense. In investigating the macro effect of foreign aid, aggregate government spending and consumption are separately estimated. To this end, the macro models are treated either in the presence of foreign aid or concessional loan where the former one is inclusive of the latter. Hence we can see clearly the impact of concessional loan which is subjected to repayment and comprises of the major part of ODA. Whilst on the Left Hand Side (LHS), total government expenditure variable is an inclusive of government consumption which on average represents about 15% of GDP. It covers spending on goods and services (defense, judicial system, wage and salaries accruals, etc); it therefore excludes the components of government spending that are developmental investments, transfers, (such as building new schools, agricultural extension projects etc.).

The three equations that represent the basic forms of panel data are expressed as follow:

$$GovExpend_{i,t} = \beta_{0,i} + \beta_1 TAid_{i,t} + \beta_2 GovNet_{i,t} + \beta_3 incmpc_{i,t} + \sum_{c=1}^{C} \beta_{c+1} Z_{c,i,,t-1} + \varepsilon_{i,t}$$

$$GovConsn_{i,t} = \alpha_{0,i} + \alpha_1 TAid_{i,t} + \alpha_2 GovNet_{i,t} + \alpha_3 incmpc_{i,t} + \sum_{c=1}^{C} \alpha_{c+1} Z_{c,i,,t-1} + \mu_{i,t}$$

Each sector is estimated using the following equation:

$$GovSec_{i,s,t} = \phi_{0,i,s} + \phi_{1,s} GovNet_{i,t} + \phi_{2,s} SAid_{i,t} + \sum_{K \neq s}^{S} \phi_{3,k} SAid_{i,t} + \phi_{4,s} incmpc_{i,t} + \sum_{c=1}^{C} \phi_{c+4,s} Z_{c,i,,t-1} + v_{i,s,t}$$

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Where 's', 'i' and 't' refers to each sectors, sampled countries and time frame respectively.

$GovExpend_{i,t}$ = Total Government Expenditure as a percentage of GDP

$GovConsn_{i,t}$ = Total Government Consumption as a percentage of GDP

$GovSec_{i,s,t}$ = Total Governmental Sectoral expenditure as a percentage of GDP

$TAid_{i,t}$ = Net Disbursement of Total Foreign Aid as a percentage of GDP

$SAid_{i,t}$ = Net Sectoral Disbursement of Concessional loan as a percentage of GDP

$GovNet_{i,t}$ = Government Expenditure net of foreign aid

$incmpc_{i,t}$ = Per capita income

Z = Vector of control variables viz., mortality rate, enrollment ratio, share of agriculture sector in GDP (Y_{agr}/Y), , road to population ratio, number of telephone lines

$\varepsilon_{i,t}$, $\mu_{i,t}$, and $v_{i,s,t}$ = white-nose error terms for the three equations

Finally, by blending the 'financing gap' model of originally coined in Chenery and Strout (1966)"two-gap" model, which states economic growth depends on investment as a share of GDP and subsequently the amount of investment would be the sum of domestic savings and foreign aid, and Boone (1996) assertion of policy variables in affecting growth. In a way the following estimation will also test the skepticism of Boone's finding which utters aid doesn't bolster growth rather it help finance consumption than investment.

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Hence, the 'financing gap' model can be spelled out in this way:

$$Growth = (Investment / Y) / \mu$$
$$Investment / Y = Aid / Y + Saving / Y$$

'μ' refers to Incremental-Capital Output Ratio (ICOR), it is defined as the growth in the capital stock divided by GDP ('Y').

Thus we concentrate here on this investment-saving gap, both for simplicity of exposition and because of the influence of this particular gap over subsequent literature and policy analysis.

$$Growth_{i,t} = \delta_{0,t} + \delta_1 Saving_{i,t} + \delta_2 TAid_{i,t} + \delta_3 GPopn_{i,t} + \delta_4 Polity_{i,t} + \delta_5 Liquidity_{i,t} + \delta_6 Openness_{i,t} + \delta_7 Drought_{i,t} + \omega$$

$Growth_{i,t}$ = Annual Real GDP Growth rate

$Saving$ = Gross Domestic Saving as percentage a share of GDP

$TAid_{i,t}$ = Net Disbursement of Foreign Aid as a percentage of GDP

$GPopn_{i,t}$ = Annual Percentage Growth of Population

$Polity$ = Polity variable[1]

$Drought$ = A dummy variable for drought occurrence in the year under consideration

$Liquidity_{i,t}$ = Liquidity of the economy measured by M2/GDP[2]

$Openness_{i,t}$ = Level of Openness economy[3] proxy by Total export

$\omega_{i,t}$ = White-noise error terms for growth equation

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[1] Polity variable is a combined variable calculated by subtracting a particular country's autocracy variable score from its democracy

[2] (M2) over GDP: which proxies for the development of the financial system (Robert G. King and Levine, 1993). Because of concern over the endogeneity of the latter variable we lag it one period.

[3] Trade openness proxies total foreign trade (all imports and exports)over total output

5 Data

Finding relevant data for the study was a cumbersome and laborious task. In addition, availability of data across the SSA region, for wider period of time, is tremendously understaffed and posed a major hindrance to an extensive study on the area. Despite, I chose SSA region over other developing nations because the region demonstrates a complex and range of socio-economical and geo-political features unlike other regions in other parts of the world. In this region, one can find economic aspects unique and specific to each country: countries could vary depending economy orientation, economic indicators or/and rate of economic growth; some had a recent fast economic growth some a downturn, some a stagnant one and even some hasn't shown any change in years, etc. Similarly unrelated and distinct social characteristics can be found across the region.

In the study, the sample countries are chosen in a merit of data availability and hence the countries were required to have at least 35 percent of the annual observations on each of the variables used in the regression. In addition the absence of countries on our main data source also geared the set of countries that are sampled in the study. Based on these criteria, 9 countries were chosen for regression. The data set is spanned from 1980 through 2003 for nine SSA countries. In analysis of the sectoral model, the data for all the variables were specified in three year average than annual values.

Consequently, important sectoral variables as sectoral government expenditure and net loan disbursement were chosen from IMF's *Government Finance Statistics* (GFS) and OECD's *Geographical Distribution of Financial Flows to Aid Recipients (various years)*. Meanwhile data on the macro and all other control variables were gathered from World

Bank Africa Database 2006. Polity variable in the growth model is mined from Polity IV project of University of Maryland 2006.

Obtaining quality data for each variable was a major concern of the study. To this end, we use two variables for foreign aid—official development assistance (ODA) and concessionary loans. For total aid to a country, we use the series on annual net disbursement of ODA. For sectoral aid fungibility analysis, we use annual concessionary loan commitment by OECD. However using annual concessionary loan has three shortcomings: First, the mapping between aid commitment and disbursement is far from one-to-one; the disbursement data have a very disparate time profile. The data on aid commitment are discontinuous, with large swings from year to year, while the data on aid disbursement are relatively smooth. Second, the disbursement data, being predetermined in most part, are much less prone to the simultaneity problem with government spending data.

6   Estimation and Results

The impacts of foreign aid on government spendings and economic growth are estimated using Iterative Generalized Least Square (IGLS) models. The estimations were made using a pooled cross-sectional time series data from nine sub Saharan countries for all estimations but sectoral equations in which case the countries under examination squeezed down to eight for the reason of lack of sufficient data on the country dropped. The estimation results are presented below in Table 1, 2 and 3.

Extra care was used while estimating the data on STATA software and in order to treat autocorrelation and heteroskedasity '*xtgls*' STATA command was implemented in all the regression analysis.

The results in Table 1 show that there are positive and statistical significant relationships between the share of government expenditure in GDP and for both share of ODA and concessional loan. Similarly government consumption excluding all government investments has positive and statistical significant relationships for the two aid variables (see Table 2). According to the results, an increase in a percentage point in share of ODA in GDP leads to 0.45 and 0.35 increases in the share of government spending and consumption respectively. Likewise a percentage point increase in a concessional loan results in 0.56 and 0.41 increases in a share of government spending and consumption respectively. In both total foreign aid and concessional loan, all aid elements aren't equally translated into government expenditure which implies the existence of partial aid fungiblity. This aid money, in most instances, that didn't go to total government expenditure might actually been used for tax relief purposes.

The other thing that worth mentioning is that the impact concessionary loans have on government expenditure is greater than ODA. Perhaps, this is due to the nature of the loans where they usually come with matching requirements, that is, for every dollar that a government spends on a specified activity, it gets a matching amount in concessionary loans.

Table 1 GLS estimates of government expenditure

Total Government Expenditure	Coefficient *eq. 1-1*	Coefficient *eq. 1-2*
Constant	66.02 (24.369***)	53.966 (31.241**)
Share of ODA in GDP	0.455 (0.082***)	
Share of Concessional Loan in GDP		0.562 (0.124***)
Government revenue net of aid in GDP	0.058 (0.099**)	-0.116 (0.122*)
GDP per capita	0.002 (0.001***)	0.0003 (0.001)
Crude Death Rate (Lag 1)	-1.068 (0.549***)	-1.274 (0.682**)
Agricultural Share in GDP (lag 1)	-0.191 (0.055***)	-0.163 (0.067**)
Life Expectancy (lag 1)	-0.657 (0.329***)	-0.453 (0.43*)
Food Production Per capita (lag 1)	0.003 (0.035*)	0.081 (0.04**)
Number of Observations	80	62
Wald chi (7)	244.79***	56.20***
Log likelihood	-228.248	-180.09

Note: *** show significance at 1% level   *show significant at 10% level

**show significant at 5% level   --Values in parenthesis are standard errors

Although, the coefficient for ODA and loan has smaller value in case of government consumption than total expenditure, aid has a significant positive impact on consumption which actually includes unproductive recurrent expenditure components. Therefore other than the tax relief effect of foreign, aid has a role of raising government consumption over developmental expenditure. This can be inferred from both the estimated aid terms in which a percentage point increase of ODA raising government consumption by 0.35 percentage point out of the total government expenditure increase by 0.45 for the same ODA increase, subsequently implying the difference of mere 0.10 percentage point going to developmental expenditure. While similar computation results in concessional loans with only 0.15 percentage point increase in government developmental expenditure to 0.41 of government consumption. Although this is not to say governments do not receive foreign aid to finance their recurrent budgetary requirement, in fact they do but in very seldom and small concessional loan form. Thus, these important findings insinuate aid is being used for unproductive purpose than their intended purposes which is to use foreign aid for developmental capital expenditures.

Table 2 GLS estimates of government consumption

Share of Government Consumption in GDP	Coefficient eq. 2-1	Coefficient eq. 2-2
Constant	66.687 (16.656***)	74.174 (19.547***)
Share of ODA in GDP	0.353 (0.056***)	
Share of Concessional Loan in GDP		0.415 (0.077337***)
Government revenue net of aid in GDP	0.354 (0.068***)	0.287 (0.076***)
GDP per capita	0.003 (0.001***)	0.002 (0.001**)
Crude Death Rate (Lag 1)	-1.088 (0.375***)	-1.391 (0.427***)
Agricultural Share in GDP (lag 1)	-0.096 (0.037***)	-0.064 (0.042*)
Life Expectancy (lag 1)	-0.854 (0.225***)	-0.949 (0.269***)
Food Production Per capita (lag 1)	-0.01 (0.024)	0.016 (0.025)
Number of Observations	80	63
Wald chi2 (7)	244.79***	158.64***
Log likelihood	-197.80	-150.55

Note: *** show significance at 1% level   -- Values in parenthesis are standard errors

**show significant at 5% level

* show significant at 10% level

The estimation results for government sectoral expenditures show that aid flow impact varies across sectors. Table 3 display the effect of sectoral aid allocations and impact on sectoral expenditures with the presence of other control variables. To this effect, with an exception to the transport and communication sector, the three sectors' aid variables have significant coefficients. This will enable us to say certain things about aid fungiblity in each sector. However the regression could have omitted variable problem due to the

omission of the grant variable. If grants and concessionary loans are positively correlated, then the estimated coefficient on the loan variable will be upwardly biased.

In agriculture sector, a percentage point increase in loan extended to the sector lead to a 0.71 percentage point increment in public expenditure on the sector. Using similar technique applied by Feyzogul et al 1998[4], we can analyze aid fungiblity. Hence in agriculture sector, aid is partially fungible with fungible parameter of 0.29. Exceptionally, aid flow to health sector has a fully non fungible parameter, moreover aid flow to the sector stimulate more expenditure on the sector. On the contrary, aid is fully fungible in the sector in fact it has a depressing impact on expenditure. Based on the available data for transportation and communication sector, the power of the test is not enough to reject any reasonable hypothesis. Lastly, the data on the sample doesn't suggest that foreign aid is being diverted to the defense or military expenditure as the loan coefficients have insignificant values.

Among the control variables, share of government revenue net of aid can point the priorities of the sampled countries. Education gets a 0.23 percentage point increase for every increase in total government revenue. Defense comes next garnering a 0.20 percentage point increase. Whereas, the result indicates that an increment in revenue depresses expenditure in health sector.

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[4] Aid fungiblity parameter ϕ can be determined indirectly using the estimated aid coefficient which is nothing but $1 - \phi$. Thus as ϕ is getting closer to zero, aid fungiblity decreases where zero means fully non fungible.

Table 3 GLS estimates of government expenditure (Sectoral Level)

	Agriculture eq. 3-1	*Education* eq. 3-2	*Health* eq. 3-3	*Transport & Communication* eq. 3-4	*Defense* eq.3-5
Constant	5.705 (2.159***)	-3.652 (1.345)	1.304 (0.583***)	-1.469 (0.901**)	-6.869 (1.696***)
Government Revenue net of Aid in GDP	0.077 (0.061**)	0.232 (0.039***)	-0.016 (0.015**)	0.067 (0.023***)	0.205 (0.056***)
Sectoral Loans					
Agriculture	0.711 (0.487**)	0.084 (0.304)	0.069 (0.12)	-0.359 (0.183***)	0.758 (0.44)
Education	3.412 (0.781***)	-1.502 (0.483***)	0.661 (0.255***)	-0.041 (0.298)	0.181 (0.699)
Health	-2.769 (1.166***)	2.633 (0.738***)	1.382 (0.287***)	0.355 (0.445*)	-1.126 (1.066)
Transport & Communication	-2.34 (0.59***)	-0.398 (0.366*)	-0.475 (0.164***)	0.06 (0.243)	0.426 (0.531)
Fuel & Energy	-2.581 (1.143***)	1.266 (0.728**)	0.367 (0.277**)	0.431 (0.44**)	-1.338 (0.989)
Manufacture & Mining	2.004 (1.333**)	0.028 (0.805*)	1.27 (0.317***)	0.294 (0.502**)	0.423 (1.159)
Per capita income	-0.001 (0.001*)	0.0002 (0.001)	0.0003 (0.000)	0.0004 (0.000)	0.0008 (0.001)
Y_{Agri} / Y	-0.062 (0.027***)	0.089 (0.017***)	-0.006 (0.007)	0.02 (0.011*)	0.051 (0.024*)
Crude death rate per thousand	-0.057 (0.084)	-0.085 (0.056**)	-0.055 (0.021***)	0.059 (0.033*)	0.315 (0.065***)
Road (k.kms. per million populn)	-0.286 (0.181**)	0.203 (0.113**)	0.105 (0.043**)	-0.029 (0.067*)	-0.436 (0.16**)
Telephone	-0.009 (0.016)	0.001 (0.01)	0.0005 (0.004)	-0.006 (0.006)	-0.001 (0.014)
Wald chi2 (12)	57.12	195.07	139.35	41.20	53.09
Log likelihood	-81.366	-60.242	-15.648	-11.827	-80.79
Obs	45	45	43	43	47

Note: *** show significance at 1% level   -- Values in parenthesis are standard errors

**show significant at 5% level

* show significant at 10% level

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Finally, the result on Table 4 to larger extent agrees with major finding of Boone (1996) and Burnside and Dollar (2004). The coefficient for share of ODA has an interestingly negative sign, which implies an adverse impact on the sampled countries real GDP growth, however statically insignificant. Hence we are uncertain of the impact of aid on real growth. Nevertheless, other variables that are considered as a policy variable found to be significant at 10% level for polity variable and 1% for level of openness of the economy for foreign trade. They both have a positive coefficient and importantly determine economic growth with coefficients of 4.5 and 0.03 for openness and polity respectively. Other variables as presence of drought dummy variable and annual population growth rate has an unflinching negative impact on growth.

Table 4 GLS estimate of Real GDP growth

Real GDP growth	Coefficient eq. 4
Constant	-4.702 (1.815**)
GDS	0.098 (0.033***)
Population growth rate	-0.155 (0.535)
Share of ODA in GDP	-0.064 (0.05)
Foreign Direct Investment	0.232 (0.149*)
Level of openness for foreign trade	4.54 (1.303***)
Liquidity level (M2/GDP)	0.105 (0.077*)
Presence of Drought	-1.518 (0.784**)
Polity	0.025 (0.083*)
	Log Likelihood =-393.352 Wald Chi2 (8)=101.34 Obs=149

Note: *** show significance at 1% level * show significant at 10% level

**show significant at 5% level -- Values in parenthesis are standard errors

7 Conclusion

In poverty stricken Sub Saharan Africa, foreign aid has become a survival matter for millions of people who live under a dollar a day. To this day, an increasing number of social scientists has investigated debatable impact of foreign aid has on poverty alleviation.

This paper also intended to contribute valuable empirical findings to the on-going debate. The purpose of the paper has been to investigate the impact of foreign aid on government spendings and economic growth. Hence consistent with other previous studies, we found aid to be fungible at macro level. The findings also show that aid is bolstering government consumption in spite of donors' intention of financing development expenditures. On the other hand, the earmarked concessionary loans given to sectors showed a varying result. From fully fungible in education to partially fungible in agriculture and to fully non fungible in health, the fungiblity parameter indicates various level of fungiblity across sectors. However, the lack of data prevented sectoral fungiblity analysis and made our result somewhat limited. Another important finding comparable to previous authors is that on average aid has had an insignificant impact on economic growth while good policy environment has had a more positive robust impact on growth.

In conclusion, a mere existence of aid fungiblity do not necessarily dampen economic growth however a non fungible portion of foreign aid going to government consumption, which consequently increases the size of governments, will lessen the aid impact on economic growth.

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9 Appendix

Table 5a Summary of the Major Variables Used for the study

Variable	Obs	Mean	Std. Dev.	Min	Max
Share of Government Expend in GDP	182	25.32	9.22	8.33	85.86
Share of Government revenue in GDP	193	20.31	9.26	5.43	52.85
Share of Government consumption in GDP	215	15.40	6.01	5.86	35.46
Share of Concessional Loan in GDP	172	8.31	7.16	-0.54	58.29
Share of total ODA in GDP	214	9.64	8.19	0.40	58.48
Total Per capita	215	824.08	970.86	93.01	4084.87
Agriculture share in GDP	214	27.54	16.05	2.42	67.20
Crude death rate per 1000 population	104	13.93	6.21	6.30	26.31
Food per capita index (1991-2001=100)	202	106.33	21.85	57.70	190.30
Life expectancy at birth (total years)	98	53.09	10.40	36.55	71.97
Road (1000kms. per million population)	95	3.44	2.70	0.42	11.87
Telephone (lines per 1000 people)	215	19.13	42.38	1.67	270.43
Real GDP growth rate(%)	213	0.84	5.24	-19.23	22.72
Real revenue growth rate (%)	184	1.83	16.16	-46.83	80.69
Real growth rate of government consumption (%)	206	1.54	14.46	-52.82	67.23
Real growth rate of ODA (%)	207	4.59	40.77	-155	172.5
Real growth rate of total expenditure (%)	145	1.44	19.66	-59.18	114.65
Share of aggregate saving in GDP	192	14.83	12.63	-13.29	48.38
Annual population growth rate	216	2.42	0.94	-2.76	4.53
Foreign Direct Investment as share of GDP	173	1.13	1.88	-7.12	10.30
Liquidity of the economy (proxy by M2/ GDP)	213	0.13	0.04	0.05	0.26
Debt service to export ratio (%)	192	20.18	17.05	1.34	195.26
Ratio of indebtedness to GDP (%)	161	80.32	46.05	11.06134	273.77
CPI (% change)	197	17.66	29.24	-42.8571	197.39
Polity	206	-0.30	6.71	-9.00	10.00
Foreign trade openness (X+M)/GDP	191	0.76	0.36	0.12	1.68
Drought Dummy (occurrence of draught =1)	216	0.17	0.37	0	1

Source: World Bank 2006 & IMF (various years)

Table 5b: Other sector specific variables

Sector Specific Variables	Obs	Mean	Std. Dev.	Min	Max
Total Government Revenue Net of Aid as share of GDP (%)	64	21.39	9.38	8.03	49.99
Sectoral Government Expenditure share of GDP					
Agriculture (%)	61	2.43	2.71	0.27	15.50
Education (%)	61	3.92	2.26	0.51	11.93
Health (%)	59	1.61	0.86	0.27	4.70
Transportation & Communication (%)	60	1.57	0.96	0.30	4.33
Defense (%)	63	2.51	1.92	0.19	9.42
Sectoral Loan as share of GDP					
Agriculture (%)	58	0.82	0.75	0.01	3.29
Education (%)	57	0.49	0.42	0.02	1.96
Health (%)	54	0.372	0.45	0.003	2.678
Transport & Communication (%)	58	0.765	0.763	0.003	3.452
Fuel & Energy (%)	55	0.311	0.436	0.001	2.511
Manufacturing (%)	56	0.204	0.263	0.002	1.005

Source: World Bank 2006, IMF (Various years) & OECD (Various years)

Table 6 Ratio of country indebtedness to GDP (%)

Year	Botswana	Cameroon	Ethiopia	Ghana	Kenya	Mauritius	Senegal	Sierra Leone	Zambia
1980	28.5	39.93	-	35.62	46.57	40.64	57.24	42.98	77.88
1981	30.65	35.21	71.43	38.15	49.44	38.74	78.78	44.68	75.27
1982	42.76	39.07	67.03	39.94	57.1	49.38	90.64	38.38	83.61
1983	47.3	37.44	61.75	39.67	59.19	47.96	94.17	48.27	100.37
1984	44.13	34.67	69.88	36.8	57.88	47.72	102.78	41.46	120.83
1985	58.75	40.39	69.45	48.15	65.82	57.21	106.77	58.18	170.46
1986	54.15	37.48	75.35	45.95	64.39	52.48	88.24	123.2	273.77
1987	43.87	39.99	84.46	67.43	70.41	48.77	92.03	102.95	238.23
1988	33.16	43.09	83.58	64.89	66.55	40.78	83.27	64.76	137.75
1989	28.83	56.87	82.43	71.04	69.62	39.03	75.07	76.35	122.11
1990	25.52	64.67	86.77	75.58	78.16	42.38	68.72	118.25	169.35
1991	24.71	60.6	77.15	70.52	88.75	38.13	72.39	103.19	166.44
1992	22.15	68.93	72.25	78.12	82.91	33.44	65.89	143.96	168.88
1993	21.45	64.68	121.91	89.96	118.17	29.72	72.01	141.84	159.1
1994	19.97	109.91	140.11	109.42	98.9	34.04	104.32	126.76	162.53
1995	16.65	115.32	135.51	101.78	79.1	42.75	91.11	134.22	163.39
1996	14.31	98.73	124.47	91.27	56.86	36.88	84.58	119.14	180.11
1997	11.06	93.29	121.08	87.57	46.53	33.87	87.86	125.12	145.49

Source: World Bank 2006

Table 7 Debt service to total export ratio (%)

Year	Botswana	Cameroon	Ethiopia	Ghana	Kenya	Mauritius	Senegal	Zambia
1980	1.89	14.64	7.44	13.10	19.73	9.06	26.71	25.22
1981	1.62	17.71	10.08	14.23	25.10	16.62	17.02	35.88
1982	2.25	15.73	13.84	15.54	27.92	17.60	12.73	31.95
1983	3.00	15.33	18.27	30.38	32.42	24.16	11.31	27.09
1984	3.71	15.65	20.39	21.74	34.27	24.99	16.63	25.22
1985	5.36	23.36	27.72	23.64	39.20	26.35	20.72	14.24
1986	4.26	26.16	31.96	28.54	35.68	17.82	26.07	50.90
1987	3.87	30.34	38.33	45.84	40.41	11.66	31.96	18.53
1988	4.25	31.81	46.94	57.06	39.15	14.32	31.00	15.39
1989	3.34	17.07	39.80	50.99	36.90	9.48	28.28	12.56
1990	4.35	22.34	34.62	36.79	35.49	9.62	20.27	14.95
1991	3.43	16.62	24.74	26.54	32.66	8.88	19.59	50.61
1992	3.91	16.27	23.09	27.19	30.94	9.12	13.32	28.79
1993	3.62	22.31	17.85	24.01	28.10	6.10	9.13	32.85
1994	4.01	21.87	19.84	24.19	33.04	7.65	16.73	31.46
1995	3.15	20.86	19.08	23.88	30.41	9.57	16.74	195.26
1996	5.24	24.59	41.61	19.50	27.40	7.40	18.81	22.07
1997	2.83	21.78	9.48	21.96	21.79	7.87	17.25	19.24
1998	2.56	22.35	10.90	18.39	22.98	9.16	20.19	21.75
1999	2.13	24.21	15.89	16.97	25.48	6.65	14.16	17.12
2000	2.03	20.30	13.06	15.61	21.19	17.19	13.92	21.01
2001	1.72	12.16	17.80	11.37	15.74	6.73	11.95	17.63
2002	1.98	12.77	8.16	6.74	15.19	8.35	11.17	21.02
2003	1.34	13.76	7.64	15.79	16.03	7.13	9.76	44.04

Source: World Bank 2006

Table 8 Real growth rate of total expenditure (%)

Year	Botswana	Cameroon	Ethiopia	Ghana	Kenya	Mauritius	Senegal	Sierra Leon	Zambia
1990	-1.19	3.04	-4.69	-3.88	12.59	-0.87	3.04	25.19	16.20
1991	10.63	11.29	-14.92	4.79	1.36	-3.25	-12.09	-20.56	9.57
1992	13.48	4.02	-15.18	27.00	-3.16	1.97	0.61	16.26	-7.00
1993	5.30	-7.90	-19.05	25.53	6.50	-9.81	1.64	5.21	-3.46
1994	1.73	-7.25	22.72	-0.39	1.70	4.44	-4.92	-3.26	6.11
1995	7.70	-5.65	0.02	-8.22	-16.50	2.13	-10.07	-11.06	-13.26
1996	-3.19	-0.20	-4.44	0.13	-23.75	1.95	-7.00	1.71	-23.15
1997	1.93	-4.84	-1.55	0.69	4.14	5.27	-5.62	-22.23	-0.47
1998	14.56	4.05	27.45	4.68	3.17	-2.35	-9.17	41.40	4.19
1999	3.65	-13.66	36.00	-5.04	-6.00	0.53	6.23	15.72	-13.08
2000	1.88	-100.00	16.53	12.83	-8.39	-0.71	9.97	21.45	0.79
2001	4.94	-	-17.73	7.39	19.10	4.33	17.08	22.36	16.24
2002	3.22	-0.06	-4.54	0.37	1.11	-5.15	-10.90	4.21	-0.98
2003	6.27	-2.62	17.90	3.13	-0.82	3.82	3.22	-8.23	0.53

Source: World Bank 2006

Table 9 Real growth rate of government revenue excluding ODA (%)

Year	Botswana	Cameroon	Ethiopia	Ghana	Kenya	Mauritius	Senegal	Sierra Leon	Zambia
1990	-15.96	-10.85	-24.02	-8.52	0.61	-0.86	0.62	9.46	9.19
1991	6.76	6.24	-22.13	41.88	-21.98	-0.82	15.78	0.80	-7.86
1992	7.81	3.71	-22.68	-14.12	37.75	-0.92	-5.17	29.79	-1.86
1993	18.27	-13.21	12.68	26.33	5.59	-6.55	-9.51	19.98	-13.50
1994	-12.67	-27.39	16.21	-2.32	6.20	-0.76	-10.41	0.84	26.45
1995	-8.13	30.29	25.50	9.04	-6.38	-7.45	9.95	-25.52	-1.20
1996	9.63	10.70	4.93	-13.82	-21.24	-11.51	1.42	7.28	4.30
1997	-2.00	5.62	9.16	-1.80	-8.53	14.78	1.82	-46.07	-3.81
1998	-12.02	5.20	10.72	5.78	9.57	-0.41	-0.97	35.17	-5.61
1999	25.44	-17.85	5.79	-10.62	64.45	2.74	3.35	-3.23	-5.57
2000	8.76	26.56	-6.38	8.32	-46.83	2.18	4.23	60.98	9.29
2001	-14.79	7.21	4.27	2.37	0.67	-12.18	-1.12	12.35	-0.50
2002	-6.08	-6.76	2.68	-0.69	80.69	1.02	10.71	-6.42	-7.32
2003	1.41	-3.05	-2.08	25.00	-45.27	10.11	-0.67	1.98	0.54

Source: World Bank 2006

Table 11 Real growth rate of total ODA (%)

Year	Botswana	Cameroon	Ethiopia	Ghana	Kenya	Mauritius	Senegal	Sierra Leon	Zambia
1990	-25.27	-1.81	27.57	-30.04	-6.50	33.09	-6.50	-12.56	55.86
1991	-13.52	-27.02	-2.47	39.74	-19.59	-35.78	-19.59	42.48	79.15
1992	-19.38	-18.85	1.91	-28.20	-3.65	-46.05	-3.65	46.76	24.38
1993	15.52	-17.51	48.70	9.06	-17.16	-22.83	-17.16	37.98	-18.15
1994	-36.75	9.14	10.92	-3.65	90.77	1.97	90.77	2.61	-19.41
1995	-4.32	-2.47	-20.99	0.01	-15.37	-53.76	-15.37	-20.01	172.50
1996	-17.79	10.92	-10.95	-6.73	-15.91	9.83	-15.91	-11.87	-68.12
1997	50.98	-33.38	-33.38	-23.66	-22.67	-6.50	-22.67	-28.56	-16.34
1998	-7.96	7.23	11.79	30.90	11.39	-3.65	11.39	13.34	-30.92
1999	-43.79	4.88	-2.33	-15.86	4.61	90.77	4.61	-30.55	84.81
2000	-51.76	-28.20	7.23	52.61	-14.09	-15.91	-14.09	160.93	23.32
2001	-3.98	0.01	61.46	0.49	-7.57	11.39	-7.57	60.55	-60.91
2002	24.01	30.90	25.82	-12.98	-1.23	-14.09	-1.23	-1.99	80.52
2003	-42.68	0.49	4.88	12.74	-21.70	-1.23	-21.70	-16.97	-25.44

Source: World Bank 2006