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SCHOOL OF GRADUATE STUDIES

**THE FISCAL EFFECTS OF FOREIGN AID IN
ETHIOPIA**

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ACRONYMS

DAC	Development Assistance Committee
EEA	Ethiopian Economic Association
EPRDF	Ethiopian People's Revolutionary Democratic Front
ESA	East and South Africa
ESAU	Economics and Statistics Analysis Unit
FRMs	Fiscal Response Models
GDP	Gross Domestic product
GNI	Gross National Income
IMF	International Monetary Fund
LDCs	Least Developed Countries
MDGs	Millennium Development Goals
MoFED	Ministry of Finance and Economic Development
NA	North Africa
NBE	National Bank of Ethiopia
NGOs	Non-Governmental Organizations
ODA	Official Development Assistance
OECD	Organization of Economic Cooperation and Development
SSA	Sub-Saharan Africa
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
WCA	Western and Central Africa

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ABSTRACT

This study tries to examine the effects of aid inflows on the government fiscal behavior, such as, taxation, borrowing and the allocation of other expenditure in Ethiopia by using a time series data from the period 1960-2012. There are five models, these models analyzed by applying the VECM and impulse response analysis. The results of the models indicate that an increase in grant results in an increase in the total tax revenue and total expenditure. But the disaggregation of tax revenue gives a different result on tax collection effort. The flow of grant has a tendency to decline direct tax collection effort. And also grant has a decrease effect on domestic borrowing, whereas the flow of grant encourages the government to increase both capital and recurrent expenditure. However, in relation to loan the result shows that loan has no effect on the fiscal components. Moreover, a model that includes ODA instead of either one of the two external financing components is estimated. The reason of incorporating ODA is that aid disbursed outside the budgetary framework can also affect government spending decisions. The results of an increase in ODA are similar to those of an increase in grants. Direct taxes and domestic borrowing fall, whereas recurrent expenditure rises. In addition, in the long run both capital expenditure and indirect tax affected by the flow of ODA in small amount. This might show ODA is more pro-consumption than investment and also aid and domestic borrowing are close substitutes.

CHAPTER ONE: Introduction

1.1 Background of the study

In the 19th century rich countries started lending money to poorer countries, and by the 1920s and '30s countries like Germany, France and Britain were providing regular aid to their colonies in Africa, Latin America and Asia. In the post-World War II decades, foreign aid in its modern form emerged and the United States became the world's biggest aid donor full Europe. Since the international economic system had collapsed and war-ravaged Europe faced a critical shortage of capital and an acute need for physical reconstruction. The response was the European Recovery Programme, commonly known as the Marshall Plan. As the Cold War developed, the two super powers and their allies would use aid to encourage political allegiances. (Tarp, 2007)

According to Development Assistance Committee (DAC), the term 'foreign aid' or 'development assistance' refers to financial flows that qualify as Official Development Assistance (ODA). In addition to financial flows, technical co-operation costs are included in ODA; but grants, loans and credits for military purposes are excluded, and transfer payments to private individuals are in general not counted. Therefore the current concept of foreign aid used in this study includes all official; grants and concessional loans that are in currency or in kind.

For a long time there is growing gap between the developed and developing countries. This gap has led to constant capital inflow from the developed countries to those in the least developed countries; with the goal of overcome their problems and reduce the gap. However, there is evidence that decades of foreign aid have done little in changing the situation of many African countries, most of which are currently experiencing low growth rates. From the mid-1970s, aid to Africa from the DAC increased rapidly in response to development needs, oil price shocks,

harvest failures, world economic recession and the African development crisis (OECD, 1985). Since 1980s aid continued to increase with the expansion in the number of structural adjustment programmes.

In recent times the declaration of the Millennium Development Goals (MDGs) in September, 2000 set eight goals. One of these goals is to alleviate the absolute poverty by half in the year 2015. Among the goals, goal eight recognize the need to address global development challenges and mobilize resources to finance interventions aimed at achieving the MDGs by means of increasing aid flows and debt relief for the poorest and highly indebted countries from wealthy countries.

Currently sub-Saharan Africa (SSA) countries are the most beneficiaries from the MDGs programme. These countries have made dramatic progress towards the MDGs but the region still requires increased financing from both domestic and donor budgets in order to reach the 2015 MDG targets, and to achieve even more ambitious post-2015 goals (ONE, 2013). These countries have long been the world's most aided region. They absorbed almost one trillion nominal aid dollars over the last fifty years but the growth record has been unimpressive (Mayo, 2009 and Easterly, 2006). From 2004 to 2010, ODA to sub-Saharan Africa rose by 51%, from \$27.0 billion (5% of GNI) to \$40.8 billion (3.7% of GNI) even if in 2012 it dropped slightly to \$38.1 billion (3.2% of GNI). The countries are still the most aided region in the world. (ONE, 2013)

Like any other developing countries Ethiopia has a long history of receiving foreign aid, dating back to the early 1950s. After World War II, Ethiopia had began to receive economic development aid from the more affluent western countries. Originally the United Kingdom was

the primary source of this aid, but they withdrew in 1952, to be replaced by the United States (Edmond, 1991). Until the 1980s the amount of foreign aid remained very low, but the 1984 famine caused massive increase in flows, mainly due to large humanitarian aid (Alemayehu and Kibrom, 2011). Currently Ethiopia receives ODA from two major sources; bilateral and multilateral donors. The assistance has been provided in the form of development financing, technical assistance and debt relief.

1.2 Statement of the problem

Currently unsustainable fiscal policies in developing countries are the main issue because sustained budget deficits and large stocks of public debt are the main sources of persistent poverty in the developing countries (Afonso & Rault 2010; Mayr 2010).

Different repeated econometric studies on panel data sets show that aid makes a positive contribution for growths, after controlling for other non-policy factors (ESAU, 2004). Aid affects the fiscal behaviour of governments through on tax effort and borrowing in addition to effects on the allocation of expenditures (ESAU, 2004). The question of whether good policies are required to make aid effective is controversial (ESAU, 2004). Hansen and Tarp (2000), Lensink and White (2001) and Morrissey (2001) find that aid assists growth independently of policies, contradicting Burnside and Dollar (2000) who found that aid accelerates growth in developing countries with sound institutions and policies, but has less or no effect in countries in which institutions and policies are poor (cited in ESAU, 2004).

According to growth theory aid's impact on growth also depends on how it affects savings, investment and government behavior in the economy. Most of the aid recipients are low-income countries where aid is still the principal source of revenue, often comparable to tax revenues in

size, and therefore aid has a major impact on growth (McGillivray & Morrissey, 2001). In addition, as most aid goes to the public sector, its impact on growth and poverty-reduction depends essentially on how it influences government behavior (McGillivray & Morrissey, 2001). These two facts make government the most important factor contributing to growth in aid receiving low-income countries (McGillivray & Morrissey, 2001).

In Ethiopia total government revenue including grants in the year 2011/12 was birr 115.7 billion i.e. 1.7 percent of GDP. In the same year the fiscal deficit was 1.2 percent of GDP, this level of budget deficit amounted to birr 8.8 billion. According to MoFED about 75 percent of this deficit was financed by foreign borrowing, while the remaining has been covered by domestic debt and income from privatization. Recently the flow of ODA to Ethiopia reached US\$ 2,617.9 million and accounted for approximately 11% of the country's national budget in 2011/12. While this amount of ODA appears to be large in absolute terms and in comparison to many countries in sub-Saharan Africa, Ethiopia's per-capita ODA ranks least among countries of the sub-Sahara Africa (MoFED, 2013). In the last decade using the OECD data, the share of ODA in public expenditure on the average has been 65%. This shows the trend of aid dependency in the country, but based on MoFED data the figure drop nearly by half (Alemayehu and Kibrom, 2011). Alemayehu and Kibrom (2011) they point out the reasons for this discrepancy. The reason is due to the difference in accounting methods: MoFED does not consider administration expenses that are not directly related to ODA financed projects and reports only ODA channeled through it. ODA channeled through other agencies such as NGOs are not reported as ODA. And also MoFED's report captures only those disbursements that have commitments in place, but does not report support without prior commitments. And also, Martins (2010) reason out that DAC/OECD measure based on questionnaires filled by DAC member countries, which is likely

to be inflated for a number of reasons: inclusion of technical assistance, emergency food-aid, and donor-implemented projects. In most cases, these funds do not pass through the central treasury and are not reported in the fiscal budget.

Ethiopia is the second most populous nation in the African continent; the country still remains among the poorest, with a per capita average annual income of USD 513 (MoFED, 2013). The country has limited capacity to invest because of inadequate resources resulting from low saving rates and poor export performance. To fill the saving-investment gap, the trade gap and the fiscal gap, the country has been receiving substantial aid from bilateral and multilateral donors. Ethiopia has been receiving more than \$3 billion on average in ODA from international donors in recent years, consistently ranking among the top five ODA recipients globally in the past decade.¹ This shows that foreign aid covers a significant part of Ethiopian government revenue even if the data from OECD and MoFED make difference.

The report from MoFED show that during 2011/12 Ethiopia's economy grew by 8.5 percent, to accelerate this economic growth path in the country the government needs a lot of finance for different projects. Particularly to finance new investment projects that are given priority in the overall development policies and strategies of the country. The country's public expenditure policy focuses on investing on growth enhancing pro-poor sectors of agriculture, food security, water, education, health, road, and rural electrification programs. Due to this, the importance of ODA in the country is very high starting from financing pro-poor projects to budget deficit and economic growth. In order to make this aid effective the government's fiscal behavior is important because aid is primarily given to the government. Aid being an important source of

¹ From OECD database

public expenditure, identifying the fiscal effects of aid in Ethiopia is fundamental. Thus the primary aim of the study is to understand the effectiveness of aid at macroeconomic level.

Owing to those facts, the study tries to examine the effects of aid inflows on the government fiscal behavior, such as, taxation, borrowing and the allocation of other expenditure in Ethiopia by using a time series data. This is aimed at showing long term impact of aid on the fiscal behavior of the government.

1.3 Objectives of the study

The main objective of the study is examining the fiscal effects of foreign aid in Ethiopia. And also the study tries to identify the following specific objectives:

- i. The effect of aid on government revenue in both direct and indirect taxes
- ii. The effect of aid on recurrent and capital expenditure
- iii. The effect of aid on domestic borrowing
- iv. And finally to suggest some policy implications

1.4 Significance of the study

There are few studies undertaken regarding the fiscal effects of foreign aid in Ethiopia. This study examines the time series effects of aid on fiscal aggregate variables of Ethiopia. Such aggregate fiscal effects overtime are likely to be important determinants of aid effectiveness. And also, the study adds something in the area of foreign aid and its fiscal effect in Ethiopia and contribute in providing an empirical method to estimate fiscal effect and applying this to Ethiopia. Besides this, the study provides a policy implication to policy makers.

1.5 Research question

The study tries to answer the following questions:

- Is aid associated with an increase in government expenditure i.e. capital and recurrent expenditure?
- Does aid increase or decrease the tax collection effort in both direct and indirect taxes?
- What is the impact of aid on domestic borrowing, if aid flow increases?

1.6 Scope and limitation of the study

This study use foreign aid, government expenditure, domestic revenue and domestic borrowing time series data from the period 1960-2012. The limitation is the problem of inconsistency in data as reported by different institutions. Even data from the annual reports of MoFED shows different figures for the same year. In relation to aid the data from MoFED and DAC/OECD different in order to tackle this shortcoming the study uses both data sources separately to identify the fiscal relation to the economy.

CHAPTER TWO: Literature Review

2.1 Introduction

The story of foreign aid begins with the “Two Gap Model” of Chenery and Strout (1966) which presents the rationale of developing economies for accepting foreign aid as their inability to achieve prosperity targets due to their low financial strength (Franco-Rodriguez et al, 1998). They argue that the attempt to increase output in underdeveloped countries can be frustrated by failure in any one of these attempts: a shortage of skills, a lack of savings, or inadequate export earnings (Chenery and Strout, 1966). To solve this failure the availability of foreign assistance makes possible a less balanced form of accelerated growth which can make fuller use of domestic resources. Some of the potential bottlenecks i.e. skills, saving or foreign exchange can be temporarily relaxed by adding external resources for which current payment is not required. In this way fuller use can be made of other resources, and the overall growth of output may be substantially higher than would be permitted by the rate of increase of the most restrictive domestic factor. (Chenery and Strout, 1966)

Critics of Chenery and Strout's (1966) two-gap model have argued that foreign capital inflows and aid in particular, may represent a useful substitute for savings (Griffin 1970, Griffin & Enos 1970, Weisskopf 1972; cited in Alemayehu 2002). In the late 1970s Griffin argued that aid is essentially a substitute for savings and that a large fraction of foreign capital is used to increase consumption rather than investment. An increase in foreign capital leads to a reduction in domestic savings (Griffin, 1970). First, public savings may decline; this may happen if either tax receipts fall or there is a change in the composition of government expenditure. Second, foreign capital may lower private domestic savings i.e. the foreign capital may be channeled to private

indigenous entrepreneurs via easy credit loans of industrial development banks or similar institutions. The availability of debt finance on soft terms may reduce the incentive of local investors to save. Finally, capital imports may reduce domestic savings by stimulating the consumption of importables and exportables (Griffin, 1970). The increased availability of imported goods which foreign capital facilitates may lead to an increase in their consumption. So the increased foreign aid lowers the effectiveness of investment, but it does supplement consumption and helps (slightly) to raise the growth rate. (Griffin, 1970)

A deficiency of this aid-growth literature is that it fails to explicitly recognize aid is given primarily to the government, and that hence any impact of aid on the economy will be mediated by government behavior (McGillivray and Morrissey, 2001a). Although the literature recognizes the importance of policy, the studies condition aid effectiveness on policy, rather than examining how aid affects policy (McGillivray and Morrissey, 2001a). The latter issue, in terms of fiscal policy, has been addressed by two separate strands in the literature. First, studies of fungibility are concerned with identifying whether aid that is intended (by donors) to be spent on a particular expenditure item is in fact allocated to that area. This is often referred to as categorical fungibility as the issue is the allocation of aid to expenditure categories and whether recipients allocate aid in the way donors intended when granting the aid (McGillivray and Morrissey, 2001a). The second is fiscal response studies, these studies go further than the fungibility studies and trace the complex impacts of aid on government fiscal behavior, such as, taxation, borrowing and the allocation of expenditure (White, 1992). So this study mainly focused on the fiscal response literatures by classifying them into theoretical review (i.e. 'traditional' fiscal response models (FRMs) versus 'alternative' approach) and VAR/VECM approach; and empirical reviews.

2.2 Theoretical review

2.2.1 'Traditional' FRMs versus 'Alternative' Approach

The traditional Fiscal Response Models (FRMs) used to analyse the impact of foreign aid on fiscal aggregates. This approach is based on a utility-maximizing government; which is assumed to maximize its utility by obtaining each one of the fiscal targets such as a variety of expenditure, revenue and borrowing during each period. An inflow of aid is then assessed on the basis of its effect on each of the fiscal targets subject to budget constraints. (McGillivray and Morrissey, 2001a)

Heller (1975) was one of the first to use this approach; He assumes that the fiscal behavior of the public sector reflects the actions of a set of public decision makers. They maximize their utility, taking in to account i) alternative uses of public resource ii) the distribution of total output between the private and public sector iii) alternative modes of domestic financing such as borrowing and taxation and iv) alternative types of external assistance, such as grants and loans.

He also assumes that the utility function of a decision maker is a function of public investment expenditure (I_g), disposable income which equals GDP less tax revenue ($Y-T$), civil consumption (G_c), socioeconomic consumption expenditures (G_s), public borrowing (B), total foreign grant (A_1) and total foreign loans (A_2). The utility function of public sector decision making can be given by:

$$U = F[I_g, (Y - T), G_c, G_s, B; A_1, A_2] \quad (2.1)$$

Capital inflows, whether public or private, bilateral or multilateral, grants or loans, are assumed to be exogenous to the public sector. Then the utility function takes in the form:

$$U = \alpha_0 + \alpha_1(I_g - I_g^*) - \frac{\alpha_2}{2}(I_g - I_g^*)^2 - \alpha_3(T - T^*) - \frac{\alpha_4}{2}(T - T^*)^2 + \alpha_5(G_c - G_c^*) - \frac{\alpha_6}{2}(G_c - G_c^*)^2 + \alpha_7(G_s - G_s^*) - \frac{\alpha_8}{2}(G_s - G_s^*)^2 - \alpha_9(B - B^*) - \frac{\alpha_{10}}{2}(B - B^*)^2 \quad (2.2)$$

Where $\alpha_i \geq 0$ for all i , and where a starred variable indicates a target level for each variable. The functional form ensures diminishing marginal utility for each of the variables $I_g, G_c, G_s, T, \text{ and } B$ as they rise above a level determined jointly by their target level and by the specific set of α parameters for each variable. It also reflects a compromise between the need for heuristic accuracy and the need for an easily estimable functional form with desirable utility function properties. The absence of any interdependence between the policy variables is its primary deficiency. (Heller, 1975)

For the set of feasible public sector decisions in order to maximize equation (2.2) there are both economic and institutional constraints. The least restrictive assumption is that all revenue inflows are pooled and allocated among all expenditure categories. Specifically,

$$T + B + A_1 + A_2 = I_g + G_c + G_s \quad (2.3)$$

This is institutionally unrealistic because most African LDCs not only reject borrowing for current expenditure, but are encouraged by donors to realize public sector savings through a surplus on the recurrent budget, viz., $(T - G_c - G_s) \geq 0$ (Heller, 1975). So finally the following constraint set is suggested:

$$I_g = B + (1 - \rho_1)T + (1 - \rho_2)A_1 + (1 - \rho_3)A_2 \quad (2.4)$$

$$G_c + G_s = \rho_1T + \rho_2A_1 + \rho_3A_2 \quad (2.5)$$

The constraint set implies that aid can be used directly for public consumption due to that in the literature, it is contended that there is greater substitutability and that aid flows can also, ex post,

be allocated to consumption. Maximization of equation (2.2) with respect to current policy variables $I_g, G_c, G_s, T,$ and B given levels of A_1 and A_2 and subject to constraint set of (2.4) and (2.5), yields the first-order conditions. Then these conditions are solved to obtain structural equations for the estimation of the parameters of the utility function and the budgetary constraint. (Heller, 1975)

Similarly Mosley *et al* (1987), using the work of Heller (1975), modeled the public sector fiscal response to foreign aid inflows. The point of departure is that the government of a developing country will attempt to maximize its own welfare in the face of budgetary constraints, and will use aid inflows from overseas as an instrument in the pursuit of that objective. (see Mosley *et al*, 1987)

Franco-Rodriguez *et al* (1998) found three significant problems with the constraints written in equations (2.4) and (2.5). The first is the interpretation given to ρ_2 and ρ_3 , which is taken to represent the extent of fungibility of aid. In other words, it is implicitly assumed that donors grant aid for investment purposes only (and that all investment expenditures are captured in I_g) hence any aid allocated to G (proportion ρ_2 and ρ_3) is an *ex post* measure of fungibility (i.e., ρ_2 and ρ_3 equal to zero *ex ante*). As there are elements of G which donors would be willing to support, notably various social sector expenditures, ρ_2 and $\rho_3 > 0$ *ex ante* and the estimated value of ρ_2 and ρ_3 is a measure of maximum fungibility. Second, equations (2.4) and (2.5) do not allow for the not uncommon practice in developing countries of financing recurrent expenditure from domestic borrowing. This can easily be overcome by rewriting equation (2.4) with $(1 - p_4)B$ and adding p_4B to the left-hand side of equation (2.5). (Franco-Rodriguez *et al*, 1998)

The last problem has been identified by White (1994) as cited in Franco-Rodriguez et al (1998), who points out that this representation over-constrains the model, not necessarily allowing the government to reach α_0 even in the case where aid revenues are sufficient to meet all targets. The problem arises because although total revenue may be sufficient to meet (2.3), α 's constrains allocation so that specific expenditure targets in (2.2) cannot be met. One possible solution is to use a single budget constraint like that in equation (2.3), which will always ensure that the model can attain α_0 when revenues are sufficient to meet each target. (Franco-Rodriguez et al, 1998)

In the work of Franco-Rodriguez et al (1998) aid, like tax and borrowing, treated as one of the forms of revenue. Their major point of departure from the previous literature is that they endogenize aid. Previous contributors have assumed that governments set revenue targets for tax and borrowing, yet treat aid as exogenous aid. In Franco-Rodriguez et al (1998) approach, governments have a target for aid revenue, and this "expected" revenue is incorporated into their fiscal planning; that is, when determining revenue and expenditure allocations, aid revenue is taken into account. Making aid endogenous does not require the assumption that recipients have control over the aid they are allocated by donors; instead it requires effective control over the amount of this allocation that is actually spent. Other innovative features of this model, notably that a budget constraint is expressed as an inequality and that domestic borrowing is allowed to finance both capital and recurrent expenditure (in previous studies it is permitted to finance investment only). (Franco-Rodriguez et al, 1998)

In this model there are two categories of public expenditure: recurrent expenditure or government consumption (G) and capital expenditure or public sector investment (I_g). Government revenue is obtained from both domestic and foreign sources in the forms of taxation and other recurrent revenue (T), borrowing from domestic sources (B) and, for developing

countries, aid inflows (A). The utility function of public sector decision-makers thus can be written as:

$$U = f(I_g, G, T, A, B) \quad (2.6)$$

The utility function in equation (2.6) can be represented as a quadratic loss function:

$$U = \alpha_0 - \frac{\alpha_1}{2}(I_g - I_g^*)^2 - \frac{\alpha_2}{2}(G_d - G_d^*)^2 - \frac{\alpha_3}{2}(T - T^*)^2 - \frac{\alpha_4}{2}(A - A^*)^2 - + \frac{\alpha_5}{2}(B - B^*)^2 \quad (2.7)$$

where the asterisks denote exogenous target levels of the endogenous variables and $\alpha_i > 0$ for $i = 1, \dots, 5$. The specification in equation (2.7) differs from all previous fiscal response models by treating aid as a choice variable for the recipient, and hence endogenous. The reason for endogeniz aid is that donors commit a certain amount of aid to recipients each year, and it is ultimately up to recipients to determine how much of that commitment is disbursed (actually spent) in the year. Although the aid commitment is determined by the donor and as such is largely exogenous to the recipient (who can however take some actions to influence commitments), the amount disbursed, and hence allocated among expenditure categories, is subject to a large degree of recipient discretion and ought therefore enter the recipient utility function as an endogenous variable. Given this reasoning, ‘A’ is disbursements while the target ‘A*’ can be represented by commitments. (Franco-Rodriguez et al, 1998)

To avoid the last problem (i.e. mentioned in Heller (1970) the problems with constraints written in equations (2.4) and (2.5)), White (1994) as cited in Rodriguez et al (1998) suggested the use of a single budget constraint like that written in equation (2.3). It is obvious that such a constraint will always ensure that the model can attain α_0 when revenues are sufficient to meet each target. Public sector fiscal decisions are subject to pressures from a number of quarters: politicians, private pressure groups, various arms of the bureaucracy and donors themselves all seek to

influence the allocation of revenues. These pressures, it is reasonable to suggest, inevitably culminate in forcing outcomes which are sub-optimal in terms of the government's own preferences. This is likely to be the rule rather than the exception and ought to therefore be captured explicitly in one's model of public sector fiscal behavior. On the basis of this reasoning they replaced (2.4) and (2.5) with the following:

$$G \leq \rho_1 T + \rho_2 A + \rho_3 B \quad (2.8)$$

The rationale for the inequality is that there are external constraints which limit the manner in which the public sector in developing countries allocates revenues. (Franco-Rodriguez et al, 1998)

In relation to the fiscal response literature Alemayehu (2002) shows a number of drawbacks of the model. Firstly, the decision-making framework is not plausible because decision-makers in most developing countries actually use a different framework. Decision-makers will have a targeted level of expenditure, based on projected growth and social development objectives. To finance these expenditure policy-makers face three costly means of financing. They finance first through foreign capital inflows, by raising revenue domestically is another and if the desired level of expenditure cannot be financed through these two mechanisms, finally governments may be forced to resort to deficit financing or expenditure reduction to the extent that is tolerable. (Alemayehu, 2002)

The second shortcoming raised by Alemayehu (2002) was that the econometric approach employed in these studies is extremely weak. Specifically, most series used in these studies have not been tested for the stationarity assumption. Thirdly, the tax variables used in the literature relate to aggregate taxes. Disaggregating taxes into different categories, such as direct and

indirect, is likely to yield quite different results. Finally, the study relating to Africa as a whole not only is restricted in its sample size, but also fails to examine the variation across different African regions. (Alemayehu, 2002)

Because of the above drawbacks an alternative approach (decision-making framework), which is more closely related to Africa's stylized facts, outlined by Alemayehu (2002) and he also specified a relevant model which attempts to depict the fiscal posture of a typical African economy. The model comprises three behavioural equations and one closure. But the scope of the model limited to examining the impact of foreign inflow on taxes (direct and indirect) and government current expenditure. (Alemayehu, 2002)

He set direct tax (T_d) as a function of economic activity (Q) and capital inflow (E). This function in log-log form is given by:

$$\ln T_d = \alpha_1 + \beta_{11} \ln Q + \beta_{12} \ln F \quad \text{or}$$

$$T_d = A Q^{\beta_{11}} F^{\beta_{12}} \quad \text{where: } \alpha_1 = \ln A \quad (2.9)$$

$$\text{where: } \beta_{12} > 0 ; \beta_{11} < 0$$

This function states that by increasing the tax base, economic activity (Q) is believed to have a positive impact upon tax revenue.

Alemayehu (2002) states that the level of indirect taxes in most African countries is closely related to external economic activity, and specifically to the level of exports (X) and imports (M). The level of these taxes is also directly related to private consumption expenditure (C_p), since such taxes are usually imposed on privately consumed commodities. Finally, foreign inflows are also allowed to affect this type of taxation. This is given formally as:

$$\ln T_i = \alpha_2 + \beta_{21} \ln C_p + \beta_{22} \ln(X + M) + \beta_{23} \ln F \quad (2.10)$$

where: $\beta_{21} > 0$; $\beta_{22} > 0$; $\beta_{23} < 0$

And also the third behavioural equation, the level of current government expenditure (G), is assumed to be positively related to total revenue (T) and foreign inflows (F). It is also specified to be positively affected by external interest payments on both concessional (i_w^*) and non-concessional (i_w) loans. The final argument he used in this function is a lagged value of the dependent variable. This is included in order to portray the persistence of previous patterns of expenditure. This is formally given as:

$$\ln G = \alpha_1 + \beta_{31} \ln T + \beta_{32} \ln F + \beta_{33} \ln i_w^* + \beta_{34} \ln i_w + \ln G_{t-1} \quad (2.11)$$

where: $\beta_{3i} > 0$; for $i = 1 \dots 4$

These three behavioural equations may be closed by a public deficit equation. The closure may be used for simulation purposes; nevertheless its inclusion does not have a direct bearing on the estimated equations. This closure is given as:

$$Z = Z_b + Z_p = G + I_g - (T_d + T_i + T_o + F) \quad (2.12)$$

This equates the difference between government total expenditure (government current expenditure, G , and government investment, I_g) and total revenue (which is the sum of total tax revenue, $T_d + T_i$, other government revenue, T_o , borrowing from domestic banks Z_b , and resource transfer from the private sector, Z_p) with the total capital inflow. The last two items, Z_b and Z_p , are balancing items that could be derived by subtracting public saving, current revenue minus current expenditure, and foreign savings, F_g , of the government from public investment, I_g . (Alemayehu, 2002)

2.2.2 Empirical Review

Heller (1975) examine the fiscal response model by developing a cross-section time series econometric model of the public sector of eleven African countries by dividing them in to two samples i.e. Francophone and Anglophone countries. By using two-stage least square (2SLS) method in both samples he found that differences between the share of total grants and loans allocated to the recurrent budget. In the Anglophone sample, 9 percent of the grant allocated to investment and 40 percent for consumption. But Francophone countries differ substantially with a stronger impact on investment. In both samples the impact of loans on taxes is negative but considerably smaller than the impact on borrowing. And also, investment rises by 63 to 76 percent of total loans, as contrasted with 41 to 53 percent of official loans. Generally the result drawn from Heller (1975) suggests that aid enables a reduction in the level of domestic taxes and borrowing. However, based on the type of aid the response of public consumption to aid varies. Because grants have a more stimulative impact on total spending they are pro-consumption, whereas loans are more pro-investment.

The empirical results from Mosley et al (1987) shows that the rate of return of aid on capital is higher and the share of aid inflows allocated to the development budget are, on average, higher in 'high aid, high growth' countries than in 'high aid, low growth' countries, whereas the impact of aid inflows on private-sector capital investment is about the same in each group. In the sample from out of eight countries four of them show significantly positive impact of overseas aid inflows on the recipient country's private sector, aid given to government will tend to 'crowd out' enterprise and investment in the private sector of developing countries, on average the coefficient is higher in the 'high aid, high growth' countries than in 'high aid, low growth' countries. Another outcomes related to tax shows that out of the seven countries in the 'high aid,

high growth', five exhibit rising tax effort, whereas among the seven countries in the 'high aid, low growth' six show declining tax effort and one show rising tax effort. The general outcome of the Mosley et al (1987) are negative ones, they found that, establishing any statistically significant correlation between aid and the growth rate of GNP in the developing countries is impossible.

Gang and Khan (1991), building on an earlier paper by Heller (1975), sought to model the public-sector fiscal response to foreign aid inflows using time-series data for India. The allocation of aid among expenditure categories was modeled explicitly, through estimates of constraint and structural equation parameters obtained from a utility-maximizing problem. They found that the Indian public sector actually dis-saved, with tax revenues pulling funds away from the investment budget, and that both aid loan and grant funds remained entirely in this budget.

The fiscal response model applied by Franco-Rodriguez et al (1998) diverges from previous applications of the Heller (1975) model basically by endogenizing aid. By using time-series data for Pakistan the estimates of proportions of domestic revenue i.e. tax (p_1), aid (p_2) and domestic borrowing (p_3) are 0.85, 0.51 and 0.54 respectively. This result indicates that most of the consumption expenditure about 85 percent financed from domestic revenue, but aid financed both consumption and investment almost equally. The result of domestic borrowing differs from the previous studies which show that the proportion of domestic borrowing allocated to finance consumption expenditure. However, earlier studies assumed that governments of developing countries they do not finance consumption expenditure from domestic borrowing (such as Heller, 1975, Mosley et al, 1987). Based on the estimates of structural equation, with each one rupee change in aid money disbursed resulting in a -2.91 rupee change in taxation. Endogenous changes in aid are also inversely related to changes in consumption and borrowing. In case of

Pakistani the overall impact of aid on revenue and total incremental effect of aid on public expenditure is negative.

Using 1956–95 time series data for Pakistan, McGillivray (2000) developed an econometric model, which differs from those used in previous studies by allowing domestic borrowing to finance both capital and recurrent expenditure. The estimates of the shares of tax and aid loans were each found to be significantly different from zero. Their values are 0.32 and 0.49, respectively, indicating that roughly two-thirds of tax and other recurrent revenues have been saved and roughly half of aid loans have been allocated to recurrent expenditure. In contrast, the null hypotheses that aid grants and domestic borrowing are zero could not be rejected. It seems, therefore, that the shares of aid grants and domestic borrowing have not found their way systematically to the recurrent budget. Generally the results indicate that aid is allocated mainly to investment, is positively associated with both investment and consumption expenditure, and has no final impact on taxation.

Morrissey et al. (2007) extend the time series FRM approach with official Kenyan data for 1964–2004, to distinguish fiscal effects of aid grants and loans and consider the impact of aid on growth (within a fiscal framework). The results differed for the two types of aid: grants were associated with increased spending and that government spending had a positive effect on growth (grants also had a small positive association with growth); loans, however, were a response to unanticipated deficits, i.e. if spending exceeded revenue (tax and grants) the government sought loans to finance the deficit (in periods of a budget surplus the loans were repaid). Fiscal deficits, hence aid loans, had a negative association with output. Another interesting result is that tax revenue was weakly exogenous, i.e. the government was not able to increase tax revenue in the short-term to adjust to budget disequilibrium (deficits). It follows that

because tax revenue and grants were not amenable to short-term change by government (in effect they were not policy instruments), borrowing (loans) adjusted to spending disequilibrium.

Lloyd et al. (2009) apply a common country-specific fiscal response analysis to a sample of 19 countries. The main finding is that aid is a significant element of the fiscal relationship for a variety of developing countries (including a number of middle income countries for which aid is a relatively small share of spending), i.e. they confirm that aid does influence budgetary behaviour. For the majority of countries aid is weakly exogenous (donors do not respond to fiscal imbalances in determining their allocation, but aid has effects on the other fiscal variables) and is positively associated with spending (both capital and recurrent). However, they do not elaborate on the effect of aid on spending, i.e. they do not provide estimates of the magnitude of the effect of aid on spending, nor do they provide any discussion of the effect of aid on the composition or dynamics of government spending.

Let's switch to the findings of Alemayehu (2002), who proposed an alternative decision-making framework based on the stylized facts in relation to Africa, dividing the continent in to three sample regions i.e. North Africa (NA), East and South Africa (ESA) and Western and Central Africa (WCA). And by using an Error Correction Model several sets of equations was estimated, he found that the impact of capital inflows on taxes varies cross the type of inflows, the nature of taxes and between regions. With respect to bilateral inflows the long-run elasticity for direct taxes ranges from -0.22 and -0.30 for the WCA and ESA regions respectively, this show that, capital inflow has a negative effect on direct taxes. Similarly indirect taxes have statistically significant relationship with private inflows. As a result, the long run elasticity of indirect taxes with respect to private inflows varies from -0.12 and -0.28 for the WCA and NA regions. And also capital inflows in all regions have a strong positive impact on current government

expenditure. In the ESA region the use of grants reach an elasticity coefficient of 0.57, this shows how much the positive impact is emphasized, but in WCA region shows less strong elasticity coefficient of 0.23.

2.3 VAR/VECM Approaches

The empirical applications of fiscal response models (FRMs) have short-comings, mostly related to difficulties in the use and estimation of targets for government expenditure and revenue, the treatment of aid, and the 3SLS non-linear econometric techniques that have been used are notoriously difficult to estimate, interpret and highly sensitive to (and demanding of) the data, often yielding inconsistent estimates of core parameters (Morrissey (2012); Martins(2010); McGillivray and Morrissey (2001a)). Furthermore, Morrissey (2012) argues that whilst it is necessary to estimate budget targets, there is no acceptable theory regarding how governments form revenue and expenditure targets; the theoretical framework does not provide a good representation of government behaviour; and the behavioural relationship being estimated is assumed fixed over the period (i.e. the models do not allow for the fact that spending decisions are made within a fiscal framework in which aid is only one component). Osei *et al.* (2005) add to the list and argue that FRMs are not predictive theories as they do not generate specific testable hypotheses of the effect of aid on fiscal behavior. (cited in Bwire, 2012)

As a response to these criticisms, dynamic Vector Autoregressive (VAR) approaches have become an increasingly popular tool for modeling the relationship between aid and fiscal aggregates. This approach uses multivariate VAR models to estimate long-run (co-integrating) relationships between a system of fiscal variables (Fagernäs and Roberts 2004b).

VAR process proposes estimation of reduced forms than the complete structure (Rahman, 2005). Most importantly, VAR provides the traceable framework to study the linkages of aid through various fiscal variables. The technique takes into account the interactions between macro variables over time, allowing a distinction in estimating the long-run (equilibrium) and short-run (adjustment to the equilibrium) relations (Bwire, 2012).

Since FRM's do not intend to investigate the dynamic impact of aid on government budget constraints, this reduced form is sufficient for policy studies. The main strength of the VAR is that it doesn't require the existence or estimate of unknown targets. Moreover, 'exogeneity assumptions can be tested using data and therefore, there is no need to impose 'prior assumptions'. (Rahman, 2005)

There is one equation for each and every variable, so all variables in the system are treated as potentially endogenous. Each variable is explained by own lags and lagged values of the other variables. The econometric model can allow the data to speak freely about the empirical content of the model. It is an a-theoretical approach, i.e. one does not have to maintain the existence of, estimate or test specific theoretical formulations of the budgetary planning targets, rather economic theory is often invoked to choose the variables to include in the analysis, select the appropriate normalization and to interpret the results. (Bwire, 2012)

2.4 Empirical reviews on VAR/VECM Approaches and Ethiopian studies

In relation to dynamic approaches a number of studies conducted. Sugema and Chowdhury (2005) for example find that in Indonesia project aid is by definition intended for development expenditures however it results in an increase in routine expenditure as well. This suggests that project aid is fungible: it creates extra resources available to increase non-discretionary spending. And also program aid tends to increase routine expenditure but not development expenditure; thus it mainly serves as budget support. In addition to this in their study they find that aid flows make the government fiscally “lazy”. The availability of aid is a disincentive to mobilise domestic revenue through a more efficient and effective taxation system.

By applying VAR model, Fagernäs and Roberts (2004a) study the fiscal effects of foreign aid in Zambia between the period 1964 and 2001. They found that a one-period injection of external financing appears to have mainly had the effect of promoting a sustained and significant rise in capital budget expenditure. Recurrent expenditures have also risen contemporaneously with the receipt of aid, as donors have wished. And also aid has a negative effect on domestic revenues. On the other hand, domestic borrowing has also increased in response to injections of aid, suggesting that, far from using these to stabilise the economy, the government has tended to take the opportunity to relax fiscal and macroeconomic controls.

In contrast, Osei et al (2003) apply VAR analysis to examine the effects of aid on the budget allocation of Ghana between 1966 and 1998. Their impulse response function model suggests that, after stabilising, a sustained injection of aid led to higher government consumption), but to only a small increase in government investment. Aid was associated with a large rise in domestic revenue and a somewhat smaller decrease in domestic borrowing. The analysis suggests that aid

to Ghana was used more to facilitate fiscal adjustment than to finance higher levels of public expenditure. Fagernäs and Schurich (2004) also find similar results for their study of Malawi over the period 1970 to 2000 concluding that external finance has had a positive long-run impact on the Government's development budget whilst having a negative impact on levels of domestic borrowing. Although in this case the aid inflow is found to have had no impact on the domestic tax effort.

Batten (2010) has applied a dynamic Vector Error Correction Model (VECM) to estimate a simultaneous system of fiscal equations between 1974 and 2008. He found that aid contributed to government's irresponsible behaviour in development expenditures and led to decline in domestic revenue collection but they have also been an important source of debt reduction. This suggests that foreign grants have acted as an important substitute to government borrowing.

By applying Autoregressive Distributed Lag model (the VECM approach) for Pakistan, Butt and Javid (2013) found that foreign grants have adversely affected government's fiscal responsibility. It has reduced domestic revenue collection while amassing foreign debt. And also the relationship between aid and domestic debt has been unambiguously negative. They said that if a positive shock is administered to grant aid, it decreases the level of public debt both in short and long run. It means that government has preferred to substitute grant aid for domestic revenue and domestic borrowing.

Bwire et al (2013b) applied the co-integrated VAR model to assess the growth effect of aid in Uganda over the period 1972-2008. They found that aid has both direct and indirect beneficial association with growth. And also aid is a significant part of the long-run equilibria, and this is separately robust to the fiscal and growth-type relations (i.e. aid and the macro variables are

significantly co-integrated). Generally they conclude that aid to Uganda has been associated with long term higher public spending, increased tax effort and reduced domestic borrowing.

There are few studies conducted in Ethiopia in relation to fiscal response studies. Aberra (2004) by using two alternative approaches i.e. neoclassical model of Heller (1975) and non-neoclassical model of Alemayehu (2002). He shows the result from neoclassical approach that grants and aid from bilateral sources are used to finance consumption as well as investment, but from multilateral sources loans and aid, are pro-investment, without leakage to consumption they fully used for investment. And also the impact of aid on government revenue is low. Similarly the result from non-neoclassical model shows that in the short run aid increases direct tax collection and has no effect on indirect taxes. In addition aid positively and negatively affects government investment and consumption respectively. The results indicated that aid in Ethiopia is mainly used to finance investment with only some portion of grants and bilateral aid leaking to consumption.

Addis (2008) by applying Fagernäs and Schurich (2004a) conventional government accounting i.e. basic budget identity, on his study, he found that foreign aid in the form of grant is pro-consumption and loan is pro-investment, both of them have a positive impact on government expenditure, and have a negative impact on domestic borrowing and indirect tax collection, but they have no effect on direct taxes. Generally he found that, by combining both grant and loan (ODA), there inflows increase public expenditure and have a negative impact on the government revenue and domestic borrowing in the country. Finally he suggested that aid and domestic borrowing are close substitutes, such that the higher aid inflow the lower will be domestic borrowing.

Berhanu (2008) by using VAR approach on Franco-Rodriguez et al (1998) model i.e. the modified Heller (1970) model; He found that an increase in grants and foreign loans results in an increase in recurrent budget expenditure and a decrease in capital budget expenditure. He suggests that this might show the existence of fungibility. Second, grants, foreign loans and ODA have a positive relationship with domestic borrowing. And also, an increase in grants and foreign loans results in an increase in tax revenue and decrease in tax revenue respectively. Finally he shows that a rise in ODA results in an increase in the tax revenue, domestic borrowing, recurrent expenditure and capital expenditure, i.e. a rise in all fiscal aggregates.

Daniel's study was based on the model developed by Alemayehu (1996) as an alternative approach to analyze the fiscal response to foreign financial inflows. Since the variables are non-stationary at levels, Daniel estimated the first difference of the variables, which shows only short-run relation among variables. Daniel's (1998) results are similar to the result of Alemayehu (1996) found for some African – Countries. The results showed that foreign financial flows have a negative impact on both direct and indirect taxes and a positive and strong impact on government recurrent expenditure. (cited in Berhanu, 2008)

By applying cointegrated vector autoregressive (CVAR) model, Martins (2010) assess the dynamic relationship between foreign aid inflows, public expenditure, revenue and domestic borrowing in Ethiopia using a quarterly data set for the period 1993-2008. He found aid grants adjust to the level of development spending, i.e. donors to Ethiopia appear to provide more grants if development spending is increasing. Furthermore, there is evidence for a long run positive relationship between aid and development spending, but not between aid and recurrent spending. As in the other cases, domestic borrowing increases in response to shortfalls in

revenue (tax and grants) and there is no evidence of a long run relationship between aid and tax revenue.

To wrap-up the empirical review mentioned in 2.2.2 and 2.4, table 2.1 and 2.2 presents results of selected country-specific studies on the effect of aid, which measure the proportion of grants, loans and ODA allocated to total expenditure (i.e. current and capital spending), domestic revenue and domestic borrowing. In general, it is difficult to find a consistent pattern regarding the impact of aid on fiscal aggregates. The impact appears to be country specific and so lacks a basis for comparing results. This suggests that empirical evidence and theoretical predictions regarding the impact of aid is contradictory and generally ambiguous.

Table 2.1: Results of Selected Studies on the Dynamic Impact of Aid

Study	Sample	Aid Measure	Incremental Impact of Aid on:				
			Current Spending	Capital Spending	Total Spending	Domestic Revenue	Domestic Borrowing
Martins (2010)	Ethiopia (1993Q3-2008Q2)	Grants	n.r	++	n.r	++	?
		Loans	n.r	n.r	n.r	n.r	n.r
Osei et al., (2005)	Ghana (1966-1998)	ODA	++	+	++	++	--
Morrissey et al., (2007)	Kenya (1964-2004)	Grants	n.r	n.r	+	n.r	n.r
		Loans	n.r	n.r	+	--	n.r
Fagernäs & Schurich (2004)	Malawi (1970-2000)	ODA	--	++	+	+	--
		Grants	--	++		+	--
		Loans	?	+		+	--
Fagernäs & Robert (2004a)	Uganda (1974-1999)	ODA	++	+		+	..
		Grants	+	++	++	+	..
		Loans	++	++		+	..
Fagernäs & Robert (2004b)	Zambia (1972-1998)	ODA	+	++		--	+
		Grants	+	++	+	--	+
		Loans	+	+		--	..

Notes: i). ++ (strongly positive), + (moderately positive), -- (strongly negative), - (moderately negative), .. (insignificant), ? (ambiguous), n.r (not reported or cannot be inferred).

ii) Due to differences in the measurement of aid, results are not directly comparable across the table.

Sources: Bwire (2012)

Table 2.2: Results of Ethiopian Studies

Study	Sample	Aid Measure	Incremental Impact of Aid on:			
			Current Spending	Capital Spending	Domestic Revenue	Domestic Borrowing
Aberra (2004)	1960/61-2002/03 (neo-classical)	Grants	+	+	..	n.r
		Loans	--	+	..	n.r
	(non neo-classical)	Grants	..	++	+	n.r
		Loans	..	+	+	n.r
Addis (2008)	1961-2007	ODA	+	++	--	--
		Grants	++	+	--	--
		Loans	+	++	--	--
Berhanu (2008)	1966-2004	ODA	+	+	+	+
		Grants	+	--	+	+
		Loans	+	--	--	+

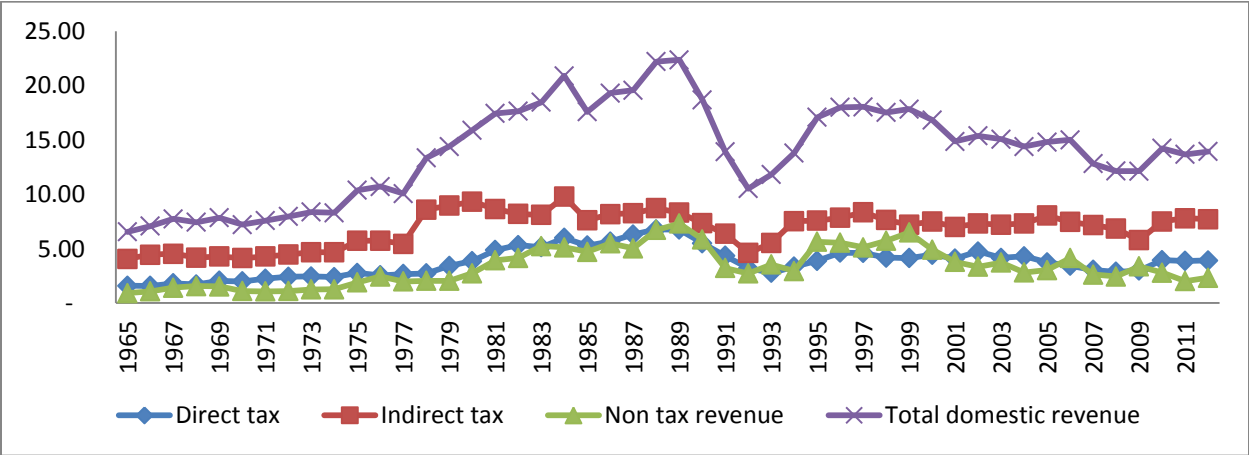
Notes: ++ (strongly positive), + (moderately positive), -- (strongly negative), - (moderately negative), .. (insignificant), ? (ambiguous), n.r (not reported or cannot be inferred)

CHAPTER THREE: An Overview of Current Fiscal Conditions in Ethiopia

3.1 Fiscal trends

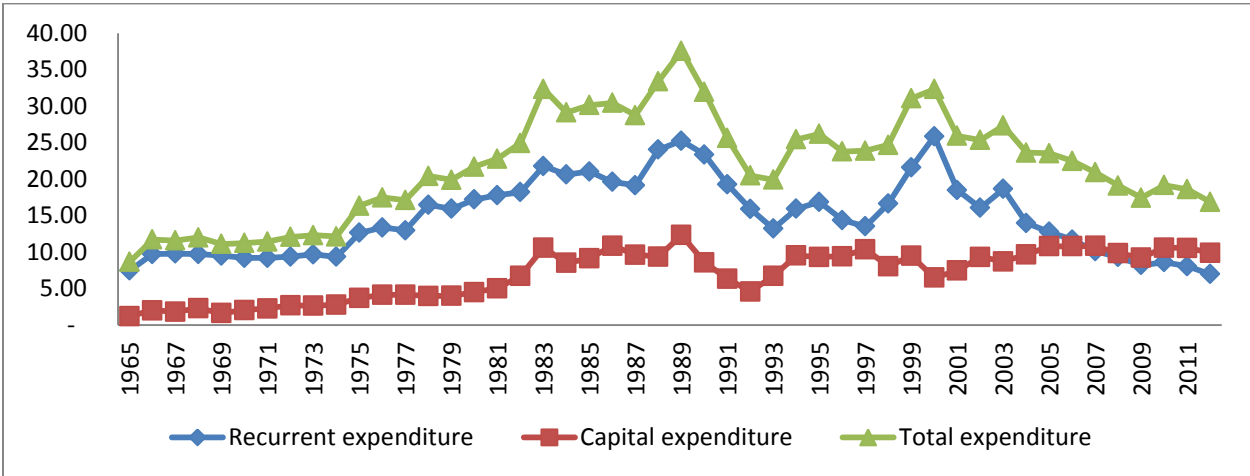
Figure 3.1 below plots government sources of domestic revenue i.e. direct tax, indirect tax and non-tax revenue between the periods 1965 - 2012. During the Imperial regime, domestic revenue grew slowly as a percentage of GDP. In the *Derg* regime revenue had increase rapidly and it reach a peak point in the year 1989, but in 1985 there was a fall in revenues as percentage of GDP mainly due to the effects of a drought in the country. And also a higher decrease in revenue recorded in this regime from 1990-1992 due to a civil war in the country which led to administrative problem to collect tax properly (Martins, 2007). In the meantime from 1992 (i.e. EPRDF regime) the revenue again started to rise and almost at stable level. Under the three regimes their main sources of domestic revenue were indirect tax this comprises both domestic indirect tax and foreign trade tax.

Fig. 3.1: Sources of domestic revenue as percentage of GDP



As shown below in figure 3.2 during the period of 1965-2007 recurrent expenditure was a dominant expenditure as percentage of GDP. Until 1974 total capital expenditure had higher percent of GDP while capital expenditure accounted less percent of GDP. From 1974 up to 1991 the total expenditure was higher than other regimes, the reason was that during this period the regime followed command economic system, this leads to increase the demand for government expenditure in all sectors of the economy. Especially in the year 1989 total government expenditure reached its peak point. Again in 2000 government expenditure particularly recurrent expenditure reaches higher level. During the period 1998-2000 there was Ethio-Eritrean war in this period the military expenditure increased this leads to a higher recurrent expenditure as a percentage of GDP. On the other side in 2000 the drop in capital expenditure was due to a reduction in both economic and social investments, likely due to the severe drought that affected the country in 1999-2000. During the period 2000-2005, current expenditures declined relative to percentage of GDP while capital expenditures more than trebled (IMF, 2006) and also in recent times the capital expenditure over take the position of recurrent expenditure (cited in Martins, 2007).

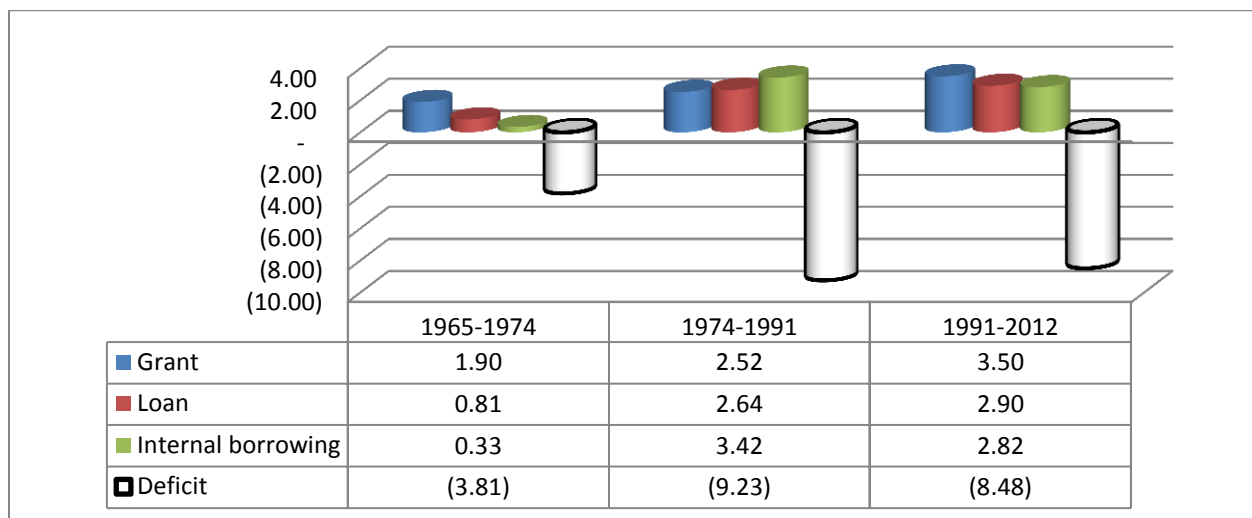
Fig. 3.2: Share of recurrent, capital and total expenditure as percentage of GDP



3.2 Fiscal deficit and Its Financing

Below fig. 3.3 shows the three regimes deficit and its financing as percentage of GDP on average. The figure shows, until 1974 the deficit as a percentage of GDP was relatively low, but after that the *Derg* regime ran higher fiscal deficits. The period of civil war in 1990-1991 registered higher deficits corresponded to other years in the *Derg* regime. This was as a result of higher expenditure especially for military purpose combined with revenue collection problem (Martins, 2007). And also in the EPRDF regime higher than imperial regime, but it is below the *Derg* regime. In the EPRDF regime in the period 1999-2000 were high fiscal deficits associated with a sharp rise in defense spending due to a war with Eritrea (Alemayehu, 2007).

Fig. 3.3: Deficit and its financing as percentage of GDP on average

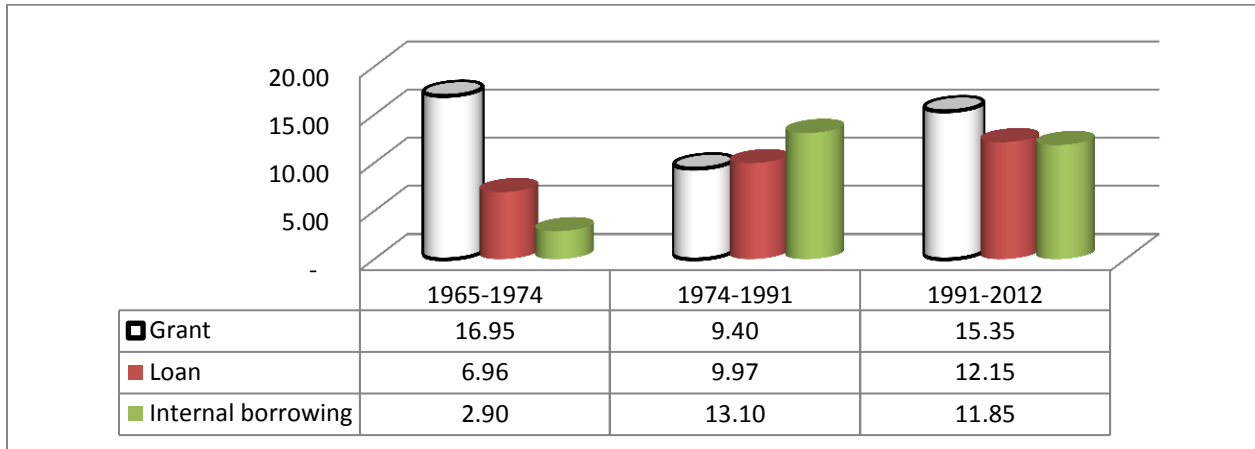


Source: Own computation based on MoFED data

The means of financing this deficit differ from one regime to the other, during the imperial regime deficit was more financed by grant than loans and domestic borrowing. However, in the *Derg* regime the deficit was financed more by domestic borrowing than from external loans and grants. Domestic financing has been partly funded through the sale of bills and bonds to

commercial banks and non-banks (Martins, 2007). And also in the EPRDF regime like imperial regime the deficit was financed more by foreign grants followed by external loans.

Fig. 3.4: Sources of finance as percentage of total expenditure on average



Source: Own computation based on MoFED data

The above fig. 3.4 shows that in the imperial regime external grant finance covers 16 percent of total expenditure on average and loans and domestic borrowing covers 6 and 3 percent of total expenditure on average respectively. However, in the Derg regime, there was high domestic borrowing to finance the expenditure than the two regimes about 13 percent of the total expenditure on average. After the fall down of the *Derg* regime there was high grant and loan to finance the deficit of the budget. This finance covers about 15 percent of the expenditure from grant and also 12 and 11 percent covered by external loan and domestic borrowing respectively.

CHAPTER FOUR: Methodology

4.1 Theoretical Framework

To analyze government's response to aid flow Heller's (1975) utility model, which assumes that the recipient country has an objective of maximizing the social welfare of its citizens under budgetary constraints, is adopted. By using this, Batten (2010) implemented the model to analyze the foreign aid and the fiscal behaviour of the government for Papua New Guinea. Following Batten (2010) the theoretical model is structured on a utility-maximising approach, where the recipient government is deriving benefits through allocation of its funds between capital expenditures, CE_t , and recurrent expenditures RE_t at time period t .

The theoretical model of utility maximization is applied to the analysis of this study because it has theoretical basis drawing from economic theory. This theoretical model formulated mathematically usually as linear or nonlinear optimization models. And also this theory has important things that applicable in most of the developing countries (Heller, 1975). Developing country governments are assumed to be rational, trying to get the most value for their spending and their incomes are limited because their country resources are limited. They face a budget constraint; due to this governments must choose among alternative benefits with their limited incomes.

Assuming the government's preferences can be expressed with the familiar Cobb-Douglas (CD) utility function this can be written as:

$$U(CE_t, RE_t) = CE_t^\alpha RE_t^{\alpha-1} \tag{4.1}$$

The reason for choosing CD's are its ease of use and fits well in cases where some of its fundamental assumptions are violated than constant elasticity of substitution (CES) (Miller, 2008). There is an important feature for the CD's utility function when the price of CE_t changes, the demand for RE_t doesn't change. This means that commodities CE_t and RE_t are neither substitutes for one another nor complements to one another. However, the CES utility function is used to model commodities that are either substitutes for one another, or complements of one another.²

In the study of Fagernäs and Schurich (2004a) the conventional government accounting, the basic budget identity is represented by:

$$E - (T + G) = B + F, \quad (4.2)$$

where (E) is total expenditure, (T) is domestic revenue, (G) is foreign grants, (B) is domestic financing (domestic borrowing) and (F) is foreign financing (foreign loans). The left side of the identity is the government budget balance after grants, while the right side of the identity is the total financing requirement, which is a combination of domestic and foreign financing. This identity rearrange as:

$$E - T = B + A, \quad (4.3)$$

Where aid (A) is the sum of foreign grants (G) and foreign loans (F). (E – T) then becomes the deficit before grants. (Fagernäs and Schurich, 2004a)

Based on this formulation, this study also uses the domestic revenue collection and foreign aid to determine the budget constraint faced by the recipient government. The foreign aid is disaggregated between grant and loan and also the tax revenue disaggregated between direct tax

² http://www.econport.org/econport/request?page=man_consumer_demand

and indirect tax. Shortfalls between expenditures and revenues are then captured by changes in the government's debt levels (domestic borrowing) or alternatively the deficit/surplus. As such the budget constraint can be written as:

$$P_{CE,t}CE_t + P_{RE,t}RE_t - (TXR_t + \beta A_t) = DB_t, \quad (4.4)$$

Where for simplification foreign aid (A_t) is the sum of foreign grants (G_t) and loans (L_t), tax revenue (TXR_t) is the sum of direct tax (DTX_t) and indirect tax (ITX_t), DB_t is domestic borrowing and P_t is prices of public goods. The specific amount of aid that the recipient country perceives to use for lowering taxes and borrowing or changing the composition of capital and recurrent expenditures is represented by β . Then government utility maximization problem can be written as:

$$MAX: U(CE_t, RE_t) \text{ s. t. } (TXR_t + \beta A_t) + DB_t - P_{CE,t}CE_t + P_{RE,t}RE_t = 0 \quad (4.5)$$

The first order conditions for equation (4.5) become:

$$\mathcal{L} = CE_t^\alpha RE_t^{\alpha-1} + \lambda(P_{CE,t}CE_t + P_{RE,t}RE_t - DB_t - TXR_t - \beta A_t)$$

$$\frac{\partial \mathcal{L}}{\partial CE} = \alpha CE_t^{\alpha-1} RE_t^{\alpha-1} + \lambda P_{CE,t} = 0 \quad (4.6)$$

$$\frac{\partial \mathcal{L}}{\partial RE} = (\alpha - 1)CE_t^\alpha RE_t^{\alpha-2} + \lambda P_{RE,t} = 0 \quad (4.7)$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = P_{CE,t}CE_t + P_{RE,t}RE_t - DB_t - TXR_t - \beta A_t = 0 \quad (4.8)$$

Rearranging the first order conditions from equation (4.6)-(4.8) to substitute λ and assuming the prices of public goods are unitary yields the following system of structural equations:

$$CE_t = \frac{\alpha}{2\alpha - 1} (DB_t + TXR_t + \beta A_t)$$

$$RE_t = \frac{\alpha - 1}{2\alpha - 1} (DB_t + TXR_t + \beta A_t)$$

$$TXR_t = CE_t + RE_t - DB_t - \beta A_t$$

$$DB_t = CE_t + RE_t - TXR_t - \beta A_t$$

$$A_t = \frac{1}{\beta} (CE_t + RE_t - DB_t - TXR_t) \quad (4.9)$$

Following Batten (2010) the structural equations of equation (4.9) gives a system of interdependent fiscal equations relating foreign aid to expenditure levels, changes in domestic borrowing, and tax revenue as follows:

$$CE = f(TXR, A, DB)$$

$$RE = f(TXR, A, DB)$$

$$TXR = f(CE, RE, A, DB)$$

$$DB = f(CE, RE, A, TXR)$$

$$A = f(CE, RE, TXR, DB) \quad (4.10)$$

4.2 Estimation Method/Approach³

The system of interdependent fiscal relationships given in equation (4.10) can be estimated by using Vector Autoregressive (VAR) model or Vector Error Correction Model (VECM) framework depends on the cointegration test. VAR models can be broadly classified as a multivariate extension of Granger causality testing, where each of the dependent variables are a function of both lagged values of themselves and a number of other endogenous explanatory terms (Enders, 2003). VAR analysis does however require that each of the variables must be

³ The discussion in this section relies heavily on Alemayehu et al (2012), Hamilton (1994), Johansen (1988) and Johansen and Juselius (1992)

stationary (Hamilton, 1994). In the case each variable is non-stationary, and confirm whether there exists a long run equilibrium relationship, the cointegration concept is used. This concept basically refers to the condition that even if individual series are non-stationary (i.e. are I(1) series), if there exists a linear combination of these I(1) series in the regression equation and is stationary, then the regression is not a spurious regression. In this case, each of the variables is first differenced to establish stationarity and then these differenced variables are applied to the VECM framework via Granger's representation theorem (Engle and Granger 1987).

In particular, Johansen (1988) and Johansen and Juselius (1992) have developed multivariate methods that explicitly use the VAR for the testing and estimation of co-integration relationships among non-stationary data. As a medium for analysis, the VAR is tractable and can be interpreted as the reduced form representation of a large class of dynamic structural models (Hamilton 1994). As such, it provides a useful framework for the investigation of both long-run relationships and short-run dynamics. Furthermore, the VAR facilitates the dynamic simulation of variables within the system following a shock using *impulse response analysis* (Sims, 1980; Lütkepohl and Reimers, 1992).

In the usual unrestricted VAR specification, there is one equation for each and every variable. Therefore, all variables are assumed to be endogenous, which avoids unnecessary *a priori* distinctions between endogenous and exogenous variables. Any assumptions regarding endogeneity and causal effects can be tested within the VAR framework. Moreover, for each endogenous variable there is a set of explanatory variables that comprise its own lags and lags of all the other variables in the model, allowing for rich dynamic effects to be captured. In the unrestricted form, all the variables in the system are treated symmetrically in the sense that they

have precisely the same set of regressors. The statistical analysis takes place in a VAR (p) model, of lag length p :

$$\mathbf{y}_t = \boldsymbol{\phi}_1 \mathbf{y}_{t-1} + \boldsymbol{\phi}_2 \mathbf{y}_{t-2} + \cdots + \boldsymbol{\phi}_p \mathbf{y}_{t-p} + \boldsymbol{\omega} \mathbf{D}_t + \boldsymbol{\varepsilon}_t \quad (4.11)$$

Where \mathbf{y}_t is a ($m \times 1$) vector of jointly determined I(1) variables, \mathbf{D}_t is a ($q \times 1$) vector of deterministic variables (e.g. intercept, trend and dummy variables), and each $\boldsymbol{\phi}_i$ ($i = 1, \dots, p$) and $\boldsymbol{\omega}$ are ($m \times m$) and ($m \times q$) matrices of coefficients to be estimated using a ($t = 1, \dots, T$) sample of data. $\boldsymbol{\varepsilon}_t$ is a ($m \times 1$) vector of n.i.d. disturbances with zero mean and non-diagonal covariance matrix, $\boldsymbol{\Sigma}$.

If the process is found to contain non-stationary behaviour (at least one variable is non-stationary), then inference based on the VAR may be invalid and the relationships among the variables spurious. The variables are (at most) integrated of order one $\{I(1)\}$ and co-integrated, equation (4.11) also has an equilibrium correction representation that is observationally equivalent but which facilitates estimation and hypothesis testing as all terms are stationary. In this case, it will be more appropriate to analyse the data within a co-integration framework. For this purpose, the VAR can be re-written in the general VECM ($p-1$) form:

$$\Delta \mathbf{y}_t = \boldsymbol{\Pi} \mathbf{y}_{t-1} + \sum_{i=1}^{p-1} \boldsymbol{\Gamma}_i \Delta \mathbf{y}_{t-i} + \boldsymbol{\omega} \mathbf{D}_t + \boldsymbol{\varepsilon}_t \quad (4.12)$$

Where each of the ($n \times n$) matrices $\boldsymbol{\Gamma}_i = -(I - \boldsymbol{\phi}_1, \dots, \boldsymbol{\phi}_i)$ ($i = 1, \dots, p-1$) and $\boldsymbol{\Pi} = -(I - \boldsymbol{\phi}_1, \dots, \boldsymbol{\phi}_p)$ comprise coefficients to be estimated by Johansen's (1988) maximum likelihood procedure using a ($t = 1, \dots, T$) sample of data in this model. $i = 1, 2, \dots, p-1$ is the number of lags included in the system and is a difference operator.

This specification contains information on both short- and long-run adjustment to change in \mathbf{y}_t , via the estimates of Γ_i and Π , respectively. Provided co-integration holds, this allows Π to be factorized such that $\Pi = \alpha\beta'$ where α and β are both $(n \times r)$ matrices of full column rank. The advantage of this parameterization is in the interpretation of the coefficients. The $(n \times r)$ matrix β quantify the ‘long-run’ relationships between the variables in the system and the $(n \times r)$ matrix of equilibrium correction coefficients, α , elements of which load deviations from this equilibrium (*i. e.* $\beta' \mathbf{y}_{t-p}$) in to $\Delta \mathbf{y}_t$, for correction. The Γ_i coefficients in (4.12) estimate the short-run effect of shocks on $\Delta \mathbf{y}_t$, and thereby allow the short- and long-run responses to differ. It therefore delivers a neat economic interpretation to the vector error correction model.

The reformulation of a VAR model in (4.11) as a VECM in (4.12) does not impose any binding restrictions on the original parameters (Juselius, 2006), *i. e.* does not change the value of the maximized likelihood function. There is therefore a direct correspondence between the estimated parameters of the two forms.

CHAPTER FIVE: Econometric Analysis

5.1 Data and Model description

The study used data from 1960-2012 for analyzing the fiscal effect of foreign aid in Ethiopia. The sources of the data are Ministry of Finance and Economic Development (MoFED), National Bank of Ethiopia (NBE), Ethiopian Economic association (EEA) CD-ROM and Development Assistance Committee (DAC) of the Organization of Economic Cooperation and Development (OECD) online database.

In the study there are five models, the first two models I and II analyses the impact of grant flows on fiscal aggregates i.e. total tax revenue, total expenditure and levels of domestic borrowing, but exclude foreign loans and the other vice versa. The reason for omission of components of the budget identity i.e. non-tax revenue and external borrowing in each model is to avoid estimating an identity. The other reason for performing separate regressions for foreign loans and grants is to saves degrees of freedom in comparison with a model that would include both types of external financing. And also including both variables in addition to all the others would also render the error correction term meaningless. (Fagernäs and Roberts, 2004)

In addition, two separate models III and IV are estimated, where total expenditure is divided into capital and recurrent expenditure, and total tax revenue into direct and indirect tax. Finally, a model that includes ODA instead of either one of the two external financing components is estimated. The inclusion of model V due to the fact that, aid disbursed outside the budgetary framework can also affect government spending decisions, for instance by lowering expenditure on items funded by non-budgeted aid inflows.

In the estimation, the very initial step is to check if the desired variables are stationary or not. The Augmented Dickey Fuller (ADF) test is used for this reason and the result test presented in table 5.1. All the variables are non-stationary at level; however these variables are stationary at first difference and they become integrated of order 1, I(1). It is therefore appropriate to estimate models that include variables in their first differenced form through the VECM procedure. Standard diagnostic tests such as autocorrelation, heteroskedasticity and normality tests are performed for each model.

Table 5.1: Results of Augmented Dickey Fuller (ADF) test

Variables	At level			At 1st difference			Stationary
	Test Stat	Critical Value	p-value	Test Stat	Critical Value	p-value	
lnG	0.2688	-2.9251	0.9741	-6.1723	-2.9199	0.0000	I(1)
lnL	0.0567	-2.9266	0.9588	-4.7774	-2.9266	0.0003	I(1)
lnODA	1.122	-2.9237	0.9972	-6.5856	-2.9237	0.0000	I(1)
lnDB	-1.6822	-2.9281	0.4332	-5.2546	-2.9281	0.0001	I(1)
lnDTX	0.8490	-2.9224	0.9939	-3.6889	-2.9224	0.0073	I(1)
lnITX	1.7261	-2.9187	0.9996	-6.8870	-2.9199	0.0000	I(1)
lnTXR	2.0364	-2.9199	0.9999	-5.8929	-2.9199	0.0000	I(1)
lnRE	0.0081	-2.9187	0.9548	-6.6588	-2.9199	0.0000	I(1)
lnCE	0.0148	-2.9187	0.9555	-7.5962	-2.9199	0.0000	I(1)
lnTEX	0.6319	-2.9187	0.9893	-7.2252	-2.9199	0.0000	I(1)

In addition to this appropriate lag length is chosen on the basis of the sequential modified LR test (LR), Final prediction error (FPE), Akaike Information Criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn Information Criteria (HQIC).

5.2 Model I – Fiscal effect of grant with aggregate components

The first model includes grants and three other variables: tax revenue, domestic borrowing and total expenditure. All the variables may be cointegrated, because they are integrated of order one (I(1)). This is tested with the Johansen cointegration test. Before cointegration test, as indicated in Alemayehu et al (2012) the diagnostic tests must be undertaken specifically tests for autocorrelation and normality because the Gaussian error terms are very important building blocks for the Johansen cointegration test. The diagnostic tests such as autocorrelation, heteroskedasticity and normality tests are performed for this model and also the other four models and they satisfied the conditions. The results of Johansen cointegration test for this model are shown in Annex 1. The values for the test statistic for both the trace test and the maximum Eigenvalue test are used to determine the number of cointegrating vectors.

The long run relationship takes the form (*t*-statistics in parentheses):

$$LNDB + 1.0437 LNG + 2.8194 LNTXR - 5.0392 LNTEX + 8.4338 = 0 \quad (5.1)$$

[7.6859] [2.9026] [-5.3398]

In accordance with the VECM procedure the cointegrating relationship is normalised, in this case with domestic financing of the fiscal deficit taking on a unitary value (Lutkepohl 1991). Because the variables show a long run equilibrium identity which is equated to zero a positive coefficient for one of the variables estimate suggests a negative *ceteris paribus* long run relationship with the normalised domestic borrowing variable. Likewise, a negative coefficient estimate suggests a positive *ceteris paribus* long run relationship with the normalised domestic borrowing variable. (cited in Batten, 2010)

Based on this, the first model relationship normalised on domestic borrowing. The above cointegrating relation shows a long-run relationship between the variables. It implies that in the long run, *ceteris paribus*, grants are negatively related with domestic borrowing and tax revenue, but positively related with total expenditure. This shows that in the long run grant used as a substitute for both domestic borrowing and tax revenue.

After establishing long-run relationship the estimation of the short-run and error adjustment coefficient of domestic borrowing, grant, tax revenue and total expenditures is done. Table 5.2 presents the results of the VECM coefficients for model I. The estimated coefficients for the error correction term shows which of the variables adjust to correct imbalance in the fiscal situation and the variable coefficients show the short-run effects of changes in the explanatory variables on the dependent variable.

Table 5.2: VECM Results for Model I

Error Correction:	D(LNDB)	D(LNG)	D(LNTXR)	D(LNTEX)
EC(-1)	-0.4499***	-0.3778***	0.0038	-0.0064
D(LNDB(-1))	-0.3521**	0.4388***	-0.0068	-0.0174
D(LNDB(-2))	-0.0257	0.1552*	-0.0194	0.0264
D(LNG(-1))	-0.0358	0.1153	-0.0634	-0.0533
D(LNG(-2))	-0.2228	0.2613**	-0.0183	0.0505
D(LNTXR(-1))	-1.0774	2.3937***	0.0563	0.2160
D(LNTXR(-2))	-0.1486	0.3359	0.2178	0.3375**
D(LNTEX(-1))	1.5031	-2.7764***	0.3880*	0.0619
D(LNTEX(-2))	-0.0312	-1.4379*	-0.0280	-0.3565
C	0.2895	0.2211*	0.0688**	0.0945***

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level

LM test: p-value 0.0842

White Heteroskedasticity Test: p-value 0.9478

Jarque-Bera: p-value 0.3872

Akaike (AIC): 1.2242

Schwarz (SIC): 2.9068

The lagged error correction term EC(-1) is significant for grants and domestic borrowing and the coefficients have the correct sign. The coefficients on EC(-1) are significant implies that the

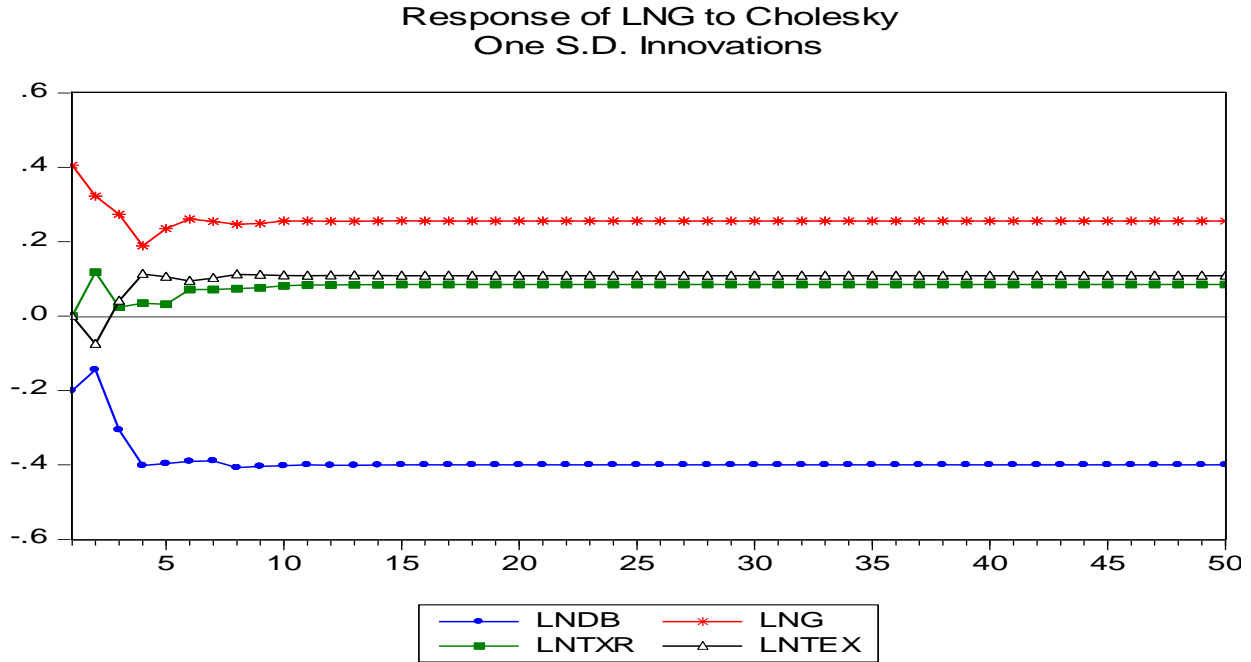
long-run relation in equation 5.1 holds. And also only the first two variables adjust to correct imbalances in the budget according to the result of equation 5.1.

The coefficients in Table 5.2 reveal the short-run, direct or *ceteris paribus* impacts without taking into account the inter-relationships between the variables. The coefficients suggest that domestic borrowing and tax revenue have a significantly positive lagged effect on grants. On the other hand total expenditure has significantly negative effect on grants. And also total expenditure is significantly positively affected by lagged tax revenue, in addition tax revenue also significantly positively affected by lagged total expenditure.

The total long term impact of an increase in grants is now assessed with the use of the impulse response function (IRF) analysis. This approach captures both the direct and indirect effects as well as those attributed to the error correction mechanism. The impulse response function shows the increment to each variable due to an additional increase in on variable, taking into account all interactions between the variables. The shock will have a permanent effect on the levels of other variables, but the impact gradually stabilises at a new level that is consistent with the long run cointegrating relationship. (Fagernäs and Roberts, 2004a)

Below fig. 5.1 shows impulse response functions as a result of a one-period, one standard deviation shock to grants.

Fig. 5.1: Impulse responses to a permanent increase in grants (model I)



This figure illustrates the impact of an increase in grants on domestic borrowing, tax revenue and total expenditure. The one standard deviation shock to grants leads a gradual decline in domestic borrowing and a rise in tax revenue. Following the shock total expenditure initially decline, but after a few period it started to rise and stabilize at a positive level. The rise in tax revenue suggests that, while grants do not have a short-run effect on tax revenue, in the long run there are indirect effects that lead to a positive change in tax revenue. The negative impact of aid on domestic borrowing however suggests that a large portion of the grant impulse is also allocated towards lowering domestic financing requirements of the fiscal deficit.

5.3 Model II – Fiscal effect of loan with aggregate components

Here model II uses the same set of variables as model I, but replaces grants with foreign loans. The values for the test statistic for both the trace test and the maximum Eigenvalue test are used to determine the number of cointegrating vectors. The trace and eigenvalue test rejects the

null hypothesis of no co-integrating vectors but fails to reject the null hypothesis of co-integrating vector (see in Annex 1). The long run relationship takes the form (*t*-statistics in parentheses):

$$LNDB - 0.319 LNL + 6.802 LNTXR - 9.749 LNTEX + 0.268 T + 17.868 = 0 \quad (5.2)$$

[-1.058] [8.296] [-8.438] [3.753]

The relationship in equation (5.2) does not look strong; the *t*-statistics of loan is not very high. Just to see the relationship, in the long run loan positively related with both domestic borrowing and tax revenue, but negatively related with total expenditure. Below table 5.3 shows the error correction for model II. In this model domestic borrowing, loan and total expenditure responds to correct imbalances in the budget according to equation (5.2), because the lagged error correction term EC (-1) is significant and correctly signed only for this variables based on the relationship shown in the long run. Loan affected by all lagged variables significantly such as domestic borrowing and tax revenue with a negative sign and total expenditure with positive sign.

In the short run domestic borrowing and tax revenue have negative lagged effect, but loan has positive lagged effect on total expenditure. And also tax revenue positively affected by lagged total expenditure.

Table 5.3: VECM Results for Model II

Error Correction:	D(LNDB)	D(LNL)	D(LNTXR)	D(LNTEX)
EC(-1)	-0.5790***	0.2110**	0.0232	0.0770***
D(LNDB(-1))	-0.1918	-0.2259***	0.0054	-0.0524***
D(LNL(-1))	0.2561	-0.1427	0.0642	0.0635*
D(LNTXR(-1))	0.8013	-1.4837**	-0.0938	-0.2945**
D(LNTEX(-1))	-1.7586	1.8409**	0.3912*	0.3904**
C	0.2678	0.1309	0.0768***	0.1110***

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level

LM test: *p*-value 0.7884

White Heteroskedasticity Test: *p*-value 0.4694

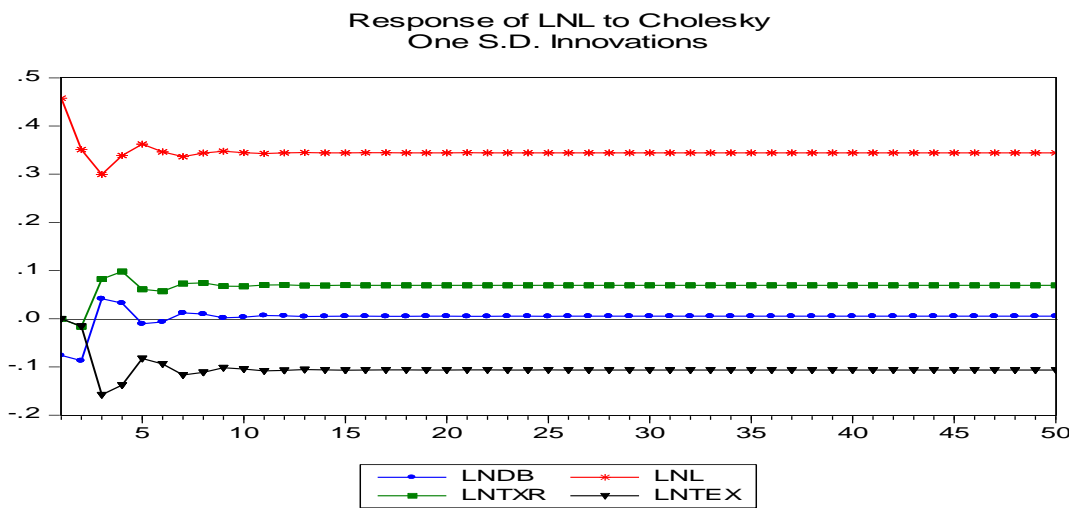
Jarque-Bera *p*-value: 0.9771

Akaike (AIC) 1.199053

Schwarz (SIC) 2.297542

The one standard deviation shock to loans leads to a rise in both domestic borrowing and tax revenue is shown in fig. 5.2. Initially both domestic borrowing and tax revenue decline, however in the long run both of them rise in a stable way. The impulse response also shows that an injection of loan has a significant impact on lowering the total expenditure. This shows that loan has encouraged the collection of tax effort and is not substitute for domestic borrowing.

Fig. 5.2: Impulse responses to a permanent increase in loans (model II)



5.4 Model III – Fiscal effect of grant with disaggregate components

In this model tax revenue is divided into direct and indirect taxes and also total expenditure into capital and recurrent expenditures. The Johansen trace test statistic is used to determine the cointegrating rank of the model. The following cointegrating relationship was found for model III (*t*-statistics in parentheses):

$$LNDB + 0.23LNG + 3.22LNCTX + 1.66LNITX - 2.84LNCE - 6.03LNRE + 0.29T + 19.63 = 0 \quad (5.3)$$

[3.183] [5.172] [3.860] [-6.348] [-10.366] [6.078]

Equation (5.3) indicates that in the long run, grants negatively related with domestic borrowing, direct tax and indirect tax, and are therefore substitutes. However, capital expenditure and

recurrent expenditure positively related with grants and biased on recurrent expenditure. This indicates that grant is pro-consumption than investment in the long run.

Below table (5.4) shows the error correction of model III. The adjustment coefficient on the error correction term is significant for domestic borrowing, grant, direct tax and capital expenditure, but the sign of direct tax is incorrect based on equation (5.3) relationship. The coefficients are correctly signed for the three variables, which indicate that domestic borrowing, grant and capital expenditure responds to budget imbalances in the previous period according to the long-term relation in equation (5.3). This suggests that domestic borrowing, grant and capital expenditure are the residual variables in the fiscal system and acts as the financing items in the budget deficit. In contrast to domestic borrowing, grant and capital expenditure the adjustment coefficient on EC (-1) in the equation for direct tax has an opposite sign to what is expected. This implies that direct tax does not respond to budget imbalances in the previous period by restoring the equilibrium.

Table 5.4: VECM Results for Model III

Error Correction:	D(LNDB)	D(LNG)	D(LNDBTX)	D(LNITX)	D(LNCE)	D(LNRE)
EC(-1)	-0.7742***	-0.2448**	0.0371*	0.0242	0.1113***	0.0431
D(LNDB(-1))	-0.1942	0.3092***	-0.0185	0.0101	-0.1304***	-0.0122
D(LNG(-1))	-0.1155	0.2245	-0.0067	-0.0577	-0.1017*	0.0145
D(LNDBTX(-1))	-1.2707	0.0308	0.2167	0.2127	0.4469	0.1923
D(LNITX(-1))	0.5037	1.2302**	0.1349	-0.1631	-0.3807*	-0.1063
D(LNCE(-1))	-0.5707	-0.6437	0.1322*	0.2658**	0.1366	0.1034
D(LNRE(-1))	-1.8099	-1.9509***	0.4034***	0.0545	0.5810**	0.1185
C	0.5963**	0.2772**	0.0240	0.0783**	0.0932*	0.0691

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level

LM test: p-value 0.7542

White Heteroskedasticity Test: p-value 0.4032

Jarque-Bera p-value: 0.9660

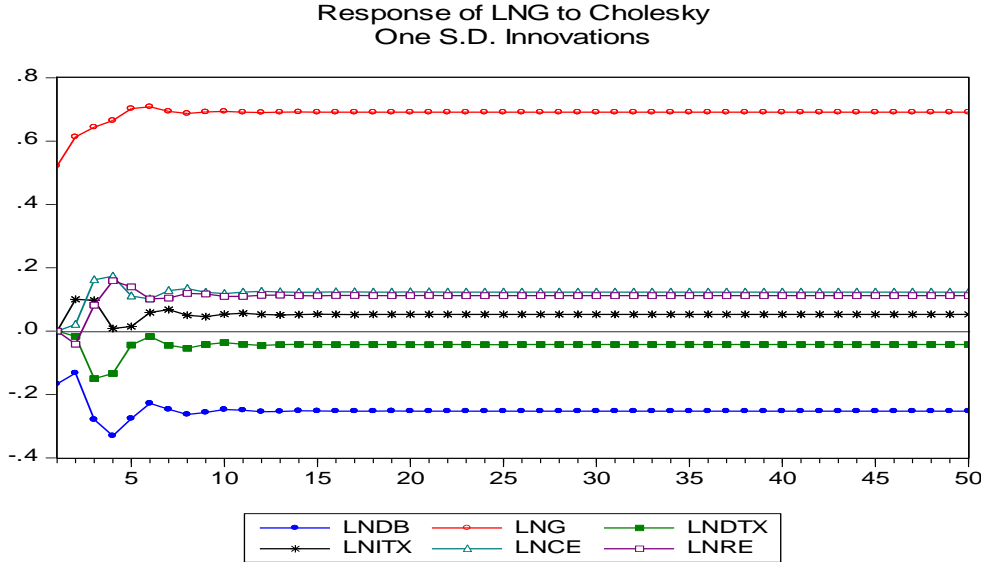
Akaike (AIC) -0.121696

Schwarz (SIC) 1.961645

Domestic borrowing has a significantly positive and negative lagged impact on grant and capital expenditure respectively in the short run. Indirect tax and recurrent expenditure have a significantly positive and negative lagged impact on grant respectively. However, grant also has a significantly negative impact only on capital expenditure. In addition capital and recurrent expenditures have a significantly positive lagged impact on direct taxes; and capital expenditure has a positive impact on indirect taxes in the short run.

Each of the long term relationships between the fiscal and aid variables are now again shown with the use of impulse response functions. Fig. 5.3 shows the effect of one standard deviation shock of grant on domestic borrowing, direct and indirect taxes, and capital and recurrent expenditures.

Fig. 5.3: Impulse responses to a permanent increase in grants (model III)



The result of the IRF shows that a one standard deviation innovation to grant leads to a decline both in levels of domestic borrowing and direct taxes. And also the impulse of grant leads to a rise in indirect tax and both types of expenditure (i.e. capital and recurrent). The result for domestic borrowing is comparatively similar to model I results and also both types of

expenditures have a similar response with total expenditure in model I IRF. This shows that both capital and recurrent expenditure financed more by external grants. However the response of direct tax due to a one standard deviation shock to grant differs from that of total tax. This shows that grants discouraged direct tax collection effort, but does not discouraged indirect tax collection effort. The result is similar with Alemayehu (2002) found for some African regions such as NA, ESA and WCA; and he suggests that disaggregating taxes into different categories, such as direct and indirect, is likely to yield quite different results.

5.5 Model IV – Fiscal effect of loan with disaggregate components

In this model also the same set of variables are used as model III, but replaces grants with foreign loans. The values for the test statistic for both the trace test and the maximum Eigenvalue test are used to determine the number of cointegrating vectors. The results of Johansen cointegration test are shown in Annex 1. The results of diagnostic test report that there is no serial autocorrelation, no heteroskedasticity and error distribution is normal. The long run relationship takes the form (t-statistics in parentheses):

$$LNDB + 0.130 LNL + 2.988 LNDTX + 1.795 LNITX - 2.839 LNCE - 6.327 LNRE + 0.34 T + 21.75 = 0 \quad (5.4)$$

[0.507] [3.986] [3.342] [-4.908] [-8.889] [5.740]

The relationship in equation 5.4 does not show strong relationship because the *t*-statistics of loan is very low, but it implies that in the long run domestic borrowing, direct tax and indirect tax negatively related to loans. And there is a positive long-run relationship between loans and the two types of expenditures.

Table 5.5 shows the results of VECM coefficients to analyse the short run dynamics of the model. The coefficient on the lagged error correction term EC (-1) is significant and correctly signed for the domestic borrowing, the long-run relationship (equation 5.4) is also likely to hold.

In this model foreign loans are affected by lagged movements in domestic borrowing and indirect taxes negatively and positively by both capital and recurrent expenditures. In addition to this domestic borrowing has significantly negative lagged effect on both loan and capital expenditure. Capital expenditure also affected by direct and indirect taxes significantly positive and negative respectively; and positively affected by recurrent expenditure.

Table 5.5: VECM Results for Model IV

Error Correction:	D(LNDB)	D(LNL)	D(LNDBTX)	D(LNITX)	D(LNCE)	D(LNRE)
EC(-1)	-0.8570***	0.2687***	0.0243	0.0314	0.1230***	0.0541**
D(LNDB(-1))	-0.1088	-0.2309***	-0.0130	0.0182	-0.1218***	-0.0127
D(LNL(-1))	0.5195	-0.2710	-0.0062	0.0219	-0.0385	0.0601
D(LNDBTX(-1))	-1.7868	0.5961	0.2472*	0.2315	0.5376*	0.1989
D(LNITX(-1))	1.0046	-1.1511**	0.1350	-0.2220	-0.5360**	-0.1032
D(LNCE(-1))	-1.0901	0.6645*	0.1079	0.2749*	0.2327	0.0152
D(LNRE(-1))	-2.5585*	1.5581**	0.3689**	0.0051	0.5352*	0.1550
C	0.6576***	-0.0153	0.0263	0.0704*	0.0724	0.0724**

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level

LM test: p-value 0.9029

White Heteroskedasticity Test: p-value 0.6389

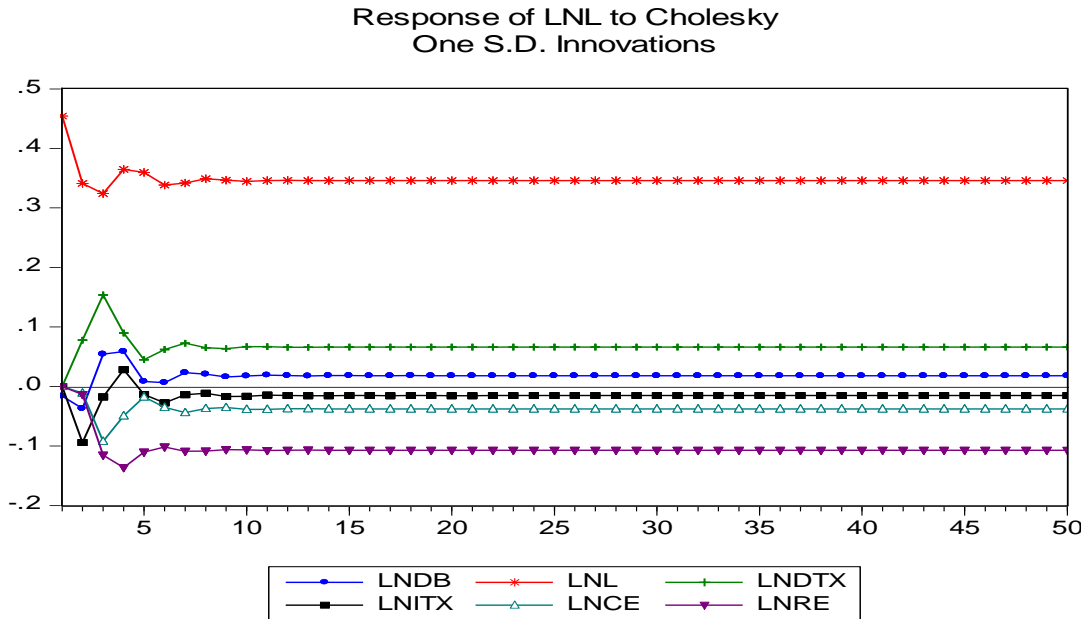
Jarque-Bera: p-value 0.3935

Akaike (AIC) -0.512248

Schwarz (SIC) 1.571093

The impulse response analysis result of this model shown in Fig. 5. 4. The one standard deviation shock to loans leads to a rise in both domestic borrowing and direct taxes. The result is similar with model II except the division of tax revenue into two in this case. However, indirect tax shows a reduction in tax collection effort due to a shock of loan. In the long run, there is a positive, but small, impact on both domestic borrowing and direct taxes. The effect on domestic borrowing is in contrast to the negative effect on domestic borrowing and direct taxes observed in model III.

Fig. 5.4: Impulse responses to a permanent increase in loans (model IV)



The IRF also shows that an injection of loan has a significant impact on lowering the composition of government spending by decreasing the amount of funds going to recurrent expenditure more than capital expenditure.

5.6 Model V – Fiscal effect of ODA with disaggregate components

Finally, in order to approximate the joint impact of both types of external financing, the last model (5) includes ODA, which can be used as an instrument for the sum of foreign loans and grants. Looking at the effects of ODA may also partly capture the effects of non-budgeted aid inflows on the budget account. Since ODA is more than the value of the sum of budgetary grants and foreign loans. In addition to ODA, the five variables, domestic borrowing, direct and indirect taxes, capital and recurrent expenditures, are included.

The values for the test statistic for both the trace test and the maximum Eigenvalue test are used to determine the number of cointegrating vectors. The trace and eigenvalue test rejects the null hypothesis of no co-integrating vectors but fails to reject the null hypothesis of co-integrating

vector. The results of Johansen cointegration test are shown in Annex 1. The long run relationship takes the following form (t-statistics in parentheses):

$$LNDB + 1.9 LNODA + 2.07 LNCTX + 1.93 LNITX - 2.76 LNCE - 4.76 LNRE + 10.11 = 0 \quad (5.5)$$

[4.758] [2.081] [2.912] [-3.473] [-6.438]

The relationship implies that in the long run domestic borrowing, direct and indirect taxes are negatively related to ODA and they might be substitutes. However, capital and recurrent expenditures are positively related to ODA. This implies that in the long run ODA encourages the government to spend more on the economy.

The error correction model is presented in table 5.6 below. The only variables with a significant coefficient on the error correction term are domestic borrowing and capital expenditure. We can therefore conclude that both domestic borrowing and capital expenditure variables adjust to a long-run equilibrium according to equation (5.5). The VECM results shows that ODA does not affected by any lagged fiscal variables, but the impact of ODA only on recurrent expenditure is significantly positive lagged effect. Capital expenditure affected significantly negative by both domestic borrowing and indirect tax and positively by direct taxes. In addition to this, recurrent and capital expenditures have significantly positive lagged effect on direct and indirect taxes respectively.

Table 5.6: VECM Results for Model V

Error Correction:	D(LNDB)	D(LNODA)	D(LNDBTX)	D(LNITX)	D(LNCE)	D(LNRE)
EC(-1)	-0.8077***	-0.0478	0.0277	0.0356	0.0845**	0.0212
D(LNDB(-1))	-0.1793	0.0057	-0.0133	0.0149	-0.1104***	-0.0059
D(LNODA(-1))	0.2196	-0.0578	0.0690	0.0023	0.2579	-0.1630*
D(LNDBTX(-1))	-1.4061	-0.1132	0.2492*	0.2223	0.6777**	0.1899
D(LNITX(-1))	1.0487	0.2424	0.1191	-0.2540	-0.4998**	-0.0748
D(LNCE(-1))	-0.1151	-0.1920	0.0714	0.2632**	-0.0356	0.0482
D(LNRE(-1))	-1.5391	-0.3112	0.3448**	0.0364	0.2513	0.1139
C	0.3889*	0.1940***	0.0256	0.0768**	0.0794	0.1002***

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level

LM test: p-value 0.9406

White Heteroskedasticity Test: p-value 0.7023

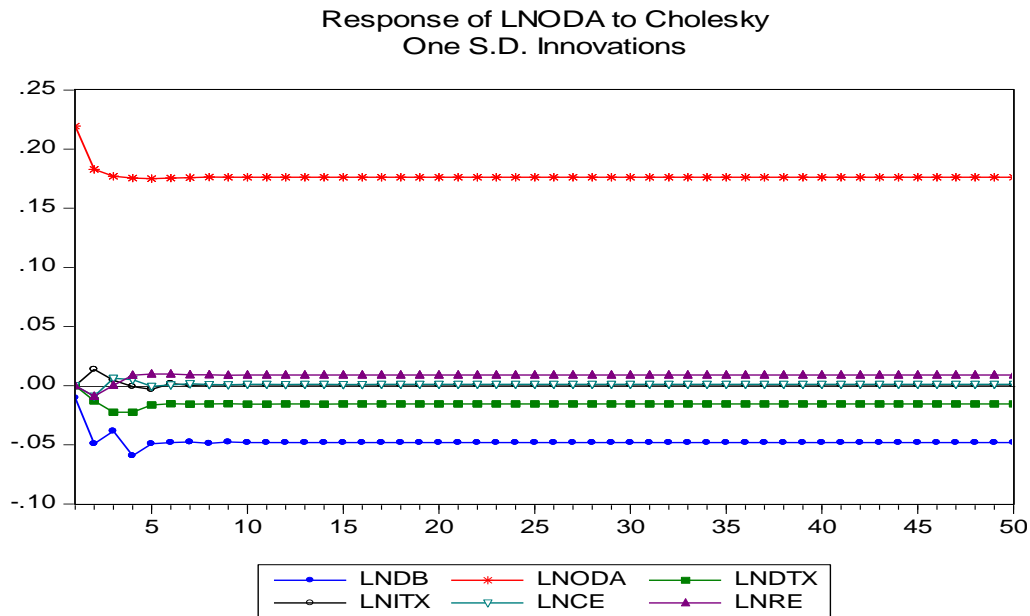
Jarque-Bera: p-value 0.8524

Akaike (AIC) -1.578024

Schwarz (SIC) 0.467438

The impulse responses to a permanent rise in ODA are shown below, this confirm a similar result of model III. In the long run, domestic borrowing and direct taxes falls, recurrent expenditure rises, but only slightly. And also the impact of one standard deviation innovations to ODA on both capital expenditure and indirect tax near zero in the long run, but initially capital expenditure shows a fall and indirect tax a rise. This shows that ODA discouraged direct tax collection effort, but does not discouraged indirect tax collection effort.

Fig. 5.5: Impulse responses to a permanent increase in ODA (model V)



In addition the result shows that ODA is more pro-consumption than investment in the long run. This might show the existence of fungibility in the ODA allocation. This result also similar to the result of Alemayehu (2002) found for some African regions, the result showed that capital inflows (especially grants) have a strong positive impact on current government expenditure in all regions.

CHAPTER SIX: Conclusion and Policy Implication

6.1 Conclusion

This paper examines the fiscal effect of foreign aid in Ethiopia by using the VECM and impulse response approach from the period 1960-2012. There were five models analysed, the first two models include aggregate variables such as domestic borrowing, tax revenue and total expenditure with grant and loan in the first and second model respectively. The third and fourth models include disaggregated tax revenue into direct and indirect tax and total expenditure into capital and recurrent expenditure with grant in the third model and loan in the fourth. Finally the fifth model replaces grant and loan with ODA, because ODA include off budgetary support that may not included in the government budget account.

The results of the models indicate that an increase in grants results in an increase in the tax revenue and total expenditure. This implies that, in the long run, grant encourage taxation efforts. And also the increase in grants encourages the government to spend more. In addition to this the increase in grant leads to a decrease in domestic borrowing, this indicate that grants used as a substitute for government domestic financing. However, in relation to loan the result shows that loan has no effect on the fiscal components due to the insignificancy of loan in the long run in both II and IV models.

Moreover, the disaggregation of tax revenue gives a different result on tax collection effort. The flow of grant has a tendency to decline direct tax collection effort. This result is similar to Alemayehu (2002) found for some African regions such as NA, ESA and WCA; and he suggests that disaggregating taxes into different categories, such as direct and indirect, is likely to yield

quite different results. And also grant has a decrease effect on domestic borrowing, whereas the flow of grant encourages the government to increase both capital and recurrent expenditure.

Finally, ODA is used to determine the joint impact of an increase in grants and foreign loans. The impulse responses to an increase in ODA are similar to those of an increase in grants. Direct taxes and domestic borrowing fall, whereas recurrent expenditure rises. In addition, in the long run both capital expenditure and indirect tax affected by the flow of ODA in small amount. This might show ODA is more pro consumption than investment. This result also similar to the result of Alemayehu (2002) who found for some African regions, the result showed that capital inflows (especially grants) have a strong positive impact on current government expenditure in all regions.

Generally, the empirical result indicates that aid inflows increase the amount of government expenditure and also some portion of reduction in the domestic revenue. This leads a widening of the fiscal deficit due to a gap between expenditure and revenue. Although an increase in aid flow motivated a reduction in domestic borrowing.

6.2 Policy implication

The above empirical results suggest some policy implications. Among this, the government of Ethiopia should focus on expanding its tax base especially on direct tax. Along with it, recurrent (non-development) expenditures should also be minimized instead of lowering capital spending. These foreign resources should be used to minimize spending, instead of lowering the domestic resource mobilization activities. The donors must focus on having a mutual consensus regarding the budgetary preferences of the government. Moreover, in order to support Ethiopia's development programs, the government of Ethiopia should manage the foreign aid effectively.

Then aid inflows will have the potential to compensate for revenue shortfalls, reduce domestic borrowing and help to smooth public spending.

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Annex 1

Model I

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.670921	84.43966	47.85613	0.000
At most 1	0.281326	28.86684	29.79707	0.0637
At most 2	0.182545	12.34944	15.49471	0.1409
At most 3	0.044413	2.271465	3.841466	0.1318

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.670921	55.57281	27.58434	0.000
At most 1	0.281326	16.5174	21.13162	0.196
At most 2	0.182545	10.07798	14.2646	0.2069
At most 3	0.044413	2.271465	3.841466	0.1318

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Model II

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.606375	69.32486	47.85613	0.0002
At most 1	0.228991	24.57171	29.79707	0.1773
At most 2	0.184045	12.08909	15.49471	0.1527
At most 3	0.047305	2.326086	3.841466	0.1272

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.606375	44.75314	27.58434	0.0001
At most 1	0.228991	12.48262	21.13162	0.5008

At most 2	0.184045	9.763003	14.2646	0.228
At most 3	0.047305	2.326086	3.841466	0.1272

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Model III

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.74844	178.5118	117.7082	0
At most 1 *	0.587283	108.128	88.8038	0.001
At most 2	0.397376	62.99337	63.8761	0.0592
At most 3	0.29649	37.16385	42.91525	0.1669
At most 4	0.213229	19.22848	25.87211	0.2675
At most 5	0.128214	6.997749	12.51798	0.3448

Trace test indicates 2 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.74844	70.3838	44.4972	0
At most 1 *	0.587283	45.13465	38.33101	0.0071
At most 2	0.397376	25.82952	32.11832	0.2407
At most 3	0.29649	17.93536	25.82321	0.3822
At most 4	0.213229	12.23073	19.38704	0.394
At most 5	0.128214	6.997749	12.51798	0.3448

Max-eigenvalue test indicates 2 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Model IV

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.647433	141.7317	117.7082	0.0007
At most 1	0.429565	88.56345	88.8038	0.052
At most 2	0.340865	59.93428	63.8761	0.1026
At most 3	0.328381	38.67613	42.91525	0.1246
At most 4	0.194558	18.37484	25.87211	0.3193
At most 5	0.134048	7.340245	12.51798	0.3104

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.647433	53.16829	44.4972	0.0045
At most 1	0.429565	28.62916	38.33101	0.4126
At most 2	0.340865	21.25815	32.11832	0.5518
At most 3	0.328381	20.30129	25.82321	0.2263
At most 4	0.194558	11.03459	19.38704	0.5098
At most 5	0.134048	7.340245	12.51798	0.3104

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Model V

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.567249	112.4826	95.75366	0.0022
At most 1	0.428594	69.76539	69.81889	0.0505
At most 2	0.312738	41.22298	47.85613	0.1817
At most 3	0.205514	22.09599	29.79707	0.2932
At most 4	0.166799	10.3629	15.49471	0.2538
At most 5	0.020501	1.056422	3.841466	0.304

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen Statistic	0.05 Critical Value	Prob.**
No. of CE(s)	Eigenvalue			
None *	0.567249	42.71718	40.07757	0.0246
At most 1	0.428594	28.54241	33.87687	0.1896
At most 2	0.312738	19.127	27.58434	0.4047
At most 3	0.205514	11.73308	21.13162	0.5742
At most 4	0.166799	9.30648	14.2646	0.2615
At most 5	0.020501	1.056422	3.841466	0.304

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Annex 2: Variable at level and difference

