THE EFFECT OF GOVERNMENT BUDGET ON CURRENT ACCOUNT: EVIDENCE FROM ETHIOPIA

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The Effect of Government Budget on Current Account: Evidence from Ethiopia

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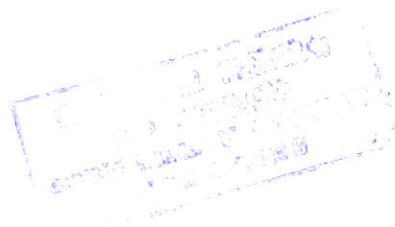

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ABSTRACT

This paper attempts to examine the effect of one of the major internal imbalances-budget deficit- on the similarly important external imbalance-the current account deficit, both theoretically and empirically. Theoretically, It is found difficult to establish a direct relationship between the budget deficit and the current account. But a number of indirect channels through which the effect of the budget deficit on the current account is mediated have been identified. The indirect nature of the channels has bared us from hypothesizing the extent of the effect and the time period that it could take.

Empirically, the granger causality tests revealed that not only does the budget deficit cause the current account deficit but also the current account deficit is found to cause budget deficit. While it is interesting to find that current account deficits can cause budget deficits as well, finding a valuable theoretical support for this causation has remained elusive. The two stage least square regression and time series modeling exercise results showed that budget deficit does have a strong and significant effect on the current account deficit both in the short and long run. Approximately, more than half of the change in the budget deficit is found to spill over to the same direction change in the current account deficit. This findings of the study, thus, strongly supports the notion that fiscal adjustment should be taken as a prerequisite for current account imbalance adjustment.

Chapter One

Introduction

1.1 Over View of the Ethiopian Economy

This section makes a brief look at the development of the Ethiopian Economy over the study years[1]. It starts by reviewing the main features that determine the development course of the economy and its present state. This is followed by an assessment of the performance of major macroeconomic aspects of the economy.

1.1.1 General Features

The first particular feature of the Ethiopian economy is that it had shown very little structural transformations over the last four decades (see Table 1.1). It remained a typical developing country economy with agriculture as a dominant sector and its performance having its print in every aspect of the economic system. Agriculture accounts for about 50% of GDP, 90% of exports and 85% of employment. It is also a major supplier of raw materials for and buyer of outputs of the industrial sector. In contrast to its size, the state of development of the agricultural sector was abysmally low. It was characterized by a large subsistence sub-sector that are based on backward agricultural practices and extremely low productivity. This low productivity and performance of the agricultural sector has largely been responsible for the poor performance of the overall economy. The industrial sector

[1] Much of the information used in this section is attached as an appendix

represents 12% of the GDP and predominantly engaged on the production of non-durable consumer goods while depending on imported inputs and technology at large. The remaining 38% of GDP are accounted by the service sector of which 10% of GDP is considered by public administration and defense (the figures are for 1996/97).

Table 1.1 GDP by Industrial Origin in percentage

Sector	1961-74	1975-90	1991-96
Agriculture	60.6	52.2	52.9
Industry	13.6	13.3	10.2
Services	25.8	34.6	36.8

Source: Calculated from Appendix I, Table 1

The second particular feature of the Ethiopian economy is that it has been liable to catastrophic effects of frequent drought and civil war which makes application of conventional economic theories much more difficult. Although the areas affected and the degree of severity may vary, previous studies on famine in Ethiopia indicated that between 1960 and 1992, drought and famine of significant magnitude had occurred at least nine times (Mohammed, 1999). The same study outlined the myriad of armed conflicts and wars taken place in the country of which the major ones include 1977-78 war between Ethiopia and Somalia, the 1982 war between Eritrian Peoples Liberation Front and the then prevailing government and the series of wars that culminated in 1991 with the over through of the military government. These series of droughts and wars have had profound consequences on the socio-economic development of the country. Among the outstanding consequences, distraction of socio-economic infrastructures and the human capital, diversion of resources from productive activities, disruption of socio-economic activities, and decline in business confidence and the ensued capital and skill labour flights (both domestic and potential foreign) could be mentioned.

The last but not the least feature is that the economy has been subjected to two completely different systems of economic management. The system that was in place before the year 1974 and which is existing currently since 1991 is relatively market oriented and allows the private sector to play an active role in the economy. The pricing system, ownership structure, various incentive and disincentive mechanisms were fairly liberal. On the other hand, the economic management system instituted during the in-between years was characterized by command and central planning where the public sector covers almost all major economic activities, such as all large and medium scale mining, manufacturing, commercial farming, banking and insurance, shipping, airways, utilities, and a large proportion of construction. Moreover, although retail trade and road transport were largely in private hands, the public sector occupies a strategic position in agricultural marketing and domestic wholesale and international trade. Above these, private investment has been discouraged by ceilings on fixed assets, licensing, high rates of personal taxation and discrimination in credit allocation. Reviews made on the performance of the economy aptly put the significant variation that was recorded under the different economic management systems.

In short, the above abridged features has at large determined the evolvement of the economy in various aspects. A birds eye view of the economy with respect to its performance in growth, external trade, fiscal balance, and exchange rate development is made in the following sections.

1.1.2 Economic Growth Performance

The period spanning the years 1960-1974 was frequently cited as the golden years of better and stable economic growth with in the past four decades. During this period GDP was growing, on average, at 4 % per annum (see table 1.2). With a growth rate of 2.4-2.6% per annum in population, GDP per capita also showed an annual growth of about 1.5% per annum. Both gross capital formation (investment) and domestic savings were in good shape too, remaining stable at about 12% and 13% of GDP, respectively. The resource gap during these years were, thus, remarkably low, being domestic savings financing about 85-90% of the Gross capital formation.

Looking GDP growth by industrial origin, much of the growth during this period came from the industrial and service sectors but their growth were not reflected as it appears on the overall growth of GDP due to the dominance of agriculture. As can be seen from Table 1.2, industry and services sectors had showed average annual growths of 6.8% and 7.5% compared to 2% for agriculture.

Table 1.2 Growth Rates of GDP by Industrial Origin (in %)

Sector	1962-74	1975-90	1991-96
Agriculture	2.0	1.3	2.8
Industry	6.7	2.8	5.6
Services	7.6	3.9	4.9
Total GDP	4.0	1.5	3.6

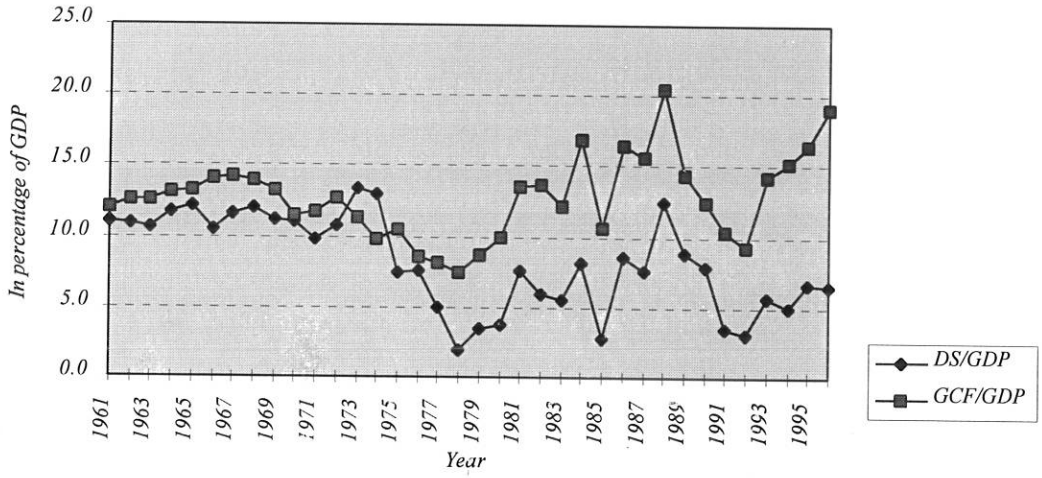
Source: Calculated from Data Taken from Ministry of Economic Development and Cooperation

The record of economic growth during the Derg regime (1975-1991) has not been satisfactory. The average annual growth rate of GDP for the period was put at about 1.5%.

But this figure masks important variations. During the first four years of the regime, the average growth rate was a mere 0.3%. It rose to 5.8% during the next two years and a consecutive fluctuations there after, reaching its lowest during the drought years of 1984/85 followed by a recovery growth for two years and a relapse later on wards. In over all, the rate of growth of GDP for this period was far outstripped by that of population growth (on average, 2.8% per annum), resulting a decline in per capita income and a deterioration in the standard of living.

The performance of domestic savings and investment were also dismal. Both domestic savings and investment had drastically plummeted in the first five years of the regime, reaching 1.9% and 7.5% of GDP in 1979, respectively. For this year, domestic savings were only enough to support 25% of the investment while the rest falls on foreign resources. The low level of savings during this period could be attributed to a combination of factors such as low level and growth of income, high government expenditure (particularly on defense and security), and adverse policy environment towards private savings. On the investment side, the imposed private investment ceiling (which was set at half a million birr and only one type of business is permitted for each person), the bureaucratic procedures for obtaining investment licenses, the discrimination in credit allocation against the private sector were the major ones. Although investment has latter recovered (even out growth its previous level as a percentage of GDP), domestic savings remained low which in most years falls of financing even 50% of the investment (see figure 1.1). This shows the expanding resource gap and the consequent adverse implication on the current account of the balance of payments of the country.

Figure 1.1 Trends in Domestic Saving and Gross Capital Formation (as % of GDP)



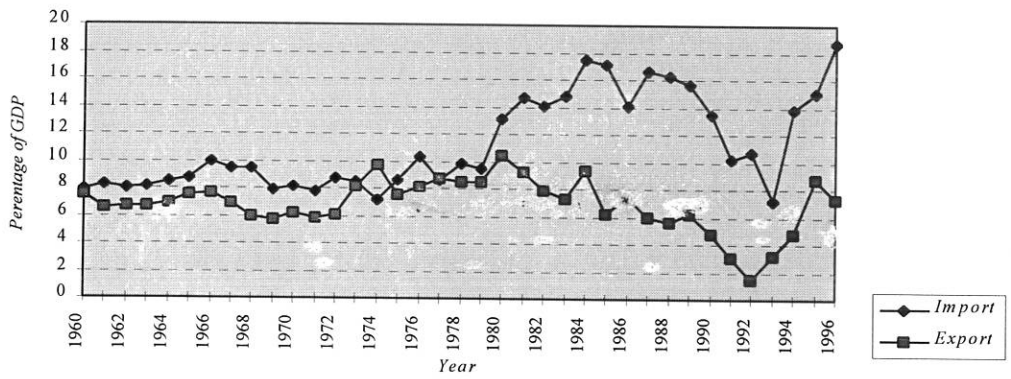
Despite the introduction of various economic reforms so as to restructure the command and control method of economic management, sustained economic growth in 1990's is still shadowed by frequent fluctuations. Although GDP has showed a recovery growth rate of 12% in 1993, the growth has immediately set back to 1.7% in 1994 and revived in the subsequent two years. Similarly, although a recommendable increase in investment (particularly made possible by the inflow of external loans and assistance) has been recorded, it was not supported by the corresponding increase in domestic savings. Still domestic savings finance much less than 50% of the investment.

1.1.3 External Sector Performance

Foreign trade plays an important role in an economy as a major earner of foreign exchange and as a source of tax revenue.

Under the Ethiopian case, being dominated by agricultural products which have an inelastic demand and which are vulnerable to natural calamities, Ethiopian export earnings have remained small with a slow growth and a considerable fluctuations over years (See Figure 1.2). Worse still is the dependence of exports on a single commodity (coffee-sharing 55-65% over the past four decades) destined to few countries which rendered export earnings to depend on the changes on the world market price of coffee and the demand situation in the importer countries. Although the need for diversification of exports, both in their composition and destination, has long been recognized, the effort has not met with success up to now. The fixed exchange rate regime which led to overvalued domestic currency, the deteriorating terms of trade against primary products, government monopoly on export marketing, difficult licensing procedures and high export tax were some of the supplementary factors that restrained export growth.

Figure 1.2 Trends in Exports and Imports (as Percentage of GDP)



On the other side, the growth of imports were relatively fast (see Figure 1.2). The concentration of imports on such goods as capital goods, fuel and semi-finished goods

which have been crucially important particularly for the development of industrial and service sectors have contributed to such growth in imports despite the various measures put in place to regulate imports.

The weak export base combined with a fast growing import bill had usually led to persistent and widening merchandise trade deficits. But there were some exceptional years where a boom in coffee prices coupled with an increase in volume led to a narrowing merchandise trade deficit and even to a surplus (as in the case of 1972/73 and 1973/74).

The development of net services was rather encouraging. Most of the time the balance for net services is positive thereby slightly modifying the widening merchandise trade deficit. However, the remaining current account deficit on goods and services has in most cases, remained substantial.

The current account deficit on good and services was financed by a mix of external resource transfers, external loans and drawing down on the country's foreign exchange reserves. Over reliance on external loans leads to external debt problem. Ethiopia's debt outstanding has reached 107.9% of GDP in 1994; making her one of the highly indebted least developing countries. While over reliance over drawing down foreign reserves leads to foreign exchange crisis which then tightens the strings around those sectors which are heavily dependent on imported goods and fuel.

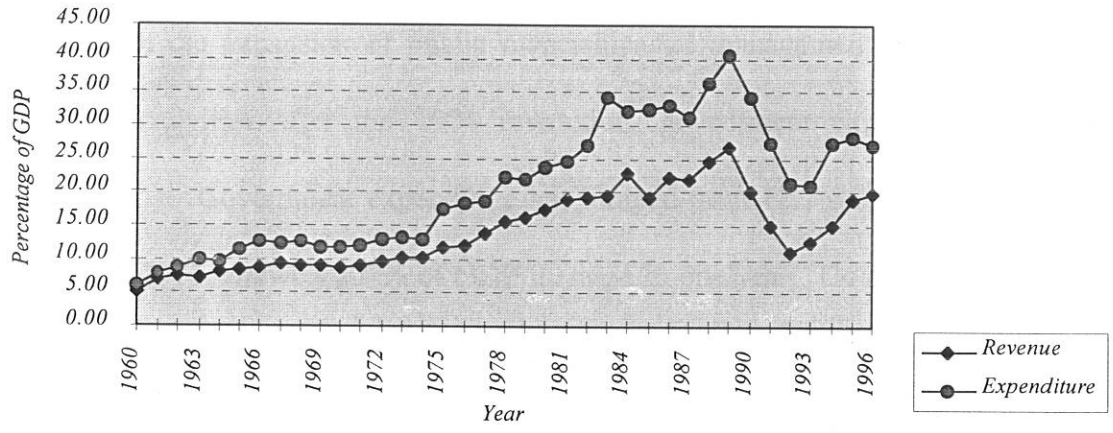
In general, the developments with respect to the balance of payments are disquaitining. As underscored by Chole, the corollary to the investment-saving gap that we reviewed earlier is the foreign exchange gap reflected in widening current account deficits in

the balance of payments. These are two sides of same coin and unfortunately, they tend to reinforce each other (Chole, 1988).

1.1.4 Fiscal Performance

Figure 1.3 shows the total government revenue, total expenditure and the deficit, defined conventionally as revenue minus expenditure of the central government. It is quite clear that the government budget balance has never been in surplus since 1960. More over, the extent of the deficit has undergone significant changes over the different periods.

Figure 1.3 Trends in Government Revenue and Expenditure (as precentage of GDP)



In the period covering 1960-1974, the budget deficit was contained at a relatively low level, being at most 3.7% of the GDP. At the initial years, both government revenue and expenditure were very low due to the fact that the government machinery and the practice of budgeting were evolving. The government revenue ranged between 7-10% of GDP during this period. About 85% of the revenue were generated through taxes, of which almost half was derived from foreign trade taxes, particularly from import taxes (which comprised about 77% of the foreign trade taxes). The other half of the tax revenue had originated from direct

Government revenue has also been performing well during the derg regime. The introduction of new taxes, the upward revision of existing taxes and the various contributions instituted have made the government revenue to grow at annual average growth of 13% during the 1975-1983 period and at 9% during 1974-1988 period. As a percentage of GDP, government revenue has consistently increased from 10% in 1974 to 27% in 1989. The growth rate of direct taxes has relatively been high during this period. Its share from total tax revenue increased from 28% in 1974 to 44.8% in 1989, replacing foreign trade taxes as the major source of tax revenue. On the other side, non-tax revenue has witnessed substantial growth from 13% of total government revenue in 1974 to 33% in 1989, the reason being the vigorously enlarged public enterprises and the corresponding requirement of these enterprises to surrender 90% of all their net profits after taxes to the central treasury.

The budget deficit has remained significant after the introduction of various reform programs in 1992/93. But an over all tendency of improvement was observed. When we come to the financing of the deficit, much of the deficit was financed from external sources. During the period before 1974, external assistance and loan financed 80% of the deficit (see table 1.3). Domestic borrowing has come to be significant in financing the deficit during the Derg regime. Even then, 60% of the deficit (on average) was financed from external sources. A dramatic shift towards domestic borrowing was seen in 1989, presumably reflecting a drying up of external sources in the last years of the regime. Domestic deficit financing mainly took the form of borrowing from the banking system which has lead to a drastic increase in money supply. This was partly the reason for the high inflation (21%) registered in the first two years of the 1990's which has never been experienced in the country.

Table 1.3 Form of Financing the Budget Deficit (in percentage of the budget deficit)

Type of Financing	1960-74	1975-90	1991-96
External Assistance	55.3	29.3	29.4
External Loan	36.5	32.5	38.2
Domestic Loan	8.2	38.2	32.4

Source: Calculated from data taken from Ministry of Finance

1.1.5 Exchange Rate Regime and Allocation

Over the past three decades and half, Ethiopia has followed a fixed predetermined nominal exchange rate regime where the currency is pegged to the US dollar. It was pegged at 2.5 birr before the year 1974 and at 2.07 birr between 1974-91.

During the pre 1974 period, the foreign exchange reserve of the country was sound and the exchange controller of the National bank allocates foreign exchange on a daily basis provided that the necessary procedures are followed. In most cases, the quantity supplied was more or less equal to the amount demanded except a few slack months in a year. This was reflected in a very insignificant and thin parallel market that existed at that time (Kidane, A., 1997).

The foreign exchange regulation of Ethiopia that have been in operation during the Derg regime spell out the procedures for transactions in foreign exchange, holding of foreign exchange, surrender and replenishment of foreign exchange, approval of exports of goods and services, capital remittances and payments for imports to Ethiopia. The regulations state that commercial banks cannot hold foreign currency and that they can not acquire shares, stocks or bonds denominated in foreign currencies. No Ethiopian national resident in the

country can maintain a bank account or foreign assets abroad and every transaction involving hard currency must be made through the National bank. The capital account is thus totally closed when we see from the side of the national resident. Generally, we can characterize the international mobility of capital as low.

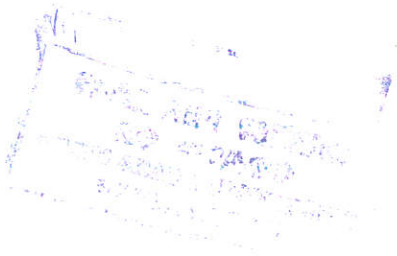
Since the supply of foreign exchange were very much limited compared to its demand, the allocation of foreign exchange was strictly administered through the exchange control department of the National bank. Out right rejection of applications for foreign exchange even for those who have acquired import licenses was quite common. This fact has led to the development of active parallel foreign exchange market to clear the excess demand, particularly of those that do not have access to the official channel. The parallel exchange rate were more than triple the official exchange rate during the last year of the regime.

As a remedy for the dire situation of the foreign exchange market, a profound devaluation of the currency was made in 1992/93. The official exchange rate was devalued from 2.07 birr per 1 USD to 5 birr in October 1992. Consequently, currency auctioning was introduced on May 1993, which has led to subsequent depreciation of the currency from 5 birr per 1 USD to the present 7.9 birr per one USD. The parallel market has diminished gradually as the premium over the official rate is much less that 10% of the official rate. However, the foreign exchange market is still tight since foreign exchange is allowed only for specific purposes and international mobility of capital is still low.

1.2 Statement of The Problem

Given the combination of adverse external circumstances and inappropriate, if not irresponsible, domestic economic management, it was inevitable that the economic performance of many developing countries suffered serious set backs during the crisis period of the early 1980s (Demery, 1994). The predominant response to these difficulties at the time has taken the form of adoption of stabilization and adjustment programmes by the large majority of developing countries. The stabilation programmes are aimed at reducing short-term macroeconomic disequilibria, especially budget deficits, balance of payments deficits, overvalued real exchange rates and inflation, while the adjustment programmes are aimed at reorienting the structure of the economy towards greater efficiency in the medium term.

The need for stabilazation programmes emanates from the crucial role that a stable macroeconomic setting plays for long run economic growth and development of a country. In this line, many studies show that a proper alignment of the real exchange rate is a major determinant of the trend of economic performance (Stern (1985), Chowdhury and Abdur (1993), Campa and Goldberg(1995) and Neumann (1993); all cited in Mekonnen (1996)). This is because changes in the real exchange rate, being a very significant relative price in the economic system, influence foreign trade flows, the balance of payments, the level and structure of production and consumption and thereby the employment and allocation of resources in an economy. The real exchange rate is also viewed as an important mechanism for transmitting trade shocks to changes in the current account. Further analysis tends to



indicate that apart from inducing better overall macroeconomic performance, the real exchange rate exerts sectoral effects.

On the other line, fiscal deficits are usually associated with overindebtedness and the debt crisis, high inflation, and poor investment performance and growth. For example, Easterly and Schmidt-Hebbel (1993) found a strong evidence that over the medium term, money financing of the fiscal deficit leads to higher inflation, while debt financing leads to higher real interest rates or increased repression of financial markets. They also found a strong evidence that fiscal deficits spill over into external deficits and that fiscal deficits and growth are self-reinforcing in the sense that good fiscal management preserves access to foreign lending and avoids the crowding out of private investment, while growth stabilizes the budget and improves the fiscal position.

Despite the unequivocal necessity to reduce macroeconomic imbalances, the success of the stabilization programmes that have been undertaken by many developing countries have been seriously questioned by many economists. One of the reasons behind this doubt lies in the absence of consistency in the policy measures implemented under the stabilization measures. In actual fact, the first question that comes into mind in addressing macroeconomic problems is to understand whether there is an interaction between the macroeconomic imbalances in question. That is: Do fiscal deficits spill over to current account deficits or vice versa ? Do increasing fiscal deficits have an effect on real exchange rate ? Does the appreciation or depreciation of the real exchange rate have an impact on fiscal deficits and current account balances? Answering these questions helps to determine the consistency and

complimentarity of the available policy options and in the selection of appropriate connective policy tools. This study is expected to contribute in this direction through investigating the effects of fiscal deficits on current account using Ethiopia as a case study.

1.3 Objectives of The Study

The central objective of this study is to review the theoretical relationship that are posited to exist between government budget deficit and current account balance and to document their empirical validity using an econometric model using Ethiopian data. Specifically, the objectives of the study are

- To put into perspective the theoretical interactions between the budget deficit and current account balance
- To test, using an econometric model, the twin deficit hypothesis that states current account deficits are primarily caused by budget deficits.
- To infer some policy implications from the analysis.

1.4 Significance of The Study

There appears to have been no research conducted to test the twin deficit hypothesis for Ethiopia. This study is, thus, a pioneering effort in documenting empirical support for the link between the budget deficit and the current account deficit in Ethiopia. Moreover, with the ongoing stabilization and adjustment programmes in the country, this study, by assessing the interactions between the two major macroeconomic imbalances that stabilization policies

are aiming to restore, will assist in ensuring consistency and complimentarity in the policy measures directed to address internal and external imbalances.

1.5 Sources of Data and Study Period

This study has tried to use data from domestic sources as exhaustively as possible. When a particular data is not found from these sources, we have resorted to external sources; namely the World Bank and The IMF. The domestic sources include statistical reports of the National Bank of Ethiopia, Ministry of Economic Development and Cooperation, and Ministry of Finance. Specifically, data related to exports, imports, balance of payments and exchange rate are taken from the National Bank of Ethiopia, those related to GDP, investment and savings are taken from the Ministry of Economic Development and Cooperation, those related to government budget are taken from Ministry of Finance and others related to terms of trade, external debt and foreign variables are taken from World Tables of the World Bank and International Financial Statistics of the IMF.

The study period covers the years spanning 1960-1995. However, due to lack of consistent data for terms of trade and external debt for the whole study period, the regression equation that includes these variables is restricted to the period 1970-95 where a relatively consistent data for these variables is available.

Chapter Two

Review of The Literature

2.1 Review of The Theoretical Framework

The importance of fiscal policy as a crucial element in influencing macroeconomic variables was put into the picture by Keynes. The theoretical interactions between the two variables can thus be tracked from that time point on wards. However, interest in studying the relationships between the government budget and current account rate, both theoretically and empirically, received attention only in the late 1970s and early 1980s when US fiscal deficits were considered to be a major cause for the deterioration in the current account of the balance of payments. For example, as cited in Cuddington and Vinas (1986b), the Federal Reserve Bank of Chicago International latter (1984) notes :

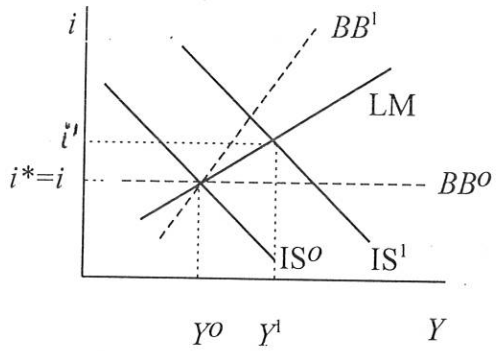
> *"... government officials and concerned observers have been pressing for measures that would reduce the (current account) deficit by addressing some of its root causes. A reduction in the federal budget deficit widely believed to be the main causes of the high U.S interest rates, which in turn are the main reason for the relatively high value of the U.S dollar and thus high imports, and low exports is believed by many to be a measure that would ultimately lead to a reduction in this country's increasingly problematic current account deficit."*

The same authors in a related study (1986a) quoted an OECD (1983) report:

> *" Firstly, independent budgetary action may be limited in its effects on domestic output (under managed or floating exchange rate regimes) since, because of the high integration of OECD economies through international trade, such action will be associated with current balance of payments deficits ...fiscal action may then lead to a form of " exchange rate crowding out" where the budget deficit has its counterpart in a deficit on the current (account) balance of payments (p.40)."*

It is on the same presumption that the IMF in its comprehensive stabilization programs requests countries facing balance of payments problems to reduce their fiscal deficits.

Theoretically, the relationship between the two variables in question can be established from different perspectives. First and foremost, their relationship can be inferred from the frameworks of the standard IS-LM and Mundell-Fleming models. According to these models, increase in the government budget deficit, caused either by government expenditure expansion or by tax reduction, lead to a deterioration in the current account balance. The process can be elaborated using a modified version of the Mundel-Fleming Model as employed by Kearney(1990).



Where i = *domestic interest rate*
i^* = *world interest rate*
Y = *domestic Income*
IS is the goods market equilibrium
LM is the money market equilibrium
BB^0 *is the balance of payment equilibrium under perfect capital mobility*
BB^1 *is the balance of payment equilibrium under low capital mobility*

Under perfect capital mobility, the balance of payment is in equilibrium when the domestic interest rate equals the world interest rate. Meaning that any discrepancy between

domestic and foreign interest rate will cause instantaneous capital flow of either direction (in or out based to which direction the domestic interest rate moved). That is why the BB line become flat at $i = i^*$. In the case of low capital mobility, a certain gap between the two interest rates is tolerated. This is manifested in the inclination of the BB line. Note that it is possible to represent different levels of capital movement between the low and perfect capital mobility schedules. The intersection of the *IS* and *LM* schedules determines the instantaneous equilibrium position of the economy at any moment in time. If this does not conside with the *BB* schedule, the balance of payments is non-zero. In this situation, the monetary authorities must accumulate or run down their stock of foreign exchange reserves under the case of fixed exchange rate regime while the movement in the exchange rate will clear the non-zero balance under the flexible exchange rate regime.

Coming to our point of interest, being expansionary an increase in budget deficit shifts the *IS* curve from IS^0 to IS^1 assuming that the economy is initially at its full equilibrium (at point *A*)*. We can develop four scenarios by combining the type of exchange rate regime and level of capital mobility, namely fixed exchange rate and low capital mobility, fixed exchange rate and perfect capital mobility, flexible exchange rate and low capital mobility, and flexible exchange rate and perfect capital mobility. Lets take first the channel that is common to all scenarios. In all of the possible scenarios, the shift in the *IS* curve due to the increased budget deficit leads to an increase in domestic income from Y^0 *to* Y^1. The increase in income in turn leads to an increase in demand for nontradables as well as for imports. The former results in an increase in the price of nontradables and hence an appreciation of the real exchange rate while the later leads to an increase in imports. Both

outcomes end up deteriorating the current account. This channel remains the only channel of relationship between the budget deficit and the current account for the first three scenarios. For the fourth scenario, i.e., flexible exchange rate and perfect capital mobility, one additional channel that is associated with the domestic interest rate emerges to work. It is clear that the shift in the *IS* curve increases the domestic interest rate from *i to* i^1. Being now greater than the world interest rate (*i**), domestic interest rate will attract foreign capital into the country. Thus, there will be an inflow of capital and a consequent increase in the supply of foreign exchange, which altogether tends to appreciate the domestic currency. The appreciation of the domestic currency stifles the competitiveness of exports while it encourages demand for imported goods. Hence, the combination results in a deterioration of the current account. In general, from this framework we can infer that the government budget deficit is positively related with the current account deficit.

Another link between the government budget and the current account can be illustrated by going back to a simple national accounts framework defining national income and private sector savings:

$Y = C + I + G + (X-M)$ ----------(1)

and $S = Y - C - T$ ----------(2)

where Y = *national income*
C = *private consumption*
I = *Private investment*
G = *Government Spending*
$X-M$ = *the current account of the balance of payments*
S= *Gross Private Sector Savings*
T= *Government Revenue*

Combining (1) and (2) it can be seen that:

$M-X = (G-T) + (I-S)$ ----------(3)

This identity states that the current account deficit *(M-X)* is equal to the difference between private sector investment and savings *(I-S)* plus the difference between government spending and revenue *(G-T)*. There is clearly some relationship, with no causality implied, between current account deficit and budget deficit. However, a direct linking would be wrong because it would imply a knowledge of ex ante movements which could only be provided by additional information about the way the saving and investment decision behavior of private sector agents is determined. In this framework the effect of increased budget deficit on the current account depends on how the fiscal policies that brought about the increase in budget deficit affect the saving and investment behavior of private individuals.

There are different hypotheses as to the effect of fiscal policies on the saving behavior of private individuals. For instance, taking a decrease in taxes as the fiscal policy that brought about the increased budget deficit, the following outcomes are predicted.

The Keynesian hypothesis asserts that consumers who have now a higher disposable income due to the tax cut will definitely increase their consumption. The extent of the consumption increase will be dependent on the marginal propensity to consume.

On the other hand, the life cycle and permanent income hypotheses maintain that only a permanent tax cut significantly affects private consumer spending while if the tax cut is temporary, the consumption effect will be minimal (the two hypotheses are forwarded by Franco Modigliani and Milton Friedman in the respective order). This, of course, implies that the effect on private spending of changes in the budget deficit is influenced by expectations

about the permanence of the deficit. The bottom line is that the increase in budget deficit worsens the current account deficit although the extent depends on the expected permanence of the deficit.

The extreme extension of the later hypotheses, known as the Ricardian equivalence proposition, claims that an increase in budget deficit what so ever has no effect on private consumption. The intuition is that consumers react the same whether government spending is financed through debt or taxes because consumers for see that a tax cut today, paid for by borrowing, will lead to a tax increase in the future. In anticipation of that future tax increase, consumers save rather than spend the income from the tax cut. If the fiscal policy was an expansion in government consumption rather than a tax cut, this hypothesis postulates that private consumption will decline one to one with each dollar of higher government consumption. The hypothesis implies that an increase in the budget deficit would, under certain circumstances, be accompanied by an increase in private saving and that both investment and the trade balance would therefore be unaffected.

Regarding the effect of fiscal policies on private investment, mixed results can be theoretically established. If the fiscal policy targets on public investment in areas that the private capital is actively employed, it can reduce private investment through driving down the rate of return in the area (i.e., through crowding out private investment) However, if the public investment is in activities that do not attract private investment, but that raise the rate of return of other private projects, it can increase private investment (i.e., crowding private investment). On the other channel, if there is repression of domestic interest rates and the

public sector is given preferential access to domestic credit, the public deficit could crowd out private investment. When interest rates are not regulated, deficit financing through domestic borrowing tends to raise real interest rates, diminishing the profitability of investment by raising the user cost of capital.

Secondly, we can observe the interaction between the government budget and current account through examining how the budget deficit is financed. There are four ways of financing the budget deficit: by printing money, by running down foreign exchange reserves, by borrowing abroad and by borrowing domestically.

Budget deficit = Money printing + (foreign reserve use + foreign borrowing) + domestic borrowing.

The parentheses around the foreign components emphasize the link between the budget deficit and the current account. In some cases, money and domestic financing of the budget deficit can be traced to have an effect on the current account.

Using foreign exchange reserves to finance a budget deficit relatively appreciates the domestic currency through increasing the supply of foreign exchange more than its demand. The appreciation will encourage imports and discourage exports, leading to deterioration in the current account. Use of foreign borrowing has a similar effect as use of reserves. Meaning that external borrowing will increase the supply of foreign exchange and thus appreciates the domestic currency. In this regard, in countries where domestic capital

markets are thin and domestic borrowing possibilities are limited (which is the case in most developing countries), the connection between budget deficit and current account deficits is more likely to be close.

With regard to money financing, heavy reliance on monetization of the budget deficit leads to inflation and an appreciation of the real exchange rate, which in turn lead to deterioration in the current account. On the other hand, reliance on domestic borrowing leads to high real domestic interest rates and this, under the perfect capital mobility assumption, induces capital inflow and an appreciation of the real exchange rate, with adverse effects on the current account.

Last but not least, the balance sheet identities can also be used to establish a link between the current account of the balance of payments, the financial sector and the government budget. Lesiit, M. A.(1990) has aptly summarized this link as follows. In terms of the balance of payments concepts, the current account surplus equals the overall surplus less the capital account surplus. Equivalently, it equals the increase in net official assets plus the capital outflow or the increase of private claims on the rest of the world. So that:

$$CA = \Delta NFA \qquad (1)$$

where CA= the current account surplus and Δ NFA = the change in the net foreign assets. For the combined banking system (commercial banks and the central bank), the balance sheet identity can be written as

$$\Delta NFA^b = \Delta M_2 - \Delta DC \qquad (2)$$

where NFA^b = the net foreign assets of the banking system; M_2 = the money stock and Δ DC = total domestic credit of the banking system to the government and the non bank private sector. The consolidated banking system increase in credit can also be written as the sum of credit to the government (g), ΔDC^g and the non bank (nb) public, ΔDC^{nb}:

$$\Delta DC = \Delta DC^g + \Delta DC^{nb} \qquad (3)$$

Since the government budget deficit is financed by government borrowing from the banking system or abroad so that:

$$G\text{-}T = \Delta DC^g - \Delta NFA^g \qquad (4)$$

where T = net taxes (Taxes less domestic transfers); G = Government Expenditure.

From equations 1 and 4, the relation between the banking systems external asset changes and the government deficit finance can be written as :

$$\Delta NFA^b = (T\text{-}G\text{-}\Delta NFA^g) + (\Delta M_2\text{-}\Delta DC^{nb}) \qquad (5)$$

This means that a decrease in the banking system's net external asset position has as their counterpart either an increased net indebtedness of the non bank public toward the banking system(i.e; an increase in credit to the public in excess of a rise in money supply) or a budget deficit that is financed by the domestic banking system.

The relationship between the current account, credit creation and deficit finance may therefore be summarized as :

$$CA = (T\text{-}G) + ((\Delta M_2\text{-}\Delta DC^{nb}) \qquad (6)$$

From equation (6), the current account of the balance of payments can be regarded as the sum of the budget deficit and the increase in domestic lending to non bank public in excess of increase in money supply. This relationship implies that the budget deficit can affect the current account.

The theoretical relationships established between the current account and government budget and the channels through which the relationship is built have had a number of underlying implicit assumptions. For instance, if we take the channel in which domestic financing of the budget deficit affect the current account we can note that a series of assumptions are embedded in the process. First, domestic financing is expected to put upward pressures on interest rates. Second, the increase in interest rate is assumed to stimulate capital inflow. Third, the capital inflow, in turn, is assumed to appreciate the domestic currency. Fourth, the appreciation of the domestic currency is expected to cause a deterioration in the current account through curtailing the competitiveness of exports and encouraging imports. All of the four implicit assumptions can be taken as hypotheses in independent researches. With regard to the first assumption, although, theoretically sound, researches conducted on this issue have found mixed results implying that domestic financing of the deficit can or can't lead to an increase in interest rates (Evans, 1985). Concerning the second assumption, capital inflow do not respond only to an increase in interest rates; rather the institutional set up, the legal framework, the policy environment and many other issues that exist in the country where the increase in interest rate is observed will also be scrutinized. Taking the third assumption that maintains an increase in domestic interest rates will be accompanied with instant capital inflow, it is hard to find a country with perfect capital mobility in

operation. A slight to complete capital control has been in order. In the case of the fourth assumption, the elasticity approach to current account balance has underscored that a change in the nominal exchange rate can have an effect as long as the Marshal-Learner Condition[2] holds. Even with the condition satisfied, the effect on the current account can be gradual which has lead to the development of the J-Curve phenomenon. Therefore, we should take note that establishing a direct forward relationship between the budget deficit and the current account is quite difficult.

Apart from the relatively theoretical relationships reviewed above, there are a number of efforts made to model the relation between budget deficit and current account. The review made by Cuddington and Vinals (1986b) and Kearney (1990) places these models into two categories. The first are models which are based on the Mundell-Fleming (M-F) model incorporating some modification and extensions. Among others are that of Dornbush (1976) which considers the implications of adding perfect foresight and exchange rate dynamics. Branson and Buiter (1983) and Sachs and Wypolsz (1984) incorporate stock flow interactions in additions to perfect foresight. These authors find that the exchange rate may or may not appreciate in the short run following a tax-financed increase in government spending, in contrast to the unambiguous appreciation predicted by the M-F model. These extensions of the M-F model have the virtue of recognizing the inherently dynamic nature of saving, investment and, hence, the current account (via the balance of payments accounting identity), but they are ad hoc, in that they are not based on optimizing behavior by economic agents.

[2] The Marshal-Learner condition states that devaluation will have an effect on the current account as long as the sum of the elasticity of imports and exports are greater than one.

The second group of models are those models which derive their important relationships from the microeconomic foundations of economic agents optimizing behavior. These models fall into a twofold classification; namely, those which result in Walarasian market-clearing macroeconmic frameworks and those which allow for the existence of market disequilibrium. Both models emphasize that both saving and investment, and hence current account, are determined fundamentally by intertemporal considerations. The main difference between the two models lies in their assumption for the long run and short run cases. The intertemporal Walarasian equilibrium models assume wage-price flexibility or full employment in both the short and long run while the non-Walarasian equilibrium models assume the existence of unemployment in the short run. Obstfeld (1981), Helpmann(1981), Sachs (1982), Dornbusch (1983) and Svensson and Razin (1983), Kimbrough (1985) and Frankel and Razin (1986) have constructed the former type of model while Dixit (1978), Neary (1980), Persson (1982), Persson and Sevensson (1983), Van Wijnbergen (1984), Cuddington and Vinals (1986) and Moore (1989) have constructed models which allow for the existence of various types of market disequilibria (cited in Cuddington and Vinals (1986b) and Kearney (1990).

The results that came out from those models do support the existence of a relationship between the budget deficit and the current account. For instance, Cuddington and Vinals (1986) in their conclusion stated that their finding supported the prediction of the new intertemporal Walrasian equilibrium models. Their prediction is that tax-financed, temporary increases in government spending always worsen the current account. A permanent increase, on the other hand, has an ambiguous effect. Taking into account the case of money financed

increase in government spending, they found that a temporary increase in government spending leaves the current account unaffected, while a permanent increase in government always improves it. However, they acknowledged that their findings are based on a number of strong assumptions; to name one they assumed the Recardian equivalent proposition to hold. According to Kearney (1990), fiscal expansion with in the above models is shown to lead to an increase in output and a deterioration in the current account balance under fixed exchange rate regime and perfect capital mobility assumption while it becomes ambiguous under flexible exchange rate regime.

2.2 Review of the Empirical Literature

A number of studies have been conducted on testing the extent of empirical support for the existence of a close relationship between fiscal deficit and current account imbalances. If (I-S) is stable over time, Laney (1984) suggests to use the following econometric relationship to test for the existence of a close 'twin deficits' relationship.

$$(M\text{-}X) = \beta_0 + \beta_1 (G\text{-}T) + u$$

He noted that if the β_1 coefficient is statistically significant and close to unity, this would provide evidence which is favorable to the "twin deficits" case. He estimated this equation on annual data from 59 countries over a period of 25-30 years and found mixed evidence of a statistically significant β_1 coefficient. Studies done by Kearney and Fallick (1987) using both cross section and time series data for the OECD countries concluded that there is little evidence in favour of such a relationship. In contrast, related studies made by Bahmani-Oskooee (1989, 1991) using US data have come out with strong evidences which portrait a

significant positive effect of budget deficit on the current account deficit. Similarly, the same study by Darrat (1988) using US data and multi-variate Engle-Granger causality estimation analysis has moderately supported Bahmani-Oskooee finding. However, it is interesting to note that Darrat found a strong evidence of reverse causation as well, which implies that current account imbalances determine fiscal deficit as much as vice-versa.

Perhaps a well elaborated study in this area is the study conducted by the World Bank on a set of ten developing countries. The study is made on relatively broad topic that assess the effect of public sector deficits on the macroeconomic performance of the ten countries. The effect of the public sector deficits on external variables such as current account balances and real exchange rate was one of the area that is treated. A common framework of analysis is employed on all countries under study. Easterly, Rodriguez and Schmidt-Hebbel (1994) in their review of this study underscored that fiscal deficits do lead to current account deficits and overvalued currencies. According to their review, the remarkable robustness of these relationships across the case studies is the strongest evidence yet in the literature for the "fiscal approach to the balance of payments"- the idea that external deficits are primarily a result of fiscal deficits.

Chapter Three

Model Selection and Specification

There is one main hypothesis that this study opts to test; namely, are current account deficits primarily caused by fiscal deficits? In doing so, two different econometric models involving the current account balance as dependent variable are developed. This study follows two ways to select the explanatory variables for the econometric models. The first way is to identify the main determinant variables for the dependent variable from standard theories and casual relationships and then take them as explanatory variables. The second way is to survey the available theoretical models on the area and take the reduced form parameters of the appropriate model as explanatory variables. What is important in both cases is a need to evaluate the variables with the actual situation of the country in question. Meaning that the variables that can be derived from some theories and models might not be relevant to a particular country for the reason that some of the important assumptions of those theories and models do not hold in the country in question.

Many studies have tried to investigate the effect of government budget on the current account balance. Three different approaches can be identified from these studies. The first approach includes those studies that have developed some sort of a model which relates the current account to the government budget. These studies derived the explanatory variables and their expected sign from the model. In this regard, the effort made by Rodriguez (1994) has been widely mentioned and used in many studies. The second approach refers to those

studies that only consider the current account and government budget variables in their econometric analysis. This is on the presumption that private saving and investment are stable and move together. This approach was used by Laney (1984).

The third approach is an extension of the second approach. Estimating the current account function with only the government budget as its determinant ignores other variables that are likely to affect the current account. In fact, there are a number of theories that trace the change in the current account to different variables. Thus, this approach refers to those studies that included other variables which are considered to be the major determinants of the current account.

This study will try to accommodate all the three approaches. This will help to look at the effect of the budget deficit on the current account from different perspectives. Moreover, if the outcomes of the three approaches turnout to be similar, it will concretize the findings of the study.

Even though, there were a number of models developed relating government budget and current account, the model that has been subjected to frequent empirical testing was the model developed by Rodriguez (1994). Partly, its wide usage lies in its origin. This model was developed as a reference framework to investigate the effect of budget deficit on the external sector variables for the studies conducted by the World Bank on different countries. To this effect, this study will follow Rodriguez's model, making our study comparable to what was done by the World Bank.

Rodriguez's model relates budget deficit to trade balance through looking at the structure of financing of the budget deficit. The main underlining and crucial assumption in his model is that the Ricardian equivalence proposition is assumed not to hold. The Ricardian equivalence proposition maintains that a tax reduction financed with debt will have no real effects on the economy if the public discounts the future taxes to service the debt and increases savings by the exact amount of the tax reduction. In this case, it can be infered from the balance of payments identity that an increase in budget deficit will not affect the trade balance since the increased deficit is financed from the same amount of increase in private saving.

In the absence of the Ricardian proposition, it is quite clear that a tax reduction financed through increased debt will result in some increase in private spending and there-by deteriorate the trade surplus or increase the trade deficit (for additional details see Rodriguez, 1994).

The additional variables in Rodriguez's model include debt level at the end of last year, inflation rate and terms of trade. The Current account function is thus constructed as follows.

$$CAD = f(BD, \underset{(+)}{} \; EXD_{t-1}, \underset{(-)}{} \; INF, \underset{(-)}{} \; TOT) \underset{(?)}{}$$

where CAD = *Current account deficit*
BD = *Budget deficit*
INF = *Annual Inflation Rate*
TOT = *Terms of Trade*
EXD_{t-1} = *Once lagged External Debt*

The econometric relationship estimated is

$$CAD = \alpha_0 + \alpha_1 BD + \alpha_2 EXD_{t-1} + \alpha_3 INF + \alpha_4 TOT + \varepsilon$$

- *The expected effect of the once lagged foreign debt level on the current account deficit is negative, on the assumption that the economy will make some adjustment in the next period in order to service its debt.*
- *Inflation, according to Rodriguiz, is expected to improve current account balance(or decrease its deficit). This is because a higher inflation may stimulate larger desired holdings of external assets by the private sector. In the short run, this implies larger capital outflows and, through the reduced rate of private spending, a larger trade surplus. However, the likely effect for the Ethiopian case is the reveres because of two reasons. First, the outlet that he considered does not exist in Ethiopia since the capital account is closed and foreign exchange has been strictly rationed in most of the study years. Second inflation tends to appreciate the real exchange rate and thereby deteriorate the current account through discouraging exports and encouraging imports.*
- *The relation between terms of trade and trade deficit balance is indeterminate. For instance, an improvement in TOT can increase real income and may thus induce either an increase in the desired stock of foreign assets which decreases private spending and improves trade balance or an increase in spending on imports which deteriorates the trade balance.*

Laney's (1984) econometric model seems very simplified but it can provide a good insight on how the two variables was behaving in the study years. The main assumption underlying Laney's estimation is that the private resource balance (I-S) is stable over time. According to the saving-investment identity, Laney's assumption implies that any change occurring in public resource balance will be reflected on the current account. As Darrat (1988) strongly noted the causality between the two variables can be bi-directional and thus there is a need to conduct Granger causality test so as to empirically test the direction of causation and then adjust the method of econometric analysis accordingly. Laney's econometric relationship, augmented with some lags, will be used to conduct the Engle-Granger causality test.

Many studies have been undertaken on unraveling the main determinants of the current account balance. Most of the studies derived the possible determinants from the standard text book approaches that are focused on addressing the current account problem of an economy. There are basically three different approaches to the trade balance or the balance of payments that try to highlight the relevance of different variables as the major determinants of the external account of a country. The Keynesian income-absorption approach argues that the trade deficit is basically due to a faster growth of home income (Y) relative to that of the rest of the world (Y*). Therefore, it recommends income-reducing policies to eliminate the trade deficit. On the other hand, the monetary approach emphasizes the rapid growth of domestic money (M) relative to the rest of the world (M*) as a cause of external deficit of a country and recommends lowering the domestic money supply to avoid the problem. Finally, the elasticity approach offers devaluation or depreciation of a country's exchange rate as a policy to cope with the trade deficit. According to this approach, the exchange rate is the main determinant of the trade balance.

From the three approaches, Bahmani-Oskooee (1989) proposed the following econometric relationship as a framework of determining the current account balance.

$$\mathbf{CAD} = \alpha_0 + \alpha_1 \mathbf{Y}_t + \alpha_2 \mathbf{Y}_t^* + \alpha_3 \mathbf{M}_t + \alpha_4 \mathbf{M}_t^* + \Sigma_{i=0}^{n} \lambda_i \, (\mathbf{P^*E/P})_{t-i} + \mathbf{u}_t,$$

where CAD = real current account Deficit
Y = domestic real output
Y = world real output*
M = domestic portion of high powered money in real term
M = world high powered money in real term*
*P*E/P = real exchange rate*
Given: E = effective nominal exchange rate
P = domestic price level
P = foreign price level*
u = disturbance term

There seems to be a strong interdependency between some of the explanatory variables in the aforementioned equation. Particularly, the effects of monetary variables are partly mediated through real output (both domestic and foreign) and real exchange rate. For instance, from the basic economic theories we know that, being expansionary, an increase in money supply leads to an increase in output (income), implying that the effect of money supply on the current account is partly mediated through its effect on domestic income which is one of the explanatory variables by itself. Similarly, the other effect of monetary expansion is an increase in prices. As can be infered from the construction of the real exchange rate, the possible effect of an increase in price on the current account is captured by real exchange rate which is also considered as an independent variable by itself. Thus, the inclusion of the money supply variables is quite indeterminate from this point of view and thus their inclusion will be determined based on the empirical outcomes.

As far as signs of the coefficients are concerned, it is expected that $\alpha_1 \gtrless 0$. $\alpha_1 < 0$ is due to the effects of income on imports; and $\alpha_1 > 0$ is due to the fact that, at higher level of income, the domestic production of importables may rise faster than consumption, lowering the volume of imports. By the same token, $\alpha_2 \gtrless 0$. With regard to coefficients of the monetary variables, the monetary approach to the balance of payments outlined that an increase in domestic money supply raises the level of real balances and, thus, the level of wealth. This increase in wealth causes the level of spending to increase relative to the level of income, bringing about a deterioration in the trade balance. Therefore, $\alpha_3 > 0$, which implies $\alpha_4 < 0$. The expected sign for the real exchange rate is negative ($\alpha_4 > 0$) since an increase (or

alternatively a depreciation) in the real exchange rate is supposed to encourage exports and discourage imports, leading to an improvement in the trade balance or the current account.

The lag structure added to the real exchange rate was used to detect the existence of the "J-curve" phenomenon. In his study on the effects of the US government budget on its current account(1989), Bahmani-Oskooee incorporated government budget deficit (revenue less spending) as additional determinant in to the above econometric equation.

$$CAD = \alpha_0 + \alpha_1 Y_t + \alpha_2 Y_t^* + \alpha_3 M_t + \alpha_4 M_t^* + \Sigma_{i=0}^{n} \lambda_i (P^*E/P)_{t-i} + \Sigma_{i=0}^{m} \phi_i BD_{t-i} + u_t$$

Where BD = government budget deficit (spending less revenue) in real term and the expected sign is positive as established in the theoretical part.

Recognizing the fact that the effects of a change in the government budget on the current account is not instant, he impcsed a lag structure on the government budget deficit variable to find out how long it takes for the government budget deficit to exert its initial impact on the current account. Although we would like to augment this econometric construct by including terms of trade as an additional variable, unavailability of consistent data that extends over the study period for this variable forced us to leave it out. Thus, the above econometric equation will be employed as a second version. However, note that we will include terms of trade in the case of the Rodriguz's model since the period for this model is reduced for incorporating this variable and external debt.

Chapter Four

Presentation and Analysis of Results

4.1 Introduction

This section is devoted for the presentation and analysis of results derived from the application of the specified models on the Ethiopian data. Two independent econometric models that consider the current account balance as dependent variable are estimated using PC-GIVE. As pointed out in the model selection and specification section, one of the econometric models follows Rodriguez's Model (1994) which have been developed as a framework for analyzing the effects that public sector deficits and the means of financing them have on the set of macroeconomic variables related to the external sector, such as the current account and the real exchange rate. Since the quantitative technique employed on this model is straightforward and the estimation of the model is meant for comparison and as an introducing part to the relatively rigorous time series modeling exercise in the later part, the results for this model are presented first. But before that there is a crucial point to be resolved with regard to the causal relationship between the budget deficit and the current account balance. Darrat (1988) argued that budget deficit and current account balance have a bi-directional relationship and thus the econometric technique used in analyzing the relationship of the two should take care of the endogenous nature of their determination. So as to test for the existence of any simultaneous causation between the two variables, the Granger Causality tests are administered.

Essentially, Granger causality test involves using F-tests to determine whether lagged information on a variable, say, X_t, has any statistically significant role in explaining Y_t in the presence of lagged Y. If, in the presence of lagged Y's, lagged X's make no statistically significant contribution to explaining Y_t, then it is said that "X does not Granger cause Y". Similarly, if lagged Y's make no statistically significant contribution to the explanation of X_t in the presence of lagged X's, then it is said that " Y does not Granger cause X". The general definition of Granger causality is

> *" X is a Granger cause of Y, if present Y can be predicted with better accuracy by using past values of X rather than by not doing so, other information's being identical"(Charemza and Deadman, 1997)."*

However, it should be noted that Granger causality tests are strictly appropriate only where the variables are stationary. For nonstationary variables these tests are valid only approximately or in some cases, may not be valid at all (Ibid.). Geweke (1989), as cited in Charmeza and Deadman (1997), pointed out that these causality tests may still be valid if the form of nonstationarity of the variables can be captured by the inclusion of a deterministic trend and/or logarithmic transformations.

Within the budget-current account deficits context, Granger causality can be investigated as follows. Consider the following current account deficit and budget deficit equations.

$$CAD_t = \alpha + \sum_{i=1}^{I} \beta_i CAD_{t-i} + \sum_{j=1}^{J} \gamma_j BD_{t-j} + \varepsilon_t \quad \text{.....(4.1)}$$

$$BD_t = \theta + \sum_{i=1}^{I} \lambda_i BD_{t-i} + \sum_{j=1}^{J} \phi_j CAD_{t-j} + \upsilon_t \quad \text{.....(4.2)}$$

Where BD and CAD refer to budget deficit and current account deficit, respectively and β_i, γ_i, λ_j, and ϕ_j are coefficients for the lags of respective variables. ε_t and u_t are assumed to be "white noise" error terms with mean zero and variance δ^2, and I and J are chosen to be sufficiently large to permit a variety of autocorrelation patterns. Since the data is annual, we have determined I and J to be four. The case of three and two lags have also been tested.

In equation 4.1, the current account deficit is assumed to be determined by its own lags and the lags of budget deficit. This equation is run with and without the lags of the budget deficit included, and then an F-test is performed to test the null hypothesis that $\gamma_j = 0$, j= 1,…,J, which states that budget deficit does not Granger cause current account deficit. The equation with both lags of current account deficit and budget deficit as explanatory variables is the unrestricted equation while the other with only the lags of the current account deficit is the restricted one. The restriction is in the sense that the coefficients for the lags of the budget deficit are assumed to be zero in the restricted equation. If the calculated F statistics is greater than the tabulated F critical value, we will reject the null hypothesis that says budget deficit does not Granger-cause current account deficit. The same procedure of testing for $\phi_j = 0$, j = 1,…J, is applied to equation 4.2 to determine the reverse causation from current account deficit to budget deficit.

The calculated F statistics is derived from the following formula:

$$F = \frac{(SSR_R - SSR_U)/h}{SSR_U/(n-k_u)}$$

Where SSR_R = *Sum of square of the residuals of the restricted equation*
SSR_U = *Sum of square of the residuals of the unrestricted equation*
h = *The number of restrictions which is given by the number of explanatory variables in the unrestricted equation (k_u) minus the number of explanatory variables of the restricted equation (k_r).*
n = *Number of observations*

The F statistics for equation 4.1 and 4.2 are presented in the following table.

Table 4.1 Summary of Granger causality tests

No.	Null Hypothesis	Lag	Calculated F statistics	Critical value (at 5% significance)	Decision
1	Budget deficit does not Granger cause current account deficit	4	2.83*	2.78 (4, 24)	Reject
2	Same as above	3	3.53*	2.96 (3, 27)	Reject
3	Same as above	2	3.52*	3.32 (2, 30)	Reject
4	Current Account deficit does not Granger cause budget deficit	4	2.77	2.78 (4, 24)	Do not reject
5	Same as above	3	3.48*	2.96 (3, 27)	Reject
6	Same as above	2	3.47*	3.32 (2, 30)	Reject

Figures in brackets are Degrees of Freedom
** shows significance*

As can be clearly seen from the above table the null hypothesis of budget deficit does not granger cause current account deficit is rejected under four lags. Reducing the lags to three and subsequently to two has not changed the result that we have got previously. Meaning that the causality tests show that budget deficit does Granger cause current account deficit. In the case of the reverse null hypothesis that maintains current account deficit does not cause budget deficit, the null is not rejected under four lags. However, subsequent reduction of the lag structure to three and two has lead to the rejection of the null, implying that current account deficit does cause budget deficit.

The other procedure that can be employed to test for causality is the test called Granger instantaneous causality test which is derived by augmenting the former equations through including $j = 0$ in both equations[3]. In short, instantaneous causality exists if present

[3] Equations 4.1 and 4.2 take the following form under instantaneous causality tests

$$CAD_t = \alpha + \gamma_0 BD_t + \sum_{i=1}^{I} \beta_i CAD_{t-i} + \sum_{j=1}^{J} \gamma_j BD_{t-j} + \varepsilon_t \quad \text{.....(4.3)}$$

$$BD_t = \theta + \gamma_0 CAD_t + \sum \lambda_i BD_{t-i} + \sum \phi_j CAD_{t-j} + \upsilon_t \quad \text{.....(4.4)}$$

Y can be predicted better by using present and past values of X, *ceteris paribus*. The test will thus be on the null hypothesis of $\gamma_j = 0, j_{=0, 1, \ldots J}$, in the case of testing causality from budget deficit to current account deficit while $\phi_j = 0, _{j = 0, 1, \ldots, J,}$ for testing the causality from current account deficit to budget deficit. The restricted equation remains the same as before while the unrestricted equation includes one more explanatory variable (see equations 4.3 and 4.4). Like the previous test, if the calculated F statistics is greater than the critical value we reject the null of absence of Granger instantaneous causality. The results for the Granger instantaneous causality tests between budget deficit and current account deficit are summarized in Table 4.2.

Table 4.2 Summary of Granger instantaneous causality tests

No.	*Null Hypothesis*	*Lag*	*Calculated F statistics*	*Critical value (at 5% significance)*	*Decision*
1	*Budget deficit does not Granger cause current account deficit*	*4*	*2.89**	*2.64 (5, 23)*	*Reject*
2	*Same as above*	*3*	*3.54**	*2.74 (4, 26)*	*Reject*
3	*Same as above*	*2*	*3.57**	*2.92 (3, 31)*	*Reject*
4	*Current Account deficit does not Granger cause budget deficit*	*4*	*2.67**	*2.64 (5, 23)*	*Reject*
5	*Same as above*	*3*	*3.0**	*2.74 (4, 26)*	*Reject*
6	*Same as above*	*2*	*3.4**	*2.92 (3, 31)*	*Reject*

Figures in brackets are Degrees of Freedom
** shows significance*

The instantaneous causality tests for bi-directional relationship between budget deficit and current account balance confirmed the previous outcome of simultaneous causality between current account deficit and budget deficit with greater strength.

The results of the causality tests confirm the strong theoretical and empirical regularity that budget deficit in deed affects the current account deficits significantly. However, the reverse causation although supported empirically is quite difficult to establish it theoretically. It seems that the possible nonstationarity nature of our data doesn't invalidate or reduce the power of the performed causality tests. However, to back up our results with tests that are made on relatively stationary data, the above causality tests are conducted on the same equations but with a deterministic time trend included at first and later with the differences of the variables[4]. The results of these tests have reaffirmed what has been found, i.e., budget and current account deficits have a bi-directional relationship.

It seems that the case studies that used Rodirguez's model have noted the bi-directional relationship between the budget deficit and the current account deficit. They uniformly employed a two stage least squares method so as to take care of the simultaneity bias that will arise due to the endogenity of the budget deficit in the current account equation. The same method of estimation is employed in this study and the results are reported and analyzed in the following section.

4.2 Results on Rodriguez's Model Regression and Their Analysis

The results of the estimation of the current account equation are reported in Table 4.2.1. The estimated equation is

$$CAD_t = \alpha_0 + \alpha_1 CAD_{t-1} + \alpha_2 BD_t + \alpha_3 TOT_t + \alpha_4 TOT_{t-1} + \alpha_5 EXD_{t-1} + \alpha_6 DD + \upsilon_t \ldots\ldots\ldots\ldots (4.2.1)$$

[4] Logarithmic transformation is not possible since one of the variables involves negative observations

$\alpha_2 > 0$, α_3 & $\alpha_4 < 0$, $\alpha_5 < 0$, and $\alpha_6 < 0$

where CAD = Current Account Deficit as percentage of GDP
BD = Primary Budget Deficit[5] as a percentage of GDP
TOT = Terms of Trade Index
EXD = External Debt Outstanding as a percentage of GDP
DD = Step Dummy for Relatively Liberalized Economy

Instruments used for the budget deficit include a constant term, current and lagged external debt, current and lagged terms of trade, current money supply (as % of GDP) and lagged budget deficit.

Table 4.2.1 Regression Results for the Current Account Equation

VARIABLE	*COEFFICIENT*	*STD. ERROR*	*T. RATIO*	*SIGNIFICANCE*
Constant	*0.18*	*0.0465*	*3.87*	*0.001*
CAD_{t-1}	*0.702*	*0.197*	*3.555*	*0.0023*
BD	*0.61*	*0.213*	*2.864*	*0.011*
TOT	*-0.00025*	*0.00019*	*-1.312*	*0.206*
TOT_{t-1}	*-0.00062*	*0.00023*	*-2.724*	*0.014*
EXD_{t-1}	*0.089*	*0.026*	*3.449*	*0.0029*
DD	*-0.0507*	*0.0154*	*-3.293*	*0.004*

Equation Summary:

No. of Observation 25 — *Standard Error of Residuals 0.0168*
SSR 0.0051 — *DW 2.07*
R^2 *0.87* — *F Statistics 21.056*
Adjusted R^2 *0.83* — *Significance 0.0000*

Test Summary[6]

AR 1-2F (2, 16) = 2.9197 (0.0830)
ARCH 1 F (1, 18) = 2.102 (0.1664)
Normality χ *(2) = 0.7507 (0.6870)*
χ^2_i *F (11, 6) = 0.5409 (0.8216)*
RESET F (1, 19) = 1.7993 (0.1974)

[5] Primary budget deficit refers to the overall deficit of the government budget before any interest payment.
[6] The reported diagnostic tests refer, in their order of appearance, to
A Breusch-Godfrey LM test for serial autocorrelation up to the fifth lag
An ARCH test for autoregressive conditional heteroscedasticity
Doornik and Hansen Univariate test for normality
White's test for heteriscedasticity
Ramsey's RESET general test of misspecification
In all of these tests, the null hypothesis refers to the correct specification of the model with regard to the respective test (Harris, 1995).

The test summary results of PC-GIVE indicate that there are no problems regarding normality, functional form and lag structure of the estimated equation. Moreover, the equation appears to fit well since the F statistics is significant at 1% and the independent variables explain 87% of the variation in the current account deficit(as a percentage of GDP). The Durbin-Watson statistics also shows that the residuals are nonautocorrelated.

Budget deficit, lagged external debt, lagged terms of trade and the liberalization dummy are found significantly different from zero. All variables except the lagged external debt have got the expected signs. The coefficient value of 0.61 for the budget deficit indicates that more than half of the change in the budget deficit as a percenrtage of GDP is transmitted directly to a change in the current account deficit in the same direction. This result entails that the persistent current account deficits of Ethiopia were largely rooted on the chronic budget deficits that the country was running. Compared to the coefficient obtained from the case studied on Argentina (0.32), Chile (0.29) and Colombia (0.45), the coefficient of budget deficit for Ethiopia seems large. But it appears moderate compared to that of Cote d' Ivoire with a coefficient of 0.93 (which shows that the trade deficit in Cote d' Ivoire is almost wholly driven by budget deficit)- see Easterly, Rodriguez and Schmidt-Hebbel, 1994).

According to Rodriguez, the effect of the lagged level of external debt on the current account deficit would have been negative, on the expectation that the economy makes some adjustment in order to service its debt. This was not found in this study although the magnitude of the coefficient is small. However, we can present an equally plausible reason for the positive effect of past year external debt on current account deficit. An increasing external debt can worsen the current account deficit through increasing the servicing of both

the principal and the accumulated arrears of interest rate payment. The terms of trade variable although has got a significantly different from zero coefficient on its first lag, the magnitude of the coefficient is very small. The negative sign of the coefficient indicates that the income effect of the terms of trade out weights its substitution effect, which is relatively regular in these kinds of studies.

As demonstrated by its negative and significant coefficient, the liberalization dummy included seems to capture the relatively better performance of the current account in partially liberalized economic management systems that prevailed before and after the derg regime. Inclusion of a deterministic trend to the regression equation so as to capture the possible nonstationarity behavior of the data has not changed the results except that the coefficient of the lagged external debt has become insignificant.

Inflation was considered to be included in the current account deficit according to Rodiriguez. As explained in the model specification section, inflation is expected to reduce the current account deficit through stimulating larger desired holdings of external assets by the private sector in the short run. This implies a larger capital out flow and a reduced domestic spending, which through the saving – investment identity establishes the corresponding decrease in current account deficit. However, this channel was totally non-existent in Ethiopia due to the fact that international capital mobility was strictly controlled or banned throughout the study years. Rather, the likely positive effect of inflation on the current account deficit, which was not emphasized by Rodriguez, is much more relevant to the Ethiopian situation. Inflation, either through appreciating the real exchange rate and then making exports externally incompetitive and/or through shifting demand from nontradables

to imports, can lead to a deterioration of the current account deficit. However, the fact that inflation was not that much high in Ethiopia and its possible high collinearity with the budget deficit lead us to excluded it from the regression equation. Marshal and Schmidt-Hebbel (1994) did the same for the case study on Chile.

4.3 Results of Time series Modeling

4.3.1 Testing for the Order of Integration

It has been the order of the day that before any sensible regression analysis can be performed on a time series data, it is essential to identify the order of integration of each variable included in the regression. To proceed to estimate a regression model without any recourse to identify the time series properties of the variables at best ignores important information about the underlying (statistical and economic) processes generating the data and at worst leads to non sensible (or spurious) results (Harris, 1995).

The test for the order of integration of variables in this study is done using the Augmented Dickey-Fuller(ADF) test. Since we do not know the stochastic process which has generated our data, we conducted the ADF test at first with a constant and later allowing for the presence of a constant and a time trend. There are two approaches, namely the Dickey-Fuller "upward" approach and the Dickey-Pantula "downward approach" in conducting the ADF test. In principle, the later approach seems to be preferable since it often be the case that this approach requires fewer regressions to be run and leads one to the appropriate order of integration of a series more rapidly and efficiently (Charmeza and Deadman, 1997).

The preferability of Dickey-Pantula approach over Dickey-Fuller approach is on the fact that in the former approach when the null is the series is I(1), it means precisely I(1) and not higher since hypotheses concerning higher order of integration have already been tested

previously. However, in the case of Dickey-Fuller, the alternative approach is precise rather than the null. For example, the non-rejection of the null that the series is I(1) with Dickey-Fuller approach is consistent with the series being integrated of order one or higher which is the source of the potential statistical weakness of this approach. Thus, this study, following the Dickey-Pantula approach, starts from testing from two units (I(2)) and if rejected continues to test for the presence of one unit root (I(1)). We started testing for unit roots from the second order based on the usual empirical regularity that most macroeconomic variables are at most integrated of order two.

The summary of the ADF test results for the current account function variables are presented in Table 4.3.1.

Table 4.3.1. ADF Statistics for Unit Root Tests-the Current Account Function variables

	Null hypothesis of I(2)		*Null hypothesis of I(1)*	
Variable	*With constant*	*With constant and a time trend*	*With constant*	*With constant and a time trend*
CAD	*-6.3***	*-6.3***	*-0.65*	*-2.7*
lRER	*-4.7***	*-4.9***	*-1.46*	*-1.0*
ly	*-5.4***	*-5.4***	*-1.4*	*-3.4*
lbd	*-8.4***	*-8.6***	*-1.4*	*-3.3*
*ly**	*-3.6**	*-4.2**	*-2.8*	*-2.6*
*lm**	*-3.3**	*-3.6**	*-1.8*	*-1.9*
lm	*-6.3***	*-6.3***	*-0.9*	*-2.5*

The number of lags included are 3

ADF Critical Values

1. *With Constant*
   - *5% = -2.96*
   - *1% = -3.65*
2. *With constant and time trend*
   - *5% = -3.56*
   - *1% = -4.28*

*** indicates significance at 1% level*

** indicates significance at 5% level*

In the ADF test with Dickey-Pantula approach, the null order of I(2) tests the presence of a unit root in the first differences of a variable against the alternative of stationarity. The null order of I(1), on the other hand, tests the null hypothesis of a unit root in the variable at its level against the alternative of stationarity. The general guide line in the ADF test is that if the absolute value of the t-ratio is less than the absolute value of the relevant ADF critical values, we reject the null hypothesis.

The results of the unit root tests revealed that the null hypothesis of two unit roots is uniformly rejected for all variables under consideration. Subsequently, the null hypothesis of a unit root is tested. In this case, we can't reject the null hypothesis at the conventional significance. This implies that all variables have definitely a unit root and thus they are integrated of order one (I(1)). To concretize these outcome, the unit root tests are supported by visual inspection of the graphs of the variables under consideration. Granger (1986), as quoted by Bahmani-Oskooee(1991), defined a stationary variable graph as:

> *An I(0) series has a mean and there is a tendency for the series to return to the mean, so that it tends to fluctuate around the mean crossing that value frequently and with rare extensive excursions.*

The graphs for all variables at levels and at differences are attached as figure 5.3.1 and 5.3.2, respectively. Inspection of the figures at levels suggests that each variable is nonstationary since all the graphs meander without any tendency to return to a long run level (mean). However, a look at the figures for the first differences reveals that some sort of stationarity is induced as each figure doesn't meander away with out returning to their long run mean.

Fig.4.3.1 Figures of Current Account Equation Variables at Levels

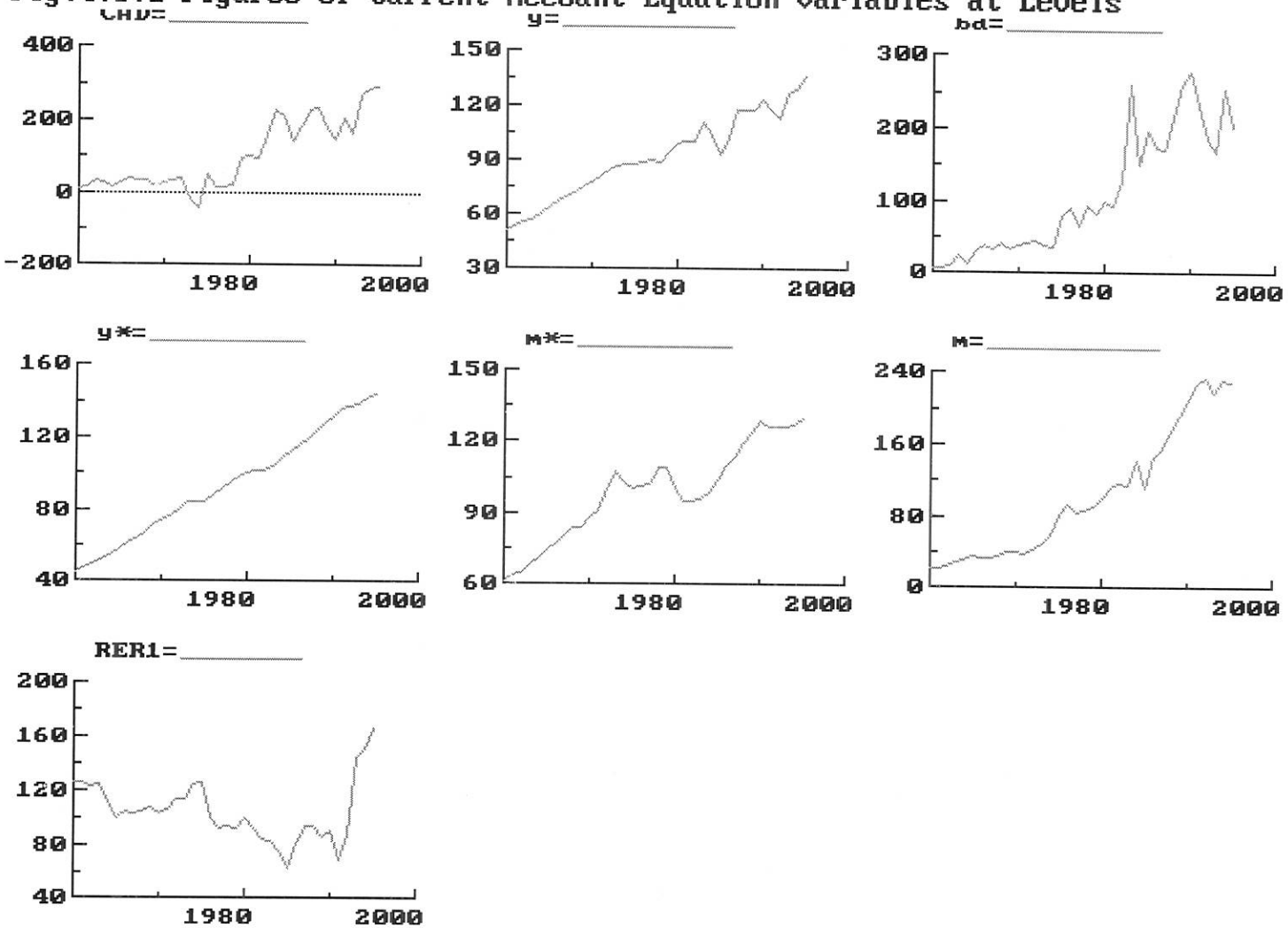
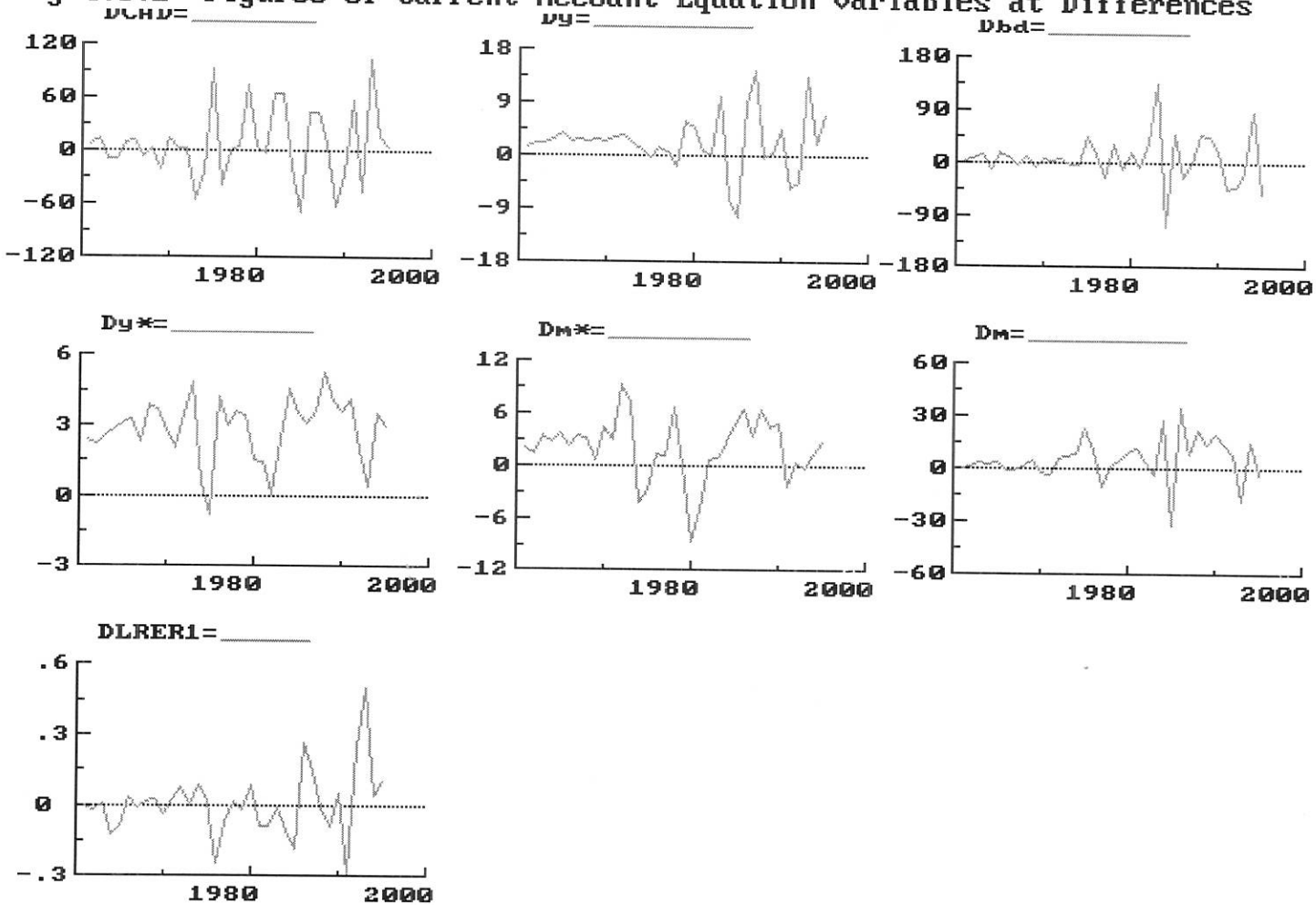


Fig 4.3.2 Figures of Current Account Equation Variables at Differences



4.3.2 Test for Cointegration

Establishing the order of integration of the variables in question is the initial move that enables a researcher to determine his next step in his time series modeling exercise. In fact, the brightest case is where all the variables are found to be stationary. In this case, application of standard regression methods is possible. However, this is an exception. In most cases, time series variables are integrated of order one and above. One alternative is to difference the variables till they become stationary and run a regression on the differences. The problem with this approach is that the results capture only the short run relationships and in some cases the coefficients don't mean anything due to the loss of the relationship through over differencing.

The recently popular step after establishing the order of integration of the variables as I(1) or above is to test whether the variables in question can cointegrate or not. The concept of testing for cointegration lies on the need to know how the linear combination of these variables behaves over time so as to use the resulting information to determine whether we can establish a model that can combine the short run and long run relationship of these variables.

As cited in Enders (1995), Harris (1995) and Charmeza and Deadman (1997), Engle and Granger defined the cointegration of two variables as follows:

> *Time series X_t and Y_t are said to be cointegrated of order d, b where $d \geq b \geq 0$, written as X_t, $Y_t \sim CI(d, b)$, if*
>
> *1. both series are integrated of order d*

2. *there exists a linear combination of these variables, say* $\alpha_1 X_t + \alpha_2 Y_t$ *which is integrated of order d-b. The vector* (α_1, α_2) *is called a cointegrating vector.*

For empirical econometrics, the most interesting case is where the series transformed with the use of the cointegrating vector become stationary, that is where d = b, and the cointegrating coefficients (the coefficients which constitute the cointegrating vector) can be identified with parameters in the long run relationship between the variables (Charmeza and Deadman, 1997).

There are two important methodologies to test for cointegration, namely the Engle-Granger methodology and the Johansen methodology. The Engle-Granger methodology involves a two step procedure. The first step is to estimate the long run equilibrium equation, which in our current account equation context takes the following form.

$$CAD_t = \gamma_0 + \gamma_1 y_t + \sum_{i=0}^{m} \phi_i BD_{t-i} + \gamma_3 M_t + \gamma_5 y^*_t + \gamma_6 M^* + \sum_{j=0}^{n} \lambda_j RER_{t-j} + \upsilon_t \text{.....(5.3.2.1)}$$

According to this procedure, the estimated parameters of this equation can be viewed as representative of the long run relationship. However, since the estimated standard errors from this model are generally useless due to the nonstationarity of the data, we can't use the standard errors for testing hypothesis about corresponding coefficients.

The second step is to determine whether the residuals from the estimated long run equation have a unit root or not. This can be done by the ADF test through estimating the following equation and testing the significance of π.

$$\Delta\hat{\upsilon}_t = \alpha + \pi\hat{\upsilon}_{t-1} + \sum_{i=1}^{k} \Delta\hat{\upsilon}_{t-1} + \varepsilon_t \text{.....(5.3.2.2)}$$

The maintained hypothesis is the existence of a unit root ($\pi = 0$) which is equivalent to no cointegration. Finding a significant π, on the other hand, implies cointegration. The essence of the Engle-Granger cointegration test is thus reduced to testing the residulas derived from the long run relationship for unit root. Stationary residuals establish the cointegration of at least two of the variables in the long run equation and the existence of some adjustment process which prevents the error terms in the long run relationship from becoming larger and larger. Consequently, an error correction model incorporating the difference of the variables, and the residuals (lagged once) as error correction term can be constructed as follows.

$$\Delta CAD_t = \mu_1 + \mu_2 \Delta y_t + \sum_{i=0}^{m} \theta_i \Delta BD_{t-i} + \mu_3 \Delta M_t + \mu_4 \Delta y^*_t + \mu_5 \Delta M^*_t$$

$$+ \sum_{j=0}^{n} \varphi_i RER_{t-i} + \mu_6 \upsilon_{t-1} + \nu_t \quad \text{.....(5.3.2.3)}$$

The coefficient of the error correction term (μ_7) needs to be negative so as to indicate the tendency of the short run dis-equilibrium to adjust to its long run equilibrium state. A significant coefficient entails that the short run dis-equilibrium will definitely converge to its long run state while the magnitude of the coefficient indicates the amount of adjustment that can be made at a period. The other coefficients represents the short run relationship between the dependent variable and the respective explanatory variables. Note that since all of the variables included in the error correction model are stationary, the estimated errors are valid, making hypothesis testing possible.

The Engle-Granger methodology for cointegration has been criticized from different angles. Among others, its inability to capture the issue of endogenity, its small sample bias,

its inability to provide valid standard errors for the long run equation, its failure to detect the presence of more than one cointegrating vector for the long run relationship and its ignorance of short run dynamic effects are the main ones (Harris, 1995; Charmeza and Deadman, 1997; and Enders, 1995).

However, using an unrestricted Auto Regressive Distributed Lag Model (ADL) with enough lags as a long run relationship equation has been found to take care of some of the problems associated with the Engle-Granger approach applied on static model. As cited in Harris (1995), using ADL model gives precise estimates (of long-run parameters) and valid t-statistics, even in the presence of endogenous explanatory variables (Inder, 1993). He also mentioned that using a dynamic modeling procedure results in a more powerful test for cointegration. In large part the better performance of the dynamic model is the result of not pushing the short run dynamics into the residual term of the estimated regression. Instituting an appropriate lag structure that ensure white noise residuals and enough degrees of freedom is the major precaution to be taken under ADL.

The Johansen methodology, on the other hand, involves a number of difficult tasks that makes its application in the real world very cumbersome. This methodology begins with defining the following type of unrestricted vector autoregression (VAR) model involving k lags of the variables and its reformulation into a vector error correction form.

$$Z_t = A_1 Z_{t-1} + \ldots + A_2 Z_{t-k} + u_t \qquad u_t \sim IND(0, \Sigma)$$

where Z_t is (nx1)matrix of variables and each of the A_i is (nxn) matrix of parameters.

Rewritten in error correction form:

$$\Delta Z_t = \Gamma_1 Z_{t-1} + \ldots + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi Z_{t-k} + u_t$$

$$where \Gamma_1 = -(I - A_1 - \ldots - A_i),\ (i = 1, \ldots, k-1),\ and\ \Pi = -(I - A_1 - \ldots - A_k).$$

Test for cointegration under this methodology is determined by establishing the rank of matrix Π. If Π has a reduced rank, it means that there are cointegrating relations among the Z's. If the rank of Π is found to be zero, it implies that all Z's are stationary. If Π has a full rank, then there is no cointegration which entails the absence of long run relationship among the Z's.

The λ-max and λ-trace tests are used to determine the rank of Π. If these tests revealed that Π has reduced rank, then $\Pi = \alpha\beta'$ where β' represent the long run coefficients and α's refer to the short run adjustment to disequilibrium (Harris, 1995). Once the presence of cointegration is established, a battery of tests, such as tests for the uniqueness and identification of the vectors, tests for weak exogenity and various restrictions on the cointegrating vector(s) will be administered. This is followed by the development of the appropriate vector error correction model.

Johansen's approach to testing for cointegration is widely acknowledged for its good attributes in the case where more than two variables are involved in the econometric equation. The statistical properties of the Johansen's approach are generally better and the power of the cointegration test is higher (Charmeza and Deadman, 1997). Particularly, this approach has a provision for estimating and testing for the presence of multiple cointegrating vectors and restrictions on them. However, a couple of problems are associated with this approach too. First and foremost, the β's and α's reported from Johansen's cointegration test

are reduced form parameter estimates. This makes establishing the direction and magnitude of the long run relationship between variables quite difficult. Secondly, in the case where more than one cointegrating vectors are identified, there is no clear cut criteria that the methodology offers for selecting a specific vector that represents the long run relationship. Thirdly, the methodology does not indicate how the standard errors for the corresponding parameter estimates can be derived, making the assessment about the significance of the estimated coefficients impossible. Fourthly, the number of cointegrating vectors identified under this approach are too sensitive to the number of lags and the type of deterministic trends included in the VAR model. It is quite possible that two independent researches on the same data set can come up with different results.

This study employs the Engle-Granger cointegration procedure on an ADL model. It is pointed out that this combination of cointegration analysis takes care of the various problems associated with Engle-Granger cointegration test applied on static econometric relationship. The main reason for adopting this methodology lies in the fact that the methodology provides precise estimates of long run parameters with valid t-statistic even in the presence of endogenous explanatory variables. It is to be recalled that the Granger causality tests have showed the bi-directional causation between the budget deficit and the current account deficit and there by the possible endogenity of the budget deficit in the current account balance.

The prime task in the ADL model is to determine the appropriate number of lags. Five lags is the common lag structure used for quarterly data. Due to the annual nature of the data set and the quest for maintaining enough degrees of freedom, this study used three lags.

The estimated equation is

$$CAD_t = \alpha_0 + \sum_{j=1}^{3} \alpha_j CAD_{t-i} + \sum_{i=0}^{3} \beta_i y_{t-i} + \sum_{i=0}^{3} \gamma_i M_{t-i} + \sum_{i=0}^{3} \phi_i BD_{t-i} + \sum_{i=0}^{3} \varphi_i M^*_{t-i}$$
$$+ \sum_{i=0}^{3} \theta_i y^*_{t-i} + \sum_{i=0}^{3} \lambda_i RER_{t-i} + \xi_t$$

The estimation of the above model with three lags has shown three important facts. First, the degrees of freedom is severely limited since we estimated an equation that includes 27 variables and 33 observations. Second, the two foreign variables (foreign real income and money supply) have shown high collinearity as the exclusion of one of the two variables resulted in a profound change in the coefficient of the other variable. Third, the coefficient of domestic money supply remained very small and insignificant under different alternative estimations and its droping out didn't change the results. Following these observations, domestic money supply and its foreign counter part are excluded from our model. This is partly on the belief that part of the effect of these variables will be captured by the corresponding domestic and foreign real income variables as well as by the real exchange rate. Thus, the estimated equation takes the following form.

$$CAD_t = \alpha_0 + \sum_{j=1}^{3} \alpha_j CAD_{t-i} + \sum_{i=0}^{3} \beta_i y_{t-i} + \sum_{i=0}^{3} \phi_i BD_{t-i} + \sum_{i=0}^{3} \lambda_i RER_{t-i} + \xi_t$$

The results of this equation are reported in the following table.

Table 4.3.2 Summary results for the estimated Current Account Long Run Equation

Estimated Equation Summary:	
No. of Observations 33	*DW = 2.5*
No. of Variables 20	*F-Statistic = 26.186*
R^2 *0.98*	*Significance = 0.0000*
RSS 0.599	
Solved Static Long Run Equation:	
CAD = 7.287 - 9.436y + 0.74BD - 3.615y - 1.325RER*	
(1.88) (3.791) (0.289) (4.59) (0.6219)	
Figures in brackets are standard errors for the corresponding coefficients	
ALD test $\chi^2(4) = 442.65\ (0.0000)$**	
*Unit Root test = -4.7952 **	
Diagnostic Test Summary:	
AR 1-2F(2,9) = 3.8731 (0.0612)	
ARCH 1-F(1,9) = 0.10577(0.7524)	
Normality $\chi^2(2) = 2.6389(0.2673)$	
RESET F(1,10) = 1.3301(0.2756)	

The diagnostic tests indicate that the model is well specified. The fit and significance of the model is quite good and the wald test decisively rejects the null that all of the long-run coefficients (except the constant term) are zero. Apart from these tests, the dynamic equation analysis of PC GIVE provides a unit root test for the null hypothesis of no cointegration.[7] We found t-statistics of -4.7952 which is significant at 5%. Thus, the null of no conintegration is rejected. This result is backed up by unit root test on the residuals which is rejected at the same significance level. All of the explanatory variables except domestic real income have the expected signs and all except foreign real income are significantly different from zero at conventional levels (at 1% and 5%).

[7] This test is based on the sum of the coefficients ($\Sigma\alpha_i$)of the lags of the dependent variable. Their sum must be less than one for the dynamic model to converge to a long run relationship. Dividing (1- $\Sigma\ \alpha_i$) by the sum of their associated standard errors provides a t-type test statistic which can be compared to against the critical values given in Benarjee, Dolado, and Mestre (1992) (Harris, 1995)

With respect to domestic real income, although the conventional line of thinking emphasizes that an increase in real income leads to a deterioration in current account deficit through encouraging imports, it is equivalently possible that the increase in real income might encourage the expansion in import substituting industries in the domestic economy and consequently a fall in imports accompanied with an improvement in the current account deficit. For the most part of the study period, Ethiopia has followed import substitution development strategy with stringent import regulatory measures in place. However, the paradox is that the established import substituting industries have, at large, depended on imported inputs and fuel. The other argument, although might not be relevant to the Ethiopian situation, is the case where the growth in real income is originated from a vibrant export sector performance.

The effect of budget deficit on the current account deficit is found to be positive and significant. This is in line with the conventional argument and the most expected direction and magnitude for Ethiopia. It is obvious that most of the study period falls under the Derg regime, during which private savings and investment were highly discouraged through different measures while on the other side government expenditure was stretched to the maximum so as to support the instituted huge public sector. Not being supported by similar expansion in government revenues, the saving-investment identity that we discussed in the theoretical section ensures that the ensued expansion in the budget deficit inevitably transpires to a deterioration in the current account deficit.

In the face of exports that are entirely based on agricultural products with an inelastic demand and that are subjected to fierce international competitive environment, the

insignificance of foreign real income in encouraging exports and thereby taming the current account deficit is quite plausible. On the other hand, the negative sign of the real exchange rate is in line with the long run relationship and it indicates that the Marshal-Learner condition holds in the Ethiopian case.

4.3.3 Error Correction Model for The Current Account

The previous section established that the current account equation variables do cointegrate. Since every cointegrated nonstationary variables do have an error correction representation, an error correction model (ECM) is constructed and estimated for the current account in this section. As elaborated earlier, the ECM includes the one-lagged residuals (ε_{t-1}) derived from the long run relationship. The pattern of the lagged residuals shows how the current account deficit gets out of its long run equilibrium in the short run and the coefficient in the ECM indicates how fast the current account adjusts to such disequilibrium situation. In an effort to incorporate the impact of the two diametrically different economic management systems that have been instituted in the country, a dummy variable is included in the ECM. This dummy is constructed in such a way that it can capture the effects of the relatively liberalized and private oriented economic systems of the pre- and post Derg regime.

The ECM is estimated with two lags at first and the Hendry-type 'general to specific procedure' is subsequently used to reduce this ECM to its parsimonious form. Model reduction is made through dropping insignificant variables using an F-test and then reparameterizing the estimated equation. The reduced models in sequence are:

1. *Long run equation with three lags to its equivalent of the ECM with two lags.*

2. $\Delta CAD_{t-2} = \Delta CAD_{t-2} = \Delta BD_{t-2} = \Delta y_{t-2} = \Delta y^*_{t-2} = 0$
3. $\Delta y_t = \Delta y^*_{t-1} = \Delta RER_{t-2} = 0$

The F statistics for testing each model in the sequential reduction process are given in the following table.

Table 4.3.3 *F statistics for sequential model reduction*

No.	*Null Hypothesis*	*Calculated F statistics*	*Critical value (at 5% significance)*	*Decision*
1	*The first reduced model is correct and significant*	*2.26*	*3.36 (4, 11)*	*Do not reject*
2	*Same as above for reduced model two*	*2.23*	*2.81 (5, 17)*	*Do not reject*
3	*Same as above for reduced model three*	*0.5*	*3.05 (3, 22)*	*Do not reject*

Figures in brackets are Degrees of Freedom
** shows significance*

As can be seen from the above table, each sequential model reduction is not rejected, implying that the excluded variables are indeed insignificant in reducing the explanatory power of the reduced model. In other wards, the explanatory power of the reduced model is still maintained. The estimated results for the final reduced model are given in Table 4.3.4.

Table 4.3.4 Summary results for the estimated reduced ECM for the Current Account

VARIABLE	COEFFICIENT	STD. ERROR	T. RATIO	SIGNIFICANCE
Δy_{t-1}	3.33	1.456	2.287	0.0307
ΔBD_t	0.28	0.138	2.029	0.052
ΔBD_{t-1}	0.267	0.145	1.841	0.0841
Δy_t^*	-1.225	0.952	-1.287	0.21
ΔRER_t	0.931	0.78	1.19	0.245
ΔRER_{t-1}	1.023	0.439	2.33	0.028
ECM_{t-1}	-0.463	0.102	-4.54	0.0001
DD	-0.0511	0.101	-0.506	0.616

Equation Summary:

No. of Observation 34 — *Standard Error of Residuals 0.2736*

SSR 1.946 — *DW 2.37*

R^2 0.66 — *F Statistics 7.12*

Adjusted R^2 0.57 — *Significance 0.0001*

Test Summary

AR 1-2F (2, 24) = 1.1213 (0.3423)

ARCH 1 F (1, 24) = 0.0646 (0.1664)

Normality χ (2) = 0.11034 (0.9463)

χ^2_i F (13,12) = 0.27291(0.9862)

RESET F (1, 25) = 0.5502 (0.5502)

The reduced model has passed all diagnostic tests. Lagged real income, lagged real exchange rate, and the error correction term are significant at the conventional levels. The error correction term has a negative sign(implying that the short run disequilibrium adjusts to its long run equilibrium) and it is significantly different from zero at 1%. The coefficient of -0.46 entails that the short run disequilibrium adjusts quite quickly to its long run equilibrium through removing 46% of the disequilibrium in one year.

The coefficients for the current budget deficit and its lag indicate that budget deficits do still have a positive short run effect on the current account deficits since they are found to be significant at 10%. As pointed out in the theoretical section, most of the channels through which government budget deficit affects the current account deficit are indirect and thus take time to reflect their expected effect. Thus, the significance of the first lag is plausible. Unlike its long run effect, in the short run lagged domestic income is found to positively affect the

current account deficit significantly. Meaning that in the short run an increase in real income tends to generate demand for imports with a year lag while in the long run its supply effect on the domestic production of importables out weights the short run effect. This might imply that the domestic economy uses imports to augment its capacity in the long run.

The coefficient for real exchange rate also tells the same story. It seems that a depreciation of the real exchange rate doesn't instantaneously encourage exports or curtail imports. In this regard, the structure of Ethiopian exports and imports might have something to tell. As briefly elaborated in the introduction part, Ethiopian exports are dominated by coffee which is demand and price inelastic in the short run since it has a relatively long gestation period. A depreciation, thus might not cause an immediate surge in exports. On the other hand, the concentration of imports on such goods as capital goods and fuel which are critically necessary for development makes reducing imports in the short run quite difficult. These combination is expected to partly explain the case in question. Although the magnitude of the coefficient of the dummy variable is almost the same as the two stages least square result, it is not found to be significant in the ECM model.

Chapter Five

Conclusion and Summary of Findings

The success of stabilization policies in restoring external and internal imbalances depends at large on maintaining consistency and complimentarity among the available policy options. The first step towards ensuring these is to understand and empirical document the interactions among the imbalances themselves. This paper attempts to examine the effect of one of the major internal imbalances- budget deficit- on the similarly important external imbalance-the current account deficit, both theoretically and empirically. Theoretically, the effect of government budget on current account can be established from different but somewhat related perspectives. In a case where capital is mobile and the exchange rate is flexible, the effect can be transmitted either through its pressure on interest rates (and thereby an ensued capital inflow, appreciation of the exchange rate and its adverse effect on the current account) or through its expansionary effect on output and prices. Within the framework of fixed exchange rate regime and international capital immobility, budget deficits maintain their expansionary nature, i.e., they gradually raise the level of domestic output and prices. Increased output usually leads to higher imports, and higher prices lead to lower exports, resulting in the deterioration of the current account balance. The same kind of relationship can be established by using the Keynesian saving-investment identity with the absence of Recardian equivalence proposition.

Studies made on unraveling the effects of budget deficits on current account deficits have largely supported the existence of a significant effect of budget deficit on the current

account. The findings of the series of case studies conducted by the World Bank in particular, have strongly grounded the existence of the budget deficit effect on the current account to the extent of recommending fiscal adjustment as a prerequisite for restoring current account imbalances and real exchange rate misalignments. Darrat(1988), in a related study, noted that budget deficits and current account deficits have a bi-directional effect. He then firmly recommended that the quantitative technique to be used in analyzing the interaction between these variables needs to be rigorous enough to take care of the simultaneity bias that might arise.

Following Darrat's recommendation this study starts its empirical inquiry through using the Granger causality tests so as to determine the direction of causation of the two variables. Granger causality and Granger instantaneous causality tests are employed on the levels and differences of the two variables. Both tests revealed the existence of simultaneous causality between the budget deficit and current account deficit. While we have established the causation from budget deficit to the current account in the Ethiopian case, it seems difficult to come up with justifiable argument to the reverse caustion.

Two models that are based on different approaches and data periods are estimated in this study. The first model closely follows the model developed for the World bank case studies. This model considered budget deficit, lagged debt level, terms of trade and inflation as explanatory variables to the current account deficit. For comparison propose as well as to take care of the simultaneity bias that could arise due to the possible endogenity of the budget deficit, this model is estimated using two stage least squares estimation method.

The second model is developed based on the conventional theories that revolve around the determination of current account deficits. Based on the absorption approach, the elasticity approach and the monetary approach to the balance of payments, five variables namely, domestic and foreign real incomes, domestic and foreign money supply, and real exchange rate are identified as major determinants of the current account. Budget deficit is included to investigate its effect on the current account. Engle-Granger two step cointegration procedure augmented by ADL is employed for this model. This combination is selected for the reason that the estimated long run equation is shown to give precise estimates (of long-run parameters) and corresponding valid t-statistics, even in the presence of endogenous explanatory variables.

Assessment of the theoretical relationships between the two variables and estimation of the above two models have come out with the following main findings.

- Although it is possible to theoretically establish the existence of the effect of budget deficits on the current account through different channels, the nature of these channels is largely indirect and conditional to a series of assumptions which by themselves could be taken as hypothesis in independent researches. This makes difficult to infer the likely extent of the effect and the time period that could take to be realized.

- The empirical findings are rather gloomy.
    - It is found out that budget deficits do cause current account deficits. However, the reverse causation is also found to work

- There exists a strong and significant spill over of the budget deficit to the current account deficit in the same direction, providing an empirical support to the "twin deficit" hypothesis in Ethiopia. This outcome is found to hold both in the short and long run. It can thus be argued that the chronic budget deficit that the country has experienced is one of the major factors that caused the equally persistent current account deficits.

In conclusion, the results of the empirical inquiry have strongly supported the existence of a significant effect of the budget deficit on the current account and thus this paper at large supports the policy implication that comes out of the World Bank case studies which states that fiscal adjustment should be considered as a prerequisite for adjustments to be made in the external sector. However, a definite recommendation of fiscal adjustment as a prerequisite for external sector adjustment can only be made when we establish the extent of the effect of current account deficit on the budget deficit.

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Appendix I

Table 1: Domestic savings, Gross capital formation, and GDP

Year	As % of GDP		GDP by Origin in percent			GDP in Million Birr (at 1973 prices)
	Domestic Saving	Gross C. Formation	Agriculture	Industry	Services	
1961	11.0	12.0	69.2	10.8	20.1	4920.15
1962	10.9	12.6	67.5	11.2	21.3	5125.55
1963	10.6	12.6	66.8	11.5	21.7	5317.87
1964	11.8	13.1	65.2	12.1	22.7	5574.76
1965	12.2	13.2	63.4	12.3	24.3	5956.81
1966	10.5	14.0	61.4	13.4	25.2	6194.73
1967	11.6	14.3	60.8	14.2	25.0	6451.74
1968	12.0	13.9	59.2	14.5	26.4	6693.67
1969	11.2	13.3	58.1	14.8	27.2	6963.41
1970	11.1	11.4	57.3	14.6	28.0	7216.19
1971	9.9	11.7	56.1	15.3	28.6	7514.68
1972	10.8	12.6	55.6	15.3	29.1	7855.48
1973	13.3	11.3	54.6	15.4	30.0	8053.22
1974	12.9	9.8	53.5	15.1	31.4	8164.81
1975	7.5	10.4	52.5	14.9	32.6	8163.75
1976	7.5	8.5	53.2	13.8	33.0	8305.87
1977	5.0	8.2	52.7	14.1	33.2	8394.14
1978	1.9	7.5	52.8	13.8	33.4	8252.84
1979	3.4	8.7	50.7	14.9	34.4	8799.98
1980	3.7	10.0	50.6	15.5	33.9	9248.61
1981	7.6	13.6	57.7	10.9	31.4	9324.50
1982	5.9	13.7	55.4	11.7	32.9	9374.00
1983	5.5	12.2	57.1	11.3	31.7	10326.50
1984	8.1	16.8	53.3	12.7	34.0	9675.80
1985	2.8	10.7	46.7	14.7	38.6	8734.70
1986	8.6	16.4	49.3	14.3	36.4	9597.30
1987	7.6	15.6	51.3	13.5	35.2	10948.70
1988	12.5	20.4	49.9	13.0	37.1	10947.80
1989	8.9	14.4	50.3	12.1	37.7	10986.40
1990	7.9	12.5	50.9	11.1	38.1	11432.70
1991	3.4	10.4	55.9	9.4	34.7	10938.10
1992	3.0	9.2	56.5	9.0	34.5	10534.50
1993	5.6	14.2	53.5	10.4	36.2	11798.70
1994	5.0	15.2	50.7	10.9	38.5	11999.30
1995	6.7	16.4	49.7	11.2	39.1	12644.30
1996	6.6	19.1	51.5	10.7	37.8	13990.20

Source: Ministry of Economic Development and Cooperation

Table 2: Balance of payments related statistics (in millions of Birr)

	Exports		Imports	Net Services	Balance on Goods and Services	Transfers	
Year	Coffee	Others				Private	Official
1971	179.6	134.8	454.8	25.3	-115.1	-11.5	28.4
1972	164.7	159.2	468.2	26.2	-118.1	3.2	29.7
1973	200.3	253.1	436.5	33.0	49.9	16.6	28.8
1974	166.1	432.7	522.8	65.9	141.9	34.3	48.5
1975	117.5	360.7	673.5	13.3	-182.0	31.0	61.5
1976	297.7	241.4	679.4	89.6	-50.7	43.9	60.8
1977	408.9	233.9	744.2	43.7	-57.7	34.3	88.1
1978	514.5	156.2	797.8	41.0	-86.1	30.7	110.1
1979	541.6	203.3	1220.1	42.2	-433.0	48.2	123.5
1980	631.8	318.8	1468.2	55.1	-462.5	41.3	124.0
1981	524.3	327.2	1384.2	70.3	-462.4	50.2	123.9
1982	480.3	297.8	1641.6	60.2	-803.3	93.6	139.8
1983	195.9	313.7	1753.0	85.9	-1157.5	175.8	191.4
1984	590.4	339.2	2067.0	112.0	-1025.4	222.0	335.2
1985	466.3	278.3	1770.4	103.1	-922.7	300.0	617.6
1986	664.8	277.9	2211.0	125.4	-1142.9	433.6	607.1
1987	524.3	285.5	2236.9	106.3	-1320.8	306.4	438.6
1988	439.3	348.8	2274.7	77.5	-1409.1	245.3	388.7
1989	626.4	291.8	2110.4	96.5	-1095.7	389.1	433.0
1990	405.4	351.5	1824.2	89.2	-978.1	354.6	335.4
1991	268.5	303.6	2130.3	-62.0	-1620.2	413.9	604.3
1992	168.3	150.9	1810.9	27.4	-1464.3	653.7	893.5
1993	537.0	412.9	3618.9	-36.0	-2705.0	1057.9	1708.7
1994	918.9	700.8	4740.3	173.2	-2947.4	1434.3	1447.7
1995	1799.0	932.8	6546.7	406.3	-3408.6	1944.9	2560.2
1996	1720.5	1205.2	8972.1	524.0	-5522.4	1980.0	2474.2

Source: National Bank of Ethiopia

Table 3: Imports by End Use as Percentage of Total Import Value

Year	Imports by End Use					Total Imports In Mill. Birr
	Raw Matreials	Semi-finished Goods	Fuel	Capital Goods	Consumer Goods	
1971	3.9	20.4	9.1	31.9	34.2	453.8
1972	3.9	15.9	10.5	37.5	30.0	468.2
1973	4.5	17.5	11.0	34.1	32.2	436.6
1974	4.3	22.0	17.1	23.2	32.7	522.8
1975	5.8	21.9	20.9	13.7	37.1	673
1976	4.1	20.6	18.3	18.5	38.2	628.6
1977	3.6	16.4	14.4	28.6	34.0	750.3
1978	3.9	12.7	16.0	29.6	34.5	797.8
1979	4.3	19.9	13.4	36.0	33.3	1186.3
1980	3.9	19.1	23.4	30.5	20.9	1370
1981	3.8	13.6	24.9	32.7	24.9	1384.2
1982	3.4	13.5	22.0	34.4	26.5	1646.4
1983	3.4	14.3	22.7	33.0	26.5	1748.4
1984	3.5	11.7	18.4	45.0	21.0	2066.9
1985	2.8	13.6	18.0	29.1	36.4	1770.4
1986	3.8	11.7	11.4	33.6	39.3	2210.9
1987	2.2	12.0	10.1	42.8	32.6	2236.7
1988	2.4	14.4	9.5	47.1	26.3	2274.7
1989	2.6	16.9	10.1	39.0	30.7	2110.4
1990	3.2	17.6	12.3	38.6	32.9	1824.2
1991	2.7	11.1	9.9	45.3	30.2	2130.3
1992	1.9	12.9	13.8	36.5	34.6	1810.9
1993	2.0	9.0	22.7	35.0	31.3	3618.8
1994	1.8	16.3	15.3	29.2	35.1	4740.3
1995	2.0	17.0	15.2	31.9	32.5	6546.3

Source: National Bank of Ethiopia

Table 4: Government finance Statistics in millions birr

Year	Revenue	Government Expenditure			Overall Deficit	Composition of Deficit Financing		
		Recurrent	Capital	Total		External Assistance	External Borrowing	Domestic Borrowing
1960	138.5	136.9	20.7	157.6	-19.1		11.8	7.3
1961	191.7	176.5	36.6	213.1	-21.4		17.3	4.1
1962	215.8	190.2	60.9	251.1	-35.3		37	-1.7
1963	218.8	203.1	94.3	297.4	-78.6		64.7	13.9
1964	262.1	247.1	60.9	308	-45.9	30.5	26.4	-11
1965	297.7	356.5	44.3	400.8	-103.1	87.9	10.7	4.5
1966	330.2	390.5	80.1	470.6	-140.4	104.7	38.4	-2.7
1967	369.9	416.2	77.2	493.4	-123.5	91.9	27.5	4.1
1968	385.8	439.5	102.7	542.2	-156.4	87.5	26	42.9
1969	405.4	454.5	75.9	530.4	-125	85.2	23.6	16.2
1970	429.1	478.9	106.1	585	-155.9	88	48.3	19.6
1971	466	507.1	124.3	631.4	-165.4	93.4	60.7	11.3
1972	494.7	521.6	150	671.6	-176.9	92.9	62.5	21.5
1973	556.2	563.1	153.1	716.2	-160	91.7	57.7	10
1974	618.1	599.2	178.5	777.7	-159.6	97.9	62.9	-2
1975	711.6	811.2	237.6	1048.8	-337.2	96	114.1	127.1
1976	781	917.6	282.8	1200.4	-419.4	77.2	121.9	220.2
1977	1011.2	1019.8	324.7	1344.5	-333.3	82.6	105.2	145.4
1978	1187.1	1367.3	329.4	1696.7	-509.6	71.8	89.6	348.2
1979	1382	1477.3	368.8	1846.1	-464.1	194.5	185.8	83.7
1980	1567.5	1694.7	443.2	2137.9	-570.4	174.1	166.3	230
1981	1756.4	1791.3	505.1	2296.4	-540	190.4	145.4	203.7
1982	1876.7	1934.6	715	2649.6	-772.9	261.6	494.8	16.5
1983	2174.4	2562.3	1245.4	3807.7	-1633.3	259.3	444.2	929.8
1984	2293.9	2265	933	3198	-904.1	253.7	237.6	412.8
1985	2323.3	2737.6	1187	3924.6	-1601.3	631.3	376.9	593.1
1986	2806.1	2659.4	1471.8	4131.2	-1325.1	443.1	544.7	337.3
1987	2925.9	2753.9	1383.1	4137	-1211.1	322	493.7	395.4
1988	3401	3598.8	1401.4	5000.2	-1599.2	635.9	539.1	424.2
1989	3898.9	3972.7	1939.7	5912.4	-2013.5	799.1	748.9	465.5
1990	3142.6	3929.1	1440.1	5369.2	-2226.6	401.4	552.7	1272.5
1991	2706.3	3698.9	1214.1	4913	-2206.7	463.3	466.7	1276.7
1992	2208	3305.1	951.8	4256.9	-2048.9	543	350.8	1155.1
1993	3191.2	3520.7	1784.9	5305.6	-2114.4	466.1	585.2	1063.1
1994	3938.9	4508.3	2694.3	7202.6	-3263.7	987.2	1799.4	477.1
1995	5914.7	5711.6	3156.5	8868.1	-2953.4	1132.1	1413.3	408.3
1996	6966.2	5894.1	3562.6	9456.7	-2490.5	1096.7	1693.6	-299.8

Source: Ministry of Finance

Appendix II

Note on the Derivation of the Foreign Related Variables

The foreign related variables are calculated through taking into consideration the major trade partners of Ethiopia and their relative trade share (in exports and imports) is taken as weights in constructing the indices in the respective variables. Six major trade partners, namely USA, Japan, Italy, Germany, UK, and France, which altogether share 65-70% of Ethiopia's foreign trade are considered. Although Saudi Arabia and Djibouti are among the major trade partners, they are not included due to lack of consistent and enough data on the areas that we are interested in. The construction of the foreign real income and foreign real money supply indices are straight foreword since we only need to make the indices based on the weights of each country. However, the construction of real exchange rate index needs to be clear since there are different versions of real exchange rate that are employed in different studies. To this effect, we have devoted the following paragraphs to out line how the real exchange rate used in this study is constructed.

The most widely used version of real exchange rate is the dependent economy definition of real exchange rate. Real exchange rate was defined as the relative price of tradables to nontradables: $RER = E\ P_T^*/\ PN$. Unfortunately, it is not possible to find an exact empirical counterpart to this analytical construct. For this reason, proxies for the world price of tradables (P_T^*) and the domestic price of nontradables have to be chosen. Most commonly P_T^* has been proxied by the wholesale price indexes (WPIs) of the country's trade partners. Since WPIs contain mainly tradable goods,

they do provide a reasonable proxy for P_T^* (Harberger, 1986). With respect to the domestic price of nontradables, we have proxied it by the country's consumer price index (CPI). Obviously, since the CPI contains some tradables, it is not the ideal measure of P_N . Still, however, the fact that consumer price indexes are heavily influenced by nontradable goods and nontradable activities, such as retail, makes them a reasonable proxy for P_N . An additional advantage of using the CPI is that it is readily and periodically available for most countries (Edwards, 1989).

We also need to determine which nominal exchange rate (E) is most appropriate when calculating RER. Should a bilateral nominal exchange rate with respect to the U.S. dollar be used? Or should a multilateral effective nominal exchange rate that considers the variability of exchange rates of a larger number of partners be used? A bilateral nominal exchange rate is better if a country has only one major trade partner or if we want to investigate the behavior of a country's real exchange rate with respect to one of its trade partners. However, if we want to treat the behavior of the real exchange rate of a country in general, it is better to use multilateral nominal exchange rate since it provides a measure of the degree of competitiveness of a country relative to a group of its major trade partners. This study uses the multilateral effective nominal exchange rate.

In line with Edwards (1989), the constructions of the multilateral indexes of real effective exchange rate make use of the following equation:

$$MRER_t = \frac{\sum_{i=1}^{k} \alpha_i E_{it} P^*_{it}}{P_t}$$

where $MRER_t$ *is the index of the multilateral real exchange rate in period t;*

E_{it} *is an index of the nominal rate between a country and its trade partner i;*
α_i *is the weight corresponding to partner I in the computation of MRER;*
P^*_{it} *is the price index of partner i in period t; and*
P_t *is the price index of the home country in period t.*

An increase in the value of this index of MRER reflects real depreciation, where as a decline implies a real appreciation of the domestic currency.

Table 5: Variables Related with Foreign Data

Year	Effective Nominal Exchange Rate Index	Real Exchange Rate Index	Foreign Real Income Index	Foreign Real Money Supply Index
1960	108.77	124.81	44.91	61.70
1961	109.17	124.85	47.33	63.67
1962	109.26	122.37	49.58	64.94
1963	109.26	123.31	52.17	68.28
1964	109.94	109.27	54.97	70.99
1965	109.94	99.97	58.10	74.59
1966	109.94	103.63	61.35	76.83
1967	109.76	102.58	63.72	80.26
1968	109.94	103.88	67.56	83.39
1969	109.83	106.18	71.28	84.05
1970	110.38	102.07	74.05	88.24
1971	109.38	104.96	76.15	91.02
1972	106.59	113.31	79.70	100.03
1973	101.49	113.39	84.52	107.15
1974	95.69	123.95	84.99	102.90
1975	96.21	126.09	84.16	100.05
1976	87.80	98.93	88.41	101.29
1977	88.84	92.22	91.39	102.33
1978	97.27	93.52	95.02	108.81
1979	100.05	91.60	98.46	108.75
1980	100.00	100.00	100.00	100.00
1981	88.86	91.22	101.42	94.79
1982	81.37	83.25	101.53	95.28
1983	78.38	82.70	103.94	95.99
1984	74.10	74.66	108.50	98.73
1985	72.56	62.31	112.06	103.40
1986	87.81	81.09	115.20	109.85
1987	98.19	93.47	118.85	113.17
1988	102.67	92.82	124.11	119.48
1989	97.57	85.36	128.18	123.71
1990	102.70	90.10	131.79	128.43
1991	103.32	67.88	135.93	125.91
1992	144.72	87.02	137.92	126.26
1993	254.11	143.27	138.37	125.81
1994	286.67	150.01	141.92	127.04
1995	343.58	165.83	144.92	129.59

Source: Calculated from data collected from World Tables of WB and International Financial Statistics of IMF

Declaration

I, the undersigned, declare that this thesis is my own original work and has not been presented, in whole or part, for a degree in any other university. All references used for the thesis have been duly acknowledged.

Declared by	**Certified by**
Mulu Woldeyes	*Dr. Ajay Tandon*
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Date June 17, 1999	Date June 17, 1999