ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

ECONOMETRIC ANALYSIS OF MACROECONOMIC DETERMINANTS OF PRIVATE INVESTMENT IN ETHIOPIA

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Econometric Analysis of Macroeconomic Determinants of Private Investment in Ethiopia

By

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ABSTRACT

The paper has developed private investment model of the Ethiopian case since private investment is the main factor for economic growth, alleviation of poverty and the upgrading of social capital and services. Added to this, interest in private investment also grew overtime because of its sensitivity to policy environment relative to public investment. These developments further accentuated interest in the determinants of private investment in developing countries. Most developing countries rely on exchange rate devaluation, higher domestic interest rates and a mix of fiscal and credit contraction policies for establishing of aggregate demand. The main interest for the study is to access effect of changes in macroeconomic policies on private investment.

The key aspect of our methodology is the application of cointegrated VAR model. The use of cointegrated VAR model helps account for spurious correlation and exogeneity bias as it is designated for nonstationary time series, and requires no endo-exogenous division of variables. And vector error correction models (VEMS) introduced in cointegrated VAR technique distinguish clearly between long run and short run impacts, providing a suitable tool for policy analysis.

The results suggest that the over all effect public investment had a crowding in impact on the private investment over the study of the period, in the long run and short run. On the other, hand the impact of devaluation policy has significant and positive on private investment in the longer but it is insignificant on the short run. Monetary policy in the form of restricting domestic credit appears to have had a significant impact on private investment. This is well indicated by the significant positive impact of banking sector credit on the private investment, suggesting that a restrictive monetary policy may lead to shrinking private capital formation by tightening financial constraint on private forms. Real output or demand reports significant direct long run and short run effect on private investment over the period of the study. The positive significant relation provides for the validity of the hypothesis that accelerator principle does explain private sector investment. Increase in real interest rate indicating that costs of funds did matter for private investors in Ethiopia. Macroeconomic instability proxied by the variability of the inflation rate and terms of trade have insignificant impact, but real GDP volatility has significant and negative impact.

CHAPTER ONE

INTRODUCTION

1.1 Statement of the Problem

In recent years, emphasis has been put on the development of the private sector in developing counties to help boost economic growth and reduce poverty. In this sense, private domestic investment in developing countries needs to be seen not only as a contributor to economic growth and employment, but also as a catalyst to attract foreign directed investment. This strategy stems from dissatisfaction with public sector dominated investment programs. It has been generally agreed that the financial performance of public enterprises has been disappointing in most countries despite the huge financial resources dispersed to them. More importantly, in developing countries, as evidenced by many studies, it is private investment that plays a greater role than public investment in determining growth (Serven and Salimano, 1990, Khan and Reinhart 1990; and Badawi, 2003 and 2005). The tendency to boost private sector participation has prominently shaped policy advice in regional and international financial institutions as well as the policy making process in developing countries, giving rise to a wave of privatization programming and other policies designed to promote private sector development (see for example, Shiferaw, 2002; Badawi, 2003 and 2005).

Ethiopia has been characterized by very low private investment activities, which led to the very low advancement in the economy, even when compared with the standard of Sub-Saharan Africa. Private investment percent of GDP for the period 1970/71-1979/80, 1980/81-1989/90

and 1991/92-1998/99 was 11.5, 9 and 12 percent respectively (Shiferaw 2002). In Ethiopia, however, private investment percent of GDP growth rate at constant market prices for the period 1963/1964-1973/74, 1974/75-1990/91 and 1991/92-2004/05 was 10.5, 7.5, and 9.0 respectively and GDP growth rate for the same period was 4.1, 2.2 and 4.8 respectively (Workie, 1997; National Bank Of Ethiopia and authors 's calculation). The policy changes from free market to command economy and then to free market and consequently the shifts made on the key variables like the exchange rate and interest rate by the different regimes have contributed to low investment and low growth in Ethiopia.

The reasons for the comparable fair performance of private investment and growth during the Imperial Regime (1960/61-1973/74) are many including free trade policy, market oriented financial sector policies developing share market, free market where prices were determined purely on supply and demand (Alemayehyu and Befekadu, 2002).

The reasons for the poor performance of private investment and growth during the socialist Regime (1975-1991) are many including the restrictive policies[1] ; a constraining business environment (such as credit restrictions to the private sector) and the general uncertainties about the situation and the future course of economic policies because of the previous nationalization.

Like many developing countries, in 1991, Ethiopia also went through the structural adjustment programs (SAP_s) in an attempt to lifting restriction on the private sector, reducing macroeconomic imbalances, realigning the exchange rate and liberalizing the trade system. Added to these reforms measures in the decentralization of the political system and reform of

[1] *Ceilings were imposed on capital and the number of business participation.*

the civil service were taken. Structural adjustment programs, therefore, were aimed at giving greater role for private sector in the economy through liberalization and privatization measures and expected to have significant effect on the investment performance in the economy. Despite one decade and half of strenuous effort to undertake these programs the response in private investment has so far been very low.

The economic reform measures seem to have paid off, or at least it could be argued that the economy is recovering, with average private investment growth and the average growth rate of real GDP for the period 1991/92-2004/05 reaching about 14.54 and 4.80 percent per annum respectively.

A significant part of the adjustment effort was directed towards making the private sector take the lead in initiating economic growth and development. The lack of appreciable investment response after the initiation of adjustment programs and other macroeconomic policy measures has now raised serious concern about their long run sustainability. Theoretical and empirical studies have proved consistent with the idea that the economic policy of a nation is crucial in determining the domestic investment behavior (Green and Villaneuva, 1991; Blejer and Khan, 1984; Shiferaw, 2000; and Badawi, 2003 and 2005).

Moreover, a growing theoretical literature has focused attention on the impact of risks and uncertainty on investment and growth, for instance, (Dixit and Pindyck, 1994; Dehn, 2000; and Shiferaw, 2002) emphasized that the impact of risks and uncertainties may be large enough to discourage investment decisions. Thus, if the goal of macroeconomic policy is to stimulate investment over the short to medium term, stability, sustainability and credibility of the policy

options adopted may be at least as important as or even more than the nominal levels of tax, exchange or interest rates obtainable in the economy. Therefore the aim of this thesis is to identify the factors that were responsible for slow growth in private investment during the period under review and how macroeconomic instability and uncertainty have impacted on private investments.

1.2. Objectives of the Study

The over all objective of the study is to derive an explicit relationship between the principal policy instruments and private investment. The specific objectives of the study include identifying the relationship between private investment and public investment, to examine the effect of real effective exchange rate, real interest rate, real credit to the private sector, real out put growth, and macroeconomic uncertainty on private investment.

1.3. Significance of the Study

This study differs from most of the earlier studies in a number of respects. First, the standard VAR model is used to overcome the problem of simultaneous bias and endogeneity. Second, it focuses on explicit testing of the stationarity of the variables and tries to show long run (cointegration) relationship among the variables. Third, this study addresses the issue of macroeconomic instability and measured using GARCH model.

Private investment is the main factor for economic growth, alleviation of poverty and the upgrading of social capital and services. Added to this, interest in private investment also grew overtime because of its sensitivity to policy environment relative to public investment. These developments further accentuated interest in the determinants of private investment in

developing countries. Most developing countries rely on exchange rate devaluation, higher domestic interest rates and a mix of fiscal and credit contraction policies for establishing of aggregate demand. Looking into the effect of changes in macroeconomic policies on private investment is of paramount importance, relevant and timely in order to analyze the aggregate private investment decision and its relationship with principal policy instruments.

In view of the nature of macroeconomic management and the lack (little) of research on its impact on private investment in Ethiopia, this study seeks to provide an empirical investigation of how macroeconomic policies have affected private sector investment for the period 1970/71 - 2004/05.

This study extends the existing literature on private investment in developing countries in two directions. First, it applies VAR methods that are scanty used to analyze the impact of public policy on private investment. Second it provides on empirical evidence for a country for which no research (or little research) has been conducted to understand the nature and dynamics of public policy and private investment. The empirical findings of this study are also expected to have insightful implications for policy.

1.4. Data Sources and Limitations

The data sources in the estimation of the dynamic model of private investment are almost fully obtained from domestic sources with few being obtained from the International Financial Statistics of the IMF and World Bank. Most of the data are obtained from National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MoFED), Ethiopian

Economic Association (EEA), Ethiopian Investment Commission (EIC), and Ethiopian Export Promotion Agency (EEPA).

In terms of data quality and quantity there are some limitations. The variables, which are totally non –existent are capital stock and out put gap index. Also the CPI used is that of Addis Ababa as there is no time series data on CPI- at the country level for the period before 1995/96.Generally, there is no long time series data to examine the dynamic modeling. The level of data available is only for the period since 1971.

1.5. Organization of the Study

Following this introduction Chapter 2 reviews various theories of investment, methodological and empirical literatures. It provides an exposition on the macroeconomic determinants of private investment. Chapter 3 provides an overview of the Ethiopian economy with special emphasis on the economic conditions that prevailed in the three regimes, imperial, socialist and post socialist. It culminates in the analysis of the trends in private investment and overview of macroeconomic policies of Ethiopia. Chapter 4 outlines data sources, definition of variables, the private investment model specification modified to cointegrated VAR model and empirical tests. Chapter 5 presents the empirical analysis from the private investment cointegrated VAR model and, chapter 6 concludes the study by providing policy implications and recommendations as implied by the empirical findings.

CHAPTER TWO

MACROECONOMIC PERFORMANCE OF ETHIOPIAN ECONOMY

2.1. Growth and Structure of Ethiopian Economy

Although dealing with Ethiopia's macroeconomic performance requires detailed presentation of the movements in all macroeconomic variables, together with their trends, this thesis will attempt to discuss the macroeconomic variables that are related with private investment.

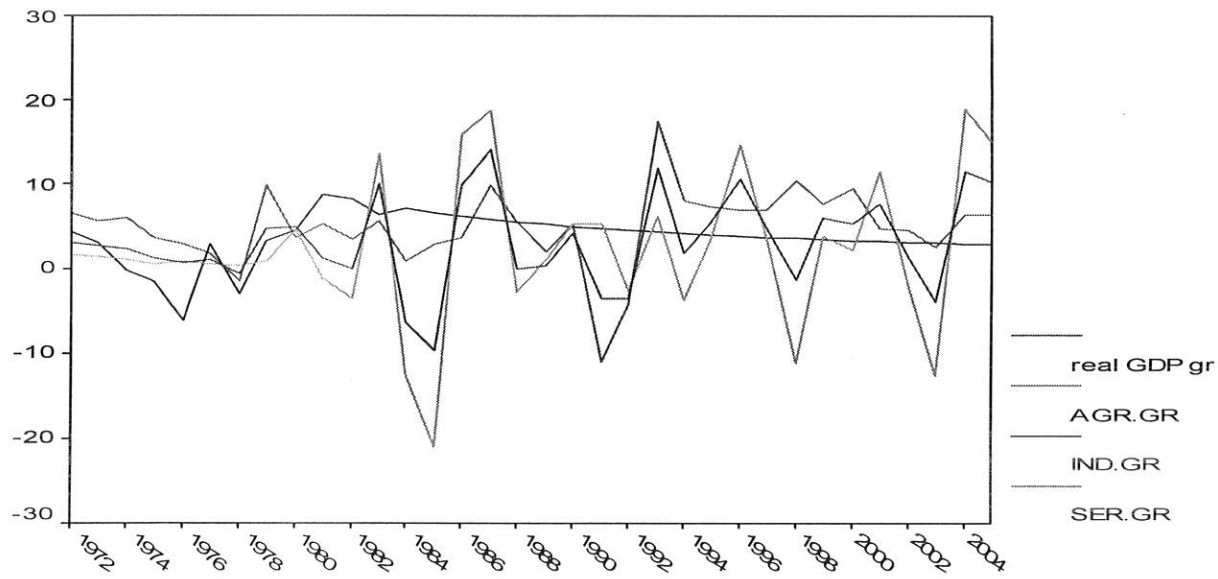
The Ethiopian economy is highly dependent on agriculture, which in turn depends on nature, and over 85% of the population, derives its livelihood from this sector. Agriculture accounts for about 46 percent of the GDP and it is the source for about 90% of the exports. The industrial sector on the other had accounts for about 12% of the GDP. The balance is accounted by the service sector.

The Ethiopian economy being predominantly dependent on agriculture its performance has particularly been susceptible to unpredictability of weather conditions. Added to this the performance of the Ethiopian economy also depends on external environment, which has an important bearing on the functioning of both the agricultural, and more importantly, the industrial sector. Both sectors depend on imported inputs such as fertilizers, chemicals and raw materials. Moreover, the county's main source of foreign exchange comes from few products. Added to this, recurrent drought and famine together with poor policies and civil war have made it impossible to bring about structural transformation of the economy.

The growth performance can be seen along three distinctive periods, which are categorized on the basis of ruling policy regimes. These are the Imperial Regime (the period up to 1974 revolution), socialist (the period from 1974/75 to 1990/91) and post – socialist regime (the period 1991/92 to date).

The Imperial Regime was characterized by some how market based economic policy and on free market mechanism to build institutions required to run a functioning financial market and investment activities in promoting export. As a result the growth performance during that period (1960/61-1973/74) was satisfactory. During this period, real GDP recorded an average annual growth rate of 4.0 percent while the population was growing at 2.3 percent leading to an increase in real per capita income of 1.7 percent. The main reasons for positive achievement were increase in investment participation and a consistent and generally sound management of the economy (Eshetu and Mekonen, 1992).

Figure2. 1. Growth Rate of Real GDP, Agriculture, Service Sector and industries



Source: NBE and Author's Calculation

In the same period the source of growth was, however, distributed rather unevenly among the economic sectors. The average annual growth of manufacturing, mining and construction was over 7 percent and for services was almost 8 percent in real terms while the agricultural sector as a whole grew at an annual rate of about 2.5 percent (ibid).

However, the macroeconomic performance of the country during the socialist regime socialist was rather unsatisfactory. Over the period, the GDP growth rate of 2.5 percent per annum was not even enough to keep the level of per capital income constant with a population growth rate of 2.8 per annum. As a result, per capita income declined by about 0.7 percent per annum.

Sectoral decomposition of GDP during the period 1974/75- 1990/91 also shows that the poor performance of growth was reflected in all sectors except for the service sector. While the average annual growth of agriculture was only 0.6 percent and that of service industry almost 3%, the service sector as a whole grew at an annual rate of about 4 percent. The poor performance of the economy during this period can be explained because of poor performance of the agricultural sector, huge military spending and very protective and inward looking trade policy. During this period gross domestic expenditure was continuously increasing from an average of about 6.1 percent in 1960-1973/74 to 7.3 percent in 1974/75-1990 /91. This is mainly due to centrally managed economy, instability, cyclical drought and war that increased government expenditure.

The socialist Regime pursued a policy that departed significantly from the market based and private sector driven economy and opted for central planning and administratively set market prices. Prices were determined on mark-up basis. Despite this, the highest rate of inflation was

recorded during the socialist regime that is 8.8 percent, while the consumer price index averaged a rate of increase of 3.5 percent per annum during the imperial regime and 5.3 during 1990/91-2003/05 the first decade of the post socialist era. However, all assessment of the behavior of prices during the last four decades is one of general stability.

Figure2. 2. General inflation Trend for the period 1971-2005

Source: NBE and Author's Calculation

The Post 1991 regime adopted typically structural adjustment policies with the support of the WB and IMF. By mid-1992, the government began implementing significant economic reforms aimed at stabilizing the economy and deregulating economic activity. The policy measures aimed at lifting restrictions on private sector, reducing macroeconomic imbalances, realigning foreign exchange management and liberalization of the trade system. Added to these reform measures is the decentralization of the political administrative and fiscal system and reform of the civil service.

As a result, during this period, relatively good economic performance is recorded though it experienced fluctuations. On average, the economy and per capita income have been growing at about 4.58 and 1.57 percent per annum respectively during 1991/92 – 2004/05. As the graph notices that the growth performance has been fragile and uneven. Moreover, when we take on a year- to- year basis, the growth was rhythmical. This is mainly due to heavy dependence both on the vagaries of nature and external shocks, including the war with Eritrea. If there had not been frequent drought and the Eritrean aggression of May 1998, the growth rate of GDP would have been expected to be higher[2].

The agricultural sector grew by 3.43 percent, while industrial sector grew by 5.94 percent and the service sector (including public administration) grew by 6.74 percent for period 1991/92 – 2004/05. The annual rate of inflation also dropped from 21 percent in 1990/91 and 1991/92 to an average rate of 6.8 percent in 2004/05 (see graphs 2.2).

In general, the Ethiopian economic growth performance has been slow with an average growth rate of 4 percent per annum during the last four decades; this may not lead to structural transformation in the economy. Even though the share of agriculture in GDP is declining, the proportional increase is not taken by the industrial sector, which has very little contribution for structural transformation and subsequent industrialization.

2.2. Macroeconomic Policies Performance

2.2.1. Fiscal Policy

[2] The observed recovery of growth during the period 1992/93-1996/97 with the growth rate of 7 percent is partly explained by the recovery from the very small base, and good weather condition, and partly because of the implementation of the reform implemented.

Despite the importance of the role of fiscal policy for allocating, stabilizing and promoting growth, the implementation of the policy has been characterized by inefficiency and lack of direction, especially during the socialist regime. However, owing much to the fiscal conservatism that the imperial government perused, the budget deficit was relatively low level (Alemayehu and Befkadu, 2002). This helped to have low borrowing requirement, which contributed to slow the growth rate of money (Figure 2.4). For instance, the share of expenditure and revenue in real GDP, on average, stood at 11 percent and 8.5 percent per annum over the period 1966/67- 1973/74, respectively and in addition, the government was able to finance the over all deficit largely by non–inflationary borrowing from the domestic credit (Zekarias, 2003).

During the time of the socialist era i.e. 1974/75-1991/92 the government pursued expansionary fiscal policy, which resulted in huge budget deficit the mainly financed from domestic bank borrowing. To overcome the deficit government introduced new taxes and augmented the existing tax rate, as result, the share of revenue in GDP was raised for the period with an average share of only 17.3 percent and its average annual growth was a mere 1.5 percent.

Government expenditure on its part had a share of 20.1 percent in GDP- for the 1981/82-1991/92 periods with an average annual growth of 1.6 percent. The rise in fiscal deficit during the socialist Regime is explained by the rapid increase in government expenditure compared to tax revenue. The observed high expenditure to GDP ratio is mainly attributed to growing defense expenditure and the proliferation of state owned enterprises. Fiscal performances during the socialist Regime show that the policy rather focused on the regulation of the economy rather than allocating, stabilizing and promoting growth.

Table2.1. *Average share of revenue and expenditure in real GDP*

Year	Revenue per real GDP	Expenditure per real GDP
1966/67-1973/74	8.5 percent	11 percent
1974/75-1990/91	17.3 percent	21.3 percent
1991/1992-2005/06	15.2 percent	23.4 percent

Source: NBE and author's calculation

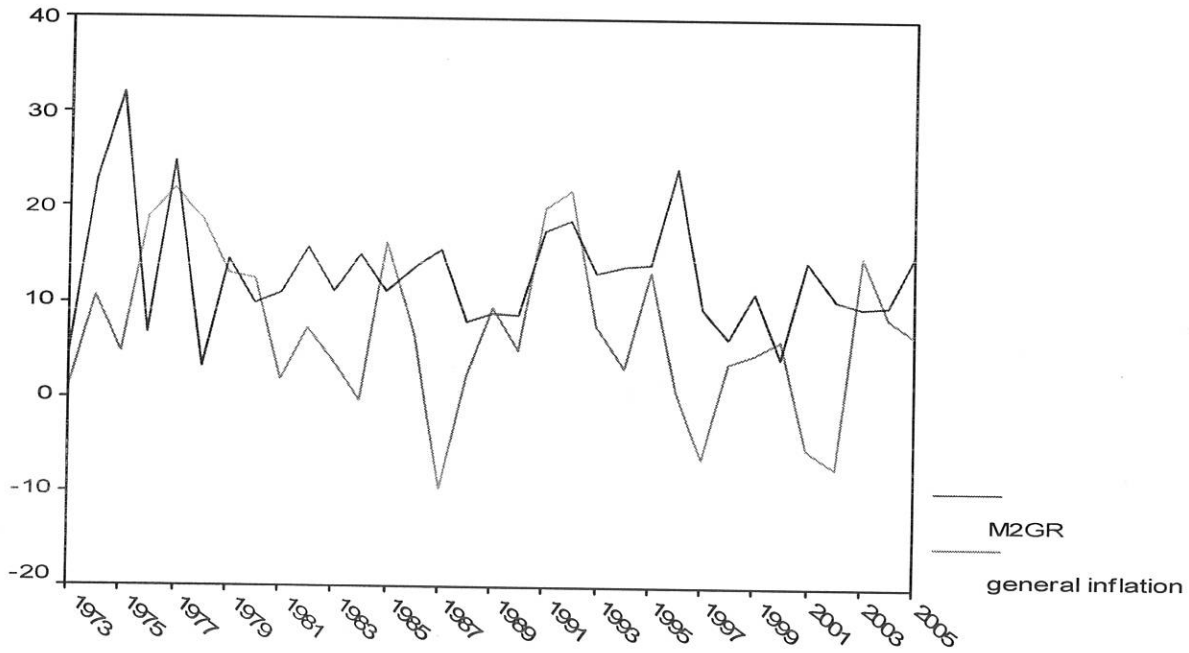
For the post 1991 period the share of revenue in GDP has declined to 15.2 percent which could be due to the lagging growth in revenue compared to the growth in GDP. For the same period the share of total expenditure increased to 23.4 while its average annual growth increased to 2.2. This expansion in government expenditure can be explained by the increase in government investments in the social and development sectors. There has been a consistent excess of government expenditure over total of domestic revenues. That is, the country has been living with the problem of fiscal deficit almost for all the years in the sample period rather the fiscal deficit increased to 8.2 percent for the post-socialist period.

2.2.2 Monetary Policy

Monetary policy will remain geared towards containing inflation and achieving international reserve targets, while leaving scope for adequate growth in domestic credit to the private sector. Commercial Bank lending rates were deregulated, except for the minimum deposit rate. The Imperial regime was characterized by an attempt to build the institutions required to run a functioning financial market. This included the establishment of the central, commercial and development banks as well as licensing various private banks. The general policy stance was to

pursue market –oriented financial sector policy. This effort might have contributed to the modest growth of money supply. For example during the period 1971/72-1973/74 the average rate of growth rate of **M2** was around 16.8percent per annum, compared to a 5.4 growth in national income (see figure 2.3.).

Figure2. 3. Money Supply Growth Rate and Real GDP Growth Rate



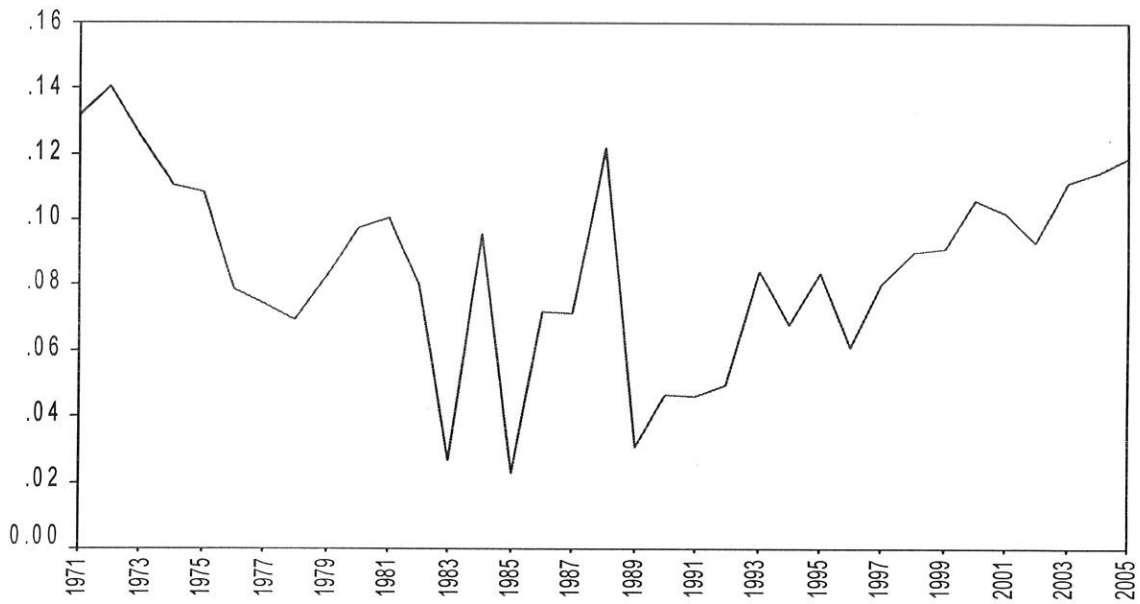
Source: NBE and Author's Calculation

This nascent development of the financial market was interrupted by the 1974 revolution that witnessed the coming of the socialist regime. The command economy, that the country followed during the socialist regime, was characterized by direct control on money and its components; nationalization of financial institution; discriminatory interest rate, foreign exchange as well as credit allocation policies. The interest rate was deliberately set at very low level (repressed) so as to favor public enterprises, channel credit to priority areas and controlling mechanisms on

money were introduced as result there was very low credit to private sector when compared with other regimes (see figure 6). Consequently, claims on central government (net) grew on average 25 percent during1974/75-1991/92 (Zekarias, 2003).

The monetary policy of the reform program dictated money supply to grow at a rate that is consistent with inflation, economic growth and the balance of payments while allowing reasonable credit for the private sector. The stock of money supply, which had been expanding during the pre-reform periods, has maintained a more or less stable path during the first period of the reform program. During 1991/92-1997/98, the average real growth rate of broad money was 4.6 percent.

Figure2. 4. Real Credits per Real GDP to the private sector



Source: NBE and Author's Calculation

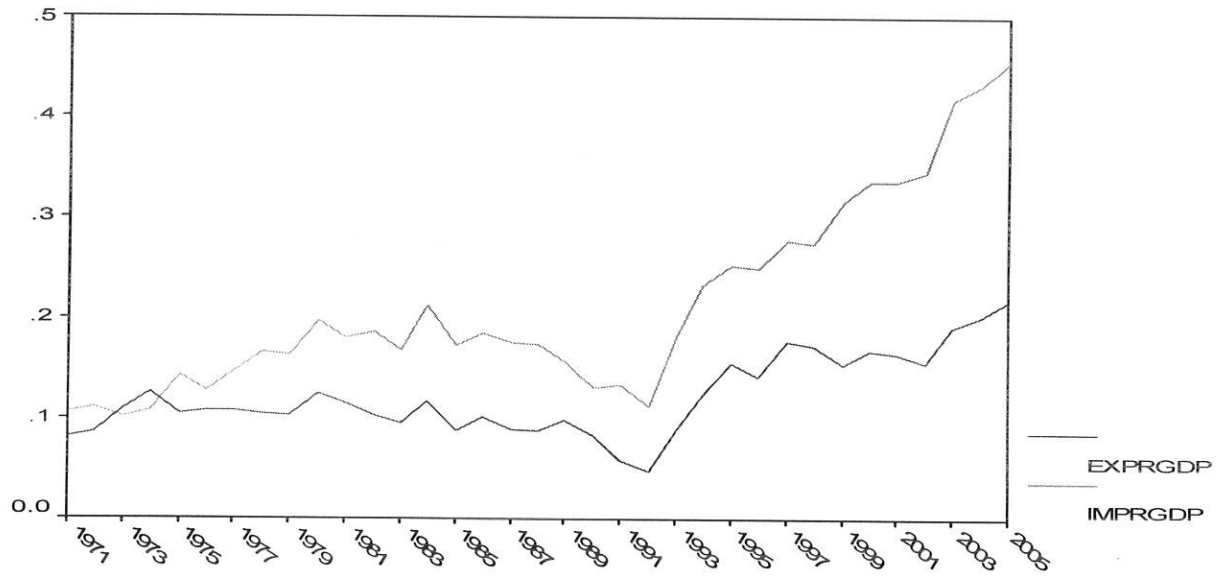
The situation of tight monetary policy changed at the beginning of the border conflict with Eritrea, and money supply started to increase considerably. In 1999/00, Real M_2 sharply increased by 13.49 percent compared with a real GDP growth of 5.35 percent.

To sum up despite an alarming rise in budget deficit and fast increase in money supply, inflationary pressure was low in Ethiopia compared with other developing countries. Average inflation rate was about 1.52, 8.34 and 6.70 for the period 1970/71-1973/74, 1974/75-1990/91 and 1991/92-2004/05, respectively. Inflation was relatively higher during the socialist era in spite of serious price controls through out the economy.

2.2.3 Foreign Trade Policy

Many less developed countries adopted import substitution strategies to promote domestic economic development. Ethiopia was one of them. During 1960/61-1973/74, export was growing on average by 9.6 percent while imports were showing an annual average growth of 6.9 entailing an annual average trade surplus of 2.1 percent of GDP. And the percentage of export per real GDP for the period mention above was an average 10 percent per annum while the import percentage per real GDP was an average 11 percent per annum. The figures showed the trade deficit for the period 1970/71-1973/74 was very small, even as fig2.5 shows import equals the export for the year 1972/73 and for 1973/74.

Figure2.5. Percentages of Export and Import to Real GDP



Source: NBE and Author's Calculation

However, in the socialist regime trade controlled systems of foreign exchange allocation, import quotas, high tariffs, and state controlled marketing of exports have long characterized policy. The restrictive trade policy followed by the socialist regime was accompanied by the over-valuation of the official exchange rate, the increasing over time in the parallel premium for foreign exchange and determinants of terms of trade led to generally falling of the share of real official export earning which registered an average annual percentage of export per real GDP were 8.00 percent. Against the percentage of import sector per real GDP was 16.53 percent per annum. So, there had been a consistent trade deficit during the period mentioned.

During 1991/92-2004/05, exports per real GDP were an average 14.8 percent per annum while imports per real GDP had an average 28.9 percent per annum. The relatively high percentage per real GDP of imports and exports is mainly attributed to trade liberalization measures taken

by the government as part of its reform program. The effect of the liberalization, however, is felt more in the ever-growing trade deficit, which rose from 8.6 percent of GDP in 1992 /93 to reach 16.096 percent in 2004/05. The ever-widening trade balance has meant that export earrings are continually dwindling and not being able to cover import bills of the economy. This call for measures to be taken to diversify exports, which are currently concentrated on some agricultural exports whose price, has continually been declining in the international market.

In sum, the export sector is still very much dependent on few agricultural products with little shift to non-agricultural products. The ever-widening trade balance had led to an increasing reliance on external financing in the form of aid and credit. With this respect, the deterioration of the country's terms of trade and ever widening balance of trade in the country show the poor performance of the export sector and the increase in price and volume of imports.

2.2.4 Exchange Rate Policy

The Ethiopian Birr was first introduced in 1945 with an official exchange rate of Birr 2.48 per US dollar. A small adjustment was made in 1964, which devalues the rate to 2.5 per US dollar. In December 1971 when US dollar was floated and ceased its convertibility to gold, the Birr appreciated to the rate of Birr 2.3 for one US dollar. The currency further appreciated to Birr 2.07 in 1973 and it remained at this rate until October 1992 when it was devalued to Birr 5 for us dollar (Ibrahim, 1992 as cited in Zekarias, 2003).

During the Imperial regime exchange rate policy was based on free market mechanism to build institutions required to run a functioning financial market. This includes the establishment of the central commercial and development banks as well as encouraging and licensing various private

banks. Hence the average annual growth rates of the real effective exchange rate of Ethiopia were 0.14 percent for the period 1965-1973 (Alemayehu and Befkadu, 2002).

During the socialist period, all foreign exchange earnings were surrendered to the National Bank. This used to ration the limited supply of foreign exchange to sectors that were accorded priority in the national plan. In general the priority was for the specialized sectors. This was also regime of fixed exchange rate (Asmerom, 1997).

The liberalization of the foreign exchange rate was facilitated with the introduction of auction – based exchange rate system, where the marginal rate, which clears the market, is taken as the ruling rate for subsequent two weeks. The retail auction system was later replaced by wholesale auction in September 1998. In the same year inter bank and the wholesale auction were working together. Beginning from October 2001, however, foreign exchange auction market has been totally replaced by the inter-bank foreign exchange market (NBE, 2004, annual report).

During the Imperial period both the official and parallel exchange rates were moving very close to each other. The parallel market for foreign exchange seems to have expanded during the 17 years of the socialist –regime (1974-1991). If we are to assume that the parallel market rate represents the true value of the currency then the Birr was clearly over valued during the socialist period. However, following the devaluation of the Birr and the subsequent policy measures taken, the parallel premium has come down to a level of being almost equal to the official rate at the end of 2001/02 (Zekariase, 2004).

2.3. Trends in Private Investment in Ethiopia

In recent years, a broad consensus has emerged among economists that by unleashing competitive forces and enhancing international competitiveness, a wealthy private sector can provide both growth and jobs. They advocate for shifting the role of the public sector towards provision of essential services such as education and health, there by reducing its intervention in the productive sector of the economy to the extent that maximum private sector development can be realized.

The growth of investment during the pre revolution (1974/75) period was quite modest. For example during the period 1963/1964-1973/74 the annual growth rate of private investment and private investment per GDP was 2.65 percent and 12.70 percent respectively (Workie, 1997). It was in the modest way since the investment policy in the Imperial Period is the some what nearest of a free market regime where administration was established and the laying of the foundations for basic infrastructure development started (road transport, air transport, banks, power generation etc) was taking place, private investment was picking up and the import substitution was being adopted. Significance progress was also made in the area of commercialization of agriculture and industrializations, and health fields. The protection of private property was guaranteed by the civil code and constitution of Ethiopia. And both foreign and domestic capital could be invested in many kind of economic activity the investor sees fit to engage in except foreigners were not allowed to own land unless there is special approval of the imperial and to fields of investment which were dominated by state enterprises.

During the period 1974/5 -1990/91 (socialist regime) the average rate of total investment and private investment to GDP during the period 1975 to 1991 was 14.28 and 7.21 percent respectively. This ratio is very low even by the standards of Sub -Saharan African countries where the average rate of private investment to GDP was 11.5 percent and 9.5 percent for the periods 1970 -79 and 1980-89 respectively (Shiferaw, 2002). This may be explained by the policy that existed during the period. The policy was favorable to public economy (restricting private investment and nationalization private investment imposed capital ceilings, credit discrimination on them). This was the period of high market concentration and public ownership and monopoly; following the nationalization of production distribution and trading enterprises. The period also hurt the private investment expansion by its discriminatory interest rate, foreign exchange as well as credit allocation; different sectors did face different interest rates.

Ever since March 1991 and even more so since the launching of the transitional economic policy in November 1991 (TGE 1991), the government of Ethiopia have declared that private sector must be given a more central role, both in non subsistence agriculture and in non agricultural sectors.

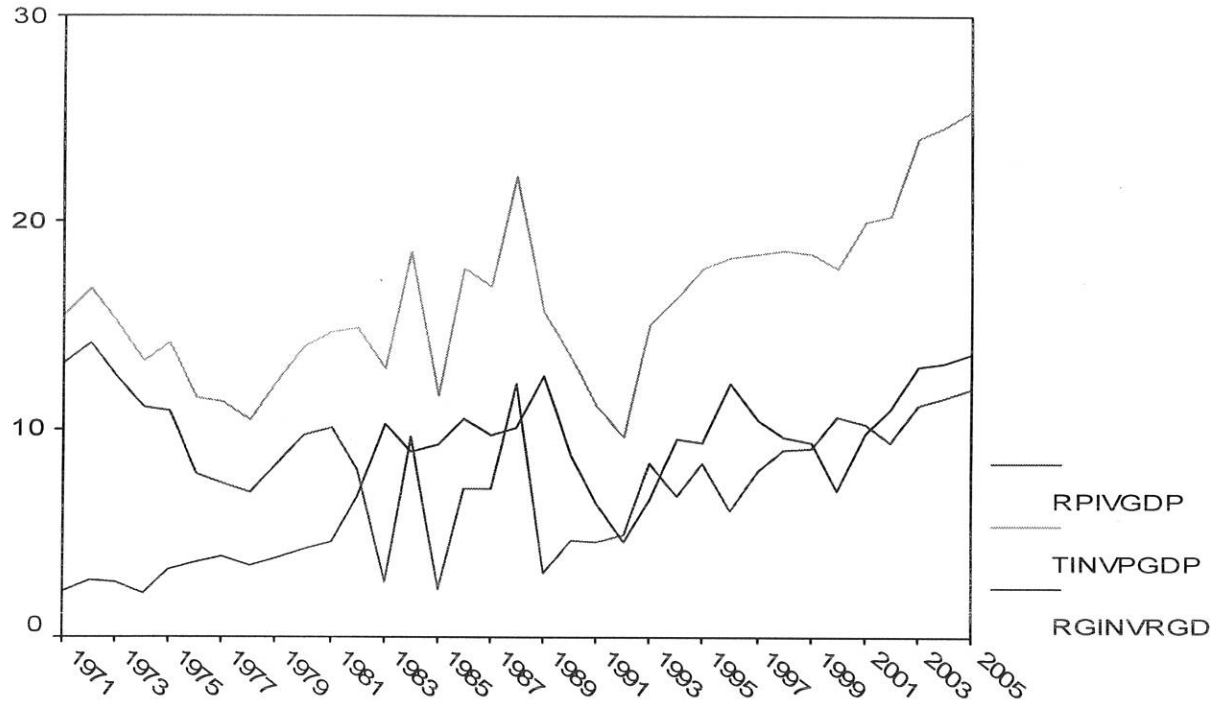
In the recent *Sustainable Development and Poverty Reduction Program* the following points are high lighted

- Concentration on agriculture that is the source of the livelihood for 85% of the population and the bulk of the poor Agriculture is a potential source of surplus to fuel the growth of other sectors of the economy.
- Strengthening sector growth especially in the industry, to promote off farm employment and out put growth supported by public investments necessary on infrastructure.

- rapid export growth, including high value agricultural products export oriented manufacturing sectors
- Investment in education and enhanced efforts to build capacity to overcome critical constraints for the implementation of development programs
- Increased water resource utilizing to ensure food security a strong focus on agricultural research and water harvesting, small scale irrigation and deepening decentralization to shift decision making closer to the grassroots to improve accountability, responsibleness and services delivery (SDPRP, December 2003:1).

As a result, during the period 1991/2 -2004/05 the ratio of total investment and private investment to GDP was 19.0 percent and 9.0 percent, respectively, which showed an increasing trend due to the reactively conducive environment mentioned above. The growth rate of private investment accelerated to 14.5 percent per annum following relatively the conducive environment created by the current government. But the growth rate of public investment was still high, about 46 percent especially investment in infrastructure.

Figure2.6. Real Total, Government and Private Investment per real GDP



Source: NBE and Author's Calculation

However, the growth rate of private investment is not without problem due to privatization as a completed phenomenon of the post reform period is considered as slow and absurd. As High tariffs on many importing items, non availability of information on export market and high and specific collateral requirements for bank loans. The study found that had there not been these investment obstacles, Ethiopia would have attracted investment from within and outside of the country. Also the existence of assessable privatization program can be an important factor for attracting additional FDI inflows, but is failed in Ethiopia.

CHAPTER THREE

A SURVEY OF THE LITERATURE

3.1. Theoretical Review

3.1.1. Basic Theories of Investment.

There are a number of competing theories of investment behavior in the literature and it is not clear which one is superior to the other. Therefore, in this section the study review only treats some of the widely discussed theories of investment.

3.1.1.1. Marginal Efficiency of Capital.

Keynes (1936) was the first to call attention to the existence of an independent investment decision in the economy. The study formulated the oldest and the most familiar explanation of the theory of user cost of capital. It stated that the firm maximizes its market value by adjusting its capital stock to a point where the marginal value product of capital equals the market interest rate[3].

This theory is underpinned by diminishing marginal value of capital in a convex production function which postulates demand for investment goods to decline with an increase in interest rate[4]. Incorporating fiscal incentives like taxes on profits and investment tax credits to make it more realistic easily made extensions to the user cost.

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[3] Interest rate is reflective of the opportunity cost of the invested funds.

[4] The user cost of capital.

The study pointed out that investment was intrinsically volatile since any rational assessment of the return on investment was bound to be uncertain. On a more formal basis, shifts in investors' expectations are supposed to be found on economic fundamentals including observed shifts in technology, consumer demand, opinion surveys and the like.

User cost theory, however, says little or nothing about what determines the marginal value of product of capital. The theory of user cost of capital developed by Keynes' was criticized on the basis of expectation hypothesis and the internal rate of return used for discounting (Ott, 1975).

Keynes did not take explicit account of such an expectation hypothesis, which could not reflect the investor's concern about the outcome of the possible return streams. To overcome this problem, it was suggested that investors only care about the mathematically expected return of each given data or the stream of returns represents "creativity equivalents" to the probability distribution, thus requiring that the stream of returns to be statistically independent, an assumption which might not be realistic.

The Keynesians approaches were further complicated by the difficulty in computing the present value of an investment project as a result of the ambiguity about the proper rate to be used for discounting. By considering a perfect capital market, the market real interest will be used which must be considered as one prevailing for comparable risk.

3.1.1.2. The Accelerator Principle.

After Keynes, the evolution of investment theory was linked to simple growth models. These models gave rise to the accelerator principle popular in the 1950s and early 1960s and widely

used in empirical studies even today in practical growth exercises (Akpokodje, 1997). The accelerator principle is based on a number of assumptions like, full utilization capacity, permanent character for sales charge; constant sales- output rates etc. (Dornbusch and Fisher 1994). The accelerator principle says that other things being equal, an increase in a firm's out put will require a proportional increase in its stock of capital equipment (ibid). The implication of accelerator theory is that, the level of output or the changes in aggregate demand determines investment or the change in capital stock. Or its extreme simplicity explains its popularity given an incremental capital out put ratio [ICOR]. It is easy to compute the investment requirements associated with a given target for out put growth (Akpokodje, 1997). In the accelerator model, expectations, profitability and capital cost, play no significant role. In the model, a relatively modest increase in the rate of growth of demand for the final good can lead to a large increase in the demand for investment increase.

A more general form of the accelerator model is flexible accelerator model. The basic notion behind this model is that the larger the gap between the existing capital stock and the desired capital stock, the greater a firms rate of investment. The hypothesis is that firms plan to close a fraction of the gap between the desired capital stock and the actual capital stock in each period. This gives rise to a net investment equation. Within the framework of flexible accelerator model, out put, internal funds cost of external financing and other variables may be included as determinants of desired capital stock. The flexible accelerator mechanism may be transferred into a theory of investment behavior by adding a specification of desired capital sock and a theory of replacement investment. In flexible accelerator model, desired capital stock is proportional to out put, but in alternative models, it depends on capacity utilization, internal funds, the cost of external finance and other variables.

Despite the drawbacks of the accelerator principle, these theories as well as the flexible accelerator principle of investment are popular as evident in most of the empirical studies done to date.

3.1.1.3. Neoclassical Investment Theory

The restrictive assumptions behind the accelerator theory led Jorgenson (1967) and Hell and Jorgenson (1971) to formulate the neoclassical approach. In this approach, which is a version of flexible accelerator model, the desired (or optimal) capital stock depends on the level of out put and the user cost of capital (which in turn depends on the price of capital goods, the real interest rate, and depreciation rate). Lags in decision making and delivery creates a gap between current and desired capital stocks, giving rise to an investment equation, that is, an equation for the change in the capital stock.

Jorgenson's model is based on the theory of optional capital allocation. The theory of profit maximizing firm, subject to a production function through which a technical relationship between inputs and outputs get defined, is central to lagging of decisions making and which in turn delivery create a gap between current and desired capital stocks, giving rise to an investment equation, that is an equation for the change in the capital stock.

The foundation of this approach has been criticized on the ground that: the assumptions of perfect competition and exogenously given out put are inconsistent, the assumptions of static expectations about future prices, output, and interest rate is inappropriate since investment is essentially forward looking, and the lags in delivery are introduced.

3.1.1.4. The Q Theory of Investment

An alternative formulation of investment function is the "Q" theory of investment associated with Tobin (1969). This theory emphasizes that what matters is the relation between the increase in the value of the firm as a result of the installation of an additional unit of capital and its replacement cost. When increase in the firm's market value exceeds a (or less than) replacement cost, firms will want to increase (or decrease) their capital stock. This ratio, known in literature as the marginal Q, may differ from unity because of delivery lags and adjustment or installation costs. However, it's not easy to measure marginal Q, and the ratio of the market value of the entire existing capital stock to its replacement cost (the average Q ratio) is used instead.

This theory has been criticized on the grounds that if firms enjoy economics of scale or market power or if they sell all they want, marginal and average Q will systematically differ (Abel.1980). Moreover, the assumption of increasing marginal installation costs underlying the Q theory is dubious. The argument is that the costs of additions to an individual firm's capital stock is likely to be proportional or even less than proportional to the volume of investment because of the lumpy nature of many investment projects. More important, disinvestment, if feasible, is more costly than positive investment: capital goods often are firm specific and have a low resale value.

3.2. Methodological Review of Private Investment in Developing Countries

The theoretical models highlighted above were essentially formulated to analyze investment behavior of firms among industrial countries or economies, with none of them so far proved to be decisively superior to the other. Direct application of those models (except simple accelerator

model) to understand investment behavior in developing countries was really difficult for two reasons. The first is technical and is related to scarcity of data on key variables such as wage rates, capital stock, real interest rates and stock market prices. The second one relates to the incompatibility of the institutional and structural peculiarities of the developing countries with the underlying assumptions of the basic models such as in the perfectly competitive markets, little or no government intervention and absence of liquidity constraints. These assumptions are hardly tenable in the context of developing countries making the models less relevant (Shiferaw, 2002).

Due to difficulties with the measurement of key variables in developing countries and the expected influence of public investment, the estimating model is modified. The pattern and level of investment are influenced by several factors, which can be termed as determinants of investment. The specification of the determinants of private investment should consider the specific realities of a given country. Variables frequently included in the private investment models can be classified as financial, non-financial and macroeconomic uncertainty (Blejer and Khan, 1984).

Monetary policy includes the rate of interest rate, real exchange rate, the level of financial development and bank credit. The fiscal policy includes government investment. Trade policy includes terms of trade, and foreign trade. Many macroeconomic variables may be viewed as sources of or indicators of uncertainty; and in this study, the rates of inflation, out put growth, and the terms of trade are used as the main indicators of overall macroeconomic instability.

The remainder of this section discusses the theoretical of these variables. Lacking the privilege of full-fledged theoretical model applicable to their context, the empirical literature on the determinants of private investment in developing countries tended to start with the neoclassical models and attempt to formulate it by incorporating variables that are supposed to have strong association with investment.

3.2.1. Monetary Policy and Private Investment

Many scholars, who studied private investment in developing countries, opted to move away from the traditional theories and give emphasis on the role of financial sector development. The fact that financial markets in developing countries are typically repressed and firms are credit-rationed constraining their ability to adjust capital to a desired level. More specifically, limited access to credit compels firms in developing countries to accumulate enough real balance before initiating investment projects. That is increase in current consumption at the cost of future consumption or increase in current consumption as a substitute of financial assets. McKinnon (1973) and Shaw (1973) provided the theoretical and empirical frame work for such analysis and they argued that the level and quality of private investment in developing countries is positively associated with real interest rate on deposits.

Since early (1990), many developing countries have embraced policies of financial reform and liberalization intended to promote capital markets and ensure positive real interest rate. Though the standard economic theory states promoting a negative relation between investment and the rate of interest, the effects of changes in the real rate of interest on private investment in developing countries may depend on the level of financial system. In a financially repressed economy, rise in interest rate may stimulate an increased flow of deposits that enable increased

investment to be undertaken (Fry, 1998). But this proposition was in contradiction with neoclassical model where interest rate is treated as user cost of capital.

McKinnon (1993) and Shaw (1973) further explained a higher positive interest rate would generate greater rates in saving and investment, which are important in accelerating the rate of economic growth. In developing countries, government intervention in the capital market, such as a fixed interest rate at a low level, imposition of a high reserve ratio, and widespread selective credit policy leads to a reduced saving rate and causes important sectors to use inferior technologies.

Nonetheless, banking sector credit and depth or size of financial intermediation came out as important factors and they are incorporated in investment equation to reflect information and moral hazard which often low capital markers in developing countries, (for example Blejer and Khan, 1984; Greene and Villanueva, 1991; Cardoson, 1993; and Oshikoyo 1994). With in this context interest rates are screening devices to sort out 'good' borrowers from 'bad' ones. The equilibrium interest rate is below the equilibrium market interest rate that is the demand for credit is more than the supply for credit which is termed as credit rationing. It is an equilibrium outcome of the unfiltered rational behavior of lenders when information costs are significant. Even if there is excess demand or loans at a certain level of interest rates, a lender may find it more profitable to ration credit than to raise interest rate. In this case, the expected returns of the excluded groups may be higher than the expected returns of investments of the group that obtain the loans where capital is allocated under such circumstance (Stiglitz and Weiss, 1981). As a result, the availability of credit to the private sector is thought to be the other key variable in

determining private investment equation in developing countries instead of using only interest rates which are administratively controlled.

3.2.2. Fiscal Policy and Private Investment

Since public investment in developing countries assumes a relatively large role than in industrial countries it became important to take account of its complementarity and substitutability with private investment and appeared in empirical investment equation (Badawi, 2003 and 2005; Shiferaw, 2002; Blejar and Khan, 1994; Cardoson, 1993; Oshikoya, 1994; Quattara, 2005; Agenor, et al, 2005; Ereden and Holcombe, 2005; Atukeren, 2005).

In theory, crowding in and crowding out effects of public investment could take place at the same time and, hence, the net effect on private investment is indeterminate. The effect of government activity on private sector activity may take two broad sets: complementarity's (crowding-in) and substitutability (crowding out) effects.

The complementarities effect asserts that public capital, infrastructure investment, is likely to be related in a rather different way to private capital profitability (formation), because the provision of public services that reduce the cost of production of the private sector would have a positive impact on the profitability of private investment. Public investment as such is expected to be a direct complement to the output produced by the private sector. Moreover, the crowding in effect of public capital on the marginal productivity of private investment is high when more public capital spending is on education and health, which may enhance the productivity of labor, other components of current public spending such as on the enforcement of property rights and legal aspects improve the productivity on private investment. Agenor, et al, 2005 suggested that

expenditure on infrastructure have a large effect in the countries where internal stocks are low and basic infrastructure services (electricity, communication, etc) are lacking.

However, to the extent that public investment displaces or crowds out private investment its positive impact on private capital formation can be highly mitigated (for example; Badawi, 2003 and 2005 in Sudan). The crowding out effect on public investment in developing countries may not be felt through an increase in distortion taxes which may increase incentives for private agents to evade tax, or increases interest rates as in industrial countries (Shiferaw, 2002). Shiferaw discussed the main reasons for crowding out effect of public investment on private capital formation in developing countries. The study stated firstly, many developing countries are characterized by limited market size which indicates that public investment in productive sectors may displace private ventures. Second, financial crowding out effect may occur if the increase in public investment is paid by borrowing on the domestic financial markets, which leads to greater incidence of rationing of credit to the private sector for there is limited credit pool in most developing countries. And finally, the study notes that financing public investment through foreign borrowing could crowd out private investment through its effect on inflation and debt accumulation, which may result in uncertain business environment.

3.2.3. Real Exchange Rate Policy and Private Investment.

In recognition of the high import content of intermediate and capital goods in developing countries as well as the universality of devaluation in adjustment programs, the real exchange rate is often included in the investment model (Badawi, 2003 and 2005; Shiferaw, 2002; Cardoson, 1993; Serven and Solimane, 1992; Ereden and Holcombe, 2005).

In most modern theoretical works, the real exchange rate (RER) is defined as the domestic relative price of tradable goods (PT) to non-tradable goods (PN). This definition summarizes incentives that guide resource allocation across the tradable and non-tradable sectors. An increase in RER (depreciation) will make the production of tradable relatively more profitable inducing resources to move from the non tradable to the tradable sector. This relative price measures the cost of producing domestically the tradable goods- degree of international competitive. A decline in RER or a real exchange rate appreciation reflects the fact that there has been an increase in the domestic cost of producing tradable goods. If there are no changes in relative prices in the rest of the world, this decline in RER represents a deterioration of the degree of international competitiveness for the country. So a country now produces tradable goods in a relatively less efficient way than before (Agenor and Montel, 1996).

In pure theory, a depreciation of RER will improve competitiveness of exports in the foreign markets and this will improve private investment incentives especially in the export sector. The reverse is true for a real appreciation of exchange rate. But empirical evidence shows that real depreciation affects private investment through several transmission mechanisms not all of which have the same direction.

According to Serven and Solimane (1990) and Cardoson (1993) countries that were highly dependent on imported capital and intermediate goods in total investment would face a contraction of investment with real depreciation. The rational behind this finding include the following: First, the adverse real income effect of the real depreciation could reduce the desired capacity of the firm. Second, with out monetary accumulation, real exchange rate depreciation may result in higher interest rate and depress investment while a real appreciation would create

an unsustainable investment boom. In addition, it would cause an increase in real debt burden and decline in the firm's net worth.

The real exchange rate is perceived to send signals to domestic and external absorption and production. It is important that these signals need be corrected, other wise; response would be distorted leading to adverse internal and external balances. Given this premise, the key issue in the deviations of the nominal exchange rate which is directly determined from the equilibrium rate is distorted. The distortions are believed to be explained as either over-valuation or under-valuation of national currencies. Distortions in exchange rates have different impacts on import demand and export supply. Over-valuation has negative effects on export supply, while encouraging imports and inflows by affecting import demand and export supply; under valuation leads to the opposite effects. In both cases, distortions lead to disequilibrium in the foreign exchange market and in trade balance. Economic theory predicts that countries characterized by extended periods of over-valuation of their domestic currency suffer from severe balance of payments problems. Over valuation imposes an implicit tax on exporters, as exporters receive less when they convert their foreign exchange earnings into local currency at the over valued rate (Dordunoo, et al., 1997).

A key component of policy reforms that contains elements of the demand and supply side measures is the real devaluation of domestic currency. Since it is simultaneously expenditure – reducing and expenditure –switching policy, it is real devaluation which affects both domestic demand and supply (Cardoson, 1993).

On the other hand, devaluation may have different effects on private capital formation in the short run and long run through the following channels by changing real supply of capital goods, samely by raising the real price of imported inputs, by altering the real product wage and hence by affecting profitability by producing produced goods, and by affecting nominal real interest rate, which affects the supply prices of capital (Agenor and Montel, 1996).

3.2.4. Foreign Trade Policy and Private Investment

The terms of trade are one of the most important indicators of external shocks to the economy and the changes in the economy's terms of trade will influence private investment demand. The permanent TOT changes will affect the profitability of private investment through two mechanisms. The first mechanism operates through the impacts of a change in the terms of trade on the real income and the profitability of the export sector, but also through the extent multiplied if profits are positively correlated across sectors. Deterioration in terms of trade reduces real income and has at least a transitory negative effect on investment. A term of trade deterioration also reduces investment in the export sector because it directly affects the profitability effect of investment in that sector. If profits are positively correlated across sector, bad news for the export sector is bad news for the economy as whole. Conversely, positive terms of trade shock will spread in the benefit throughout the economy.

The deterioration in the terms of trade also affects the budget adversely –either indirectly, by reducing the tax base, or directly, if the government owns the export sector. Budget deterioration will require corrective measures and its deflationary effects will reduce investment. When government spends what it earns, reduction in taxes automatically will reduce spending, profits, and investment, even in the absence of corrective actions Cardoson (1993) called this

effect Manaus Opera House Effects. The second mechanism operates when deterioration in terms of trade has an impact on the current account and thus induces concretionary measures.

Deterioration in the terms of trade will worsen the current account balance. If the deterioration is perceived as permanent, it will require corrective measures. A transitory deterioration that can not be financed will also require correctives measures. These measures may include expenditure – reducing fiscal and monetary policies that will affect investment adversely. They may also include a devaluation of the exchange rate that can only be transmitted in to a real devaluation in the context of tight money; Cardoson called this effect 'IMF' effect.

The adverse effect in the terms of trade will increase the cost of imports relative to income and also reduce the purchasing power of exports. Severely terms of trade, therefore may worsen the ratio of current deficit to GDP ratio -an indicator of external balance and macroeconomic instability, with adverse consequence on private investment (Cardoson, 1993).

World prices fluctuation will not only induce macroeconomic uncertainty but will also exert an impact on inflation, the real exchange rate, resource allocation, and the over all investment out look. An increase in the price of an imported good with large weight in the cost of living index will have a direct impact on consumer prices. Depressed export prices, in the agricultural export sub sector will draw resources away from the export sector reducing export and discouraging investment in the sector (Oshikoya, 1994).

3.2.5. Macroeconomic Uncertainty, Instability and Private Investment.

Developing economies suffer from a high degree of macroeconomic uncertainty. Growth, inflation, real exchange rate and other key macroeconomic variables are much more volatile in developing countries than industrial economies, and the consequences of this excess volatility for aggregate performance in several dimensions growth, investment and trade have attracted some attention in empirical literature (Dixit and Pindyck, 1994). In case of investment, this concern has been received by recent theoretical work identifying several channels though uncertainty can impact on investment such as exchange rate volatility, policy uncertainty, inflation variability (Serven, 1996; Dixit and Pindyck, 1994; Dehn, 2000; and Shiferaw, 2002). But the effect of uncertainty on investment relation is indeterminate on the theoretical grounds and at the same time some of these effects of uncertainty operate in mutually opposing directions. To get determinate relationship among uncertainties and private investment with in typical country and specified period of time, they need to be incorporated as key determinants of investment.

Many economists and theoretical arguments in this line of research focus on the detrimental effects of macroeconomic instability on private investment, productivity, capital accumulation and economic growth. A rise in macroeconomic instability means a rise in one or more policy induced macroeconomic instability indicators such as inflation rate, and public deficit to GNP ratio, moreover macroeconomic instability adversely affects the rates of productivity and investment mainly by creating uncertainty about current and future macroeconomic environment (Fischer 1993a and 1993b cited in Ismihan, et. al. 2003; Dhan, 2000 and Shiferaw, 2002).

3.2.5.1. Inflation and Private Investment.

Inflation rates also constitute a source of uncertainty in macroeconomic environment. But the direction of the effects of inflation on investment is ambiguous in both the theoretical and empirical literature. The traditional view on the role of inflation on economic growth articulated in the works of Tobin (1965) held that inflation is positively correlated with capital formation. According to Tobin, the substitutability hypothesis views money and capital as substitutes. Since inflation increase the cost of holding money; this will encourage a portfolio shift into capital. The line of reasoning here is that inflation by encouraging saving reduces the interest rate and therefore leads to an increase in investment and economic growth (De-Gregorio, 1995).

The studies conducted by Stockman, 1981, De-Gregorron, 1993 and Jones and Manuelli 1993, cited in De, Gregorro and Guivotti, 1995.; Shiferaw, 2002 and Oshikoya, 1994, however, shown that inflation can be considered to be a tax on investment and therefore a cog in the wheel of economic growth.

Another mechanism that inflation could affect growth is by distorting the optional choice between consumption and leisure. An increase in the rate of inflation will increase the price of consumption with respect to the price of leisure inducing substitution from consumption to leisure, thereby reducing the labor supply (De, Gregorro and Guivotti, 1995).

In relation to the above fact, Ikide, (2003) argued that inflation results in macroeconomic instability thus creating uncertainty. This high uncertainty can distort the price mechanism as means of allocating resources efficiently. The study added that periods of macroeconomic

instability can lead to low investment as investors postpone investment decision waiting for the resolution of the inflation if they considered it as temporary. Moreover, Inflation engendered macroeconomic instability can lead to capital flight by substituting domestic currency by foreign currency and investing on foreign countries that have low inflation.

Inflation may exacerbate informational problems and increase moral hazard problems in the banking sector. This may lead to the inefficiency of financial sectors in allocating resources (lending and saving becomes risky) and more fragile due to high default risk (Stiglitz and Weiss, 1981).

De, Gregorro and Guivotti, 1995 added that in world of imperfect information, the informational problems may be exacerbated by high inflation rates, affecting the efficiency with which credit is allocated, and the total volume of intermediation.

To sum up, the need to control inflation has never been in contention. The fact that some level of inflation is inevitable for economic growth at least in the short run is well established. What has remained a controversial issue is what this tolerable level of inflation could possibly be (Ikidi, 2003).

3.2.5.2. Uncertainty and Private Investment

Hartman, (1972) and later Abel (1983) showed that in an economy with out frictions, an increase in uncertainty about prices would increase investment. The reason is that under constant returns to scale the marginal profitability of capital is a convex function of input and

output prices. Hence, by Jensen's inequality, an increase in uncertainty about prices would induce an increase in investment as cited in De, Gregorro and Guivotti (1995).

However, the recent literature on irreversible investment has shown that this relationship can be reversed, (De, Gregorro and Guivotti, 1995.; Dixit and Pindyck, 1993 and Shiferaw, 2002). When investment is hard to reverse, that is roughly once a machine has been put in place it has no alternative use and therefore no resale value, instability and uncertainty create value to waiting for more information so as to avoid getting stuck with unprofitable and irreversible projects.

According to Servern (1996), uncertainty and instability can be strong deterrents to private sector investment, especially in the context of invertible fixed investment. Because most fixed capital investment is at least practically sunk[5] and investors can feel uncertainty about their future rewards[6]. And finally investors can control the timing of investment and postpone it in order to acquire more information about the future.

As argued by Shiferaw (2002) under the condition of irreversibility, uncertainty and waiting for more information, the optimal investment policy seeks balance between the value of waiting [7] and cost of waiting[8]. The value of waiting could be considerably large particularly when uncertainty is high suggesting that uncertainty can become a major obstacle for investment.

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[5] i.e. It cannot be recovered completely by selling the capital once installed
[6] the best investors can do is attach probabilities to the possible outcomes
[7] which is the present value of future streams of returns in case they fall short of the user cost of capital
[8] which is present value of returns forgone by waiting for a project which could turn out successful a way

Dixite and Pindyck (1994) summarized that the net present value rule- invest when the value of the unit of capital is at least as large as its cost- must be modified when there is an irreversible investment (because when an investment is made, the firms cannot disinvest, should market conditions change adversely). This lost portion value is an opportunity cost which must be induced as part of the cost: Accordingly, the value of the unit must exceed the purchase and installation cost, by an amount equal to the value of keeping the investment option active.

According to Shiferaw (2005), uncertainty is not only confined to volatility of macroeconomic variables but political instability and social unrest are also sources of potential instability. And social unrest is also a potential source of uncertainties with comparable and at times highly detrimental impact on private investment.

According to (Badawi 2005 and Shiferaw 2002) there are two mechanisms through which sociopolitical factors could influence private investment in developing countries. The first relates to the extreme cases of instability that lead to changes in the rules of game and threatens investors of their property rights. The other and perhaps the most common one refers to the unpredictability of the political environment, for example, due to repeated change of government or officials of key government institutions which undermine the responsiveness of private investors to economic incentives or reform measures.

Serven (1996) argued that an extremely important form of uncertainty by investors is the imperfect creditability of policy reforms. The study further explained that unless investors are fully convinced that the reforms are permanent, their altitude about the probability that the reforms may be reversed would become a key determinant of the investment response. The

possibility of policy reversals creates a value of waiting for investors feeling irreversible projects lack of confidence will be reflected in a weak and delayed investment response, as it takes time for investors to become convinced that policy reform will be sustained.

The effect of uncertainty on investment is ambiguous on theoretical grounds and depends on the assumptions used. The important implication from an empirical stand point is that uncertainty might have a significant impact on dynamic investment behavior and so should be incorporated in to an empirical analysis of the impact of public investment on private investment.

3.3. Empirical Literature.

The theoretical models highlighted above were essentially formulated to analyze private capital formation behavior of firms in industrial economies with none of them so far decisively proved to be superior to the other. This calls for analyzing empirical literature of developing countries to point out the more appropriate model.

Green and Villanueva (1991) attempted to examine the determinants of private investment in 23 developing countries by specifying modified neo-classical flexible accelerator model with panel model for the period of Post 1974. The regression results showed that real GDP growth was statistically significant and had positive effect on private investment, but negatively relates to real interest rates.

Cardoson (1993) used quadrennial panel data and regression analysis for examining private investment in six Latin America countries (Argentina, Brazil, Chile, Colombia, Mexico and

Venezuela). The result showed that public investment per GDP had positive and significant effect on private investment.

Amin (1998), had the same argument as Badawi (2005), on his study 'Cameroon's fiscal policy and economic growth accounting model for the period 1961-1994 using two-stage least square estimation. The paper pointed out that public investment crowds out private investment; real exchange rate had significant and negative effect on private investment as debt variables. But the per capita GDP had positive coefficients and has highly significant impact on private capital formation.

Harupara (1998) studied macroeconomic determinates of private investment in Namibia in his masters thesis for the period 1970 to 1996 using stationarity test and co-integration. The result found that volumes of credit granted to private sector, real out put, and public investment have a positive and significant effect both in the short run and long run on private investment; and depreciation of the exchange rate stimulates private investment in the long run model but it has negative impact on the short run. On the other hand, the study revealed that macroeconomic instability, proxied by the variability of the inflation rate deters private investment activity in Namibia in the short run and long run. But unlike this conclusion, another study tried to analyze an econometric analysis of determinants of fixed investment in Namibia for the period (1982-99) using co-integrated VAR model .The study showed that output had no significance for investment and public sector investment appeared to have low significant impact on private sector investment (Hasmavindu, 2002).

Serven (1998) focused on macroeconomic uncertainty and private investment in least developing countries. The paper dealt with, how various macroeconomic instabilities have affected private investment activity in 60 developing countries using unbalanced panel data. The results indicated that private investment is negatively affected by real exchange rate volatility, inflation volatility, and price of investment goods and terms of trade. And the result also showed that devaluations have a negative impact of on investment.

Moshin and Kilindo (1999) studied the impact of government policy on macroeconomic variables in a case study of private investment in Tanzania for 1996-1990 using two stages least square method. The result of the study was the same as (Amin, 1999) and (Badawi, 2003, 2005), that is, public investment had crowding out effect and real banking credit had stimulus effect on investment.

Serven (2002) examined real exchange rate uncertainty and private investment in 23 developing countries for the period 1970-1995 using unbalanced panel data and GMM estimation. The regression showed that private investment is statistically and negatively related to real exchange rate uncertainty. And the investment effect of real exchange rate uncertainty is influenced by the degree of trade openness and financial development. That is higher openness and wealthier financial systems are associated with significantly negative uncertainty investment and vice versa.

Shiferaw (2002) attempted to analyze private investment and public policy in Sub-Saharan Africa. The study estimated reactive impact of each explanatory variable on private investment using first FGLS estimation and Quantile regression estimation for the period 1979 to 1998. The

FGLS result showed that increases in the lagged level of real per capita GDP and its annual rate of growth have a direct impact on private investment and also argued that the relative impact of per capita GDP is stronger than a dollar increase in the level of per capita GDP. Credit to the private sector has a significant and direct relationship with private investment. According to study public investment has crowding in effect on private investment in Sub-Saharan African i.e. there is complementarity's effect between public and private investment. In contrast, the result found government borrowing from domestic banking system has indirect effect on private investment in SSA indicating the existence of financial crowding out effect. But the relative impact of crowding in is stronger than crowding out effect. All the measures of macroeconomic volatility have negative sign but only the volatility of the terms of trade seems to have a significant negative impact on investment. The study also indicated that inflation did not show up as major deterrent of private investment.

Badawi (2003) on his study, "private capital formation and public investment in Sudan for testing the substantiality and complementary hypothesis using a neoclassical growth frame work and co-integrated VAR model for the period 1969-1998," analyzed that both public and private investment had a significant contribution to economic growth, but the contribution by private sector is more pronounced than public investment. The result of the study also pointed out that public sector investment had more crowding out effect than crowding in effect and it curtails private investment expansion.

The same author (2005) reached the same conclusion on his, private capital formation and macroeconomic policies in Sudan for the period 1969-1998 using VAR modeling modified neoclassical flexible accelerator investment. Moreover, the result of the study further found out

that real output, real banking sectors credit have significant and positive impact on private capital formation but the result noted that public sector investment, real interest rate had significant and negative impact on private capital formation. The real exchange rate had significant and positive short term impact on private sector investment but it has negative long-run impact on private sector investment in fixed asset i.e. devaluation had negative impact on private investment.

E.Jr, et al. (2003) analyzed the behavior of the Brazilian investment and capital stock series for the 1970-2000 through the lens of the neoclassical theory. The finding showed that the neoclassical theory was able to fairly describe the investment behavior.

Erden and Holcombe (2003) attempted to examine the effects of public investment on private investment in developing countries by applying several pooled panel specification of a standard investment model from 1980 to 1997. The study found that public investment complements private investment; and private investment was constrained by the availability of the bank credit.

Ismihan, et al. (2003) studied macroeconomic instability, capital formation and growth: the case of Turkey for the period 1963-1999 using time series economic techniques, co-integration and impulse response analysis. The result suggested that macroeconomic instability has seriously curtailed the capital formation and growth. Furthermore, Turkish experience indicated that the chronic macroeconomic instability seemed to be a serious impediment to the public investment and had shattered, or even reversed, the long run complementarities between public and private investment.

Nabende and Slater (2003) tried to analyze private capital formation in South East Asia for the period 1971-1999 using ordinary least square technique. The result pointed out that output exerts a positive impact on private investment, public investment impacts significantly but it has crowding out effect. On the other hand, foreign direct investment had crowding in effect on private investment. And exchange rate has no significant effect but interest rate has negative and significant effect on private capital formation.

Agenor, et al. (2005) examined public infrastructure and private investment in the Middle East and North Africa on three sample countries (Egypt, Tunisia and Jordan) using VAR Model for the period, 1965 to 2001. The model suggested that public capital expenditure facilitates the expansion of private investment in Egypt, but it had no significant effect in Jordan and Tunisia.

Atukem (2005) applied a multivariate probit model to examine the determinants of the crowding in effects of public investment in a sample of 25 developing countries for the cross-section data for the period between 1975 and 2000. The model predicted that the likelihood of crowding –in effects of the public investment was higher in countries with a stable macro environment. It was also found that the likelihood of the public investment to crowd in private investment increases with availability of domestic credit, and as the foreign debt service burden decreases. In addition, as per capita GDP increases the likelihood of crowding in decreases.

Ouattara (2005) attempted to analyze modeling the long run determinates of private investment in Senegal over the period of 1970-2000 using modified flexible accelerator model. The model suggested that private investment is positively affected by public investment (complementary),

real GDP and foreign aid whilst the credit to the private sector and terms of trade affect private investment negatively.

Some studies relating to the above- mentioned issues have been carried out in the case of Ethiopia. Workie (1997), in his master's thesis on determinants and constraints of private investment in Ethiopia for the period 1974/75-1994/95 using ordinary least square method concluded that, availability of finance, the real exchange rate, and policy variable (dummy) were consistently significant determinants of private investment. The real exchange rate had positive and significant influence on the private investment. This implies that devaluation of domestic currency in 1992 had favored private investment. The same conclusion is reached by (Asmerom, 1997) on the study of exchange rate policy and economic reform in Ethiopia for the period (1974-1991).

Jonse (2002) used General Chowdhary Structural Model with simultaneous equation model and using two stages least square regression to capture the interrelationship between public and private external debt, capital accumulation and production. The result pointed out that output has an investment accelerator effect. In addition, investment is statistically and directly affected by growth rate in marginal product of capital[10] and negatively relatrd with growth rate of population.

Samson (2004) examined the effect of export earnings and capital formation in Ethiopia for the period 1965-2001 and used a modified version of the flexible accelerator model for investment. The result pointed out that export-earning instability had significant negative impact on

[10] That is the higher productivity of capital, the greater it encourages growth rate of domestic investment.

aggregate investment in both long run and short-run. On the contrary domestic, credit availability had stimulus effect in private investment and in the long-run domestic inflation had curtailed effect on private investment.

Most of the study tried to explain above have the following drawback. First the major drawback of most studies in the above empirical literature was that they did not account the problem of simultaneous bias and endogeneity. That simultaneous equation model is constructed on the basis that the dependant variables are not only determined by the independent variables but also by some of the dependent variables in the other equation (Gujurati, 1995). In the presence of simultaneity, applying the method of OLS, disregarding other equations in the system, leads to biased and inconsistent estimates. That is, as the sample size increases indefinitely the estimates do not converge to their true (population) values no matter how large the sample size (ibid).

Second, some of the above studies cited did not testing the stationarity of the variables explicitly and did not try to show long run (cointegration) relation ship among the variables. Analyzing regression parameters without appropriate investigation of time series data may result in spurious correlation (named by Granger and Newbold, 1974 cited in Gujurati, 1995). It indicates that correlation between variables in regression equation is because of time trend rather than meaningful economic relationship. And the severity of nonstationarity stems from high likeliness of time series data to be subjected to autocorrelation.

Generally some studies cited above used a single investment equation framework to estimate determinants of private investment. This approach is trouble some in the sense that it does not account for nonstationarity and endogneity and this thesis tends to overcome this problem by

adopting cointegrated VAR model combining cointegration analysis and vector autoregressive time series.

CHAPTER FOUR

MODEL SPECIFICATION AND METHODOLOGY

4.1. Model Specification

The model of private investment used in this thesis is an eclectic version of the basic flexible accelerator model based on Blejer and Khan (1984). They attempted to assess the relationship between the principal policy instruments and private capital formation in developing countries to analyze the principal policy instrument to be linked to private investment. Their model emphasizes the effect of resource constraints on private investment behavior, including that arising from foreign exchange rationing.

Private investment is positively related to the growth of real GDP (Green and Villanueva, 1991). Similarly, it has also been hypothesized that private investment is affected positively by income levels, as countries with higher income level tend to dedicate more of their wealth to domestic savings which would then be used to finance investment (Green and Villanueva, 1991).

Since public investment in developing countries assumes a relatively larger role than in industrial countries, it becomes very important to take into account of its complementarity or substitutability, but its impact remains ambiguous as mentioned in the literature review.

The flow of bank credit to the private sector is the most important source of investable funds compared to sources like retained profits and foreign sources. Private firms in developing countries heavily rely on bank credit as source of financing. With financial markets being generally repressed, credit policies generally affect private investment via the shock of credit

available to firms that have access to preferential interest rates as discussed in the literature review.

Other important factors introduced to the investment equation are real interest rate and real effective exchange rate. The standard economic theory suggested a negative relationship between investment and the rate of interest rate. But according to McKinnon and Shaw, in a financially repressed economy, rises in the rate of interest may stimulate investment by increasing saving (Fry, 1998). The effects of changes in real interest rate on private investment in developing countries may depend on the level of financial sophistication.

Since Ethiopia, like any other developing countries is characterized by high import content of intermediate and capital goods as well as the universality of devaluation in adjustment program, the real exchange rate is often included in investment equation to analyze the net effect of devaluation.

Finally, uncertainties are suggested to be other important determinants of investment in developing countries. Since macroeconomic institutions are susceptible to recurrent socio-political economic changes in developing countries, a considerable empirical literature sought to sketch an investment-uncertainty relationship. Macroeconomic instability has received a prime attention, with a view asserting the unfavorable impact of macroeconomic instabilities on private investment. Macroeconomic instability is approximated by variances of macroeconomic aggregates like variance in inflation, terms of trade, growth rate (Shiferaw, 2002).

It appears from the above discussion that investment determinants are very much multidimensional. Although survey of relevant literature helps in identifying the most important factors that affect investment decision, it by no means provides an exhaustive list of investment determinants. These determinants may include psychological factors such as entrepreneurs' relevance to contract their plant size for no reason but maintenance of self- pride (Badawi, 2005).

In the following section the study estimate an investment equation whose variables are chosen in accordance with investment theory and empirical literature covered above.

$$RPINV_t = f(\ RGDP_t, RGINV_t, REER_t, RIR_t, RPSCR_t, MEUN_t\ ) \ldots\ldots\ldots [1]$$

Where RGDP is real output RPINV is real private investment, RGINV is real government investment, REER is real effective exchange rate, RIR is real interest rate, RPSCR is banking sector credit to private firms and MEUN is macroeconomic uncertainty, nominal is converted using GDP deflator (NBE data base).

If there is a structural break in the time series estimation it is better to regress separately before and after the break. But the time series data at hand is smaller to regress separately to get appropriate estimation, so the study use dummy variable for change policy from market oriented (post and pre socialist regime) to the socialist economy. The dummy takes a value of one for the former and a value of zero for the latter.

4.2. Methodology

4.2.1 VAR Modeling

Most of the empirical literature noted above employed single investment equation framework to estimate determinants of private investment, assuming implicitly or explicitly stationarity and exogeneity of variables. The assumption of stationarity of variables is troublesome in view of most macroeconomic time series display non-stationary trends (Haris, 1995). Thus, integrated or near integrated regression with these variables leads to the danger parameter estimate with non standard distributions which makes inference much more difficult. Such regressions lead to spurious regression problems in analyzing regression parameters with out appropriate investigation of time series data. It indicates that correlation between variables in regression equation and where what actually exists is correlation of time trend rather than meaningful economic relationship.

Endogeneity problem or simultaneity bias may also raise special concern in investment investigation. Interaction and interdependence of economic policy variables make it necessary that investment models incorporate a set of equations. Each equation of the system of equations describes the behavior of certain variable, which appears in the other equations as an explanatory variable. Most studies undertaken to look at the determinants of or the impact of public policy on private investment have over looked feed back effects from the other variables in private investment. As for public investment, most studies undertaken to look at the determinants of or the impact of public policy on private investment have overlooked feedback effects from other variables to public investment. Therefore, this thesis employs a simple

cointegrated VAR model, combining cointegration analysis with vector autoregressive time series model.

A VAR is a 'K' equations; k-variable linear model in which each variable is in turn explained by its own lagged values plus current and past values of the remaining k-1 variables. This simple framework provides a systematic way to capture rich dynamics in multiple time series, and the statistical toolkits that come with VAR_s were easy to use and interpret. And as Sims and others argued VARs provide a coherent and credible approach to data description, forecasting, structural inference and policy analysis (Sims, 1980, as cited in Stock and Watson, 2001).

The VAR approach has a number of advantages over a single framework: first in developing countries in general it has proved difficult to estimate structural models of private investment. Second, the VAR approach does not impose any causal links between the variables a priori. Rather, VAR models allow testing whether the causal relationship implied by single structural equations is valid or whether there are feed back effects from outputs to the inputs. Third unlike single structural equation approach, the VAR approach allows for indirect links between the model variables. Finally, unlike single structural equations, the VAR approach does not assume that there is at most one long run (cointegration) relationship among specified model variables.

The use of cointegrated VAR model helps to account for spurious correlations and exogeneity bias as it is designated for non-stationery time series, and requires no endo-exogenous division of variables (it assumes endogeneity of all variables)[11].

[11] Harris ,1995 provide detailed discussion of co integration VAR econometrics

A VAR system of equations may be expressed as

$$X_t = A_1 X_{t-1} + A_2 X_{t-2} + ... + A_p X_{t-p} + \Phi D_t + \varepsilon_t \ldots\ldots\ldots\ldots [2]$$

Where $X_t \equiv [X_{1t} \ldots . X_{tk}]$ is a K.1 vector containing K variables in the system.

The variables are: real out put (RGDP), real private investment (RPINV), real government investment (PGINV), real effective exchange rate (REER), real interest rate (RIR), banking sector credit to private firms (RPSCR) (all variables in natural logarithm except RIR).

A_j denotes a K x K matrix of autoregressive coefficients for j = 1, 2, ------ P, and ΦD_t coefficients on deterministic terms (intercept, trend, dummies and so forth) collected in the D X 1 vector D_t . The vector $\varepsilon_t \equiv [\varepsilon_{1t} \ldots . \varepsilon_{kt}]'$ is a k – dimensional white noise process, i.e.

$E[\varepsilon_t \varepsilon_j'] = \Omega \; and \; E[\varepsilon_t \varepsilon_s'] = 0 \; for \; s \neq t \; with \; \Omega \;\; a(k \; x \; k)$ symmetric positive definite matrix.

4.2.2 Cointegrated VAR

The concept of cointegration is in essence a statistical characterization of a situation where the variables in the hypothesized relationship should not diverge from each other in the long run, or if they should diverge in short runs. This divergence must be stochastically bounded and diminishing overtime. The dependent variables in such a relationship may depend not only on

the level of explanatory variables but also on the extent of deviation of the explanatory variable(s) from the equilibrium relationship with dependent variable (Harris, 1995).

This sort of behavior is usually captured by the vector error correction models (VECMs) embodied in the cointegrated VAR technique that distinguish clearly long-and short-run impacts, providing suitable tool for policy analysis[12].

The error correction representation of equation (2) takes this form

$$\Delta X_t = \Pi X_{t-1} + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \ldots + \Gamma_{p-1} \Delta X_{t-p+1} + \Psi D_t + \varepsilon_t \ldots\ldots [3]$$

$\Pi \equiv -I + \sum_{i=1}^{p} A_i \quad \Gamma_i = -I + A_1 + \ldots + A_i = -I + \sum_{j=1}^{i} A_j \quad i = 1,2,\ldots p-1$, denote (kxk) matrices of coefficients, respectively

Equation [3] shows how long-run impacts on elements on X are incorporated in the short-term dynamics.

$$\Delta X_t = \alpha \beta' X_{t-1} + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \ldots + \Gamma_{k-1} \Delta X_{t-p+1} + \Psi D_t + \varepsilon_t \ldots\ldots [4]$$

Cointegration analysis is concerned with determining the maximum number of linearly in independent relationships in the system. In technical language: determining the rank of the system. While matrix α holds long run adjustment coefficients, matrix β contains long-run coefficients or elasticity's. Hence, the essence of conducting cointegration analysis is to (i) test for the presence of long-run stationary relationship (s) between variables (ii) estimate long turn parameters β (cointegration vector). (iii) Estimate long run coefficients of adjustments

[12] Error correction models are thoroughly discussed by Johansson, 1995.

(loading coefficients), and (iV) employ long run information to estimate VECMs which describe short-term dynamics.

Determining components in equation (2) and (3) (ΦD_t and ΨD_t) is crucial issue in VAR analysis as results may depend on whether constants and trends are included in VAR system and VECM (Ahking, 2002, as cited in Badawi, 2005). Equation (2) is estimated but with constant with out a linear trend since the existence of a linear trend in differenced series implies that quadratic trend exists in levels, which is unusual in macro time series.

4.2.3. The Test for Unit Root

Directly estimating a model that utilizes time series variables can result in spurious regression. This may arise when analyzing using the standard regression methodology in variable that are not-stationary. This may not be because of the variables in the model are necessarily related but because of the common trend present in them. The standard t- and F- tests are not valid in this case. Therefore, there is need to examine the time series proprieties of the variables before proceeding to the estimation.

Even though variables entering a model are non stationary, there may not arise a spurious regression if they can form a cointegration VAR relationship. But it is very important to know the order of integration of the variables entering the VAR model for the conduct of cointegration analysis. The Augmented Dickey Fuller (ADF) tests, which are described below, are used to test for the order of integration.

$$\Delta y_t = \mu + \gamma T + \beta y_{t-1} + \sum_{i=1}^{k} \lambda i \Delta y_{t-1} + u_t \quad \text{..... [5]}$$

Where y_t is the variable in equation, T is a time trend, k is lag length, and μ_t is a random variable assumed to be "white noise'. Equation [5] is applied to variables LnRPINV, LnRGINV, LnRGDP, LnRPSCR, LnREER and RINT defined as:

LnRPINV = natural logarithm of real private investment

LnRGINV = natural logarithm of real government investment

LnRGDP = natural logarithm of real Gross domestic product

LnRPSCR = natural logarithm of real credit to private sector

LnREER = natural logarithm of real effective exchange rate

RINT= Real interest rate

The study employs Akaike Information Criteria (AIC) and Schwarz Bayesian Criteria (SBC) to determine lag length k in the above equation. The two criteria produce the same lag length for all variables. The main concern of running test equation (5) is to estimate the ADF t-statistic β/s.e ((β) in order to test for the null hypothesis of non stationarity against alternative hypothesis of stationarity. The joint hypothesis $\beta = \gamma = O$ is also tested using F-test. Acceptance of rejection $\beta = \gamma = O$ implies that series is non-stationary with a significant trend. Significance of the trend variable may also be tested using individual t-statistic. The test model yields four categories of variables: non-stationarity with a significant trend, non-stationary with insignificant trend, stationary with a significant trend and stationarity with insignificant trend (Harris, 1995).

4.2.4. Test for Cointegration

Cointegration entails the existence of long run relationship among variables which may contain stochastic trends. There are two methods that are widely utilized to test for the existence of

cointegration among set of variables. The first one is the single equation based Engle-Granger two steps procedure while the second one is the multivariate, Johansen Methodology. The fact that the Engle-Granger Method presupposes one cointegrating vector and that is a priori categorizes variables into endogenous and exogenous variables has rendered the Johansen Multivariate framework as superior. Therefore, the Johansen methodology which is described below would be utilized in this study.

There are two alternative tests in the Johansen multivariable framework that are used to test for the Rank of the matrix. The rank of the matrix is equal to the numbers of its none zero eigen values. Thus, both types of tests are used to test the number of non-zero eigen values in matrix. The first test is known as the $\hat{\lambda}_i$ trace statistic, which tests the null hypothesis that the number of co-integrating vectors is $\leq$ r against a general alternative. On the other hand the second test which is known as the $\hat{\lambda}_i$ max statistic tests the null hypothesis that the number of cointegration vectors is r against the alternative r+l. A formal test for the number of cointegrating relationship can be based on the following likelihood ratio test static often referred to as trace test statistic (Harris, 1995).

$$2\left(L^*_A - L^*_\circ\right) = -T\sum_{i=r+1}^{k} \log^{\left(1-\hat{\lambda}_i\right)} \ldots\ldots\ldots\ldots\ldots [6]$$

Where $L^*_\circ$ is the maximum value the log likelihood function can attain under the null hypothesis of r cointegrating vectors and where L^*_A is the maximum value the log likelihood function can

attain under the alternative hypothesis of that there are as many cointegrating vectors as there are variables in X_t.

The procedure for assessing the cointergrating rank is an application of the general hypothesis testing procedure: formulate the null and alternative hypothesis and a test statistic whose distribution tabulated in this case by simulation, assuming the null hypothesis to be correct. A 'large' value of the test statistic is evidence against the null hypothesis: 'Large' being determined by reference to a table of critical values which show the probability that a value to the observed value would have occurred if the null hypothesis is true.

In order to determine the cointergrating rank, rather than simply stating that $\leq$r, construct the following sequence of tests (Patterson, 2002).

First, test H (0) in H (k), if H (0) is not rejected the sequence stops, conclude that r= 0 is consistent with data; if H (0) is rejected move on to test H (1) in H (k).

Second, if H (1) is not rejected the sequence stops, conclude that r $\leq$1 and further, given that r=0 was rejected, conclude that r= 1 is consistent with the data; if H (1) was rejected move on the test H (2) in H (k).

Third continue this process. The last possibility is testing H (k-1) in H (k); if H (k-1) is not rejected conclude that r= k-1, if H (k-1) is rejected conclude r = k.

The model can relate the outcome of this test sequence to the three model cases discussed above: (i) if the null hypothesis r= 0 can not be rejected, then the appropriate model is a VAR in the first differences (ii) if O < r< k, then the VECM, under the restriction rank (Π) = r maximum likelihood estimation is the appropriate, and, (iii) if the last null hypothesis of the test sequence, r= k - 1, is rejected, then the VAR is stationary in levels variables in X_t are (trend) stationary and in this case the appropriate model is the unrestricted VAR model for X_t in levels form.

CHAPTER FIVE

ANALYSIS AND INTERPRETATION OF MODEL RESULTS

5.1. Econometric Analysis

5.1.1 Testing for Unit Roots

The check for stationarity of each time series is made using the formal ADF tests on the time series data for each of the variables specified in the previous chapter. The results of the Augmented Dickey Fuller (ADF) unit roots are reported in the following table 5.1.

Table5.1. Unit Roots Tests Using ADF Procedure Variable Constant

Variable	K	ADF	Inference
Lnrpinv	1	-0.097	Non – stationary
Lnrgpinv	0	-0.957	Non- stationary
LnrPscr	0	-0.011	Non- stationary
LnReer	0	-1.126	Non- stationary
LnRGDP	0	-0.840	Non- stationary
Rint	0	-1.003	Non- stationary
Dlnpinv	0	-10.990	Stationary
Dlnpscr	0	-4.636	Stationary
Dlnginv	0	-4.991	Stationary
Dlnreer	0	-4.062	Stationary
Dlnrgdp	0	-5.195	Stationary
Dint	0	-4.190	Stationary
Critical ADF Value 5% = -3.61 1% = -4.39			

Note: Optimum lags are selected using the Akaike Information Criteria (AIC)

Table above 5.1 presents the result of ADF test on the variables under the assumption of no constant and deterministic time trend. The results indicated that the null hypothesis of non stationarity be rejected for all variables in the level form. But, the ADF test applied to the same variables in first difference become stationary at the conventional 1% levels of significance, except for RINT at 5% level of significance. Hence, from the unit root tests conducted, all the variables which constitute the VAR, are found to be integrated of the same order, i.e. all variables are integrated of order one, I(1).

Having shown that all the variables integrate of order one I(1) it is necessary to determine whether there exists at least one linear combination of these variables. In other words, the study looks for a stable and non- spurious relationship among the regressors in each of the relevant specifications. This is done by using the cointegration technique.

5.1. 2. Cointegrated Finite VAR System and Stationary Long run Relationship

The VAR system of equations is estimated where matrix Z incorporates RPINV, RGINV, RGDP, RPSCR, REER, RINT and dummy variable over the period 1970/71- 2004/05. The thesis adopts a general –to- specific procedure the key decision variable is often the lag length p for which acommen practice is to choose p by information criteria such as AIC or SIC subject to that choice passing a test, the Lagrange Multiplier test, for absence serial correlation. This study uses dummy variables of the o, 1 form may be needed for policy change events to remove 'outliers '. The study employs Akaike Information Criteria (AIC) and Schwarz Bayesian Criteria (SBC) to determine lag length k in the above equation. The study chooses a lag length of two which seems to be residuals are free of serial correlation, distributed $Chi^{\wedge 2}$ (2) under the

null, is not significant, as suggested by Akaike Information Criteria (AIC) and Schwarz Bayesian Criteria (SBC). Hence we estimate VAR (2). The VECM in equation (3) is estimated with lag (1) note t- k in equation (1) compared to t- k + 1 in equation [2]. Equation (3) which embodies short- term dynamics reduced I(0) processes is then assumed to depend on the rate of terms of trade volatility, real growth rate volatility and general inflation. Therefore, estimation of equation (3) is conditioned on these variables[13]. The study employs PcGive, which is based on Johansson (1988), to determine co integration rank r and estimate adjustment coefficient α_s and β cointegrating vector (s) results are reported in table [5.2.] and [5.3.].

Having the specified VAR model the next step is to test for cointegration. The statistical hypothesis under cointegration is H (P): rank (π) $\leq$ r, where r is the rank of long run matrix π. To determine r the VAR model is estimated and results are reported in table (2). The report here is the trace statistics rather than lambda- max test statistics since our null hypothesis is r $\leq$ 0 against r > 0 which is a general alternative of one or more cointegrating vector[14]. The result indicates that there is one cointegrating vector in the system. The null hypothesis that there is no cointegrating vector in the system (r $\leq$ 0) is rejected, but the null that there exists at most one cointegrating vector (r$\leq$1) is accepted. This is indicated by for the Ho: r $\leq$ 0 the trace statistic reports a magnitude of 135.77 which is insignificant (greater than the critical value 90.4) at 1%. While for H_0: r $\leq$ 1 the trace statistic reports a significant magnitude of 81.47 which is less than the critical value 81.7(table 2) at 10% level of significance.

[13] Alternatively, these three variables could be directly introduced to the system. But this implies estimating more coefficients, which seem impractical with the relatively small sample size at hand.
[14] Lambda- max statistics is usually used for the null r = 0 against the specific alternative of r + 1 cointegrating vectors.

Table5.2. Cointegration Analysis and Testing for Cointegration Rank r

H0: r ≤	Trace stat.	Eigne values	P- value
0	135.77	0. 904	[0.001]
1	81. 47	0.817	[0.151]
2	51.20	0.600	[0.375]
3	27.28	0.516	[0.377]
4	12.69	0.357	[0.761]
5	3.246	0.094	[0.834]

Unrestricted standardized estimate for one cointegrating vectors β_1 and respective adjustment coefficients are summarized in the following table (5.3.).

Table5.3. Unrestricted Standardized Eigne Vectorβ'

	RPINV	RGINVS	RPSCR	REER	RGDP	RINT	DCI
β'	1.00	-0.95	0.16	-0.75	-13.04	0.012	-0.95
	(rest.)	(-4.75)	(5.0)	(-5.2)	(-3.47)	(10.0)	(-2.50)

t – Values in parenthesis

Table5.4. Unrestricted Standardized Adjustment Coefficients α :

	α
RPINV	0.194 (1. 83)
RGINV	0.346 (5.00)
RPSCR	0.183 (1.56)
REER	-0.196 (-1.37)
RGDP	0.128 (1.40)
RINT	14.757 (3.75)

t- Value in parentheses

Variables in the system move together towards a stationary, long run equilibrium state defined by the cointegrating vector. The unrestricted standardized estimates for the cointegrating vector β and its respective feed back adjustment. Coefficients α_s are reported in table (5.4.) along side respective t- ratios. The cointegrated long run relationship with adjustment coefficients or loading parameters corresponds to the term (πZ_{t-1}) or ($\alpha \beta' Z_{t-1}$) the equation [3]. This term embodies the error correction term ($\beta' Z_{t-1}$) that term to enter short term vector error correction models (VECM).

As shown in table (5.3.) above, all variables have a positive and significant long run impact on real private investment except real credit to the private sector which has a negative and significant long run impact on real private investment. Real GDP reports a larger elasticity of nearly 13.04 compared to that of other variables RGINV, RPSCR, REER, RINT and DCI are 0.95, 0.16, 0.75, 0.012 and 0.95 respectively. Real interest rate seems to adjust to long run

equilibrium path much quicker than the other variables. This is indicated by the large magnitude of the loading parameter α reported for private investment (see in table 5.4.).

5.1.3. Long – run Weak Exogeneity

Adjustment coefficients (along with respective t- values) infer some information about variables long run weak exogeneity with respect to cointegrating vector. It can be seen from table [5.4.] that α_s on REER, RPSCR and RGDP insignificant, indicating long run weak exogeneity with respect to cointegrating vector; the variables are cointegrated with trend movements in other variables in the system, while in the short term they respond only to changes in the other variable. On the contrast RGIN and RINT appear significant loading coefficients. This traditional inference is supplemented by formal tests for long run weak exogeneity and the results are reported in table (5.5) below. Respective α coefficients on variables are linearly restricted to equal to zero, preserving the cointegration rank of one. The restricted coefficients are then tested (separately) for weak exogeneity. The linear hypotheses of zero alphas on REER, RPSCR and RGDP are accepted since associated likelihood ratios $Chi^{\wedge 2}$ report respective values of 0.53, 1.04 and 1.59, which are highly insignificant (p-probability in parentheses). Long run weak exogeneity does not however characterize RGINV and RINT, as long run equilibrium relationship tends to have a significant feedback effects on real private investment. Similarly $Chi^{\wedge 2}$ tests for weak exogeneity of RGINV and RINT report magnitude of 4.98 and 9.52, which are highly significant enabling us to easily reject the null of weak exogeneity.

Exogeneity test has important implications for investment equation. In investment analysis based on a single equation frame work the feedback impact from private investment to

government investment, and real interest rate, the so-called simultaneity problem, is usually neglected by assuming a priori that government investment, and real interest rate are weakly exogenous are rejected at 5% level of significance, indicating that a significant long run stationary feed back to government investment, and real interest rate exists.

Table5.5. Tests for Long – Run Weak Exogeneity

Ho: variable is exogenous to investment vector

Variable	Chi^2	F- probability	decision over	inference Ho
RGDP	1.59	0.21	Acceptance	Exogenous
RGINV	4.98	0.02	Rejection	Not exogenous
RPSCR	1.04	0.31	Acceptance	Exogenous
REER	0.53	0.47	Acceptance	Exogenous
RINT	9.52	0.00	Rejection	Not exogenous

Considering interferences in table (5.5.), the long run exogeneity REER, RPSCR and RGDP are utilized to re-estimate the system, preserving the cointegration rank one and imposing three long runs zero restrictions on respective adjustment coefficients on REER, RPSCR and RGDP [15]. Results for restricted standardizedβ's and α s are reported in table (5.6).

[15] No restrictions are imposed on β_1 apart from identification restrictions.

Table5.6. Restricted Cointegrated Vector and Adjustment Coefficients' With Dummy

$$\alpha_{1} = \alpha_{2} = \alpha_{4} = 0$$

a) Restricted Standardized Eigen Vectors β'

	RPINV	RGINV	RPSCR	REER	RGDP	RINT	DCI
β'	1.00	-0.68	-0.46	-0.43	-0.44	0.018	-0.18
	(rest)	(-1.98)	(-4.18)	(-2.29)	(-2.75)	(4.31)	(-3.42)

b) Restricted standardized adjustment coefficients α '

	α
RPINV	-1.319(-1.99)
RGINV	0.221 (3.45)
RPSCR	0.000 (rest)
REER	0.000(rest)
RGDP	0.000 (rest)
RINT	-20.07(-2.08)

t- Value in parenthesis

Comparing results of unrestricted and restricted standardized models, the magnitudes have small change but they maintain the same sign except real credit to the private sector. This indicates that implications of REER, RPSCR, and RGDP exogeneity are of great importance for the relationship between private investment and the remaining variables.

All variables remain to be significant in explaining long run investment in both restricted and unrestricted VAR representation. Considering results of restricted cointegrating vector RPSCR, REER, DCI, and RGDP exerting significantly and positively long run impacts on private investment, where as the remaining have significantly and negative impacts on private investment. All variables remain to have significantly positive impacts on real private investments.

5.2 Discussion and Presentation of the Model Result.

5.2.1. Real Output and Private Investment

The real output, represented in terms of real gross domestic product, report a significant direct long run effect on private investment over the period of the study. The magnitude of this effect is nearly 0.44 it is smaller than related results found for developing countries, real output coefficient appears to be close to unity in Blejer and Khan (1984).

The result suggests that there is a direct relationship which means that an extra dollar of real GDP would increase private investment expenditure by 0.44 dollar. The positive significant relationship between real output and private investment provides evidence for the validity of the accelerator principle hypothesis, which proposes investment is proportional to change in out put. Thus, it can be argued that expansion of the production capacity of the economy will stimulate private investment and this can be magnified by exploitation of the economies of scale in the productive sector of the economy in the long run that exerts a positive impact on private investment. This finding is similar with the findings of (Badawi, 2003 and 2005 for Sudan, Ouattara, 2005 for Senegal; and Ellis, 1998 for Namibia; Green and Villanueva, 1991 for developing countries).

5.2.2. Real Exchange Rate, Devaluation and Private Investment.

Persistent devaluation and depreciation of the domestic currency has impacted private investment positively. This is indicated by the long run elasticity of private investment with respect to real exchange rate, which exerts positive significant. The magnitude is 0.43. This result is consistent with (Asemerom, 1997 for the case of Ethiopia; Workie, 1997 for the case of Ethiopia; and Harupara, 1998 for the case of Namibia).

The arguments for real devaluation confirm that devaluation of currency will increase private investment by increasing the price in local currency. Real devaluation revealed that decreased real user cost through the replacement or supply price of factors of production and there by affected profitability and investment positively. This shows that the positive effect has dominated any long-run negative effects on investment through the increased market value of assets of firms in export and import substitution industries; this is also because of expansion of traded goods in the economy.

The transmission mechanism in the case of Ethiopia may be explained, as the devaluation of a currency will increase in the price of tradable. This increase in the price of tradable in turn will enhance the export of items through the official channels. That is smuggling will be reduced, as a result supply of exportable commodities through the official channels have increased. This in turn will increase the foreign exchange earnings of the government, provided that the international price of such tradable does not decline. The expansion in export due to devaluation will lead to a rise in the relative price of domestic tradables. This may cause a decline in domestic consumption.

5.2.3. Real Interest Rate and Private Investment.

The long-run elasticity of investment with respect to real interest rate is found statistically significant and negative with a magnitude of nearly 0.018. This elasticity is small compared to results found for other coefficients.

Results for real rate of interest also appear to be interesting in light of considerable theoretical and empirical evidence. Some researchers made significant empirical contributions to a negative relationship between real interest rate and private investment in developing countries. In this study real interest rate has exerted negative and significant impact on private investment. This long run relationship between private investment and real interest rate supports neoclassical proposition, where interest rate is treated as user cost of capital.

This indicates that cost of funds does matter to private investors when they make decision regarding expansion in fixed assets. The low elasticity contribution of interest rate on private investment suggests that financial deepening will play a dominant role in financial liberalization for Ethiopia. Therefore, one may conclude that financial deepening is more important in stimulating private investment in Ethiopia.

5.2.4. Public Investment and Private Investment

The over all net effect of public investment on private investment during the study period (1970/71-2004/05) has positive long-run elasticity. The finding supports crowding in hypotheses. The reported magnitude is nearly 0.68. This implies that different categories of government investment may have had different impacts; the long run over all effect has been

positive. In other words, the crowding in effect is found to be sufficient to outweigh any crowding out effect. This crowding in effect may be due to the expansion of public services like infrastructure that reduce the cost of production of the private sector. Public investments as such have a direct complement to the output produced by the private sector. Moreover, crowding in effect of public capital on the marginal productivity of private investment is because public capital spending is on education and health, which may enhance the productivity of labor. Other components of current public spending such as on the enforcement of property rights and legal aspects can also improve the productivity of private investment. This confirms similar findings by Shiferaw (2002) in Sub Saharan countries, Cardoson (1993) in six Latin America countries and Ouattara (2005) in Senegal.

5.2.5. Credit to Private Sector and Private Investment

Credit to the private sector reports a positive long run effect on private investment, indicating that private investment has been moving in the same direction as banking sector credit flows. The long run elasticity is highly significant with elasticity of 0.46. This indicates credit to the private sector exerted a significant impact on private investment in Ethiopia.

The results also may imply that cost of funds does matter to private investors when they make decision regarding the expansion in the fixed assets. Generally, the theory suggests that, over all, credit has a predictable and positive effect.

5.3. Vector Error Correction Model (VECM)

The cointegrating vector β in table (5.6.) can be written as

CIa= 1.00 * LnRPINV +0.68* LnRGINV +0.46 * LnRPSCR +0.43 * LnREER +

0.44 * LnRGDP -0.18* RINT..... [7]

Equation [7] describes the error correction terms that enter short-term equations. It also embodies restricted long run stationary relationships; short term dynamics or the I(0) system comprises of six equations of changes in RPINV, REER, RGINV, RPSCR, RGDP, and RINT conditioned on uncertainties proxied by general inflation (GINF) of the country, volatility of real GDP growth rate (RGDPGr) and volatility of terms of trade (VTOT). Also the cointegrating vector CIa lagged one period appears on the right hand of six equations. The system is estimated by unrestricted ordinary least squares and results are reported in table (5.7). Since all variables in the I(o) system should be stationary. Changes in general inflation, volatility of real growth rate of GDP and TOT should enter the system.

Macroeconomic instability is proxied by variance in the terms of trade and real GDP is measured by fitting an Auto Regressive Conditional Heterosecdasticity (ARCH) model to terms of trade and real GDP.

The GARCH representation of the terms of trade reflects the fact that the particular measure is conditional variance of the terms of trade rather than the unconditional one, in the sense that the concern here is fluctuation of the variable around a predicted future path rather than fluctuation around an average (for detail see appendix).

Table5.7. Short - Term Dynamics

Variables	ΔRPINV	
Constant	-6.96	(0.433)
$\Delta RPINV_{t-1}$	-0.98	(0.001)
$\Delta RGINV_{t-1}$	-0.80	(0.09)
$\Delta RPSCR_{t-1}$	0.17	(0.51)
$\Delta REER_{t-1}$	0.39	(0.51)
$\Delta RGDP_{t-1}$	3.89	(0.04)
$\Delta RINT_{t-1}$	0.02	(0.03)
CIa_{t-1}	-0.61	(0.07)
$GInf_{t-1}$	0.001	(0.4)
$\Delta RGDPGr_{t-1}$	-37.9	(0.09)
$\Delta VTOT_{t-1}$	-0.18	(0.79)

t – Probability in parenthesis

In the private investment equation lagged change in RINT reports positive and significant coefficient at 5 percent level of significance. The favorable impact of high real interest rate may be a result of a short-term transmission mechanism similar to the one described by McKinnon and Shaw (1982). The coefficient on the lagged change real interest rate shows that, holding other variables constant a percentage change in the lagged change of real interest will increase private investment by about 0.02 percentage points. The small contribution of interest rate in private investment suggests that financial depending will play a dominant role in finical liberalization for Ethiopia.

The lagged change in government investment also report significant at 10 percent level of significance and has negative sign. This negative impact on the past may exert a negative externality on private investment activities. The past government investment may create negative externalities on the current private investment or the past government investment had a memory effect.

The lagged residual, CIa_{t-1} representing the error correction term, is expected to have a negative sign as it captures the process by which agents' adjusts to the long run equilibrium. The feed back of long run relationship between private movement and right-hand variables (CIa_{t-1}) reports negative and significant impact at 10 percent level of significance on the change in real investment. The result suggests that agents adjust for expectational errors about the equilibrium relationship in the previous period. This is shown by the elasticity coefficient, which implies that there is a 61% feed back from the previous period into the short run dynamic process.

The lagged change in the credit to private sector (RPSCR) and real effective exchange rate (REER) have a positive but insignificant impact on private investment, at 10% level of significance.

Private investment was lagged more than one period back, possibly to capture further loss of the regressors that could not be included in order to preserve degrees of freedom, given the limited sample size. The coefficient of one period back, may also suggest that investment projects undertaken in the past can exert a negative externality on private investment activity in that it exerts negative effect on private investors perceptions about the investment climate and benefits accruing from investment.

An increase in lagged change real output exerts a positive impact on the change in private investment as it is significant at the 5 percent level of significance. Thus expansion of the production capacity of the economy will stimulate private investment.

There is no significant relationship between general inflation and private investment in the case of Ethiopia for the study period as Shiferaw (2002) found for Sub-Saharan Africa.

Conditioning variable (VTOT) reports insignificant effects on private investment although they all appear with theoretically justifiable negative signs. The unexpected insignificant short term effect of macroeconomic uncertainties (VTOT) on private investment may be explained by the contention Solimano's (1998). The contention is insignificant of the uncertainty variable may reflect the variable's lack of correspondence to changes in fundamental variables, though the VTOT could be significant to the VAR system as a whole.

Real GDP volatility reports negative and significant effect on private investment. As noted in the literature of the macroeconomic performance of Ethiopia, RGDP growth performance has been slow with an average growth rate of 4 percent per annum during the last four decades. The heavy dependence of the Ethiopian economy on agriculture can further deter the growth of the economy for this sector depends fully on rain that is uncertain. This uncertainty in growth of the economy will have a negative impact on the over all investment.

CHAPTER SIX

CONCLUSION AND POLICY IMPLICATIONS

6.1 Conclusion

This study identifies the major determinants of private investment as being, public sector investment, credit to the private sector, real GDP growth, Real exchange rate and macroeconomic uncertainties proxied by volatility in terms of trade, general inflation and volatility RGDP.

Public investment appeared with a positive impact in long run estimations. This suggests that the current Ethiopian government has undertaken undertook investment projects (notably infrastructural) that were complementary to the private sector development; the crowding in effect has been enough to outweigh the impact of crowding out effect. The positive impact of public investment on private sector investment supports the crowding in hypothesis in Ethiopia.

The volume of credit granted to the private sector has proved to be one of the major determinants of private investment accumulation in Ethiopia. Real banking sector credit to the private sector investment has a positive and significant impact indicating that private investment has been moving in the same direction as banking sector credit flows.

Private investment is positively related to real output both in the short run and long run. The positive significant relationship between real output or demand and private investment provides evidence for the validity of the hypothesis that the accelerator principle does explain private

sector investment. The positive long run impact of real output on private investment may be due to the exploitation of economies of scale.

Real interest rate reports a negative and significant impact on private investment in the long run and this negative relationship between private investment and real interest provides evidence for the validity of the neoclassical theory of investment hypothesis. But, private investment is positively related to real interest rate in the short run.

Depreciation of the exchange rate stimulates private investment in Ethiopia both in the long run. The positive impact of depreciation in the domestic currency on the private sector investment may contribute to the appropriateness and relevance of devaluation policy. A possible scenario for an expansionary devaluation in the long run, which is the positive effect of a permanent real devaluation of the market value of capital in the traded sector, is dominant over the negative effect on replacement price of capital goods. This takes place as the relative size of the traded goods sector in the economy increases.

Finally, macroeconomic instability, proxied by the variability of the inflation rate and terms of trade has insignificant and positive impact on private investment. However, real GDP volatility has significant and negative effect with theoretically justifiable negative signs on private investment. Conditioning variable, Real GDP growth reports negative and significant effect on private investment. This is because macroeconomic performance of Ethiopia in general, RGDP growth in particular is characterized by fluctuation in rates and the growth is mainly dependent on the rainfall. This variable growth of the economy has a negative impact on the investment.

6.2. Policy Implications

The findings of the study suggest that the Ethiopian government should adopt a well planned privatization programme that will lead to the privatization of public corporations that are directly competing with the private sector in the productive of the economy.

The privatization programme that the government of Ethiopia has launched in early 1990s seems to be a step in this direction, though it suffers several shortcomings. Moreover, Ethiopia has recently embarked upon a commercialization programme which converted public corporations such as Ethiopian Airlines, Telecommunication corporation, Ethiopian Electric power corporation and postal agency into parastatals, the government has to play actively and see to its transparency and efficiency prevail.

If private sector is to play a predominant role in economic growth and development; it must receive the greatest share from the volume of domestic credit. In this regard, the banking and financial institutions should devise mechanisms that will enable them to render the services efficiently even to investors in small scale industries in remote areas, because commercial banks are normally concentrated in the major towns of the country to date. Informal financial arrangements have served as sources of finance to small and medium scale investors. Thus, efforts should be directed on upgrading informal financial arrangements and strengthening their links with informal institutions, commercial banks of Ethiopia that have support to large numbers of clients. The policy implication of reducing financial constraint on the private sector development should therefore address a credit expansion within a comprehensive framework that incorporates a complete set of monetary, institutional and prudential objectives and which

strikes at the same time an appropriate balance between inflationary forces and expansion in the bank advances to the private sector.

The real interest rate normally is not expected to play a significant role in decision making about credit obtained from financial institutions in most developing countries, since it is set by governmental authorities (Shiferaw, 2002). The regression results showed a negative impact on private investment of an increase in real interest rate in the long run, but there is positive relation ship between real interest rate and private investment in the short run, though its coefficient is small. This result implies that private investors are sensitive to increases in the real interest rate.

Financial institutions do not seem to provide 'sufficient' starting up capital for investment projects and this together with high real lending rates and especially high information costs have inhibited private investment in Ethiopia. Liberalization endeavors may imply efficiency gains by allocating financial resources efficiently to borrowers, thereby inducing productivity expansions. However, increasing interest rates and cost of funds may cause a quantitative decline in private investment. A balanced policy action of price liberalization on both deposit rate and lending rate should, therefore be viewed as motivating private investment expansion together with reducing information cost of private investment projects and finical institutions.

The effect of devaluation found to be positive in the long run. The result suggests that real exchange rate should be depreciated toward a more depreciated equilibrium level in order to improve the trade compositeness of the economy. But there supporting this regression result will be suspicious because Ethiopia is one of the highest net importing countries in both capital goods and consumer goods. Therefore, extensive devaluation may have deleterious impact on

private investment. To avoid this problem government should follow blend of expansionary monetary policy (consistent with contentions for government capital (public investment) and credit (see above)); and contractionary public capital spending. Contraction in capital spending should pay special and cautious attention to the nature of different categories of government capital and their implication or the private sector investment, while cuts in recurrent expenditure should consider any potential plummeting in aggregate demand and output and their impacts on private investment through the accelerator effect.

Finally, the validity of accelerator principle suggests the quantity of domestic out put should be expanded, as it will increase the profitability of the firms, especially those that are producing tradable goods. This can be enhanced through the provision of the right incentives to the private sector such as by improving trade competitiveness, tax polices, trade polices and key price in the economy. Moreover, this can be enhanced through development of infrastructural sector such as by expanding road construction, telecommunication, electrification, private Medias, etc.

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APPENDIX

Annex: A Reduced Form Equation Derivation of the Aggregate Capital Stock Model

According to a flexible accelerator investment model which begins by assuming that the desired capital stock is proportional to the level of expected out put.

$$k_t^* = \alpha y_t^e \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad [1]$$

Where k_t^* is the desired capital stock by private sector in period't'. y_t^e, is expected level of output, that can be thought of as future aggregate demand in period t and α constant (i.e. capital output ratio).).

$$\beta\ (k_t - k_t^*)^2 + (1-\beta)\ (k_t - k_{t-1})^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [.2]$$

Where k_t is the actual private capital stock, the first term indicates the cost of disequilibrium, and the second term the cost of adjustment with respect to k_t yields a partial adjustment mechanism like the following.

$$(k_t - k_{t-1}) = (\beta)\ (k_t^* - k_{t-1}) \qquad 0 \leq \beta \leq 1 \quad \ldots\ldots\ldots\ldots\ldots\ldots [3]$$

Where β is the coefficient of the adjustment, and the equation indicates actual private capital adjusts to the difference between desired private capital in time't' and actual private capital in

the previous period because the data on capital stock are not available for most developing countries, we can make use of the gross private investment definition which is expressed.

$$RPINV_t = (k_t - k_{t-1}) + \delta k_{t-1} \quad \text{..... [4]}$$

Where δ the depreciation rate of private capital stock and $RPINV_t$ is gross private investment. Rearranging, we get

$$RPINV_t = [1 - (1-\delta)\,L]\, k_t \quad \text{..... [4a]}$$

Where L is lag operator and $L k_t = k_{t-1}$

Also, for empirical purposes, the partial adjustment mechanism equation [3] can be specified in terms of $RPINV_t$ as

$$RPINV_t - RPINV_{t-1} = \beta\left(RPINV_t^* - RPINV_{t-1}\right) \quad \text{..... [5]}$$

To add more dynamics to the specification, we assume that economic factors that influence the desired level of investment affects the speed of adjustments at which the gap between the desired and actual gross private investment closes up in each short run period. Hence, linear representation of β can be defined as follows:

$$\beta = \alpha_\circ + \left(\frac{1}{RPINV_t^* - RPINV_{t-1}}\right)(\gamma X_t) \quad \text{.....[6]}$$

Where α_o is the intercept and X_t is vector of the relevant economic factors that influence the desired level of investments. An implicit assumption equation [6] is that lagged effects of these variables on private investment are also captured by the coefficients of adjustment. For example if credit to private sector enhances to private investment to its actual level, and vice versa.

Substitute equation [6] into equation [5] and rearranging, we get

$$RPINV_t - RPINV_{t-1} = [\ \alpha_o + \left(\frac{1}{RPINV_t^* - RPINV_{t-1}} \right)(\gamma X_t)\ ] RPINV^*_t - RPINV_{t-1}$$

$$RPINV_t - RPINV_{t-1} = \alpha_o (RPINV_t - RPINV_{t-1}) + \gamma X_t \ldots\ldots\ldots\ldots [7]$$

Note that equation [4a] in the steady state is given by

$$RPINV_t = [1 - (1 - \delta)\, L]\, k^*_t \ldots\ldots\ldots\ldots\ldots\ldots [8]$$

Inserting equation [1] into [8] and resulting equation in to [7] and rearranging, we obtain the following equation for private investment.

$$RPINV_t = a\alpha_0 [1-(1-\delta)L] Y_t^e + \gamma X_t + (1-\alpha_0) RPINV_{t-1} + \mu_t \ldots\ldots\ldots [9]$$

In this form, the model is quite flexible because it allows private investment to be specified not only as function of the expected level of real output but also relevant variables. The preferred equation will be derived from a specification search selecting a parsimonious model from larger set of explanatory variables.

Equation [9] however, is not in already estimateable from it contains unobservable factors that need to be measured for proxy for expected output. In equation [9] which is unobservable, there are varieties of ways of generating it. this thesis use the adaptive expectations model (Cagan, 1956 cited in Akpokodje, 1997) and it is a common practice is to fit an autoregressive process, from which the predictable values are taken to represent expected out put 0r, in which expected out is assumed to respond to the error between actual out put and that was expected in the pervious period, However the first method requires a large set of time series data. Therefore, in this study, a first order regressive model, AR (1) of the logarithm of real GDP is estimated (Beljer and Khan, 1984).

Annex: B. Measuring Uncertainty and Instability

Several methods for the measurement of uncertainty have been proposed in the literature. However, as Serven (1998) and Denn (2000) argued, the uncertainty measures obtained from either the sample variation (variance or standard deviation of a variable in equation) or estimation of a univarate autoregressive specification have their short comings. The former approach does not allow unpredictable components to be distinguished. Estimating the predictable movements from the previous values of the stochastic variable in equation tends to overstate the level of uncertainty. The latter approach distinguishes between predictable and unpredictable shocks but implicitly assumes that these components do not vary overtime. However, may be greater during the bad than the good states of the economy and thus vary overtime in a systematic way.

Given these criticisms, the generalized autoregressive conditional hetrosecdaticity specification (GARCH) has become popular way to model volatility because not only separates out the predictable and unpredictable component been also allows for heterosecdasticty in the unpredictable components. Following the studies by, Serven (1998), and Dehn (2000), simple univariate models of GARCH (1.1) is specified to obtain uncertainty measures

$$X_t = \Phi_0 + \Phi_1 t + \Phi_0 X_{t-1} + \nu_t = 1, \ldots . T$$

$$\sigma^2 = \eta_0 + \eta_1 \nu^2_{t-1} + \eta_2 \sigma^2_{t-1}$$

Where $\nu_t \square N\left(0, \sigma^2{}_t\right)$ and $\sigma^2{}_t$ shows the variance of ν_t conditioned on information set up to period t. The fitted values of the conditional variance provided a proxy for uncertainty.

At this point, another important issue is to determine in the above equation, what variable may be viewed as a source of or an indicator of uncertainty and in this study the rate of inflation, output growth, and terms of trade are used as main indicators of over all macroeconomic instability. First the conditional variances of these variables are obtained by estimating the above GARCH process. Second, following the analysis of Serven 1998, a summary measure of uncertainty is constructed using the conditional variances of the variables as volatility measures. To this end, a principal component analysis is carried out.

Annex: C. Definition of Variables.

LnRPINV and LnGINV: Natural logarithm of real private and public sector investments. Private sector fixed capital formation is aggregate of corporate expenditures on construction and building, transport and equipment, and machinery and equipments. Public sector capital expenditures are the sum of public enterprises and government (central and regional) capital investment on construction and building, transport and equipment, and machinery and equipments plus spending on land improvement and plantation development(for example ,expenditure on irrigation and flood controls; and reclamation and clearing].

RGDPGr: Output growth rate is the rate of growth of the value of out put of final goods and services produced within the country.

LnREER: Natural logarithm of Real exchange rate is computed as $RXR_t = \frac{E_t}{GDPD_t} \Big/ \frac{1}{XUV_t}$, Where E is the average of official and market nominal rates, GDPD is gross domestic product deflator, and XUV is export unit value or export price in industrialized countries. The latter index stands as a proxy for the foreign price of Ethiopian imports. An increase in the real exchange rate RXR is equivalent to a real devaluation or depreciation of the Ethiopian Birr, while the opposite is equivalent with real appreciation.

RIR: Real interest rate is computed as $RIR_t = \left[1 + LR_{nom} \Big/ 1 + INF\right]^{-1}$ where LR is commercial banks nominal lending rate and INF is expected rate of inflation, with both divided by 100. Expected inflation is based on dynamic expectations about inflation rate where expected inflation is a geometric distributed lag function of current and lagged values of rate of inflation

$$E_t\left(\pi_{t+1}\right) = \sum_{i=0}^{\infty} \rho^i \pi_{t-i} \qquad where\ 0 < \rho < 1$$

RPSCP: Credit to private sector refers to loans, treasury bills and other monetary instruments granted by financial institutions to private sector.

TOTV: Terms of trade volatility. Terms of trade is obtained by dividing the export price index by the import price index

GINF: General Inflation volatility is calculated as the annual increase in the consumer price index

RGDPV: real growth rate volatility, like TOTV and INFV the instability measured by fitting an autoregressive conditional hetroscedasticity to real exchange rate, real growth rate ,terms of trade and inflation respectively .