



JIMMA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

**EXPORTS, DOMESTIC DEMAND AND ECONOMIC GROWTH IN ETHIOPIA:
GRANGER CAUSALITY ANALYSIS**

BY

SORESSA TOLCHA JARRA

JUNE, 2013

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A Thesis Submitted to the School of Graduate Studies of Jimma
University in Partial Fulfillment of the Requirements for the Degree
of Masters of Science in Economics (Economic Policy Analysis)

JUNE, 2013

JIMMA

Declaration

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

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ACKNOWLEDGEMENT

First and foremost, I would like to thank the Almighty God and his mother St. Mary for giving me Patience, strength and courage to overcome all the difficulties that I went through in the pursuit of a course of studies leading to the award of a Master's of Science in Economics. I would like to express my heartfelt thanks to my advisors, Dr. Zenebe Gebreegziabher and Mr. Belayneh Kassa for their invaluable scholastic support and other assistances they provided me in developing this thesis.

I extremely indebted to Emaye, Abaye, our little sister (Meseret), My brothers Gatachew and Tesfaye and all the rest of the family members; really I love you all! It is because of the heartfelt scarification you paid that I am here today! Unforgettable warmest appreciation also goes to my aunts and extended relatives for all of their support.

I would like to extend many thanks to my instructors and friends who assisted or encouraged me in one way or another and these include, but not limited to Fikiru Alemayehu, Tofik Siraj, Qixessa Delessa and Dereje Asefa.

I never forget the friendship and companionship of all my class mates that I always remain for all of their kind cooperation. Thanks you all!

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LIST OF ACRONOMY

AD	Aggregate Demand
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
DD	Domestic Demand
DDLG	Domestic Demand Led-Growth
ED	External Demand
EEA	Ethiopian Economic Association
ELG	Export-Led Growth
EPRDF	Ethiopian Peoples Revolution Democratic Front
FDI	Foreign Direct Investment
GCE	Government Consumption Expenditure
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
HCE	Household Consumption Expenditure
HIC	Hannan-Quinn Information Criteria
IMF	International Monetary fund
IS	Import –Substitution
LDCs	Least Developed Countries
LL	Log Likelihood Information Criterion
MoFED	Ministry of Finance and Economic Development
NBE	National bank of Ethiopia
OECD	Organization for Economic Cooperation and Development
SIC	Schwarz information criteria Information Criterion
SSA	Sub-Saharan Africa
TGE	Transitional Government of Ethiopia
VAR	Vector Autoregression
VECM	Vector Error correction Model
WB	World Bank
WDI	World Development Indicators

ABSTRACT

Fundamental relationships between different macroeconomic variables may follow certain common theories but local preferences are also decisive in determining their behavior since, macro economy of every country is unique and they need to be treated after considering their peculiarities. In this regard, looking into domestic demand-growth nexus and export-growth nexus are, therefore, needed in order to understand the long -run economic stance and to capture the short-run dynamics in the national economy as well as to find evidence about the source of economic growth. However, the causal relationship between exports, domestic demand and economic growth in Ethiopia has not received adequate attention. Therefore, the aim of this study is to find a causal relationship between export, domestic demand and economic growth in Ethiopia using time series data over the period 1960/61-2010/11. This study uses two measures for domestic demand, namely household consumption and government consumption. Granger causality and Johansen cointegration test are employed in the empirical analysis. Result of Johansen cointegration test indicates the existence of long run relationship among the variables. The result of Granger causality test shows that there is a dynamic relationship between export and economic growth and between domestic demand and economic growth. Export and domestic demand are important for economic growth as well as, economic growth have an impact on export and domestic demand in Ethiopia. A successful and sustained economic growth requires growth in both export and domestic demand. Nevertheless, a balance emphasis should be to domestic demand to push the economy towards higher growth path.

Key words: Domestic demand, Ethiopia, Exports, Granger causality

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Any development model starts with the key factors that determining economic growth. In this regard, we have an admirable Keynesians macro economic theory that suggests aggregate demand as the source of growth. Broadly, aggregate demand is categorized into domestic demand and external demand. It was primarily generated from the Keynesian theory of demand, either or other wise to follow export promotion or internal market development for economic development of a given country. The former focuses on external demand (trade), while the latter highly stresses on the domestic demand. Thus, by focusing on different forms of demand, the two strategies implicitly admit the strength of ‘effective demand’ on economic development as articulated by the Keynesian theory of demand in Keynes’ General Theory (1930).

Growth is termed as export-led growth if the attainments of a high rate of export growth go with a high GDP and income growth rate. If an increase in economic growth leads to increase in export it is called growth-led export. On the other hand, growth could be termed as domestic demand-led, if the growth of GDP is mostly influenced by growth of domestic demand and the role of export is relatively weaker. Moreover, if an increase in economic growth lead to increase in domestic demand it is called growth-led export. Naturally, the direction of causality is crucial for the choice of the growth strategy. Literature tries to assess the nature of the relationship between exports, domestic demand and economic growth, but hold different views on the existence and direction of causality. Moreover, there are debates among economists concerning which demand is more superior and especially which demand is more favorable for LDCs to enhance their long-run economic growth.

The period 1970s has been the most important schema about hastened economic growth in economic policy formulation for developing countries in general and Sub-Saharan Africa (SSA) in particular. External sector (trade) has been one among the agendas in which focus has been given. In the modern sense, the view that openness is the driving force to economic growth is

part of the “Washington Consensus”¹ (1980s). Following the consensus, particularly developing countries have been given much attention for external trades in order to improve their economy. The main purpose of trade policy reform over the period 1980s was to promote economic growth by consolidating the static and dynamic gains from trade through a more efficient allocation of resources, greater competition, an increase in the flow of knowledge and investment, and ultimately, a faster rate of capital accumulation and technical progress (Paulino and Thirwall, 2004). In addition, Bhagwati (1988) argued that export-led growth leads a win-win approach for both developing and developed countries in many ways. All benefits from the global application of comparative advantage. While, developing countries get additional benefit such as transfer of technology, knowledge and best practice, industrialized economies benefited from international competition.

However, there is no general consensus whether export-led growth is supported or otherwise. The successes of East- and South-Asian countries using export-led growth strategy to bring about economic growth were just too compelling and convincing in many aspects. Thus, the only way out for African countries is to wholesomely copy this model (Beri, 2009).

This has not been the case for Africa. The last four decades have been a period of bust and boom. A more worrisome development is the fact that the composition of Africa’s exports has remained essentially unchanged in favor of primary products. Dynamic and competitive regions have made major shifts to manufacturing. Africa has been gone behind and the task of catching up with western economies is harder. On the other hand, SSA does not produce enough goods to trade, at least not of the right kind or quality, or at the right price (Hammouda, 2004).

Palley (2011) stressed that developing countries need a new model of development. In view of the shallow and exploitative characteristics of the export-led growth model, developing countries must look into growth based on internal market development. Palley proposed domestic demand-led growth (DDLG) strategy as an alternative to export-led growth strategy.

¹ The Washington consensus emphasizes five key policies: (1) trade liberalization and export-led growth, (2) financial market liberalization and financial capital mobility, (3) fiscal and monetary austerity, (4) privatization, and (5) labor market flexibility.

For the past three decade emerging economies have relied on export-led growth as a driver of their development. Now, as the global economy struggles to getaway the shock of the recession, many emerging economies are hoping for a continuation of that pattern. That hope stands to be disappointed, however, because the conditions that supported export-led growth are exhausted. The global economy is now characterized by a structural shortage of demand and intense competition between emerging economies. In such an environment, export-led growth cannot work for emerging economies as a whole. The solution is to shift to domestic demand-led growth (Palley, 2011).

There is a role played by export in the growth performance of Ethiopia economy. It generates foreign exchange earning that is essentially used to finance imports of intermediate inputs, fuel and capital goods and others that are believed to be essential for the economic growth of the country (Gemechu, 2002). World Bank (1987) classified Ethiopia as one of the strongly inward oriented countries during the periods of 1963-73(Imperial regime) and 1973-85(Dergue regime). Despite the tariff and non-tariff protections, this strategy hadn't performed well. This was due to the fact that the import competing industries had been at their rudimentary stage and infant. The Transitional Government of Ethiopia (TGE) who came to power in 1991/92 launched a new economic policy where the role of exports to economic growth was given due importance in the development strategy of the country. However, due to sluggish performance of the sector with the combination of the structural problems existing in the whole economy, the export supply response to the policy change had not been as anticipated (MEDaC, 1997).

Moreover, macro economic theory proves that apart from export, domestic demands are also the cause for economic growth. Seyoum and Ferede (2004) argued that private consumption is by far the largest component of the demand side of the Ethiopian economy. They argued that, given the low level of average incomes, private consumption concentrated on agricultural products by rural household is higher than urban. The bulk of this expenditure is made on food items. For rural households, this leaves only slightly more than a quarter of total consumption expenditure for non-agricultural products. Moreover, government spending is another important component of domestic demand that influences economic growth. The above arguments signify that looking at a causal relationship among export, domestic demand and economic growth is required to have a better understanding about growth strategy.

1.2 Statement of Problem

The common knowledge in Keynesian macroeconomic context is that, rise in final demand (domestic and external demand) is the key driver in stimulating aggregate expenditure and subsequently fueling economic growth.

Rapid export growth has been an important feature of East Asia's remarkable record of high and sustained growth. In particular, the wave of growth in the four tigers (Hong Kong, South Korea, Singapore and Taiwan) and the Newly Industrialized Countries (such as Indonesia and Thailand) has been used to support the argument that carefully managed openness to trade through an export-led growth strategy (ELG) is a mechanism for achieving fast growth. The experiences of these countries have provided the evidences that ELG strategy can lead to growth (Todaro & Smith, 2006). Nevertheless, practical evidence in support of export-led growth (ELG) may not be universal.

As opposed to external trade the domestic demand is also very much important for economic growth. In reality, domestic demand, measured by private consumption, government spending and investment are the cause of economic growth. Mainly, changes in consumer demand have been the key factor in determining the economic growth in both developed and developing countries as consumption is the biggest expenditure category in almost all economies and constitutes 70-80 percent of aggregate demand (Aslanoğlu et.al, 2009).

It is expected that fundamental relationships between different macroeconomic variables may follow certain common theories but local preferences are also decisive in determining their behavior. Thus, macro economy of every country is unique and need to be treated after considering their peculiarities (Amin and Rahman, 2010). One of the macroeconomic variables is export. Export is always remaining important for growth, enabling the countries to pay for imported capital goods and other essential resources that have multiplier effects on the overall economic wellbeing. In addition, domestic demands are also very much important for long run growth path of the economy. Looking into domestic demand-growth nexus and export-growth nexus are, therefore, needed in order to understand the long -run economic stance and to capture the short-run dynamics in the national economy as well as to find evidence about the source of economic growth.

However, there is no solid consensus among previous studies concerning to the causal relationship between domestic demand, export and economic growth in developing countries. Felipe (2003) argued that Asian countries are better off by following export-led growth rather than domestic-led growth, since export causes growth more than domestic demand does. Chimobi and Uche (2010) in Nigeria argued that in the short run and long run both exports and domestic demand cause growth and as the result they supported, export-led growth and domestic demand led-growth. Lai (2004) in case of Malaysia supported export-led growth and domestic demand led-growth in the short-run but only domestic demand led-growth in the long run.

Short-run and long-run causal relationships among macroeconomic variables such as aggregate demand would find their way into policy formulation at various levels of government. Nevertheless, with the exception of few attempts, an analysis of the causal relationship between exports, domestic demand and economic growth in Ethiopia has not received adequate attention. Tegenu (2011) examined “export-led growth or domestic demand led-growth for Ethiopia”? However, his analysis focuses on paradigm shift of policy. Biramo (2012) also analyzed the effect of export-led growth strategy (ELG) on Ethiopian economy and argued that export causes economic growth and the reverse causality is not true. But, his study did not incorporate domestic demand.

Owing to this fact and eventually to fill the gap, this study tries to deal with causal relationship between domestic demand, export and economic growth under definite condition of Ethiopian economy. To the best of my knowledge, there are no previous studies addressing the issue at hand. Consequently, this study tries to find out such relationship in Ethiopia using cointegration techniques and Granger causality tests. The matter is an empirical issue. The paper doesn't provide complete alternatives development strategy; the bigger exercise.

1.3 Research Questions

Accommodative policy environments of domestic demand have continued to support economic activity in Africa in general and in Ethiopia in particular. Relatively flexible domestic demand and robust export growth in Ethiopia are expected to strengthen economic growth and foster economic development. In line of the above arguments, this study tries to address the following questions.

1. Is there any long run equilibrium relationship between domestic demand, export and economic growth?
2. Does domestic demand matter for economic growth?
3. Is there evidence to support domestic demand-led growth and/or export –led growth?
4. Is causality between domestic demand and export, and economic growth uni-directional or bi-directional?

1.4. Objective of the Study

The major objective of the study is to examine causality among export, domestic demand and economic growth in Ethiopia. Specifically, the objective of this study is to:

1. Test the existence of short run or long run relationship among export, domestic demand and economic growth
2. Test for short-run, long run and overall causality between export, domestic demand and economic growth
3. Find out the relative importance of domestic demand and export for economic growth.

1.5 Hypothesis of the Study

Based on the empirical literature, the study sets three hypotheses that might hold to be true in testing the causality and cointegration.

Hypothesis 1: There is only short run relationship among, export, domestic demand and economic growth

Hypothesis 2: There is bidirectional causality between export and economic growth and between domestic demand and economic growth in the short run, long run/overall.

Hypothesis 3: Export and domestic demand has no significant effect on economic growth.

1.6 Scope and Limitation of the Study

This study attempts to analyze exports, domestic demand and economic growth nexus in Ethiopia for the time spanning from 1960/61 to 2010/11. However, it does not go forth to examine the complete alternative growth strategy of the country. Household consumption and government consumption is used to measure domestic demand. The limitation of this study arises from the inconsistency of data reported by different institutions.

1.7 Significance of the Study

This paper is used to widen the outlook for policy making and expected to be used as input for a more coherent approach to policy prescription regarding to final demand and economic growth. The literature on the nexus between export, domestic demand and economic growth in developing countries is very limited and hardly found in case of Ethiopia. Thus, this paper is expected to make contribution to the existing literature.

1.8 Structure of the Paper

This paper contains six chapters. The road map for the paper is as follows: The first chapter deals with introduction which encompasses background of the study, statement of the problem, research questions, objectives, hypothesis, delimitation & limitation and significance of the study. Chapter two provides review of pertinent literature while the third chapter summarizes the macroeconomic performance of Ethiopia, with special reference to domestic demand, export and economic growth. The fourth chapter presents model specification and methodology, chapter five deals with dish of the paper (findings). The last chapter concludes and forward policy implications.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

“Scientists, economists, and detectives have much in common: they all want to figure out what’s going on in the world around them. To do this, they rely on both theory and observation” (Mankiw, 2002). It is similar to say that based on what they see happening, they build theories through which an attempt was made to make sense. In order to evaluate the theories’ validity, they then turn to more systematic examination. After theory and evidence come into line, they feel do understand the situation.

This section substantiates the above argument by reviewing literatures on export-growth nexus and domestic demand- growth nexus from perspective of macro -economic theory in general and empirical evidences in particular.

2.1 Theoretical Review

Economic growth in a simple term is the increase in the national product in general. It is also possible to define economic growth as the increases in the real national product per capita. In economic growth, the concept of “Gross Domestic Product” is widely used. Since the nominal prices may hinder an accurate measurement of GDP, real values are taken into consideration in measuring GDP. GDP free from nominal values can reflect the real situation in a more accurate manner and will also give the opportunity to compare among years.

When we come to international comparisons, the per capita income matters more rather than the magnitude of GDP. While GDP measures the goods and services produced in an economy, it does not reflect the wealth increase of individuals in a society, since it does not take the population increase into consideration (Sloman, 2004)

In general, economic growth theory deals with long-run growth trend of the economy, or potential growth path (Branson, 2002). Early growth theories emphasized on different factors that lead to economic growth. For instance, Mercantilists emphasized surplus balance of trade, Physiocrats emphasized agriculture as the source of all wealth while the Cameralists favoured taxation and state regulation for strong economy (Lombardini, 1996)

Within the framework of the classical models of Smith and Malthus, economic growth is described in terms of fixed land and growing population. But without technological change, increasing population eventually exhausts the supply of free land and triggers law of diminishing returns which results in declining real wage down to subsistence level at which point Malthusian equilibrium obtains.

Barbosa et.al (1999) stated that, Mainstream growth models usually follow Say's Law and, accordingly, emphasize on the supply side of income growth through some sort of growth accounting. In such framework, however, there is no fundamental role for aggregate demand since, from the start; it is assumed that supply creates its own demand.

In contrast to this framework, Keynesian models usually follow the principle of effective demand and, therefore, give emphasis to sources of aggregate demand. Hence, in Keynesian models growth is a demand-led process. Accordingly, this demand is broadly categorized into external and domestic demand. In the literature domestic demand is best proxied by household and government consumption.

Household consumption expenditure covers all purchases made by resident households (home or abroad) to meet their everyday needs: food, clothing, housing services (rents), energy, transport, durable goods (notably cars), spending on health, on leisure and on miscellaneous services. Thus, by convention, apart from residence, all goods and services bought by households to meet their own everyday needs are recorded as household consumption. Government consumption is government acquisition of goods and services for current use to directly satisfy individual or collective needs of the members of the community.

In development economics, the literature has conventionally favoured the strategy of what has come to be termed "export-led growth" (ELG) strategy, which is characterized by the attainments of a high rate of export that would lead to a high growth in GDP. Of course, the extent to which export can still make a positive contribution to GDP growth depends on the relative strength of export vis-a-vis import growth (Chatterjee, 2008).

On the other hand, growth will be termed as domestic demand-led if economic growth is mostly influenced by growth of domestic demand. The subsequent discussions provide export-growth nexus and domestic demand growth nexus to have better insight about their relationship.

2.1.1 Export-Led Growth, Growth-Led Export and Feedback

As opposed to domestic demand-led growth, the support for the export-led growth strategy, which is a modification of the import-substitution strategy, has a long history. Starting from the early works of scholars such as Chenery and Strout (1966), and Balassa (1971), to the more recent research, including research based on endogenous growth theory (Lucas 1988; Romer 1990; and Barro 1991), provide a plenty of theoretical support for outward orientation as a circumstances for rapid and sustained economic growth. Moreover, the development experience of a number of East Asian countries since the late 1960s is often cited in the literature as evidence of success of this development strategy (Westphal, 1990; and World Bank 1993).

As a result, recently, one of the themes that development economists have given more focus is the relationship between economic growth and export achievement. There are two views among economists concerning the impact of export on economic growth. One group is supporting export led-growth hypothesis that export has positive and significant impact on economic growth. According to this group, growth in export would lead to economic growth mainly due to the fact that the economy drives positive externalities from the exposure of global market. The other group is those who have a series of doubt on such relationship. Even though, different views have been entertained, one could notice from aggregate demand, as export is the important factor attributing for GDP growth.

Staple theory of growth is the most power full export-based model that takes into account different outlooks how enhancement in export brings economic growth². Staple production necessarily uses natural resources intensively. Thus, the basic assumption of the staple theory is that; staple exports are the leading sector of the economy. That is, the export sector acts as a key propulsive sector, pushing the rest of the economy forward. It is a profitable primary commodity

² The staple approach to the study of economic history is primarily a Canadian innovation, the leading innovator being Harold Innis in his pioneering historical studies, notably of the cod fisheries and the fur trade (Grant and Watkins (1993)). A staple is a primary product that faces a large and growing demand in world markets, does not require elaborate processing, and has a high enough value-to-weight (volume) ratio to bear transportation costs.

export. Such an export industry may be established as a consequence of recent discovery, increased demand, cost-reducing technological change, or any combination of these.

The central concept of the staple theory, thus, is the impact of export activity on economy and society. In sum, the likely growth path of a staple economy is the following. Growth is initiated by an increase in demand for a staple export. If the spread effects are strong as the export sector grows so too will the domestic sectors. This will lead to increase in demand for factors such as capital and labour. Domestic slack, if it exists at all, will be quickly absorbed, and the continuation of growth will depend on the ability to import scarce factors. If the supply of foreign factors is elastic, the customary tendency for the expansion of one sector - in this case exports - to affect domestic sectors adversely by driving up factor prices is mitigated. (Watkins (1963)

By focusing on the productivity and growth of factor supplies, the supply driven model led by Cordon replaces the demand driven model of Staple growth theory. According to Cordon (1971) a nation benefited more if participating in international trade. Accordingly, the benefit of international trade are: static gain, rise in income, better capital accumulation, gain from substitution effect which is likely from fall in price of investment goods relative to consumption goods and factor weight effect; the productivity of labor and capital. This means export growth rise rapidly, if factor productivities are faster and more efficient.

According to the “balanced growth” principle, there exists a vicious circle in attaining self-sustaining growth. Rosenstein-Rodan (1943) and others quoted in (Gemechu, 2002) argued that:

“Firms did not industrialize because there was no market for their goods and there was no market for their goods because income was low and income was low because firms did not industrialize. This kind of low level equilibrium, it was argued, could be broken by the simultaneous industrialization of large part of the economy, and any failure to industrialize was essentially viewed as a coordination problem. Of course, exports, by breaking this circle of causation, could provide an important avenue for growth (Rosenstein-Rodan, 1943, p.1)”.

Alternatively, the “unbalanced growth” doctrine led by Albert (1958), of course by agreeing on the existence of vicious circle, argued that we need to concentrate on the selective sectors because the industrialization in some leading sectors would pull along the rest of economy.

So, what is most needed is not industrialization in the large number sector, rather in the leading sector. According to this principle it is this leading sector that is expected to bring industrialization in the rest of the economy through forward and backward linkage. Export, as a leading sector could start industrialization.

According to Chow (1987), export growth expands the limited domestic market potential, especially in the case of small open economy, and hence plays a significant role in achieving economic of scale needed for development of industrial sector. In addition to this, export growth links domestic economy with the global economies thereby, expanding the aspect of competition in the global market. So, whenever there is export, according to Chow factor productivities improved and finally economic growth attained.

Marshall and Jung (1985) argued that export growth causes real GNP growth for the following reasons. First exports that are based on the comparative advantage would allow the operation of economic of scale leading to efficiency gain and greater output. Second, growth in export is used to overcome the foreign exchange constraint through earning more and more hard currency and allowing the economy to purchase necessary intermediate goods for the domestic production purpose and hence, result in the growth of output. Third, export growth represents the growth of the demand for the product of the country, in which the economy is more stimulated to produce more to meet the increased demand and in turn help GNP to grow. In addition, Marshall and Jung (1985) argued for the causality running from growth to export as well (Growth Led-Export hypothesis). They pointed out that “internal growth mechanism better explains export growths rather than the reverse”.

According to Feder (1982) the economy consists of two different sectors: export and non-export. He argued that, marginal factor productivities are significantly higher in the export than the non-export sector. This is mainly due to, inter-sectoral positive spillover effect of externalities generated by the export sector. Therefore, growth can be achieved by reallocating resources from relatively inefficient (non-export sector) to relatively efficient sector (export sector). Expansion in export improves factor productivity and ultimately leads to a lot of benefits, such as knowledge exchange, idea innovation and efficient use of resources (Kavoussi, 1984).

According to Wong (2007) export provides the opportunity of accessing advanced technology, practicing the so-called learning -by-doing gains and better managing practices. Moreover, export led-growth hypothesis could be viewed as product life cycle hypothesis. This is explicitly to mean, it is export within which economic growth as a cycle starts to operate. Helpman and Krugman (1985) added; export stimulates technological improvement in the domestic economy due to the fact that global market competition is highly going across all economies.

Though, exports are important for economic growth, the direction of causality may not be necessarily unidirectional as output growths can cause expansion in export which is commonly known as Growth Led-Export hypothesis (GLE). The argument is that, economic growth may Granger-cause exports as well. As noted in neoclassical trade theory, economic growth through its effects on supply side (factor endowments) will create the demand for exports, providing the country with a strong export production base that is internationally competitive. In the case of intra-industry trade, growth causes exports in a country with relatively abundant resources and a lower degree of openness (Gharte, 1993; and Salvatore and Hatcher, 1991).

In addition, the argument for productivity-driven exports put forth by Lancaster (1980) and Krugman (1984) is that productivity growth leads to enhancement of skills and technology and the increased efficiency creates a comparative advantage via a reduction in costs for the country that facilitates exports. According to Kaldor (1967) growth of the economy is the manifestation of productivity gain in which this productivity gain in turn helps reduction of unit cost of production and, hence act as the stimulus of expansion in export.

Bhagwati (1988) proposed an idea that GLE hypothesis is likely, the notion supported by neoclassical trade theory, unless antitrade bias results from the economic growth-induced demand and supply. Venables (1996) in new trade theory further pointed out that the pattern of output expansion and the structure of market are very much important in changing export sector via the “cumulative causation”. Moreover according to Giles and Williams (2000) in a situation where market is unable to perform its job well, government intervention for correcting market failure may also effects to the GLE hypothesis.

Bidirectional relationship between export and economic growth might also be the case. Helpman and Krugman (1985) argued that realization in economies of scale due to productivity gain may raise exports. Export expansion may further enable cost reductions, which in turn may result in further productivity gains. Bhagwati (1988) also suggested that expansion in trade will generate more income, in which higher income in turn is powerful for export to expand.

2.1.2 Domestic Demand -Economic Growth Nexus

Contrary to the export led-growth hypothesis, in recent times, in the academic community and in political circles more frequently statements have been made to the effect that the potential for growth and development based on the export model has been weakened and there is a need to switch over to an alternative economic strategy prioritizing the stimulation of the domestic market (Munko, 2007).

Export-led growth has harmed developing countries in several ways. First, it diverted the attention from domestic market expansion to external trade. Second, it has placed developing economies to compete each other being at the bottom of the ladder. Third, it causes conflict of workers between industrialized and developing countries and finally, it has incapacitated the world economy by creating deflation and excess capacity. Moreover, being at the current stage, when competition for a share of the world market is much stronger than say in the 1960s and 1970s, a strategy of ELG for most developing economies is likely to be more difficult to pursue. Over the last two decades, international trade, featuring growth in supply side has been the central focus in economic policy analysis. However, development policy has neglected the development of domestic demand. This neglect has likely slowed growth and made it more unequal between developed and developing countries Palley (2002).

Openness has the potential to increase investment, improve resource allocation and facilitate the transmission of new ideas and technology. But in many African countries the lion's share of growth rates is not explained by openness rather domestic demand and policies matter (Sachs and Warner, 1995, 1997).

Countries have added to global supply through export-led growth without similarly adding to global demand since, the focal point of international competitiveness has encouraged holding down costs and, therefore, focus has encouraged conservative competition and contributed to destabilizing deflationary conditions in the global economy (Blecker and Razmi, 2005).

Domestic demand-led growth hypothesis, suggests that, it is the rise in domestic demand which is considered to be the main driving force for economic growth. Concerning to these hypothesis there are two but supplementing views. Their difference lies on their degree of perception. Those who sensed domestic demand led –growth hypothesis in strictly speaking, by strongly arguing that an increase in domestic demand that leads to economic growth and at the same time causes export to fall. On the other hand, those who sensed it in weakly speaking; arguing that since, an increase in domestic demand is greater than its indirect effect on fall of export rise; domestic demand leads to economic growth (Asian Development Bank, 2005).

According to Palley (2002) Export led-growth strategy have many drawback especially in developing countries and he suggests that the solution is to shift from export led-growth strategy to domestic demand led-growth (paradigm shift).The simplistic export led-growth is theoretically criticized that it suffers from a fallacy of composition. That is, it assumes that it is up on demand on the rest of the world that the domestic economy would depend to grow. If the demand for the domestic economy in the global market is highly demanded it is the sign of economic prospects in this country and if demand falls it is automatic that growth would retard. According to him strategies aimed at attracting export-oriented foreign direct investment (FDI) should reduced and substituted by a new paradigm based on domestic demand-led growth model. Otherwise, economic tension between emerging and industrialized economies is likely to happen in the global economy and asymmetric stagnation is also became a problematic.

In global context, there is danger of a beggar the neighbor outcome in which all try to grow on the back of demand expansion in other countries. For individual countries, export growth represents a way of growing demand. If export growth comes at the expense of international demand growth, then it may just shift the country composition of growth without raising overall world economic growth. The following issues are very important for domestic demand led-growth. Good governance, improved income distribution, financial stability and space for

counter cyclical stabilisation policy, and an adequate, fairly priced supply of development finance (Palley, 2002).

Bello (2001) underlines governments have understood the importance of domestic demand to stimulate growth and that domestic demand-led growth will replace export led- growth. Thus, developing the demand side leads to a more comprehensive agenda, as rise in income becomes a critical source of demand. The higher the income, the better the demand in which it causes improvement in productivity in which encourages investors to invest more. Moreover, the higher investment leads further productivity gain that encourages robust domestic demand and consequently, advance in development. So, domestic demand can then promote a virtuous circle of inclusive development.

Lai (2004), however, argued that though the strategy of domestic demand-led growth has been advocated in recent times and has empirical support, it should not entirely replace an export-led growth strategy. If a long run relationship between exports and economic activity exists, export-orientation is still one of the best strategies to adopt to ensure growth. Nevertheless, in view of the recent economic crisis in which export-dependent economies suffered more questions began to arise whether export-led growth strategies remain viable.

2.2 Empirical Review

Much of empirical researches have been preoccupied with separate issue of final demand growth nexus, such as issues relating to export-economic growth nexus or government spending - economic growth nexus or/and household consumption-economic growth nexus. Some of the most important studies of this type are as follows:

Gharte (1993), using a vector autoregressive (VAR) model for Taiwan, the United States, and Japan, found export-led growth in Taiwan, economic growth Granger-causes export growth in the United States, and a feedback causal relationship existing in Japan. Ekanayake (1999) analyzed the causal relationship between export and economic growth in India, Indonesia, Korea, Pakistan, Philippines, Sri Lanka and Thailand and Malaysia employing cointegration and error-correction models for the period 1960 to 1997. The result showed that with the exception of Malaysia in which only export-led growth hypothesis is supported, bi-directional causality exists

between export and economic growth in long run for all countries. Abhayaratne (1996) employed the techniques of causality and cointegration to examine the relationship between exports and economic growth in Sri Lanka during the period 1960-1992. Johansen's test of cointegration was employed. The result revealed that no evidence of any long-term cointegrating relationship or short-term relationship between the two variables and hence rejects the hypothesis of export-led growth in the sample period.

Asif et.al (2009) tests export and economic growth nexus in Pakistan for the period 1970-2008 using cointegration and granger causality. The result revealed that export expansion leads to economic growth. The Granger causality test suggests that there is uni-directional causality running from export to economic growth. Mahadevan (2007) analyzed the export-led growth nexus in Malaysia using the Toda and Yamamoto (1995) causality test over the period 1978-2000. The result showed that export causes economic growth and the result supports the internally generated growth hypothesis. Mahadevan argues that, while economic growth is necessary for export growth and vice versa, they are not sufficient conditions for continued spillover effects as appropriate domestic markets and policies are still required to ensure the export-led growth or growth led export hypothesis. In the case of Mexico, Thornton (1996) found a significant and positive Granger causality relationship between exports and economic growth for the period 1895-1992.

Boame (1998) by using the granger causality test investigated empirically the causal relation between GNP growth and export growth for Ghana over the period 1960 to 1992. The result supported the primary-export-led growth strategy for Ghana. Moreover, the evidence in favour of export promotion is stronger. Amavilah (2003) determined the role of exports in economic growth in Namibia's using data from 1968 to 1992. The results showed that the general importance of exports, but find no distinct sign of accelerated growth because of exports. Jordan (2007), on the other hand, analyzed the causality between exports and GDP for Namibia over the period 1970 to 2005. Granger causality and co-integration test were employed. The result revealed that exports Granger cause GDP and GDP per capita and suggested that the export-led growth strategy through various incentives has a positive influence on growth.

Erfani (1999) examined the causal relationship between economic growth and exports over the period of 1965 to 1995 for several developing countries in Asia and Latin America. The result showed the significant positive relationship between export and economic growth. The study also provided the evidence about the hypothesis that exports lead to higher output. Ahmad and Harnhirun (1996) studied the economic success of new industrial countries such as Indonesia, Philippines, Singapore and Thailand using time data series from the year 1966- 1988 to find out whether export is the cause of the countries' economic growth or otherwise. They found that export is not the main contributing factor towards economic growth. The link between export and economic growth lies in the development policy.

Oluwasola and Olumide (2012) examined the impact of trade on economic growth in Nigeria using data from 1980-2010 by employing the ordinary least square techniques(OLS).The result of the study showed that trade, foreign direct investment, government expenditure and exchange rate have a significant positive impact on economic growth in Nigeria.

Ighodaro and Okiakhi (2010) in Nigeria, examined government expenditure disaggregated into general administration and community and social services and economic growth by employing time series data for the period 1961 to 2007. Johansen cointegration and Granger causality test were used. Their results revealed negative impact of government consumption expenditure on economic growth. Similarly, Taban (2010) examined government spending and economic growth for the period 1987:Q1 to 2006:Q4 and applied bounds testing approach and Granger causality test. The result found that the share of government consumption spending and share of investment spending to GDP are negative impacts on economic growth in the long run.

Farzane et.al (2012) investigated the relationship between government size (measured as the share of total government consumption expenditure and investment expenditure in GDP) and economic growth in Iran for the period 1971-2008. Vector Auto Regressive Model, Johansen Test and Auto Regressive Distributed Lag Model were used for analyzing the long run relationship, whereas, Error Correction Model was considered for the short run. Moreover Wald Coefficient was used for trivariate causality test. The result revealed that the relationship between government size and economic growth in Iran is negative. Furthermore there is a one-way causality relationship for the long run and the short run-from government size to

economic growth. In Lebanon Saad and Kalakech (2009) investigated the impact of government spending on economic growth for the period 1962 to 2007. Johansen cointegration technique was employed. They found that government expenditure on education has a positive effect in the short run. Government expenditure on defense and health are insignificant in the short run and negatively affect economic growth in the long run.

Josaphat and Oliver (2000), examined the impact of government spending and economic growth in Tanzania using time series data for the period 1965-1996. They adopted Ram model (1986) in which according to them, total government spending was disaggregated into human capital spending, physical spending and government consumption spending. They found that government consumption spending is significantly and positively influences economic growth and proposed that government consumption spending is the cause and growth accelerating. Chiawa et.al (2012) investigated the relationship between government expenditure and economic growth in Nigeria, using Johansen based cointegration analysis and Granger causality testing for the period 1970-2008. The test for causality shows that economic growth Granger causes government expenditure, which supports the Wagner's Law, that government expenditure affects the economic growth.

Liu et. al (2008) examined the causal relationship between GDP and public expenditure for US for the period 1947–2002. The result revealed that total government expenditure positively causes growth of GDP while growth of GDP does not cause expansion of government expenditure. Thus, they concluded that based on the causality test, Keynesian hypothesis exerts more influence compared to Wagner's law. Komain & Brahasrene (2007) examined the relationship between government expenditures and economic growth in Thailand, by employing the Granger causality test. The result showed that government expenditures and economic growth are not Co-integrate. Hence, it further explained the unidirectional relationship as causality runs from government expenditures to growth at least in the short run.

Ranjan and Sharma (2008) investigated the impact of government expenditure on economic growth in India for the period 1950-2007. The result show that government consumption expenditure exerted significant positive impact on economic growth. Taban (2010) investigated the government spending-economic growth nexus for the Turkish economy using quarterly

data for the period 1987Q1-2006Q4. The result of causality test showed that a strong bi-directional causality between the total government spending and economic growth.

Olukayode (2009) investigated the impacts of government expenditure on economic growth in Nigeria employing time series data spanning from 1977 to 2006 and adapting Ram (1986) model in which government expenditure is disaggregated into private investment, human capital investment, government investment and consumption spending at absolute levels. The results revealed that all the expenditures have positive effect on economic growth. By employing Ordinary Least Square (OLS) method and Standard Granger Causality test, Jiranyakul and Brahmairene (2007) examined the relationship between economic growth and government spending for Thailand over the period 1993 to 2006. They found that a significant positive impact of government consumption on economic growth during the period investigated moreover, the result of granger causality test showed that unidirectional causality running from government consumption to economic growth and no feedback causality.

Dilrukshini (2002) investigated the relationship between economic growth and public spending in Sri Lanka for the period 1952 to 2002. Johansen cointegration technique and Granger causality test was used. The findings suggest that there is no direct relationship between government consumption spending and economic growth and no evidence to support as government consumption is caused by economic growth. The result of Johansen cointegration technique and error correction model by Loto (2011), investigating the impact of sectoral government expenditure on economic growth in Nigeria for the period 1980-2008, revealed that in the short run, expenditure on education and agriculture were found to be negatively related to economic growth, while expenditure on national security, health, transportation and communication were found to be insignificant.

Lin (1994) examined government spending and economic growth for a panel of 62 countries for the time span of 1960-1985. The result revealed that government consumption is insignificant in developed economies, but significant positive in LDCs. Dunne and Nikolaidou (1999) investigated government spending and economic growth in Greece for the period (1960- 1996). Defense expenditure, military expenditure and government consumption were used as explanatory variables while growth was dependent variable. The result shows that military and

defense expenditure have negative impact while government consumption doesn't affect economic growth.

Employing, Granger causality test with time series data in Tanzania, Kweka and Morrissey (1998) worked on the relationship between economic growth and consumption expenditure. The result reported that no evidence to support either the impact of GDP on consumption expenditure or vice-versa. In addition, Folster and Henrekson (1999) did the analysis and argued that there is no correlation regarding the direction of causality between economic growth and consumption expenditure. Employing error correction model (ECM) and Granger causality analysis for 19670 to 1999 periods in Malawi, Jumbe (2004) studied the causality between consumption, agricultural income and non-agricultural income. The result showed that agricultural and non-agricultural income cause consumption and as the same time consumption cause income.

The study by Magazzino (2011) in Italy revealed that there is long run bidirectional relationship between consumption and economic growth. Similarly, Faridul et al. (2011), using time series data from Malaysia for the period 1971-2008 and applying ARDL bounds testing approach to Cointegration and causality tests within a Vector Error Correction Model (VECM), found that unidirectional causality between consumption and economic growth. Aqeel and Butt (2001) by employing the techniques of Cointegration and Hsiao's of Granger causality and using the time series for the period 1955-56 for Pakistan found that economic growth is a pre-requisite to the growth in consumption, while consumption justified neutrality hypothesis. Yoo (2006) used Granger causality to test the causal relationship between consumption and growth in Asian countries for 1971 to 2002 period. He found bidirectional causality between variables.

In Ethiopia, Girma (1982) analyzed the relationship between export and economic growth by incorporating GDP as the dependent variable and exports as the only explanatory variable. His results revealed that GDP and exports are highly correlated with correlation coefficient of 0.962 and the coefficient of determination (R^2 was 0.81). Kedir (1998) examined the export-growth relationship. His results showed that a positive and significant impact of exports on economic growth. In regards to, Granger non-causality, he found causality running from exports to economic growth without feedback.

Gemechu (2002) empirically tested the relationship between exports on economic growth in Ethiopia for the period 1960/61-2000/01 using simultaneous equation model and the Granger causality. His result revealed that export significantly affected economic growth in the short run and causality runs from exports to economic growth. Biramo (2012) investigated the effect of export-led growth strategy on the Ethiopian economy for the period 1974-2009 using simple Granger causality tests. The result revealed that uni-directional causality between export and economic growth. Export growth causes economic growth.

Siraj (2012), utilized the model developed by Ram (1986), and analyze the role of government expenditure in economic growth and the role played by official development assistance (ODA) in financing government spending for the period 1975-2010. The result showed that spending on human and physical capital has positive and significant impact on economic growth, whereas, public consumption expenditure is affecting economic growth negatively. Accordingly, his finding is in line with Barro's (1990) statement that the negative effect of public spending on economic growth conveys the unproductive nature of spending.

Tsadiku (2012) investigated the impact of government spending on economic growth. His study focused on the impact of disaggregated total government spending in to human capital and agricultural expenditure using annual data over the period 1960/61-2010/11. Cointegration and error-correction model is employed. The results showed that expenditure on education has significant positive effect on growth both in the short run and long run. However, expenditure on agriculture negatively affects growth, while health expenditure is found to be insignificant.

Therefore, it can be concluded that the empirical evidence has been rather mixed. While some studies support the existence of relationship and causal linkage between exports, government consumption, household consumption and economic growth, others failed to support the existence of such relationship. Besides, some of them supported only uni-directional causality between these variables.

The immediate comment is that, causality tests are very sensitive to the omitted variables. The above studies confined themselves to separate issues and as the result, none of them treated the causal relationship among export, domestic demand and economic growth. Treating all variables together is important, since mutually they might exert more power in influencing the short run and long run relationships and even could divert the direction of causality. This is also used to know the element of final demand that bear a greater burden on economic growth (see Gübe, 1997). In addition, some of the above study contains methodological weakness. They followed the usual approach (regressing real growth on real export growth) and to infer support for the proposition that export growth causes output growth from the significance of the export growth coefficient (e.g Oluwasola and Olumide). The same is true for government consumptions (e.g Jiranyakul and Brahmasrene). But, due to the national income accounting identity, export and government consumption are component of GDP. Hence, this means that there is biasness in favor of correlation.

A number of authors including (Tyler (1981), Sheehey (1990)) argued that if evidence is found in support of the export-led growth hypothesis, by using such methodology, then this could be biased by the built-in correlation between GDP and exports which is a component of GDP. According to Sheehey (1990), alternative measures of the export variable not subject to this bias should be used to test the desired relationship such as using the share of the variables to GDP.

Thus, to have clear picture about export, domestic demand and economic growth nexus, multivariate analysis is required in empirical investigation. In this regard, different professionals tried testing the causal relationship among export, domestic demand and economic growth using different techniques. All the tests that have been carried out are broadly classified as those that are based on cross-country analysis and country specific time series studies.

2.2.1 Cross-Country Studies

Wong (2008) examined the importance of exports and domestic demand to economic growth in ASEAN-5, namely Indonesia, Malaysia, the Philippines, Singapore and Thailand. ARDL cointegration and Granger causality was used. Domestic demand is measured by private consumption, government consumption and investment. The results showed some evidence of bidirectional Granger causality between exports and economic growth and between private consumption and economic growth.

Felipe and Lim (2005) empirically tested, “export or domestic demand-led growth in Asia”?³ They started their analysis positing that, in the recent years, some developing Asian countries claim to have started shifting emphasis from export-led growth to domestic demand-led growth policies with a view of achieving more balanced growth strategy, and they examined how far this shift has gone in five Asian countries? They found that there is no evidence marked by this shift in the period 1993-2003. Even they found that period of expansionary domestic demand and deteriorating net export signaled a follow-on crisis.

Felipe (2003) analyzed the growth accounting among Asian countries, and found that since income level is too low among these countries, domestic demand-led growth fail to generate and accelerate economic growth. These countries should rely up on foreign market to sell their products and finally enhance their economy. Felipe argues that these countries are better off by following export-led growth rather than domestic-led growth. Blecker (2003) provided some counter-arguments against export-led growth, especially on Felipe’s line of thinking. Blecker argued that “the export-led growth strategy is doomed to fail due to global demand constraints since 'the market for developing countries' exports is limited by the capacity of the industrialized nations' imports”.

The above studies used cross-country data to test export, domestic demand and economic growth nexus. Though, cross-country study is helpful for generalization, it is a time series study for specific county which is potentially more informative. Since, the analysis is for a particular country and this can avoid some of the sampling and econometric problem.

³ China,India,Philippines ,Korea and Thailand

Therefore, it is important to make an assessment of the export, domestic demand and economic growth nexus for individual countries on the basis of time- series data.

2.2.2 Country Specific Time Series Studies

Wong (2006) examined Granger causality among export, domestic demand and economic growth in China using time series data over the period 1978-2002. Household and government consumption were used as the measure of domestic demand. The result showed that bidirectional Granger causality among, export, domestic demand and economic growth. Consequently, he concluded that, there is a dynamic relationship among export, domestic demand and economic growth. Export and domestic demand are important for economic growth as well as economic growth have an impact on export and domestic demand.

Chimobi and Uche (2010) examined the relationship between export, domestic demand and Economic growth in Nigeria using time series data over the period 1970-2005. They employed Granger causality and cointegration test. Household and government consumption were used as the proxy for measuring domestic demand. They found that economic growth Granger causes both export and domestic demand while government consumption has been caused by export. In addition, their result reveals bidirectional causality between export and household consumption. They argued that domestic demand is a genuine tool that encourages Nigerian economy.

Lai (2004) argued that several empirical studies on export-led growth for Malaysia have led to inconclusive and mixed results. He explained in his own view that 'this may be due to the exclusion of domestic demand in the bivariate or multivariate models used in the studies'. Consequently, he re-examined the role of domestic demand in economic growth in Malaysia using a three variables and Johansen (1988) cointegration methodology and Granger causality testing. The results revealed short run bidirectional Granger causality exists among exports, domestic demand and economic growth. Thus, the results support the export- led growth and domestic demand –led growth at least in the short run. But the result is not supporting export-led growth hypothesis in the long run. He argued instead, the highly significant positive impact of domestic expenditure on economic growth implies that use of domestic demand as the catalyst for growth is appropriate.

In addition, Dullah et.al (2010) investigated the factors that stimulate and maintain economic growth in Malaysia from the year 1970 to 2007 using household consumption expenditure, government expenditure, export, exchange rate, and foreign direct investment as the determinant factors. They employed Johansen cointegration analysis and Granger causality testing. The results showed that only household consumption expenditure and exports are found to cause economic growth while this is not true for the government expenditure, exchange rate and foreign direct investment. They argued that consumption expenditure and export play important roles as determinant factors for economic growth, and other factors such as government expenditure, may have a role as a catalyst and complement determinant factors for economic growth.

According to Kaldor (1988), long-run growth is determined by the sum of the growth rate of government consumption spending and the growth rate of exports. Based on Caldor's contribution for the theme, Oreiro and Nakabashinot (2007), assessed the existence of a demand-led growth for the Brazilian economy over the period 1990-2005. The variables used were real exports (X), real investments (I), real government consumption (G), and real money supply (M3) and real GDP (Y). They found that almost 95% of the growth rate of real GDP in the period is explained by variables at the demand side of the economy. Money supply was found to be insignificant. A unidirectional causality running from exports and government consumption to GDP was also found.

In case of Ethiopia, Tegenu (2011) examined export-led or domestic demand-led growth policy for Ethiopia. He based his arguments on Ethiopian government plan to export power to Sudan and Djibouti. He asks why the government gave priority to energy export in the face of growing domestic power shortage in the country and reply; in its development strategy the government has given strong emphasis to the promotion of exports in order to increase the growth performance of the economy. He argued that the current stage of the country's structural transformation requires policy agenda of domestic demand-led growth. He concluded that, in Ethiopian context to increase effective domestic demand, it is necessary at first to bring about a shift in the household demand from food consumption to manufactured goods. To bring about a shift in demand, it is necessary to increase household income. Surprisingly, he propose paradigm

shift of policy based on single line of arguments (Power export) even without raising about government spending and investment. My immediate comment is that, it is misleading to come with such conclusion without considering the behaviour of domestic demand and total export composition.

In nutshell, mixed empirical results concerning the causal relationship between, domestic demand, export and economic growth can be attributed to a number of factors. Among other things, estimation techniques, choice of variables, study period, and level of development of the country being studied matters. As the result, up on considering the methodologies employed so far, Johansen cointegration techniques and Granger causality test (allow us to test direction of causality) is used to study export, domestic demand and economic growth nexus in Ethiopia for relatively longer period (1960/61-2010/11).

Furthermore, to take care of the simultaneity problem ,since export and measures of domestic demand(household consumption and government consumption) are components of GDP, percentage share of export ,household consumption and government consumption in GDP is used.

CHAPTER THREE

MACRO ECONOMIC PERFORMANCE OF ETHIOPIA

After sufferings from deep economic crisis and heavy political turmoil during 1980s and overthrow of military regime, Ethiopia entered into a new era of development, emphasizing poverty reduction and economic growth. The country has recently achieved considerable progress in terms of economic growth, with GDP growth exceeding 11 percent, in the last seven years and remarkable improvements in accessing public services. Thus, it shows some signs of having entered a new phase of more rapid economic growth. If this progress proves to be more than a short-term period, Ethiopia could leave the ranks of the poorest countries in the world sooner than might have been expected only a short time ago (World Bank, 2008).

This growth rate of real GDP leads an important achievement of per capita income, particularly, in the last seven years. Yet given the extremely low initial per capita income, the country remains one of the poorest in the world, given emphasis to the urgency of accelerated growth and development on a sustained basis.

Thus, the aim of this chapter is to discuss macroeconomic performance of the country with a special emphasis to economic growth, exports, performance of domestic demand measured by government and household consumption.

3.1 The Economy of Ethiopia at Glance

In spite of its long history and rich potential in terms of resources, Ethiopia is one of the poorest and least developed countries in the world in terms of economic and social indicators. High incidence of poverty, low social service facilities, exponential population growth, unemployment and under-employment, backward technology and low productivity, environmental degradation, etc. have been the characteristic feature of Ethiopian economy.

Agriculture takes the lion's share of economic structure with other proportion of service and industrial sector. Agriculture is the major foreign exchange earner. Nearly all Ethiopian exports originate from this sector. The main Ethiopian exports such as coffee, pulses, oilseeds, hides and

skins are all agricultural products. Agricultural exports account for over 90 percent of the total exports of the country. (MoFED, 2010)

However, the heavy dependence of the economy on agriculture and the poor performance of the agricultural sector, which is worsen by fluctuation in weather condition and hence droughts, have had negatively affecting the economy. The per capita income of Ethiopia is one of the lowest in the world and the combined rapid population growth makes the situation worse off. Nevertheless, the recent performance is encouraging. In comparisons with sub-saharan Africa, Ethiopian economy is performing well, especially over the past decade. According to report by World Bank (2012) “Over the past decade, the Ethiopian economy has been growing at twice the rate of the Africa region, averaging 10.6 percent GDP per year between 2004 and 2011 compared to 5.2 percent in sub-saharan Africa”.

The following table summarizes the growth rate of population, real GDP and GDP per capita.

Table 3.1: Average growth rate of GDP, percapita GDP and population, 1960/61-2010/11

Variable	Period				
	1960/1-1973/4	1974/5-1990/91	1991/2-2000/01	2001/02-2010/11	Average
Real GDP	2.85	2.1	5.6	9.36	4.98
GDP percapita	1.18	-1.00	1.61	6.21	2.00
Population	2.29	2.62	2.01	2.45	2.34

Source: Own computation from MoFED and Africa Development indicators data (2010/11)

The table above shows that for the past five decades, on average, real GDP has been grown by 4.98% while population grows on average by 2.34%, leaving per capita income to grow by 2.00%. Between 1960/61-1974/75 average economic growth rate was 2.85 percent. In 1974/75-1990/91 period the economy grew by an average of 2.1. That is an average of 0.75 percent less than the 1960/61-1974/75. In 1991/2 -2010/11 average economic growth rate per annum is 7.48 percent.

Though the recent trend is encouraging still there is a need for overcoming the challenges which undermine the achievement of high GDP and GDP per capita need to be tackled in order to improve the dismal realities in the years to come. The figure below shows trends of growth rate of GDP and per capita GDP.

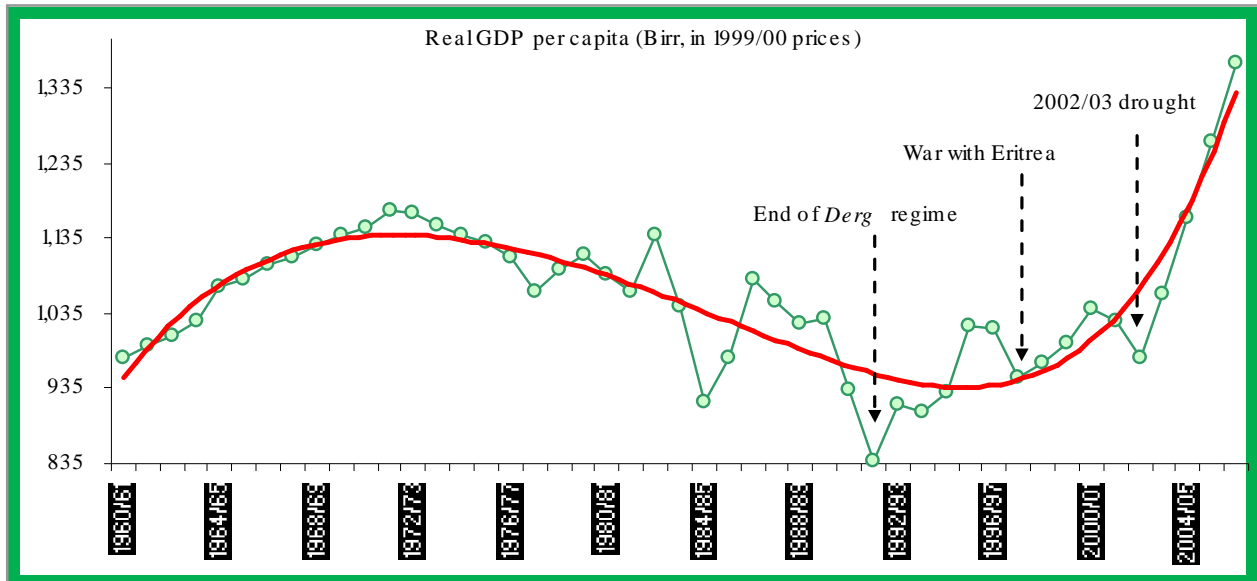


Fig 3.1: Ethiopia’s Per-Capita Income: A Long Term Perspectives

Source: Computation from WDI and MOFED

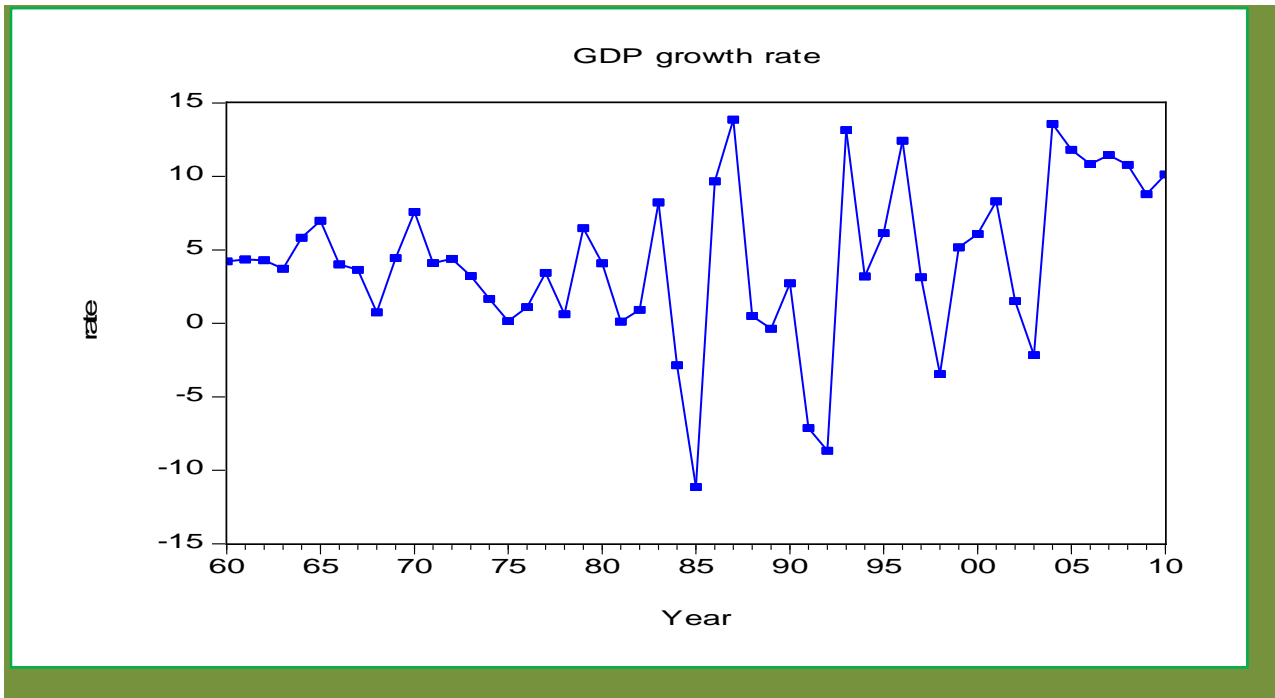


Fig 3.2: Growth rate of RGDP

Source: Own computation using World Bank: World economic outlook data base (2010/11)

Figure 3.1 and 3.2 show the Per capita GDP and GDP growth rate respectively. In the first half of 1980s the Ethiopian economy was showed downward trend. Particularly in 1984/85 the Ethiopian economy was at the worst scenario .That was due to severe drought prevailed in the country. But later on shows some improvement, then come to further recession up to the over throw of military regime. The Ethiopian economy come backed to growth in the early 1990s after the overthrow of the Dergue and the end of its suppressive economic policies. However, this recovery was interrupted by two major shocks: the war with Eritrea from 1998 -2000 and drought in 2002/03. The current boom is a combined effect of cyclical recovery and structural shifts in the economy towards a higher growth path.

3.1.1 The Contribution of the Key Sectors in the Economy

The main sectors of the economy and their considerable share in the total output are shown in Table 3.2, for selected years, which are representative of the structure of Ethiopian economy during the 1960s to 2000s.

Table 3.2: Average annual sectoral contribution to GDP

Sector	Period				
	1960/1-1973/4	194/75-1990/1	1991/2-2000/01	2001/02-2010/11	Average
Agriculture as %GDP	68.14	67.48	57.74	46.05	59.85
Industry as % GDP	9.19	13.88	10.86	13.15	11.77
Service as % GDP	22.67	18.64	31.4	40.8	28.37

Source: Own computation using MoFED data and Africa Development Indicators (2010/11)

As the mainstay of Ethiopian economy, on average, agriculture contributed the highest share to GDP in all regimes. During the imperial regime (at least as part of it considered), the sector contributed more than 68% of total output. However, during the military regime on average, the contribution of agricultural sector to the total output showed a meager decline as compared to the imperial regime, and continues to play the lion's share of the economy. The decline in the share of agricultural sector is compensated by rose in industrial sector. More importantly, during the EPRDF particularly (1991-2000) as ADLI strategy was adopted, the sector contributed about 58% nations' output. This is mainly due to the adoption of ADLI strategy, with aim of making agriculture, the engine of growth and gradually passes the way to industry. And later on (2001-2011) its contribution was relatively declined, but, not passes its way to industry as expected. Rather, it is the service sector which shows a significant improvement.

Despite its declining contribution to GDP over time, agriculture is, and will continue to be, the backbone of Ethiopian economy. This is due to the fact that more than 80% Ethiopian's are living in rural areas and derive their livelihood predominantly from agriculture. The contribution of service sector was intermediate during the imperial and Dergue regime, but during the EPRDF, particularly in the last ten years it become the major contributor to the total output (40.8%). The role of this sector has shown a commendable contribution mainly due to development and strength of financial services, transportation and communication, tourism and trade as well.

However, the industrial sector has not yet gained a momentum and, as the result, its contribution is minimal and almost similar in all regimes.

In general all sector of the economy showed an improvement during the period under investigation agriculture, the mainstay of Ethiopian economy, contributes the lion’s share. Moreover, recently, service sector also shows significant improvement.

3.1.2 Rate of Growth of Economic Sector

During the imperial regime, on average, the service sector dominated the period in terms of growth rate. This was due to small base of the sectors and the indication of high growth potential had little fertile ground been given for promotion of the sector. During the military regime the agricultural growth rate was considerable. This was mainly due to the fact that special emphasis was given for communal farming system which opened the opportunity to plough fertile land that was not in use before and hence, increase productivity of overall agricultural sector. The following table summarizes the average growth rate of each sector.

Table 3.3: Average growth rate of major sectors of the economy between 1960/1 and 2010/11

Sector	Period			Average
	1960/61-1973/4	1974/5-1990/91	1991/2-2009/10	
Agriculture	2.05	1.88	4.74	2.89
Industry	6.92	1.75	8.29	5.65
Service	7.64	2.93	9.39	6.65

Source: Own computation using MoFED and Africa Development Indicators data (2010/11)

Under the current government the growth rate of service sector is satisfactory at least in the relative term and that of industrial sector is encouraging. This is due to good policy environment in general and special emphasis given to foreign direct investment.

3.2 Domestic Demand and Economic Growth in Ethiopia

3.2.1 Household Consumption Expenditure

Household consumption expenditure (HCE) is a transaction of the national account's use of income account representing consumer spending. Growth measured by (GDP), is probably the most important economic indicator in almost all economies. It significantly affects the behaviors and expectations of both consumers and producers. Keynesians' argue that, aggregate demand which is consisting of domestic and external demand is the source of economic growth. One of the major determinants of domestic demand in an economy is consumption. Hence, information about consumption expenditure is essential while dealing with economic growth. The foremost important measure of consumption in an economy is personal consumption expenditures (PCE). The following figure presents the share of household consumption to GDP.

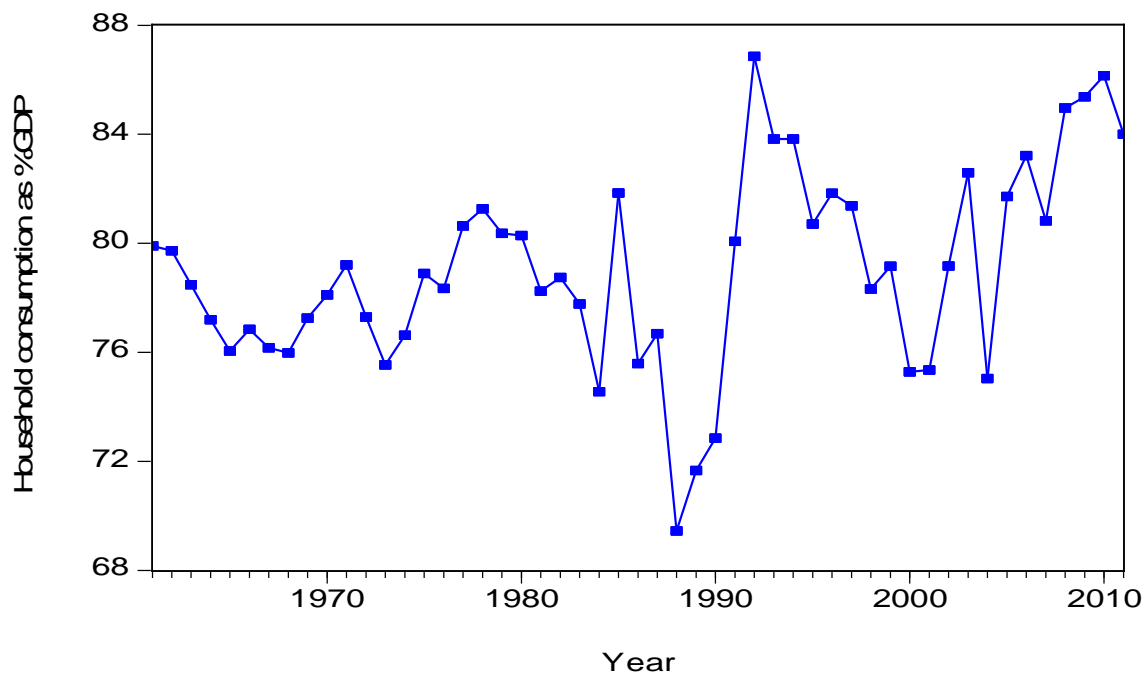


Figure3.3: Trends of household consumption as percentage of GDP

Source: own sketch using MoFED data (2010/11)

In Ethiopia, Private consumption expenditure represents the largest component of total spending in the economy and hence it accounts for around two-thirds of the nation's Gross Domestic Products (GDP). On average, the share of household consumption from GDP has increased over the whole period being 77.45% in 1960/61-1973/4 to 82.30% in 2001/02/-2010/11. Between 1960/61 and 2010/11 the share of household consumption from GDP has averaged about 79.5 percent. In 1988/89 the share of household consumption to GDP was very low. During the period demand for government consumption had been raised to finance war and the economy did not recover fully from severe drought occurred in 1985. These undermine the share of private consumption. In general, household consumption as the largest components of aggregate demand, influences economic growth as well used to determine the economic cycle.

3.2.1.1 Household Consumption Categories

The following table shows the household consumption expenditure categories and their shares in GDP

Table 3.4: Household final consumption expenditure shares in the GDP

Expenditure category	2000/01-2009/10
Food, Alcoholic beverages & tobacco	38.68656
Clothing & footwear	5.735213
Electricity, gas & other fuel	17.49705
Furnishings & household equipment	6.270647
Health	0.73423
Transport & Communication	2.569316
Recreation & culture	0.549613
Education services	0.82068
Hotels, cafes & restaurants	3.2750294
Miscellaneous goods & services	5.299868
Total	81.43821

Source: Own computation using MoFED data (2010/11)

In line with accessibility of data, only the recent past ten years data is used to describe categories of household consumption expenditure and their shares to GDP. As seen from the above table, from the total expenditure on output, largest share of household consumption is going for food, alcoholic beverage and tobacco. This is due to the fact that food is the basic necessity to survive.

Households tend to satisfy first and foremost their basic needs, a higher share of expenditure dedicated to necessities could indicate lower living standards. Secondly electricity, gas and other fuel consumption take the greater share. This shows the importance of energy in economic activity. Expenditure on health and recreation & culture takes the last two shares. The first case is resulting from provision of such service by government with the lowest possible cost. The second one is due to low income and hence a value given for recreation is minimal.

3.2.1.2 Growth rate of Private Consumption and GDP in Ethiopia

Over the sample period (1960/61-2010/11), the growth rate in private consumption has been volatile.

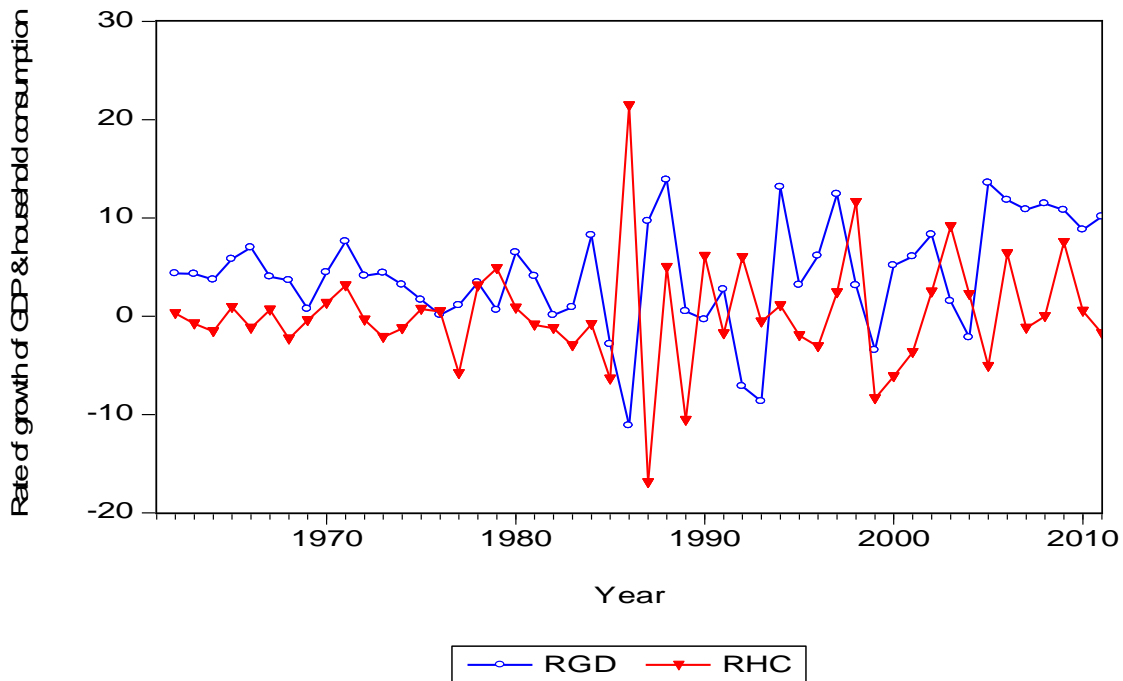


Figure 3.4: Trends of growth rate in private consumption and GDP

Source: Own sketch using World Bank: World economic outlook data base (2010/11)

As seen from the above figure, in 1980s private consumption growth was generally weak. In mid 1980s growth in private consumption declined tremendously reaching the all-time-low of negative in 1987/88. This was due to chronic civil war associated with severe drought and low disposable income. The source of consumption is income. Income is gained through employment (self or

government). This requires peace and security, in which the period 1980s was characterized by absence of secured environment. The situation had been aggravated with severe drought of the time. In 1990s it showed up and down turn trend, due to high and low disposable income. However, from 2000, relative to other period, private consumption did pick up resulting from strong domestic demand largely driven by lower lending rates and higher household income. The most interesting observation is growth rate of GDP almost follows the pattern of growth rate of household consumption.

3.2.2 Government Spending

3.2.2.1 Distinction between Government Purchase and Government Consumption

Government purchases are the expenditures by the government sector on final goods and services undertaken in a given time period. The official measure of government purchase is termed government consumption expenditures and gross investment, which reflects the fact that some government purchases are for consumption goods and some for capital investment.

Government consumption expenditure (GCE), on the other hand, is government acquisition of goods and services for current use to directly satisfy individual or collective needs of the members of the community. It is the final current expenditure of the central and local government sectors. It represents only part of total public sector spending, as it does not include capital expenditure, social security benefits or other transfers by government and also excludes expenditure by public corporations. Moreover, government consumption expenditures consist of spending by government to produce and provide services to the public, such as public school education.

3.2.2.2 Growth and Composition of Government Spending

In broader terms, government spending composed of Capital and recurrent expenditure. At an aggregate levels, the composition of government expenditures has a general impact on the economy and impact on the output of the public sector in particular. The classification of general spending was aimed to achieve various kinds of outlays, such as economic, social, general and other services. Over the period investigated on average, recurrent expenditure accounts about 70 percent of total expenditure, while capital expenditure takes the remaining share. Moreover, the share of total spending in total output was, on average 18.83 percent.

Table 3.5: Average distribution of current and capital expenditure and share of total spending to GDP

Variable	Period			Average
	1960/61-1974/74	1974/5-1990/91	1990/91-2010/11	
Recurrent	80.4	73.4	56.06	69.96
Capital	19.6	26.6	43.91	30.03
Total (%GDP)	11.9	25.2	19.4	18.83

Own computation from MoFED data (2010/11)

During the imperial regime the recurrent expenditure claimed more than 80% of total expenditure. During the period the emphasis given to public investment was minimal. During the military regime recurrent expenditure was relatively declined compared to the imperial regime and capital expenditure was raised. Under current government capital expenditure was significantly raised and reaches, on average, about 44 percent of total expenditure. This shows that under EPDRF government has given a considerable focus on capital investment than the previous regimes.

During the imperial regime the ratio of government expenditure to total output was about 12 percent. In the military regime, however, the ratio was tremendously raised to 25.2 percent. This was due to civil war that prevailed in the country during the period. Under EPDRF, on average government spending as a percentage of GDP is relatively declined and reached 19.4 percent.

3.2.2.3 Government Consumption Expenditure

Government consumption expenditure includes **general services** (general government, internal order and justice and national defense), **economic services** (Agriculture natural resource, mining & energy, trade & Tourism, transportation and communication, construction, economic development study), **social services** (education and training, culture and sport, labor and social affairs, public health, housing and community service) and others.

On average, the share of total government consumption for selected services was modest during the period 1960/61-2010/11. General Service share of total consumption was about 39 percent, while economic and social services took 27.09 and 21.23 percent respectively.

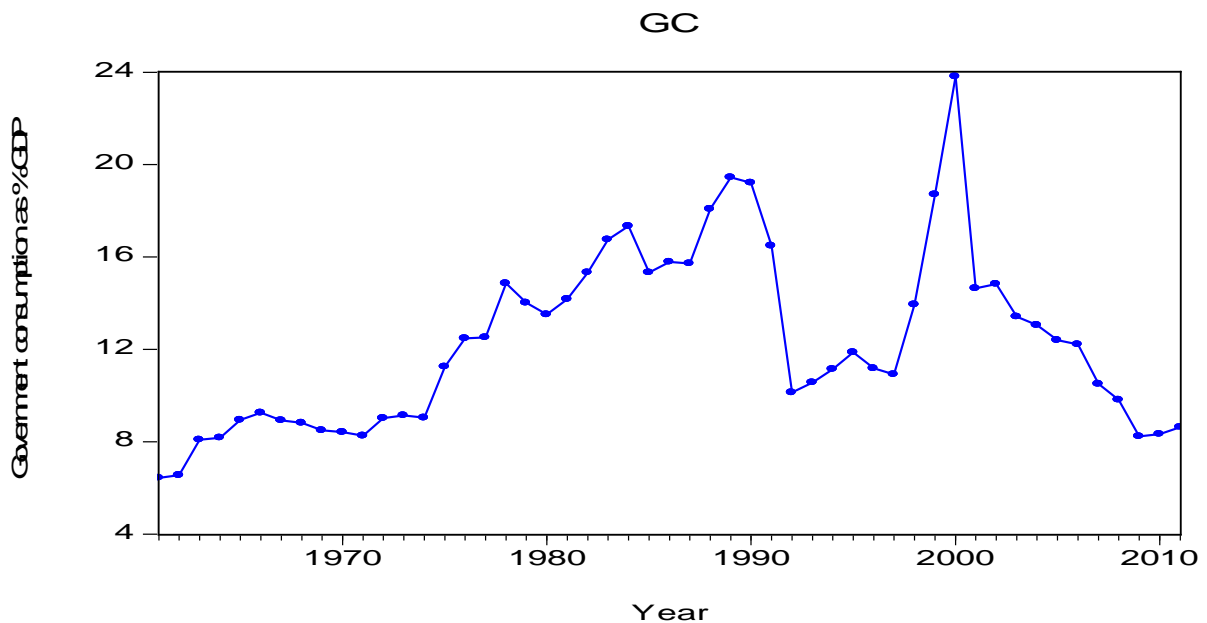


Figure 3.5: Trends of government consumption as the percentage of GDP.

Source: Own sketch from MoFED data (2010/11)

During the Imperial regime (at least for considered period) on average, the administration and general service took about 48% of total government consumption. Economic and social sectors had a share of 21.26 % & 22.83% from the total government consumption respectively. During military regime administration and general service share was, on average 40.7 percent. Economic service sector share was 28.66 percent, while that of social services was only 16.1 percent.

Under EPDRF expenditure for economic service outweighed (31.35%) the others. This implied policy focus on improvement in economic wellbeing. Expenditure on social and general service is also considerable.

In terms of shares to GDP, the share of government consumption to GDP was 8.39% during the imperial régime. The share of annual average government consumption to GDP was highest during the Dergue regime, on average (15.42%). This was due to civil war prevailed in the home country and external war with Somalia. However, under EPDRF, this share was relatively declined to 12.41 percent. This is mainly due to the prevalence of peace and orders in the country with the exception of war with Eritrea and growing emphasis for capital expenditure as well.

3.3 External Sector Development (Export)

In both developed and developing economies there is a role played by international trade in the overall economic performance of the country. In line with this fact, countries of the world have been recently given focus to external sector, mainly following the Washington consensus. In Africa trade plays a considerable role in the campaign against poverty and attaining sustainable economic growth, mainly through ensuring productivity and efficiency.

Ethiopia had done well from international trade especially during Imperial regime. During the military regime, however, the growth rate of export was shrunk and it was fall almost by 50% from the preceding regime. Since the launch of a new market-based economy in 1992, the government of Ethiopia set up a key trade policy device, with the adoption of export promotion strategy that aimed at promoting export. The strategy was to encourage free market through policies that rely heavily on export promotion as the most suitable and trustworthy mechanisms.

The argument is promoting exports would enables the country to correct imbalances in the external sector and at the same time strengthen the domestic economies. From then on ward, an improvement in the international trade has been achieved with the attempt of diversifying export. But the results are not as anticipated, due to dependency on primary agricultural output, fluctuation of weather condition, unpredictability of international market prices etc.

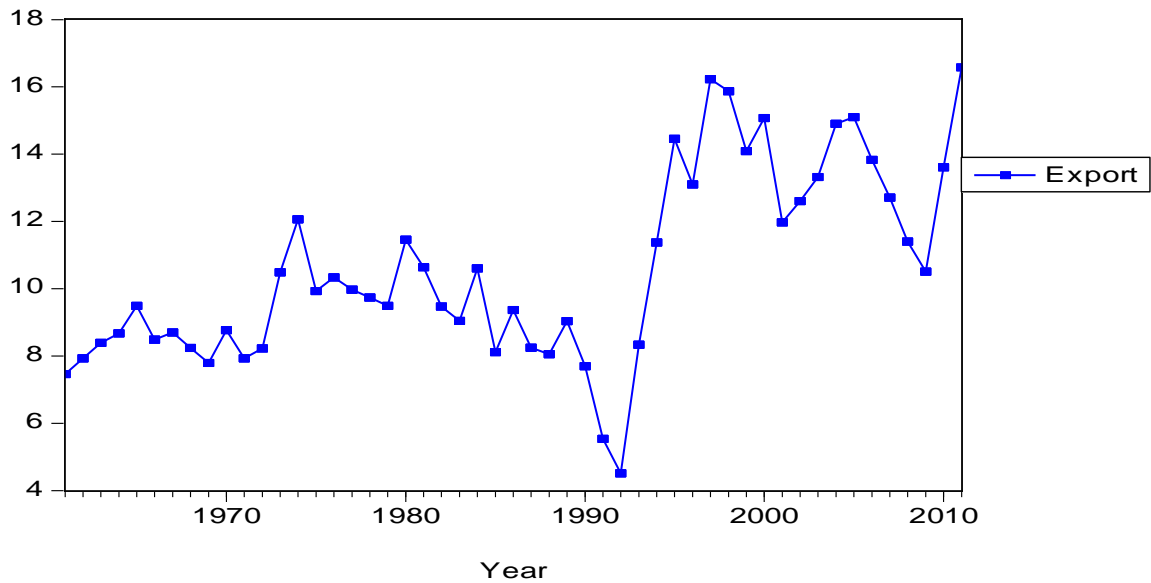


Figure 3.6: Trends of export as the percentage of GDP

Source: Own sketch using MoFED and National Bank data (2010/11)

During the imperial regime (for considered period), on average, the percentage share of export to GDP was 8.76 percent. This figure is almost similar with that of the military regime period (9.21%). Following different action taken by current government to boost the share of export to GDP, a significant improvement has been registered. Hence, the share of export to GDP has reached, on average, about 13.45 percent during the period 2001/01-2010/11. For the whole period under investigation export share to GDP is about 11 percent in Ethiopia.

3.3.1. Growth Rate of Export

The total value of receipt from export grew at annual average growth rate of about 13 percent between 1960/61-2010/11. In terms of growth rate, on average that of chat was dominant during the period. The least growth rate was registered by hides and skins. Moreover, the table below shows the total average growth of total export and major export items.

Table 3.6: Average Annual Growth Rate of Total export earnings from major Exports

Major export item	Period			Average
	1960/1-1973/4	1974/75-1990/1	1991/2-20010/11	
Coffee	2.7	7.1	25.08	11.62
Hides and skin	9.1	5.6	17.24	10.64
Pulses and oil seeds	13.1	2.4	18.04	11.18
Chat	0.8	69.8	221.00	97.20.
Total	10.9	2.67	25.35	12.97

Source: Gemechu (2002) and own computation from MoFED data (2010/11)

During the imperial regime, the total value of export earning was mild. During the period (i.e for 14 years considered), the average annual growth rate of real value of exports was 10.9 percent. During the period, earnings from the export of coffee, probably the largest exportable item has been growing at an average annual rate of 1.7 percent. Pulses and Oilseeds which is the second largest exportable item of the then grew at annual average growth rate of 13.1 percent. Hides and skin and chat took the remaining share.

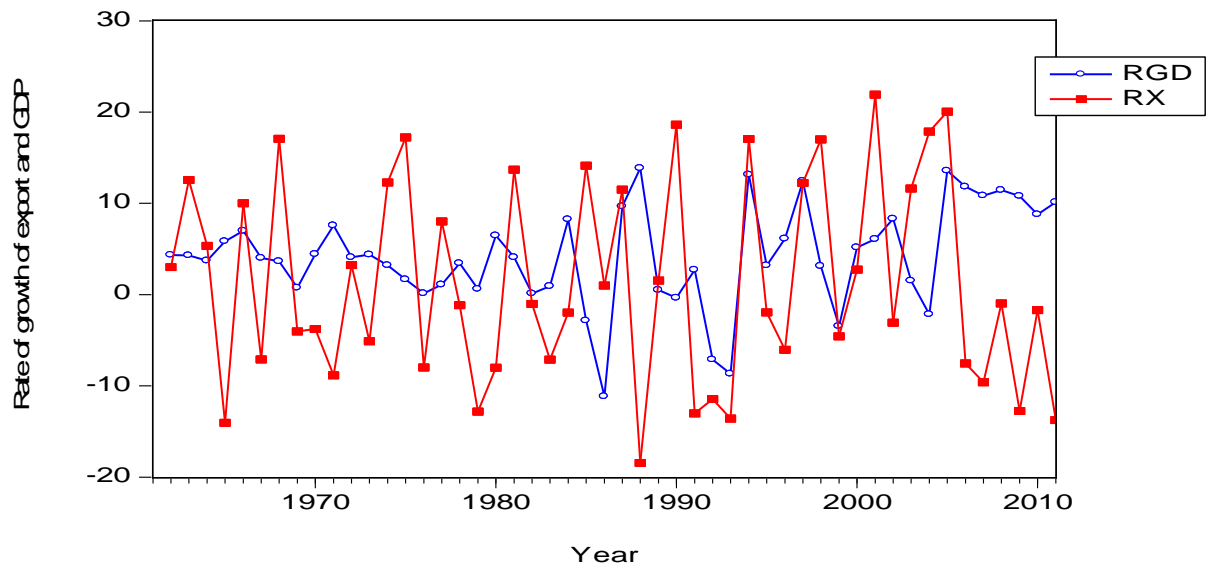


Figure3. 7: Growth rate of exports and GDP

Source: Own sketch using MoFED data (2010/11)

In general the growth rate of export in Ethiopia is volatile. This is basically attributed to factors related to **demand side** (e.g real GDP of trading partner) and **supply side** (domestic infrastructure, macroeconomic environment, institutional quality, etc).

During the military era (1974/75 – 1990/91), the average annual growth rate of real export showed a deteriorating trend, compared to the Imperial regime. The growth rate of total value of export earning was declined by 75 percent compared to the figure in the Imperial regime. It was due to little attention given in the export sector in general and the poor performance from pulses and oilseeds. The proceeds from the export of the pulses and oilseeds, which was growing at an average annual rate of 13.1 percent during the Imperial regime, declined to 2.4 percent during the military regime. Moreover, at the end of military regime extreme negative growth rate was registered.

With the arrival of the EPRDF the growth rate in the real value of total exports has shown a significant improvement. Total exports grew by a significant percent and reached about 23 percent in 2000/01 alone. This is due to different policy measures undertaken by the government

to promote exports. Revenue from the various export commodities has also shown a considerable improvement. However, due to volatility and unpredictability of international market growth rate of export during 2004/05-2010/11 has declined. The increase in the value of export contributed a lot for the registered economic growth during the period 1991/91-2005/06.

Generally, growth rate of exports and government consumption are volatile in Ethiopia during the period under consideration. Relative to export and government consumption, household consumption move in a very closer way with economic growth. (Figure 3.8). This implied that the behaviour of household consumption is very much similar with that of economic growth. Thus, domestic demand remained firm during the period. However, the growth rates of export and government consumption are higher than that of household consumption.

Moreover, during the imperial and military regime the ratio of exports to GDP was relatively low. However, this has been increased during EPRDF following prudent macroeconomic policy. On the whole, domestic demand and export had a role economic growth.

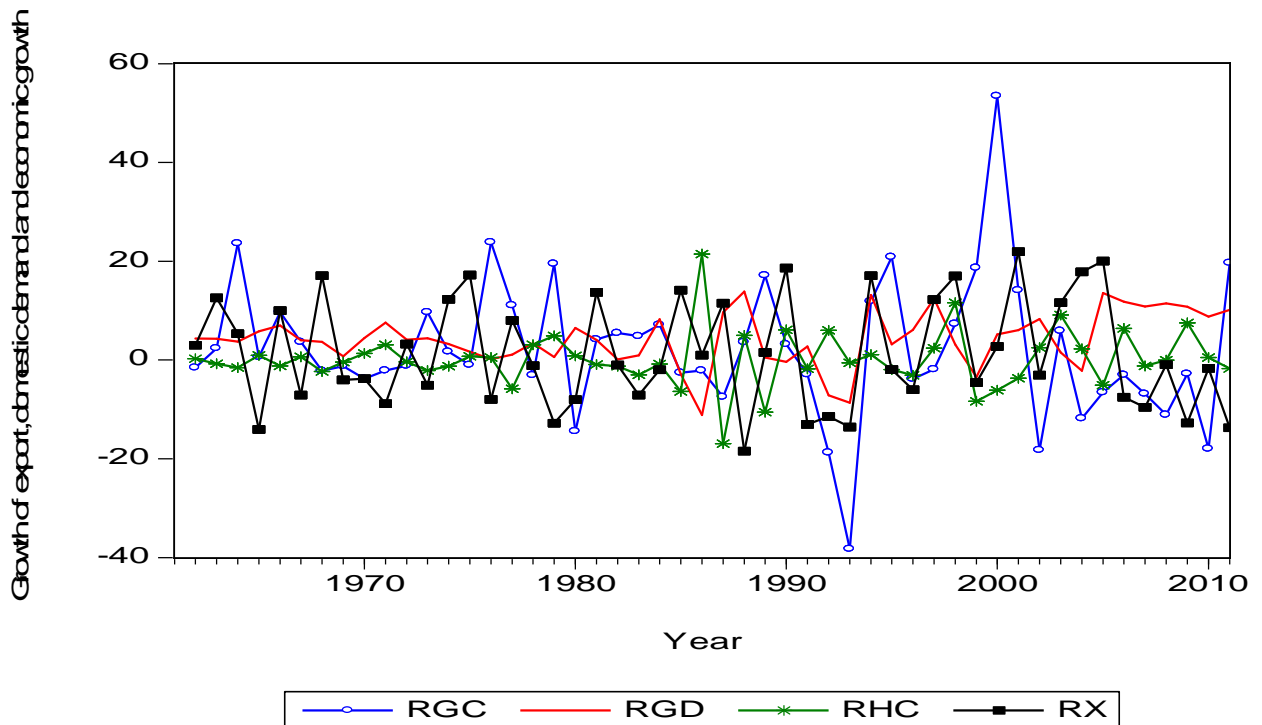


Figure 3.8: Growth rate of domestic demand (household and government consumption), export and economic growth in Ethiopia (1960/61-2010/11).

CHAPTER FOUR

ECONOMETRIC METHODOLOGY

4.1 Theoretical Model Specification

In the literature of the export led growth (ELG) hypothesis, the bivariate model of exports and economic growth is usually used. Consequently, the measure of domestic demand could be included in the bivariate model to examine the relationship between exports, domestic demand and economic growth (Wong, 2008).

So, the basic macroeconomic relationship of the aggregate demand composition is used in this study to examine the relationship between economic growth, domestic demand and export using Vector Autoregressive Model (VAR). The VAR method is powerful in causal analysis of variables, since, all the variables in a VAR are systematically treated endogenous by including for each variable an equation explaining its evolution based on its own lags and the lags of all the other variables in the model. Based on this inherent characteristic of this model, Sim (1980), suggested that VAR models is a theory-free method to estimate economic relationships as variables are symmetrically endogenous.

Thus, in order to examine the short-run dynamics and long-run relationships among domestic demand, export and economic growth, the study employ cointegration and Granger causality test in the VAR form as: $U(\text{VAR})=(Y,X,GC,HC)$.

Following [(Lai, 2004), Wong (2007, 2008), Chimobi and Uche (2010)], the primary model could be specified as:

$$Y=f(X, HC, GC) \text{-----} (4.1)$$

In an econometric form equation (4.1) can be stated as:

$$\text{Ln}Y_t = \beta_0 + \beta_1 \text{Ln}X_t + \beta_2 \text{Ln}HC_t + \beta_3 \text{Ln}GC_t + \varepsilon_t \text{-----} (4.2)$$

Where, Y_t is economic growth proxied by GDP per capita

X_t is export (%GDP)

GC_t is government consumption (%GDP)

HC_t is household consumption (%GDP)

The variables are logged so that, the first differences can be interpreted as growth rates and as well as to reduce variation in time series data sets. The coefficients are elasticities and ε is the white noise error term.

According to Sheehey (1990), using exports and other component of GDP as existing figures leads to bias in favor of correlation and, the alternative measures of the components of GDP (e.g export) variable not subject to this bias should be used to test the desired relationship such as using the percentage share. The same is true for household and government consumption since, they are other components of GDP in context of the final demand. Following the above justification, household consumption, government consumption and exports are expressed as the percentage of GDP.

If the primary model is the outcome, household consumption is expected to affect economic growth positively because of multiplier effect of increased consumption on aggregate demand and eventually influencing output. Export is also expected to affect output positively, mainly through factor productivity. The sign of the government consumption is undecided, since the existence of higher tax (for instance) could have negative impact on private consumption which causes aggregate demand to decline larger than the increase in government revenue and finally leads to lower output.

4.2 Empirical Model Specification

Vector Autoregressive Models (VAR)

The general form of the VAR (p) model with deterministic terms can be specified as under:

$$Y_t = \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \dots + \alpha_p Y_{t-p} + \psi X_t + \varepsilon_t \text{-----} (4.3)$$

Where $Y_t =$ an $(n \times 1)$ vector of time series variables.

$\alpha_i =$ $(n \times n)$ coefficient matrices

$\varepsilon_t =$ $(n \times 1)$ vector of white noise error term.

$X_t =$ (1×1) matrix of deterministic components

If the series is found stationary and integrated in the same order, the dynamic relation of the variables can be studied by employing the simple Vector Autoregressive (VAR) model, as given under in a matrix form.

$$\begin{bmatrix} Y_t \\ X_t \\ GC_t \\ HC_t \end{bmatrix} = \beta_0 + \beta_1 \begin{bmatrix} Y_{t-1} \\ X_{t-1} \\ GC_{t-1} \\ HC_{t-1} \end{bmatrix} + \beta_2 \begin{bmatrix} Y_{t-2} \\ X_{t-2} \\ GC_{t-2} \\ HC_{t-2} \end{bmatrix} + \dots + \beta_n \begin{bmatrix} Y_{t-n} \\ X_{t-n} \\ GC_{t-n} \\ HC_{t-n} \end{bmatrix} + \varepsilon_{it} \quad (4.4)$$

Having specified a VAR framework, this study specified a particular VAR model as under.

$$\begin{aligned} Y_t &= a_0 + \sum_{i=1}^n a_{1i} Y_{t-i} + \sum_{j=0}^m a_{2j} X_{t-j} + \sum_{k=0}^p a_{3k} G_{t-k} + \sum_{l=0}^q a_{4l} C_{t-l} + U_{1t} \\ X_t &= b_0 + \sum_{i=1}^n b_{1i} X_{t-i} + \sum_{j=0}^m b_{2j} Y_{t-j} + \sum_{k=0}^p b_{3k} G_{t-k} + \sum_{l=0}^q b_{4l} C_{t-l} + U_{2t} \\ G_t &= c_0 + \sum_{i=1}^n c_{1i} G_{t-i} + \sum_{j=0}^m c_{2j} X_{t-j} + \sum_{k=0}^p c_{3k} Y_{t-k} + \sum_{l=0}^q c_{4l} C_{t-l} + U_{3t} \\ C_t &= d_0 + \sum_{i=1}^n d_{1i} C_{t-i} + \sum_{j=0}^m d_{2j} X_{t-j} + \sum_{k=0}^p d_{3k} G_{t-k} + \sum_{l=0}^q d_{4l} Y_{t-l} + U_{4t} \end{aligned} \quad (4.5)$$

Where; variables are as defined earlier and U_t is white noise error term.

The above specification treats all variables endogenously (the fundamental use of VAR).

After setting VAR the long run and causal relationship between export, domestic demand and economic growth is investigated using Johanson cointegration technique and Granger causality analysis.

4.3 Description of Data and Sources

This study employs annual data of Ethiopia and the samples are over the period from 1960/1 to 2010/11. The variables included in the analysis are economic growth proxied by gross domestic product per capita (PCGDP), export of goods and services (X) and domestic demand proxied by government consumption expenditure (GC) and household consumption expenditure (HC). All variables are in 2000 price (2000=100). The study uses the data collected by national and international organization for the purpose of national account estimation and hence data were sourced from Ethiopian Ministry of Finance and Economic Development (MoFED), National Bank of Ethiopia (NBE), Ethiopian Economic Association (EEA) data base (2012), Africa Development Indicators (2011) and International Monetary Fund (IMF) and World Bank (WB), World economic Outlook data base (2011).

Per capita Gross Domestic Product (PCGDP): The ratio of GDP to total population. It is robust measures of economic growth than GDP, especially for international comparisons.

Exports(X): Represents goods and services that are produced domestically and sold to buyers of other countries.

Household consumption (HC): Represents all goods and services bought by households to meet their own everyday need, apart from residence.

Government consumption (GC): Represents government acquisition of goods and services for current use to directly satisfy individual or collective needs of the members of the community. It represents only part of total public sector spending, as it does not include capital expenditure, social security benefits or other transfers by government and also excludes expenditure by public corporations.

4.4 Method of Data Analysis and Estimation Technique

The aim of this sub-section is twofold. The first one is to provide some information concerning to the tests to be employed in this study. The second is to set the hypothesis of the relevant tests. Hence, this sub-section proceeds as follows: First, unit root tests is undertaken to know whether the series are stationary or otherwise. Secondly, if the series are found to be stationary after differencing, cointegration technique is applied to know the long run relationship among variables. Thirdly, once cointegration is examined vector error correction models is used to obtain both short run and long run information. Fourthly, Granger causality test is applied that could hold through error correction term. Finally, volatility test is undertaken to detect out sample causality test.

4.4.1 Testing for Unit Roots

Before proceeding to test for a causal relationship between the time series, checking the stationarity of the variables used in the models to be estimated are much important and even thought to be the first step in time series data analysis.

A stochastic process y_t is called stationary if it has time-invariant first and second moments. In other words, y_t is stationary if the means, variances, and covariances are finite numbers. On the other hand, a time series having, time-varying mean or a time-varying variance or both is called nonstationary time series (Helmut, 2005). The definition is very much important, to make sure of whether the series had a stationary trend or otherwise, and to establish orders of integration if it is found to be nonstationary.

This study uses aggregated time series variables. However, most macroeconomic time-series variables are non-stationary and, hence, it is paramount importance to test for the stationarity of the variable. Thus, this study uses the most powerful unit root tests (Augmented Dickey- Fuller (ADF) and the Phillips Perron (PP)) to test for the stationarity of time series data. The aim here is to avoid spurious (false) regression results.

The ADF requires the estimation of the regression below which is carried out in the context of a model with time trend:

$$\Delta Y_t = \beta_1 + \beta_2 t + \beta_3 Y_{t-1} + \sum_{i=1}^n (\alpha_i \Delta Y_{t-i}) + \varepsilon_t \dots \dots \dots (4.6)$$

Where; y_t time series, ΔY_{t-1} expresses the first differences with n lags determined by the AIC, SBC and HQC lag selection criteria and ε_t is the variable that adjusts the error of autocorrelation. The coefficients β_1 , β_2 , β_3 and α_i are being estimated.

After specifying the framework, we can proceed to test the pair of hypotheses. The null and the alternative hypothesis for the existence of unit root in variable Y_t is as under:

$H_0: \beta_3 = 0$ versus $H_1: \beta_3 < 0$.

$H_0: \beta_3 = 0$; there is a unit root.

$H_1: \beta_3 < 0$; the time series is stationary.

If the computed absolute value of the t statistic exceeds the ADF critical values, we reject the hypothesis that $\beta_3 = 0$, and conclude that the series is stationary.

On the other hand, Phillips and Perron use non parametric statistical methods to take care of the serial correlation in the error terms by making corrections to the t -statistics of the coefficients of the lagged variables, not by adding the differenced term of the lagged variables. It is given as follows.

$$\Delta Y_t = \mu + \alpha Y_{t-1} + \varepsilon_t \dots \dots \dots (4.7)$$

Where; ε_t is $I(0)$ and may be heteroskedastic. The PP tests correct for any serial correlation and heteroscedasticity in the errors ε_t of the test regression by directly modifying the test statistics.

4.4.2 Cointegration Test

Macroeconomic theory often suggests that some set of variables cannot move far away from each other if individual time series are integrated of order one, $I(1)$. Engel and Granger (1987) pointed out that if a linear stationary combination exists between two or more non-stationary variables, then the non-stationary time series are said to be co-integrated.

There are some methods for cointegration tests. Engle Granger two step procedure, Phillips-Ouliaris method, Johansen maximum likelihood procedure and Pesaran and Pesaran bound testing approach otherwise known as ARDL for cointegration are some of them. In this regard, we take advantage of the procedure developed by Johansen (1988). The Johansen procedure is a multiple equation method that allows the identification of the cointegration space which enables the testing of how many cointegration relationships exist.

The Johansen ML technique has several advantages: Firstly, without imposing any bias on the estimates, it permits the existence of cointegration between series of variables. Secondly, it helps to identify whether more than one cointegrating vector exists or not. Thirdly, it can estimate long-run relationship between non-stationary series using ML procedure. The model incorporates a vector of non-stochastic variables (x_t) orthogonal to the constant term such as ‘dummy type’ variables and/or stochastic ‘weekly exogenous’ variables (Johansen and Juselius, 1990).

Johansen’s methodology is given by the following vector autoregressive (VAR) of order p form:

$$y_t = \chi + A_1 y_{t-1} + \dots + A_p y_{t-p} + Bx_t + \varepsilon_t \dots\dots\dots(4.8)$$

Where; y_t is $n \times 1$ vector of non-stationary $I(1)$ variable, x_t is $n \times 1$ vector of deterministic variables, χ is vector of constant and ε_t is $n \times 1$ a vector of error term.

This VAR can be rewritten in the first differenced form as follows:

$$\Delta y_t = \chi + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + Bx_t + \varepsilon_t \dots\dots\dots(4.9)$$

where, $\Pi = \sum_{i=1}^p A_i - I$, and $\Gamma = - \sum_{j=i=1}^p A_j$

Γ and Π represent short run adjustment and long-run relationship among the y_t variables respectively. In the Johansen method, trace and maximum eigenvalue test statistics are the two test statistics for the number of cointegrating vectors.

Trace Test:

$$Trace(r_{0/k}) = -T \sum_{i=r_0+1}^k \ln(1 - \lambda_i)$$

In the trace test, the null is that the number of cointegrating vector is less than or equal to 1, 2, and so on. If the null hypothesis cannot be rejected, there is no cointegrating vector and we are forced to stop here. But if the null hypothesis is rejected we need to proceed.

$H_0: r_0 = g$ cointegrating vectors

$H_1: r_0 \leq 1$

Maximum Eigenvalue Test:

$$\lambda_{\max}(r) = -T \ln(-\lambda_{r+1})$$

H₀: r = g cointegrating vectors with (g = 0, 1, 2, 3, ---)

H₁: r ≤ g+1.

4.4.3 Vector Error Correction Model (VEM)

Cointegration explains the case where long run equilibrium is reached among the series that themselves (individually) may be non-stationary. Error correction model is built if and only if the variables are found to be integrated i.e the long term relationship that exists between the variables can be expressed by ECM. It is used to correct short run deviation of the variables from their equilibrium relationship (Gujarati, 2004). The VECMs associated with long run estimate is specified as under.

$$\Delta Y_t = \psi + \beta_1 \Delta X_t + \beta_2 u_{t-1} + \varepsilon_t \dots \dots \dots (4.10)$$

Where Δ denotes the first difference operator, u_{t-1} is one period lagged error term and ε_t is a white noise error term.

The coefficient of error correction term could be significant positive, significant negative or insignificant. The positive significance indicates that Y_t is above its equilibrium value and starts to adjust down towards equilibrium in the next period. Negative significance indicates that Y_t is below its equilibrium value and it starts to adjust towards equilibrium in the next period. However, the insignificance of error correction term indicates the equilibria of the system .i.e no time to take for adjustment and finally, the absolute value of β₂ decides how quickly the equilibrium is restored (Gujarati, 2004).

4.4.4 Granger Causality Test

Granger-causality statistics examine whether lagged values of one variable helps to predict another variable. The central message in Granger causality is to examine whether one variable (say, X) causes another variable (say, Y) and how much of the current Y can be explained by past values of Y and then to see whether adding lagged values of X can improve the explanation of Y. This is similar to say, if event X occurs after even Y, then X cannot Granger cause Y (Granger, 1969). Hence, ‘Granger causality’ indicates causality in the prediction sense rather than in structural

sense. It begins with the assumption that ‘the future cannot cause the past’. Y is said to be Granger caused if X helps in the prediction of Y, or equivalently if the coefficients on the lagged X’s statistically significant.

If variables are not cointegrated, Granger causality test (at least in the short run) could be within the first difference VAR model. But, if variables are cointegrated, a multivariate vector error correction model (VECM) is appropriate (Engel and Granger, 1987)

Following Engle and Granger (1987) the representation can take the following form: (equations 4.11 to 4.14)

$$\Delta \ln Y_t = \beta_{21} + \sum_{i=1}^h \beta_{22i} \Delta \ln X_{t-i} + \sum_{i=1}^h \beta_{23i} \Delta \ln C_{t-i} + \sum_{i=1}^h \beta_{24i} \Delta \ln G_{t-i} + \sum_{i=1}^h \beta_{25i} \Delta \ln Y_{t-i} + \beta_{26} EC_{1,t-1} + U_{1t} \quad \text{--- 4.11}$$

$$\Delta \ln X_t = \beta_{27} + \sum_{i=1}^h \beta_{28i} \Delta \ln X_{t-i} + \sum_{i=1}^h \beta_{29i} \Delta \ln C_{t-i} + \sum_{i=1}^h \beta_{30i} \Delta \ln G_{t-i} + \sum_{i=1}^h \beta_{31i} \Delta \ln Y_{t-i} + \beta_{32} EC_{2,t-1} + U_{2t} \quad \text{--- 4.12}$$

$$\Delta \ln C_t = \beta_{33} + \sum_{i=1}^h \beta_{34i} \Delta \ln X_{t-i} + \sum_{i=1}^h \beta_{35i} \Delta \ln C_{t-i} + \sum_{i=1}^h \beta_{36i} \Delta \ln G_{t-i} + \sum_{i=1}^h \beta_{37i} \Delta \ln Y_{t-i} + \beta_{38} EC_{3,t-1} + U_{3t} \quad \text{--- 4.13}$$

$$\Delta \ln G_t = \beta_{39} + \sum_{i=1}^k \beta_{40i} \Delta \ln X_{t-i} + \sum_{i=1}^k \beta_{41i} \Delta \ln C_{t-i} + \sum_{i=1}^k \beta_{42i} \Delta \ln G_{t-i} + \sum_{i=1}^k \beta_{43i} \Delta \ln Y_{t-i} + \beta_{44} EC_{4,t-1} + U_{4t} \quad \text{--- 4.14}$$

Where; Y_t is GDP per capita; X_t is export; G_t is government consumption and H_t is household consumption. $EC_{1-4,t-1}$ is error correction term obtained from respective cointegrating regression; Δ is first difference ; k is lag length. $U_{t's}$ are serially uncorrelated random error terms with mean zero.

4.4.5 Test of Volatility

There are two approaches, variance (forecast error) decomposition and impulse response function for characterizing the dynamic behaviour of the VAR model. The impulse response functions and variance decomposition technique suggested by Sims (1980) are useful devices in the VAR framework for testing the sources of variability. The impulse response function can trace the response of the endogenous variables to a shock in another variable. The variance decomposition breaks down the variance of the forecast error for each variable into components that can be attributed to each of the endogenous variables.

CHAPTER FIVE

ESTIMATION AND DISCUSSION OF RESULTS

5.1 Unit Root Test

According to Granger and Newbold (1974), the regression results may be spurious if the variables are non-stationary. As the result, it is very important to test the existence of unit root and examine the order of integration for each variable beforehand, so as to avoid the spurious correlation problem. To this end, all variables are detected through graphical inspection of their time series plots.

The plots of the variables at their level are presented in the appendix B. From the plot it is easily observed that each variable seems to have a non-constant mean. i.e, their distribution depends on time, which explicitly stipulates that the series are not stationary in levels. In contrast the plots of the variables in first differences are at least, visually revolve around their mean expressing that the variables are stationary. According to Harris (1995) of course, the plots are the first approximation for decision. However, it is unreliable to make inferences about unit root based on graphical evidence. As a result, it is time to turn to appropriate and formal way of testing each of the variables under consideration.

In this regard, the well known Augmented Dickey- Fuller (1981) and the Phillips Perron (PP) (1988) are applied to test the existence of unit root and ascertain order of integration. The primary interest is to determine whether the variables are stationary or not. First, if the series are non-stationary and we used a classical method of estimation such as OLS, we are mistakenly going to accept spurious relationships, in which their results would be meaningless. Second, if the series are found to be non-stationary, the common knowledge is differencing the series. But, differencing has its own costs. It prevents detection of the long-run relationship that may be present in the data, i.e. the long-run information is lost.

The null hypothesis for the test states that the series has unit root. Whereas, the alternative hypothesis says the series is stationary. Both these unit root tests suggest that the variables under examination are a unit root process at levels and, hence, integrated of order one, $I(1)$. The unit root

test is undertaken both at the intercept and intercept plus trend regression forms, and the results of Augmented Dickey- Fuller (ADF) and PP unit root test are given in Tables 5.1 and 5.2

Table 5.1: ADF unit root test for stationarity

Level									
Intercept					Trend and intercept				
Variables	test	1%	5%	p-value	test	1%	5%	p-value	Decision
	Statistic	critical values			statistic	critical values			
LPGDP	1.012	-3.565	-2.919	0.996	0.329	-4.148	-3.500	0.998	I(1)
LRX	-1.966	-3.565	-2.919	0.300	-2.329	-4.149	-3.500	0.411	I(1)
LRHC	-2.551	-3.568	-2.921	0.109	-2.337	-4.152	-3.502	0.406	I(1)
LGC	-2.605	-3.568	-2.921	0.098	-3.009	-4.175	-3.513	0.141	I(1)
First difference									
DLPGDP	-2.513	-3.574	-2.923	0.001**	-2.799	-4.161	-3.506	0.0003**	
DLRX	-7.326	-3.568	-2.921	0.000**	-7.260	-4.152	-3.502	0.0000**	
DLHC	-6.309	-3.574	-2.923	0.000**	-5.709	-4.165	-3.508	0.0001**	
DLGC	-5.895	-3.568	-2.921	0.000**	-5.952	-4.152	-3.502	0.0000**	

Table 5.2 PP unit root test for stationarity

Level									
Intercept					Trend and intercept				
Variables	test	1%	5%	p-value	test	1%	5%	p-value	Decision
	Statistic	critical values			statistic	critical values			
LPGDP	0.748	-3.565	-2.919	0.992	0.096	-4.148	-3.500	0.996	I(1)
LX	-1.952	-3.565	-2.919	0.306	-2.371	-4.148	-3.500	0.389	I(1)
LHC	0.122	-2.611	-1.947	0.717	-3.500	-4.148	-3.848	0.217	I(1)
LGC	-2.237	-3.565	-2.919	0.196	-2.1343	-4.148	-3.500	0.514	I(1)
First difference									
DLPGDP	-5.129	-3.568	-2.921	0.000**	-5.325	-4.152	-3.502	0.0003**	
DLX	7.328	-3.568	-2.921	0.000**	-7.261	-4.152	-3.502	0.000**	
DLHC	-18.631	-3.568	-2.921	0.000**	-22.558	-4.152	-3.502	0.0001**	
DLGC	-5.872	-3.568	-2.921	0.000**	-5.904	-4.152	-3.507	0.0001**	

Source: Own estimation using Eviews 6.0.

The variables for the growth rate of per capita GDP is given by DLPGDP, that of the share of export earnings in the GDP is by LX, that of the share of private consumption expenditure in the GDP is by LHC and that of the share of government consumption in the GDP is given by LGC. The null hypothesis claims that the relevant series contains a unit root. D indicates the first difference of the respective series and finally ** indicates rejection of null hypothesis at 1% level of significance.

The above table presents the result of both ADF (based on the automatic lag length selection by Akaike information criteria) and PP test. The obtained results shows that all the time series in levels are non-stationary, which means they are integrated at an order of 1, i.e. $I(1)$. Thus, the null hypothesis cannot be rejected for any of the variables under examination at 1% and 5% level of significance. However, when differenced once, the tests strongly reject the unit root, saying that they are integrated at an order of zero.

The results of the unit root test are consistent with the theoretical argument that most macroeconomic series are not stationary at their levels and become stationary at their first difference. Once, the series found to be stationary in differencing once, no further tests are required. Although the individual series could be non-stationary, i.e., they are individually $I(1)$, as presented above, a linear combination of them might be stationary (Engle and Granger (1987), which means a well-defined linear relationship exists among them in the long run. So, the subsequent discussion provides a test for cointegration between the variables under investigation in which the null hypothesis claims no cointegration.

5. 2 Lag Length Selection and Long run Relationship

5.2.1 Lag Length Selection

Before proceeding to the task of testing cointegration relationship, optimal lag length determination is required in vector autoregressive (VAR) model. This is important since, under-parameterization would lead to a biased result and similarly, over-parameterization reduces the power of the tests. Basically information theoretic model selection criteria attributed to Hannan-Quinn information criteria (HIC), the Log Likelihood (LL), the Schwarz information criteria (SIC) and the Akaike information criteria (AIC) are considered.

Empirical literature often suggests the use of the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC) to select the lag length of the VAR system, which is achieved by minimizing the AIC and SBC. Then use the one that suggests the smaller order; of course, the two may choose the same lag length, which is more interesting.

This study determined the optimal lag length according to the VAR lag order selection criteria and hence, Akaike Information Criterion (AIC) of lags (p) of VAR, Schwarz Bayesian Criterion (SBC) of lags (p) of VAR and others select the same lag length which is one. So in this study, the lag length used is one for cointegration test. The result is given in the table below.

Table 5.3: VAR Lag Order Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	115.9321	NA	1.00e-07	-4.763068	-4.605609	-4.703815
1	234.8536	212.5406*	1.26e-09*	-9.142708*	-8.355411*	-8.846443*
2	247.2432	20.03414	1.49e-09	-8.989071	-7.571937	-8.455794
3	257.4375	14.74923	1.99e-09	-8.742021	-6.695049	-7.971732
4	274.9083	22.30319	2.02e-09	-8.804610	-6.127800	-7.797308
5	291.4637	18.31655	2.26e-09	-8.828241	-5.521594	-7.583928

*indicates lag order selected by the criterion using Eviews-

PE: Final prediction error

IC: Akaike information criterion

SC: Schwarz information criterion

Once the optimal lag is decided based on the criterion, then corresponding estimated residuals need to be tested for the sufficiency of the lag to pass tests relating to the presence of autocorrelation. The lag length selected by the criteria would be used when residual could pass the autocorrelation test and, hence, the test proves that no autocorrelation problem at lag one. Then step is taken to discuss about the long run relationship among variables.

5.2.2. Final Demand and Growth Linkage in the Long Run

Both PP and ADF tests suggest that all the variables (per capita GDP, household consumption, government consumption and export) are found to be integrated of order of 1, i.e., I (1), and thus, have a stochastic trend, and in addition, found to be stationary at their first differences, indicating that they are all candidates for inclusion in a long-run relationships for testing the number of cointegrating relationship among them. In the case of cointegrating equation estimation, this study

selected under linear trend and level data. Both tests; the maximum eigenvalue (λ_{max}) and trace statistics (λ_{trace}) are used to determine the number of cointegrating vectors.

The following table presents the results obtained by the application of the Johansen procedure to test for cointegration relationship using a VAR at an order of one. The Johansen cointegration approach has been used, due to its ability to capture the properties of time series by estimating of all possible cointegrating vectors along with the test statistics. The result corresponds to the time period (1960/61-2010/11)

Table 5.4: Result of Johansen cointegration test

<i>Null hypothesis</i>	<i>Alternative hypothesis</i>	<i>Eigen value</i>	<i>Statistic</i>	<i>5%critical Value</i>	<i>Prob.</i>
<i>Trace test(λ_{trace})</i>					
r=0	r \geq 0	0.396398	48.78435	47.85613	0.040*
r \leq 1	r \geq 1	0.259520	23.54232	29.79707	0.770
r \leq 2	r \geq 2	0.136639	8.519461	15.49471	0.411
r \leq 3	r \geq 3	0.023194	1.173336	3.841466	0.2787
<i>Maximum Eigen value test(λ_{max})</i>					
r=0	r=1	0.396398	25.24203	27.58434	0.096
r=1	r=2	0.259520	15.02286	21.13162	0.287
r=2	r=3	0.136639	7.346124	14.26460	0.449
r=3	r=4	0.023194	1.173336	3.84166	0.278

Where (*) means rejection of the null hypothesis at the 5% and r denotes the rank of the long-run matrix.

From the above table, the trace statistic indicates the existence of one cointegrating relationship while, the maximum Eigen value fails to say. Though, no complete agreement among econometricians, concerning which of the test is powerful, this study has preferred to report and rely on trace tests. The trace test shows more robustness to skewness and excess kurtosis in the residual rather than maximum eigenvalue. It is also robust to departure from heteroscedasticity (Johansen, 1995).

The null hypothesis which claims no cointegration is rejected at the conventional level of significance, since the trace test statistic is greater than the critical value at zero cointegrating vector(r=0).So, it is fair to conclude that there exists a long run relationship between the series and the results support the existence of one cointegrating relationships. This is equivalent to say among

economic growth, household consumption, government consumption and export, there is one long run relationship.

“Causality implies the existence of prior laws that govern the relation between the cause and effect” (Rashid and Zubaidi, 1999). Thus, empirical estimates are best necessary but never sufficient in establishing causality.

Once the existence of unique cointegrating vector is identified, Johansen Maximum Likelihood method of the linear combination of variables represented by the first row of standardized beta (β) eigenvectors and first column of alpha (α) coefficients are important for long run equation and short run adjustment. The table below presents the results of beta and alpha matrices.

Table 5.5A) Normalized beta (β) eigenvectors.

Y	LGC	LHC	LX
1.00000	-0.20177	-3.71064	-0.5778
-0.90072	1.00000	5.201386	-1.35225
-0.55672	0.700927	1.00000	-0.06136
-2.70156	-0.68271	-3.68462	1.00000

Table 5.5 B) Alpha (α) coefficient

D(LY)	-0.028286	0.007018	0.000960	-0.003227
D(LX)	-0.013044	-0.026475	0.008142	-0.013369
D(LHC)	-0.020300	0.015851	0.001024	-0.000941
D(LGC)	0.012871	-0.021835	-0.043107	-0.005523

The alpha coefficients show the speed of adjustment of the long run parameters towards the steady state and the deviation from the equilibrium.

Standardized β eigenvectors

Y	LGC	LHC	LX
1.0000	-0.20177	-3.71064	-0.5778

Next, test of significance on the long run parameters which is obtained by imposing zero restriction on the long run β coefficients is conducted. The following table presents the test of significance of long run coefficients.

Table 5.6: Test of zero restriction on the long –run parameters (Significance of long- run coefficient)

<i>Variable</i>	<i>β coefficient</i>	<i>LR test of restriction ch²(1)</i>	<i>t- value</i>	<i>Prob</i>
LGC	0.20177	0.639	[1.223]	0.423
LHC	3.7106	5.523	[-4.483]	0.018*
LX	0.5778	9.773	[-2.775]	0.001**

Where; * and ** denotes rejection of the null hypothesis at 5% and 1% significance level respectively.

As revealed from the above table the null hypothesis that claims β coefficients are significantly not different from zero is rejected at 1% and 5% level of significance for export and household consumption, indicating that the variables have significant effect on growth in the long run.

Therefore, the final long run equation is given as under.

Table 5.7: Results of Long run Equation

Variable	LGC	LHC	LX
Coefficient	0.20177	3.7106	0.5778
P value	[0.423]	[0.018]*	[0.001]**

* and ** denotes significant at 5% and 1% respectively

Consequently, the results that appear in table 5.4 suggest that the number of statistically significant cointegration vectors is equal to 1 and is the following one⁴.

$$Y = 0.20177LGC + 3.71064LHC + 0.5778LX$$

$$P_{value} \quad [0.423] \quad [0.018]^* \quad [0.001]**$$

System (Multivariate) Diagnostic test

Vector AR 1-2 test: $F(32,119) = 1.1155 [0.3282]$

Vector Normality test: $\chi^2(8) = 38.235 [0.11000]$

Vector hetero test: $F(80,167) = 0.79392 [0.8765]$

Vector hetero-X test: $F(140,173) = 0.74283 [0.9662]$

⁴ Weak exogeneity test has been conducted but not reported here since, it confirms the above relationship.(see appendix E)

In order to for the results to be econometrically credible and economically meaningful, it is important to investigate the statistical properties of the model. To this end, a number of diagnostic test have been undertaken. The result shows that, the null of no serial correlation, homoscedasticity and normality are not rejected at conventional level of significance. Moreover, the RESET test also confirmed that there is no functional misspecification problem. In addition, graphical test of vector autoregressive (VAR) stability and residual autocorrelation graphs of long run equation are given in the appendix C

The diagnostic graph of residual (1-step residuals ± 2 nd SE) has also been employed and the plots of the recursive graphics that bounds within the 95% critical values are given in Appendix C. As can be seen from the graphs, the null hypothesis of overall parameter consistency from the VAR cannot be rejected based on the 1-step recursive residuals (1-step residuals ± 2 nd SE) and hence, each variable is stable. Having conducted the system diagnostic, now it is reasonable to interpret the results. The coefficients' estimates in equilibrium relationships which are essentially the long-run estimated elasticities relative to economic growth suggest that household consumption is elastic to economic growth.

From the above result we can infer that in the long run an increase of 1% of household consumption will lead to an increase of 3.7% for economic growth. This is through multiplier effect of final demand. Higher consumption implies higher demand. The higher demand in the economy necessitates output expansion in order to satisfy the excess demand and higher output indicates improvement in overall national income, and eventually economic growth. The finding is theoretically plausible and empirically consistent with Aqeel and Butt (2001) in case of Pakistan. The result refutes the result of Kweka and Morrissey (1998), and Folster and Henrekson (1999) in case of Tanzania

On the other hand, in the long run, an increase of export by 1% will lead to incase of economic growth by 0.57%. This is due to the fact that export is very important for economic growth through improving productivity. The finding is consistent with that of Chimobi and Uche in case of Nigeria, Lai (2004) in case of Malaysia, Lin and Li(2002) in case of china, Gemechu in case of Ethiopia and so forth.

However, government consumption expenditure is found to be statistically insignificant and, hence, has no significant effect on growth in the long run. This is due to short run phenomenon of this type of expenditure, and hence, inability of such expenditure to create productive asset as its spillover effect would not be span to long run to drive the economy in the future. This finding is consistent with Dunne and Nikolaidou (1999) in case of Greece, Loto (2011) in case of Nageria.

5.3. A VAR Model with an Error Correction Mechanism

After determining that the logarithms of the variables in the model are cointegrated, we must estimate then a VAR model in which we shall include a mechanism of error correction model (ECM). This is formulated as under:

$$\Delta Y_t = \psi + \sum_{i=1}^m h_i \Delta Y_{t-i} + \sum_{j=1}^m \lambda_j \Delta GC_{t-j} + \sum_{q=1}^m \phi \Delta HC_{t-q} + \sum_{z=1}^m \gamma \Delta X_{t-z} + \pi ecm_{t-1} + \varepsilon_t \text{ ----5.1}$$

Where; π is the speed of adjustment

In order to estimate dynamic short run model, the first difference of all variables are estimated using OLS and then one period lag is imposed on all variables including the vector error term saved from the long run equation. Then, the final form of the error-correction model is selected according to the approach suggested by Hendry from general to specific and dropping the highly insignificant variables based on t-value is employed until the parsimonious model is obtained. The procedure requires undertaking diagnostic tests at each stage of reduction. With the exception of the first difference of government consumption expenditure all included variables are found to be statistically significant and economically meaningful. Moreover, normality test, residual autocorrelation, test of heteroscedasticity and Ramsey's reset tests are conducted.

Table 5.8: Parsimonious Result of VECM estimate

Variables	Coefficient	Std.error	t-value	t-prob	Part^2
Constant	0.00613860	0.008140	0.754	0.455	0.0144
Dpcy_1	0.725056	0.2217	3.27	0.002	0.2152
DLGC	0.00959534	0.06120	0.157	0.876	0.0006
DLGC_1	0.124787	0.05895	2.12	0.041	0.1031
DLHC	0.374591	0.1736	2.16	0.037	0.1031
DLHC_1	0.267918	0.1626	2.65	0.007	0.1651
DLEX	0.0258301	0.07028	2.368	0.015	0.1035
DLEX_1	0.0379640	0.17366	3.115	0.009	0.2068
ECT_1	-0.61765	0.2932	-2.11	0.042	0.1022

R² = 0.795031 F (8, 40) = 8.264 [0.000]** DW =1.88

Diagnostic tests

AR 1-2 test: F (2, 37) = 3.9159 [0.087]
ARCH 1-1 test: F (1, 37) = 1.5093 [0.2270]
Normality test: Chi²(2) = 3.1534 [0.2067]
Hetero test: F(16,22) = 2.9115 [0.1006]
RESET test: F (1,38) = 3.6817 [0.0625]

The value of the coefficient of determination (R-square) is sufficient, while the Durbin-Watson (DW) statistics is within the permissible limits, without revealing any autocorrelation balances.

In the short run, change in economic growth is positively and significantly affected by last year growth. Change in domestic demand components in this year and one year back also causes current economic growth positively. The same is also true for export earnings. This is in line with theoretical argument that economic growth is due to its major components in each year and accumulated effect of the past year. The base year growth matters for the current year economic improvement and become the base for the enhancement of its components for the years to come.

The lagged error correction term (ECT-1) included in the model to capture the long run dynamics between the cointegrating series is negative indicating speed of adjustment towards equilibrium. It implies that economic growth will adjust itself to equilibrium by 61.76% per annum and full adjustment will take about one year and seven months.

The magnitude of export, government consumption and household consumption in the long run are much higher than the short-run impacts indicating that the impacts of change in export and domestic demand on economic growth are much stronger in the long-run.

The existence of cointegrating relation among exports, government and household consumption and economic growth suggests there must be Granger causality at least in one direction.

5.4 Granger Causality Test

Though, cointegration implies the existence of at least unidirectional causality between variables it does not provide the direction of causality (Engel and Granger (1987). Thus, having established a cointegration relationship, we based on error-correction model (ECM) to test for Granger causality among export, domestic demand and economic growth. According to Granger (1988), if the series are found to be cointegrated, the inclusion of error correction term in testing causal relationship among variables is very much important, since, it provides an extra channel through which causality may be observed. Otherwise the standard Granger test may lead to invalid causal information. Moreover, including error correction term also allow us to distinguish between short run, long run and overall causality.

Sources of causation between the variables in one equation (4.11) – (4.14) can be identified through three channels:

- (a) The coefficients of each explanatory variable in one equation (short-run Granger causality)
- (b) The lagged error correction terms
- (c) The terms just described in (a) and (b) jointly (strong or over all Granger causality)

For this purpose two-step procedure is used. First, the long-run equations are used to obtain the deviations from the long-run equilibrium. Then the error-correction model is estimated with the one-period lagged residuals from the first step.

In the literature the questions of optimal lag to include in the Granger causality test is raised and the issue of the best statistical method to use in deciding the maximum lag is not similar. Thornton and Batten (1985) come up with the conclusion that the final prediction method is a better technique for determining the optimal lag. However, Jones (1989) argued that “ad-hoc methods for determining the lags to use in Granger’s causality test performed better than some of the statistical methods used to search for optimal lags”.

The lagged change in the respective independent variables of VAR representation tell us the short run causal impact whereas, the significance of the error correction term gives the information on long run causality. The coefficients of error correction terms are expected to capture the adjustments of ΔY_t , ΔX_t , ΔG_t , ΔH_t and ΔX_t to their long run equilibrium, whereas, the coefficients on lagged variables of ΔY_t , ΔX_t , ΔG_t , ΔH_t and ΔX_t are expected to capture the short run dynamics of the models.

In the Granger causality, the following four conditions are the likely outcomes. (1) Neither variables Granger cause each other (short-run phenomenon) (2) one variable (say g) causes the other (say h) but not the other way round (3) one variable (say h) causes the other variable (say g) but not vice versa and (4) all variables are reinforcing each others.

As long as the coefficient of error correction term is statistically significant, causality exists among the variables under investigation even if the coefficients of the lagged variables are not statistically significant.

The direction of causality can be determined by testing for the significance of the coefficients of each dependent variable in equations (4.11) to (4.14). In order to check for short-run causality that enables us to detect whether causality runs from export, household consumption and/or government consumption to economic growth in equation (4.11), we test the null hypothesis [$H_0: \beta_{22i}=0$; $H_0: \beta_{23i}=0$ and $H_0: \beta_{24i}=0$] against the alternative hypothesis. The underlying null hypotheses for testing whether short-run causality runs from economic growth, household consumption and/or government consumption to export in equation (4.12) are [$H_0: \beta_{29i}=0$; $H_0: \beta_{30i}=0$ and $H_0: \beta_{31i}=0$]. In the similar manner to test short run causality runs from economic growth, export and/or government consumption to household consumption in equation (4.13), we set the null hypothesis [$H_0: \beta_{34i}=0$; $H_0: \beta_{36i}=0$ and $H_0: \beta_{37i}=0$] against the alternative hypothesis. Further, for short-run causality running from economic growth, export and/or household consumption to government consumption in equation (4.14), we test [$H_0: \beta_{40i}=0$; $H_0: \beta_{41i}=0$ and $H_0: \beta_{43i}=0$]

For long-run causality we need to test the significance of the speed of adjustment, which means testing whether the coefficient of the respective error-correction term-represented by β_{26} β_{32} β_{38} β_{44} are equal to zero or different from zero. Finally, strong causality is tested by applying joint tests

including the coefficients of the respective explanatory variables and the respective error correction term of each equation. This is helpful to notice which variables bear the burden of a short-run adjustment to re-establish a long-run equilibrium, following a shock to the system (Asafu-Adjaye, 2000).

As a testing criterion, the Wald χ^2 test and F statistic are used. With these statistics the variables of interests (economic growth, household consumption, government consumption and export) are tested for each separate equation. The results are summarized as under.

Table 5.9: Results of Granger causality tests

Dependent	Sources of causation (Independent)								
	Short run				Long run		over all causality		
	$\Delta \ln Y$	$\Delta \ln X$	$\Delta \ln G$	$\Delta \ln C$	ECT_1	$\Delta \ln Y, ECT$	$\Delta \ln X, ECT$	$\Delta \ln G, ECT$	$\Delta \ln C, ECT$
	P-value				p-value		P-value		
$\Delta \ln Y$	-	0.26	0.03	0.004	0.004	-	0.019	0.45	0.002
$\Delta \ln X$	0.011	-	0.74	0.042	0.032	0.011	-	1.24	0.65
$\ln \Delta G$	0.049	0.75	-	0.026	0.41	0.042	3.52	-	0.008
$\Delta \ln C$	0.006	0.32	0.11	-	0.024	0.003	0.035	0.00	-

The included variables in the analysis are: per capita GDP (Y) share of export earnings in the GDP (X), the share of private consumption expenditure in the GDP (C) and the share of government consumption in the GDP (G). The reported probability is that of F-statistics.

Empirically, the finding reveals that there are causal relationships between economic growth, export, government consumption and household consumption at least in one of the three cases, i.e. short-run, long-run and overall causality.

Let begin the analysis with the short-run causality results. In the short-run, the result tells us that causality runs from household consumption to economic growth and from economic growth to household consumption. So, there is bi-directional Granger causality between economic growth and household consumption in the short run. Moreover, the causality also runs from government consumption to economic growth and from economic growth to government consumption.

There is uni-directional causality between export and household consumption as well as between government consumption and household consumption. The causality is running from household consumption to export and government consumption. In addition, the causality between export and economic growth in the short run is also unidirectional; the causality is running from growth to export. However, there is no short-run Granger causality between export and government consumption. Thus, there is a dynamic relationship between export, domestic demand and economic growth.

In the long run, export and domestic demand Granger causes economic growth. Economic growth, government consumption and export also Granger causes household consumption. There is bidirectional Granger causality between export and economic growth and, between household consumption and economic growth. However, there is unidirectional causality between economic growth and government consumption. The direction of causality is running from economic growth to government consumption. The result also shows strong causality between household consumption and economic growth.

In the whole, the result shows that domestic demand measured by household and government consumption is important for economic growth and in the same manner economic growth is also important for domestic demand. The same is true for export. Economic growth promotes export and export is also important for economic growth. As the result, the finding supports domestic demand led-growth, growth led-domestic demand and growth led export hypothesis in the short run and long run, while, export-led growth hypothesis is supported in the long run.

With respect to previous work undertaken concerning to export, domestic demand and growth nexus, the finding that domestic and economic growth reinforcing each other is consistent with the argument of palley (2002), who argued that domestic demand play a significant role in economic

growth, Bello (2001) who argued government has understood the importance of domestic demand to stimulate growth and Munko (2007) among others. Munko argued that economic strategy prioritizing stimulation of domestic market have the potential effect for growth and development. The result is also argued with Lai (2004), who argued domestic demand-led growth is supported. However, as long as long run relationship between exports and economic activity exists, domestic demand led growth should not entirely replace an export-led growth strategy. Since, export-orientation is still one of the best strategies to adopt to ensure growth

Moreover, the finding of bidirectional Granger causality between household consumption and economic growth is consistent with Wong (2008) in case of Asean-5, Jumbe (2004) in case of Malawi, Magazzino (2011) in case of Italy; causality between government consumption and economic growth is consistent with that of Komain & Brahma (2007) in case of Thailand, Ranjan and Sharma (2008) in the case of India, Sami Taban (2010) in the case of Turkey, Olukayode (2009) in case of Nageria, among others.

Regarding to export-economic nexus, the finding is consistent with Ekanayake (1999), In case of India, Indonesia, Korea, Pakistan, Philippines, Sri Lanka and Thailand, Thornton (1996) in case of Mexico, Amavilah (2003) in case of Namibia , Girma (1982) and Gemechu (2002) in case of Ethiopia among others.

However, compared with other previous studies the finding of this study contradicts with the argument of palley (2011).who argued “the global economy is now characterized by a structural shortage of demand and intense competition between emerging economies. In such an environment, export-led growth cannot work for emerging economies as a whole. The solution is to shift to domestic demand-led growth”, the finding of Asif et.al (2009) in case of Pakistan who, found uni-directional causality running from export to economic growth, Jiranyakul and Brahma (2007) in case of Thailand who found no feedback causality from economic growth to government consumption among others.

Furthermore, the result also refutes the neutrality hypothesis (no causality) by Dilrukshini (2002) in case of Sri Lanka, Kweka & Morrissey (1998) and Folster & Henrekson (1999) in case of Tanzania

Finally, as to this study there is no evidence to support pulley's (2002) argument (drawback of export-led in developing countries) and the solution set by him to paradigm shift to domestic demand and Bellos' (2001) argument; government have understood the importance of domestic demand to stimulate growth specially in least developed economies and domestic demand led growth will replace export-led growth.

5.5. Test of Volatility

The presence of causal links among domestic demand, export and economic growth is already presented using Granger causality tests. However, Granger causality do not sufficiently answer the question on what is the extent of causality and as such, is it destabilizing in nature? In this regard we take the advantage of forecast error variance decomposition and impulse response function in order to provide further insight to the dynamic relationship of the variables in the system.

5.5.1. Forecast Error Variance Decompositions (FEVD)

If domestic demand and export are important for economic growth, the impact of the shocks on these variables is significant on growth. How much of the variance in forecast errors of future economic growth can be attributed to innovations in export and domestic demand growth is the issue of FEVD. This technique is standard in the VAR approach; for details, the reader is referred to Doan (1992), Sims (1980), etc. The analysis of variance decomposition is computed through distributing all variables in the system by one standard deviation. But ordering of the variables matter, since, ordering can alter the decomposition factor.

The result presented in the following table is based on the VAR system ordered as Chelosky ordering of LY LX LHC LGC. Since there is no prior reason to choose any ordering over the other, I decide to experiment the analysis by ordering all four variables alternatively with some other ordering. The result shows that estimates are affected when order changes, but basic results concerning the short run and long run relationship among per capita GDP, export and domestic demand are not altered. Thus, changing the ordering had the negligible impact on the result and therefore, the inference in this particular case. The results of variance decomposition of per capita GDP, export, private consumption and government consumption to one-standard deviation shocks

in over a 10 years period is presented in the following table⁵ (Chelosky ordering LY LX LHC LGC).

Table 5.10: Variance Decomposition of LY

Period	S.E.	LY	LX	LHC	LGC
1	0.046023	100.0000	0.000000	0.000000	0.000000
2	0.068041	96.44478	0.102601	3.160620	0.292000
3	0.088137	79.01571	0.930299	19.58130	0.472696
4	0.110181	63.13423	3.675878	31.82163	1.368253
5	0.130230	53.34229	5.407502	39.09911	2.151100
6	0.147652	47.90169	6.430054	42.89626	2.771998
7	0.162791	44.72255	6.960153	45.13427	3.183027
8	0.176380	42.68580	7.277303	46.57678	3.460123
9	0.188897	41.23326	7.490918	47.62335	3.652465
10	0.200629	40.11628	7.655193	48.43270	3.795824

The above table presents the results of the variance decomposition analysis. This analysis is used to supplement the Granger Causality test results to examine the out of sample causality. There are several considerable findings from the variance decomposition results. The result show how much an economic growth's own shock is explained by movements in its own variance and the other variable. After two years, 96.44 per cent, 98.52 per cent, 76.54 percent and 80.48 percent of the variation in the forecast error variance for per capita income, export, household consumption and government consumption spending is explained by its own shock, respectively. (For detail see appendix D)

In explaining the shocks in per capita GDP growth, household consumption expenditure is more important than export and government consumption both in the short-run and long-run. After 2 years 3.16 percent of variation in per capita GDP is being explained by household consumption expenditure, 0.29 percent by government consumption and 0.10 by export.

⁵ since, the focuses is on the response of output growth per capita to shocks in the export and domestic demand, only the forecast-error variance decomposition of the GDP growth per capita variable in response to a one standard deviation innovation in export, private consumption expenditure and government consumption is presented. These responses are estimated using random generation of the parameters of the model setted in Granger causality analysis in a Monte Carlo study with 100 iterations. Since the innovations are not necessarily totally uncorrelated, the residual terms are orthogonalized using a Chelosky decomposition in order to obtain a diagonal covariance matrix of the resulting innovations and, therefore, isolate the effects of each variable on the other.(see appendix D for the variance decomposition of other variables)

Then the statistics for household consumption expenditure, government consumption and export increases to 48.43 percent, 3.79 percent and 7.65 percent respectively, after ten years. Therefore, in the sense of final demand, household consumption expenditure plays more important role in forecasting and accelerating economic growth in Ethiopia. This is consistent with the finding of Granger causality results given in Table 5.9

Variance decomposition provides information concerning to the magnitude and direction of causality, but says nothing about the sign of the causal relationship among the variables and how long would the effect of the shocks persist in the system. In this regard, we take the advantage of the generalized impulse response function.

5.5.2 Generalized Impulse Responses

An impulse response functions portrays the response of the system over time to a shock to each of the variables in the system. The results of impulse response function of economic growth measured by per capita GDP to a one-standard deviation shocks in percapita GDP, export, private consumption expenditure and government consumption over a 10 years period is presented in the table below.

Table 5.11: Impulse Responses to Generalized One S.D Innovation

Response of LY

Period	LY	LX	LHC	LGC
1	0.046023	0.006459	-0.008092	0.003512
2	0.048444	0.004641	0.003562	-0.003963
3	0.040904	0.013876	0.028061	-0.011706
4	0.039067	0.024630	0.038116	-0.019549
5	0.037180	0.026703	0.042288	-0.023142
6	0.037368	0.027043	0.041776	-0.024206
7	0.037533	0.026099	0.040807	-0.024014
8	0.037785	0.025581	0.040058	-0.023653
9	0.037859	0.025336	0.039821	-0.023424
10	0.037877	0.025326	0.039811	-0.023354

For a one standard deviation innovation of disturbance originating from itself, future per capita GDP increases by 0.05 percent in the first year and declines in the fourth year to 0.04 and reaches to 0.037 at the end of time horizon. Though, its impact declines overtime but doesn't cease in the long run.

One standard deviation innovation of disturbance coming from household consumption results about 0.003 percent increase in per capita GDP in the second year and further increase to 0.04 percent in the fifth year and its effect did not die out and eventually reaches 0.03 percent at the end of time horizon. But its effect after the immediate shock is negative. i. e in the first year. This is due to excess demand from the household following shocks, and inability of the economy to adjust itself immediately to higher demand. Since, the time is too short to adjust output. But, in the years to come, the economy adjusts to this excess demand and the response of economic growth is positive.

In other words, a shock in household consumption exerts a negative impact on economic growth in the first year. But between years two to four the impact of the shock is, a sharp rise in growth and positive economic growth and then fluctuate around there and finally stabilizes thereafter. One standard deviation innovation of disturbance coming from export results, about 0.006 percent in the first year and increases to 0.02 percent in the fourth year and finally stabilizes at about 0.02 percent in the time horizon. Thus, the impact of export on economic growth is strong in the long run.

However, a response of growth to disturbances in government consumption is positive only in the first year. From year two over year ten the shock to government consumption decreases growth. It remains negative and declines sharply up to year four, and fluctuate around the negative level before stabilizes after year six. This implies that shock to government consumption affects growth negatively. Thus, the impact of export and domestic demand on economic growth are permanent.

Generally, Comparing the results from descriptive analysis through short-run and long run results to Granger causality and Volatility test results, the output speaks loudly the same thing, which enhances the trustworthiness of the results.

CHAPTER SIX

CONCLUSION AND POLICY IMPLICATION

This chapter presents summary of conclusion and policy implication concerning export, domestic demand and economic growth nexus in Ethiopia.

6.1 Conclusion

The study has investigated a causal relationship among domestic demand, export and economic growth in Ethiopia using annual time series data. In empirical analysis, Augmented Dickey Fullers (ADF) and Phillips Perron (PP) unit root test are used in testing the stationarity of the variables. The result show that export, domestic demand (government and household consumption) and economic growth measured by per capita income are found to be integrated of order one. Therefore, the study proceeds to determine the existence or otherwise of cointegrating vectors in the variables. The result of Johansen cointegration test shows that export, domestic demand and economic growth are cointegrated. Thus, the finding indicates that a co-movement in the variables. So, the Granger causality should be in the ECMs.

The result of Granger causality test shows a dynamic relationship between domestic demand (household consumption) and economic growth both in the short run and long run and evidence of unidirectional causality between export and economic growth as well as between government consumption and economic growth. Overall, there is a dynamic relationship between domestic demand and economic growth and between export and economic growth in Ethiopia.

The strength of the causal relationship of variables, as measured by variance decomposition analysis, reveals that household consumption highly causes economic growth and certainly the most important one when compared to export and government consumption in Ethiopia. Thus, the finding supports domestic demand led-growth, growth led-domestic demand and growth –led export hypothesis in the short run and long run, and export-led growth hypothesis is in the long run. There is some evidence to support that growth led-domestic demand and export is dominant than the feedback causality. There is also evidence that domestic demand is superior to export in causing economic growth.

Generally, Export and domestic demand are both important for economic growth as well as, economic growth have an impact on export and domestic demand. In other words, Economic growth Granger cause both export and domestic demand and domestic demand and export are also the causes for economic growth in Ethiopia.

6.2 Policy Implications

Output growth in Ethiopia seems to come from increase in household consumption expenditure. Thus, government needs to boost domestic demand in general and household consumption expenditure in particular through creating employment. Income is the most important determinant of consumption. One way of obtaining income is through employment. Therefore, reduction of unemployment is similar to increasing aggregate domestic demand and hence, consumption. In addition, reduction of unemployment increases productive labor forces that are used as factor input particularly in least developed countries like Ethiopia. Since, exports provide foreign exchange earnings and also create employment opportunity, and eventually growth in output, policy should pay considerable attention to exports. However, a balance emphasis should be to domestic demand to push the economy towards higher growth path.

In general, successful and sustained economic growth requires growth in both export and domestic demand. Finally, prudent macroeconomic policies such as income policy are important to strengthen export growth nexus and domestic demand growth nexus in Ethiopia.

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APPENDICIES

Appendix A: Descriptive Statistics (Test of normality)

	GDP	GC	HC	X
Mean	10.74219	2.206548	4.420430	2.288670
Median	10.67742	2.258369	4.429251	2.229207
Maximum	11.91370	2.884126	4.541751	2.913562
Minimum	9.911952	1.578262	4.291994	1.961524
Std. Dev.	0.484297	0.315651	0.055503	0.217665
Skewness	0.506732	-0.067648	-0.466289	1.176778
Kurtosis	2.856139	2.305881	2.731421	2.754731
Jarque-Bera	2.226585	1.062725	2.001403	12.98130
Probability	0.328476	0.587804	0.367621	0.11518
Sum	547.8515	112.5339	225.4419	116.7222
Sum Sq. Dev.	11.72719	4.981769	0.154027	2.368904
Observations	51	51	51	51

APPENDIX B: Plots of variables at levels and first difference

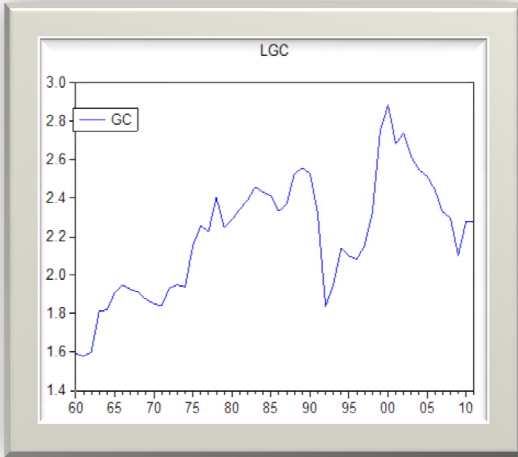


Figure 1: Time plot of log transform of GC in level

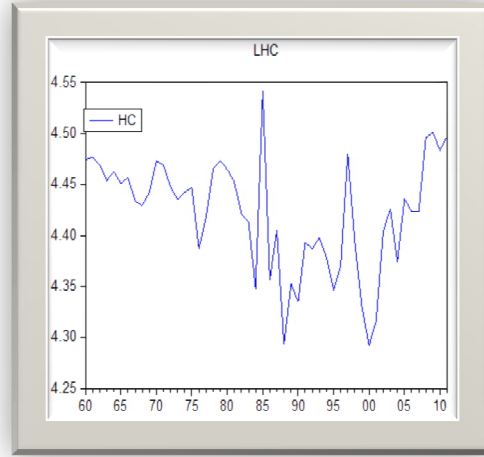


Figure 2: Time plot of the log transform HC in level

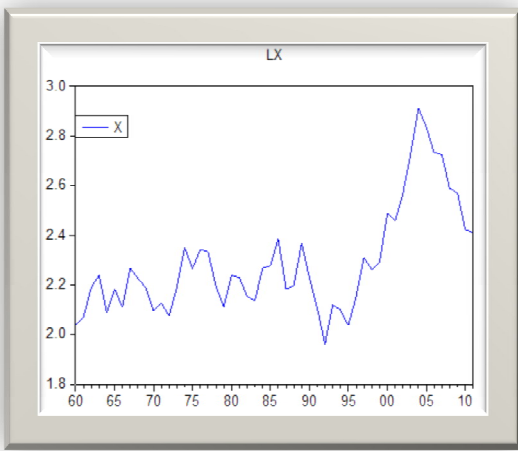


Figure 3: Time plot of log transform of X in level

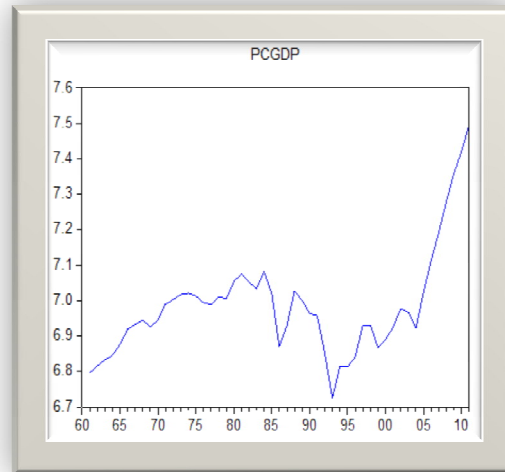


Figure 4: Time plot of log transform of PCGDP in level

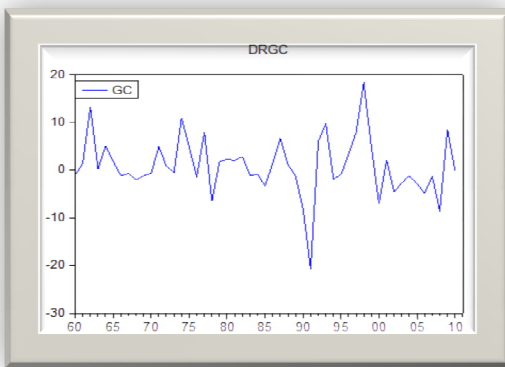


Figure 5: Time plot of the first difference of log transform of GC

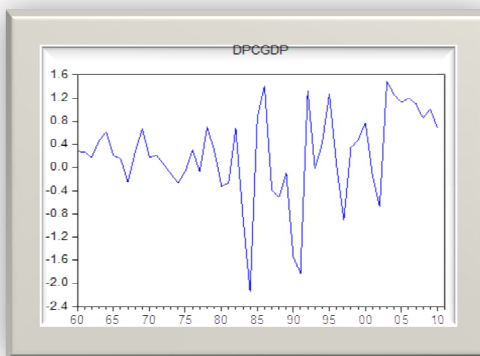


Figure 6: Time plot of the first difference of log transform of PCGDP

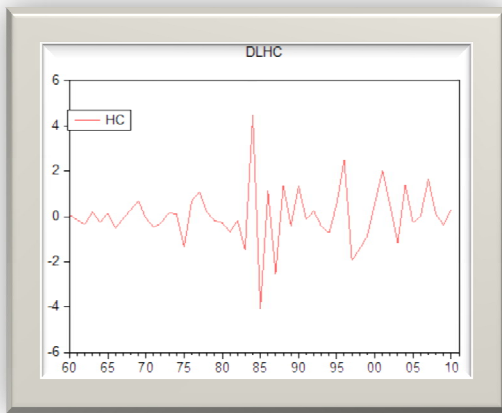


Figure 7: Time plot of the first difference of log transform of HC

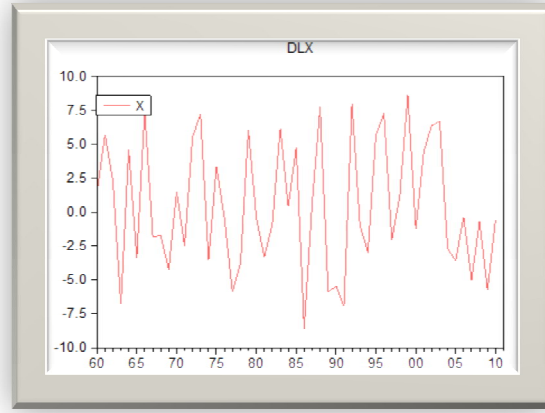
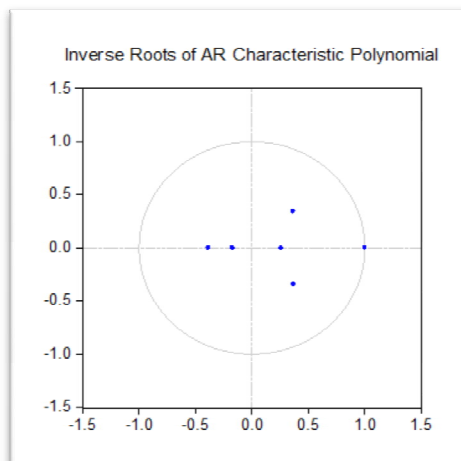
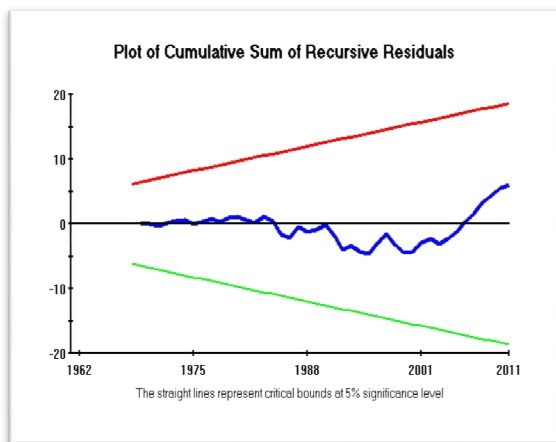


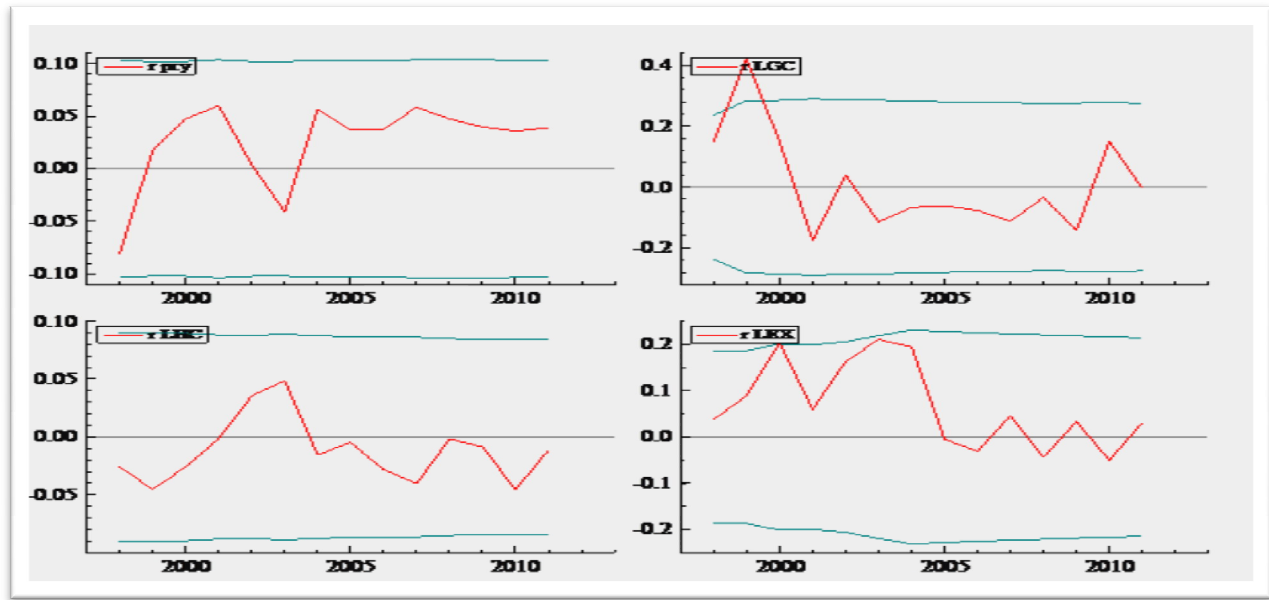
Figure 8: Time plot of the first difference of log transform of X

APPENDIX C: Stability Tests

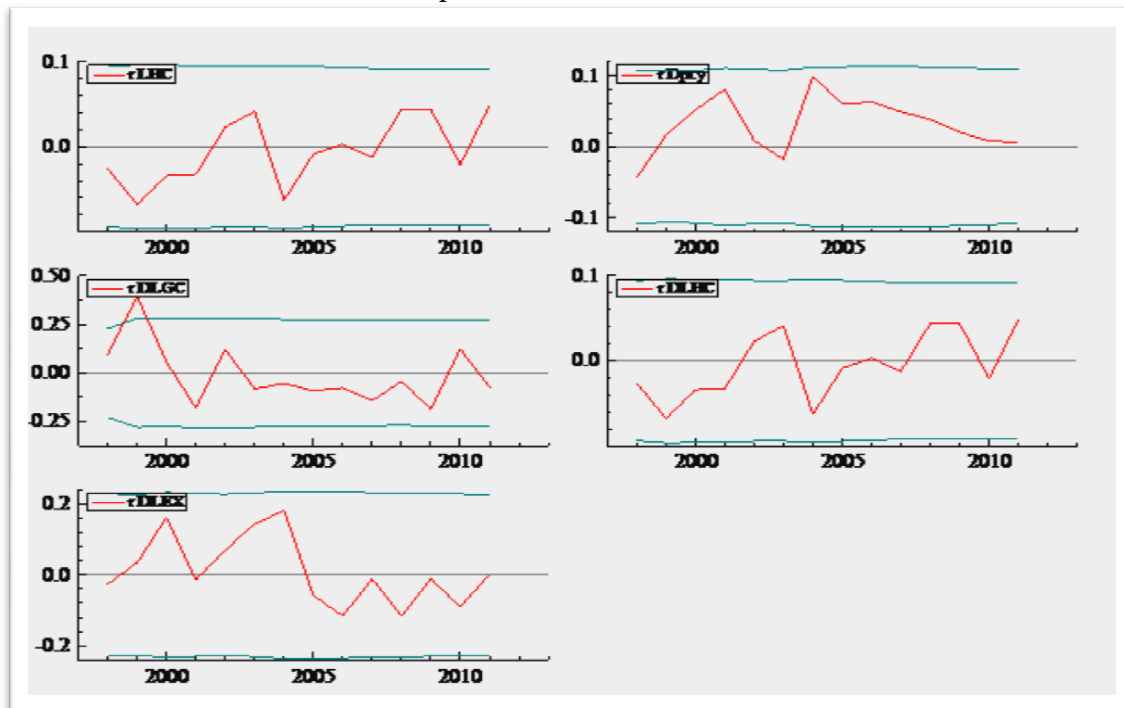
I. cumulative sum of squares of recursive residuals and inverse of AR characteristics polynomial for VAR stability test.



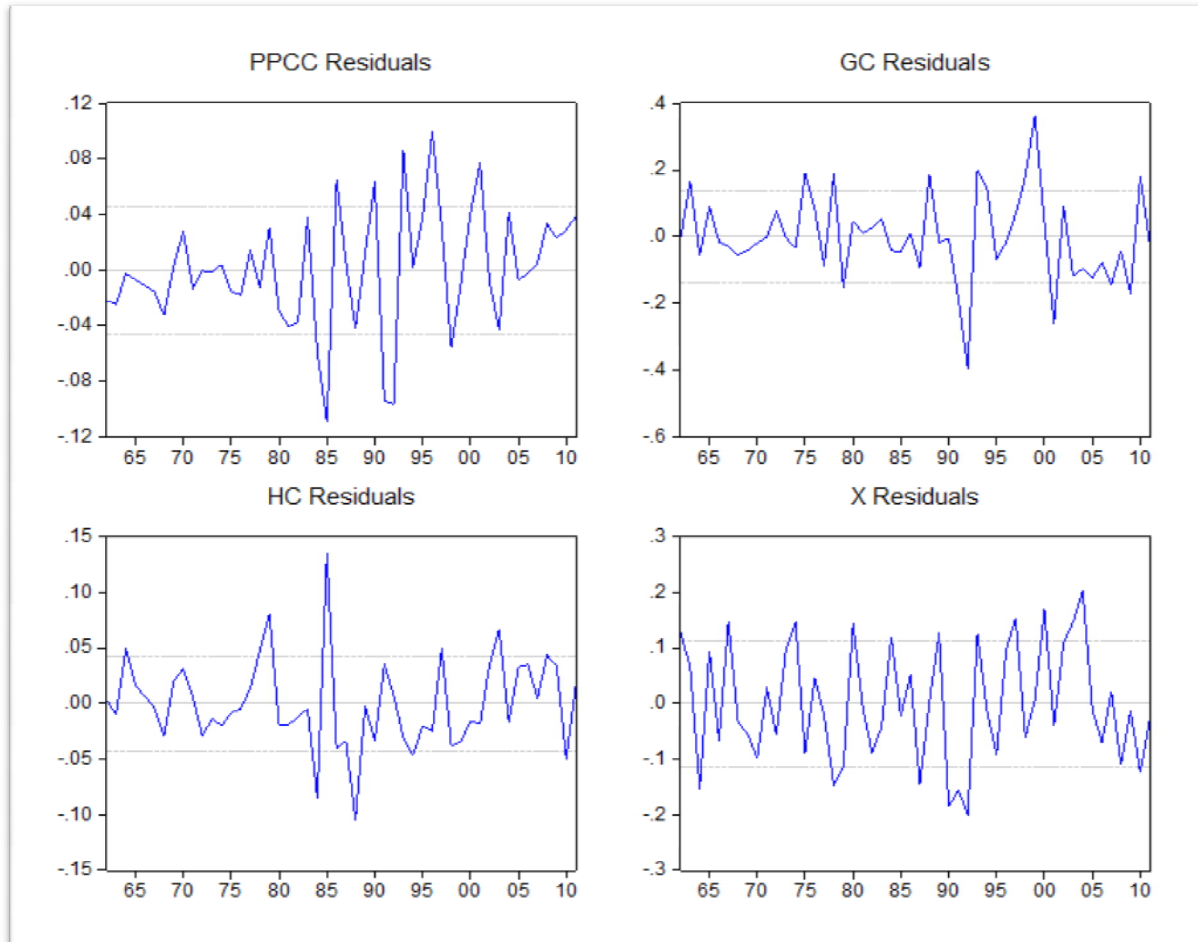
II. Long run recursive test, 1-step residuals $\pm 2^{\text{nd}}$ SE



III. Short run recursive test, 1-step residuals $\pm 2^{\text{nd}}$ SE



IV. Residual Tests



Appendix D: Tests of Volatility

I. Variance decomposition of LX

eriod	S.E.	LY	LX	LHC	LGC
1	0.112572	1.969655	98.03035	0.000000	0.000000
2	0.153693	1.138915	98.52218	0.126327	0.212577
3	0.185765	1.052099	97.31505	1.327267	0.305582
4	0.210781	1.081948	95.49059	2.893924	0.533537
5	0.232937	1.159598	93.79531	4.276830	0.768256
6	0.253062	1.214839	92.55606	5.252208	0.976891
7	0.271808	1.251855	91.70146	5.913126	1.133555
8	0.289392	1.275199	91.09793	6.377368	1.249501
9	0.305996	1.291875	90.64265	6.728632	1.336840
10	0.321746	1.304942	90.27823	7.010909	1.405921

II. Variance decomposition of LHC

eriod	S.E.	LY	LX	LHC	LGC
1	0.043190	3.091517	1.420173	95.48831	0.000000
2	0.053181	6.719560	0.936691	76.54712	15.79663
3	0.060939	5.854636	7.062217	70.32495	16.75819
4	0.067042	6.709133	9.116367	65.26124	18.91326
5	0.072861	6.803128	11.27804	62.37696	19.54187
6	0.078263	6.966839	12.32785	60.46520	20.24011
7	0.083404	7.004156	13.09960	59.16918	20.72707
8	0.088260	7.040874	13.63863	58.15689	21.16361
9	0.092867	7.064148	14.08706	57.33324	21.51555
10	0.097250	7.087713	14.46138	56.64050	21.81040

III. Variance decomposition of LGC

eriod	S.E.	LY	LX	LHC	LGC
1	0.139005	0.582261	3.200151	10.17764	86.03995
2	0.216066	1.260408	5.954905	12.30009	80.48460
3	0.274702	0.934415	7.110250	10.11656	81.83877
4	0.321984	0.801734	8.987375	8.692286	81.51860
5	0.362528	0.693055	10.19939	7.711980	81.39557
6	0.398701	0.627929	11.06630	7.106120	81.19965
7	0.431824	0.582102	11.61827	6.708088	81.09154
8	0.462625	0.550074	12.00432	6.432387	81.01322
9	0.491537	0.525598	12.28846	6.224480	80.96146
10	0.518856	0.506262	12.51338	6.059239	80.92112

Chelosky ordering LY LX LHC LGC

APPENDIX E: Weak Exogeneity Test

Variable	LR test of restrictions: Chi ² (1)	Probability value
LPGDP	21.696	0.000*
LHC	0.501	0.478
LG	0.313	0.575
LX	2.299	0.129

* indicates discarding of null hypothesis at 1% significance level