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**SCHOOL OF GRADUATE STUDIES**

# TRADE OPENNESS NEXUS ECONOMIC GROWTH IN ETHIOPIA: TIME SERIES ANALYSIS

BY

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**ADDIS ABABA, ETHIOPIA**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS IN PARTIAL FULFILLMENT OF REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS I N DEVELOPMENT ECONOMICS**

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**MAY, 2019**

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## DECLARATION

I hereby declare that this thesis is my own work and has never been presented in any other university or I have not plagiarized in the preparation of this assignment and have not allowed anyone to copy my work. All sources of materials used for this thesis has been appropriately Acknowledged.

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This is to certify that the thesis prepared by Ashenafi Zelalem entitled trade openness nexus economic growth in Ethiopia: an empirical investigation and submitted in partial fulfillment of the requirements for the degree of master of art in development economics complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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## ACRONYMS & ABRIVATION

| | |
|---|---|
| ADF | Augments Dickey-Fuller |
| ARDL | Autoregressive distributed lag |
| EEC | Ethiopian investment commission |
| FDI | foreign direct investment |
| MT | Ministry of trade |
| NBE | National bank of Ethiopia |
| OPNT | Openness to trade |
| REER | Real effective exchange rate |
| RGDP | Real gross domestic product |
| SAP | Structural Adjustment Program |
| VECM | Vector error correction model |

# Contents

## Abstract

*This study purposed to determine the granger causality and the long run and short run relationship between trade openness and economic growth in Ethiopia covering the period between 1992 and 2017. It incorporates foreign direct investment and exchange rates as the additional variables. To test for stationarity of the data, the augments Dickey-Fuller (ADF) were used. The Autoregressive distributed lag (ARDL) model was employed in this study to examine the long run relationship between the variables. The findings of the study suggestd the existence of positive and significant impact of trade openness on economic growth in Ethiopia in the long run; its short run growth impact is estimated to be insignificant. Moreover, the impact of real effective exchange rate and foreign direct investment variables were found to be positive and highly significant in the long run. The granger causality result reveals that trade openness, foreign direct investment and real exchange rate granger causes gross domestic product. It also indicates the existence of bi directional causality between gross domestic product and foreign direct investment. Therefore, there is a need to design and implement any policy action that could help improve the magnitude of the country's exposure to international trade integration.*



**Key words:** Co-integration, Economic Growth, Ethiopia, Trade openness

# CHAPTER ONE

## 1. INTRODUCTION

### 1.1 Background of the study

The leading motivation behind every economy is to attain a high and sustained economic growth that could further support the overall objective of economic development. To achieve this broad objective, governments over the world have been pursuing various strategies compatible to their respective economies. Trade openness, hence is among the many alternatives being in effect towards facilitating the growth process. The contemporary effort to make it easy to exchange goods and services, labor information, capital, and ideas across the borders is known as trade openness. The main aim is to integrate societies and economies at global level. Trade openness has helped movement of resources from developing to developed economies and improved technological advancement (Herath, 2010).

Ethiopia adopted the Structural Adjustment Program (SAP) of World Bank in 1992. Before this period, different trade and economic policies were implemented by the different governments that ruled the country. The trade policy adopted in the pre-1992 period (both imperial and military government of Ethiopia) was characterized by strongly inward- oriented development strategy that had negative impact on export directly or indirectly through profitability and competitiveness. The current government current government comes to power in 1992 and under takes trade policy reform as recommended by World Bank and has embarked comprehensive trade reform on both export and import side.

According to Effiomt et al (2011), the corner stone of the SAP induced policy was the opening up of domestic economies to face increased competition in order to ensure efficiency in resources use, removal of wastages, elimination of persistent misalignment in the external and domestic sectors and a general redirection of the economy to the path of recovery and growth. Trade liberalization is one of the most controversial polices in international economics and finance. This is because in a competitive environment prices get lower and products became diversified through which increased welfare emerges gains from specialization and efficiency are also further advantage of economies openness. To promote the performance of the private sector, a new investment proclamation has also been promulgated, and subsequent revisions were made to the same so as to relax some restrictions. It appeared that the number of investment projects has increased following the new policy direction and enactment of the new investment code. For instance, in the manufacturing sector, about 609 new projects with capital of about Birr 1,451 million and 89 expansion projects with a capital of about Birr 347 million have commenced operation during July 1992 to July 1999(See Ethiopian Investment Authority).

The growth of GDP has revived and increased to about 5.6% during 1991/92 to 1999/2000; the quantity of export has also shown an increasing trend though there is a fall in the international price for coffee in the last two years. Gross capital formation has, however, remained at about 15% of GDP, while saving has declined to about 4.2% over the same period.

Since the 2000s, Ethiopia has emerged as one of the fastest-growing economies in Africa. Nevertheless, Ethiopia's manufacturing sector is still far from being an engine of growth and structural change. The manufacturing sector plays a marginal role in employment generation, exports, output, and inter-sectoral linkages. In

some ways, the structure and performance of the Ethiopian manufacturing sector mirrors the wider sub-Saharan African experience (Lawrence 2005). The Ethiopian manufacturing sector has had two distinct features: first, "… a low level of industrialization in terms of the sector's share in GDP, export earnings, industrial intensity, and competitiveness. Second, the industrial structure is dominated by small firms and resource-based industries (in particular the food industry) and [is] concentrated around the capital city" (Oqubay 2015: 66).2

The wider industrial sector, and manufacturing within it, grew much faster after 2005. Thus, the annual rate of growth of industrial output doubled to nearly 20 percent by 2015–17, while manufacturing output grew by 10 percent a year from 2005 to 2010 and by 17.9 percent in 2015–17.3 despite this acceleration, however, the level of industrialization remained low. Value added in manufacturing had only reached 6.4 percent of GDP by 2017, though value added in the wider industrial sector was by then up to more than 25 percent (NPC 2018: 8; NBE 2018b: 6).4 During the same period, the annual growth rate of the industrial sector almost doubled from 10.1 to 19.8 between PASDEP and GTP I period.

Despite the increase in manufacturing output, there has been no comparable growth in manufactured exports and employment. The share of manufactured exports in total exports remained less than 13 percent while total exports decreased from 12.7 to 7.7 percent of GDP during 2001 and 2016/17 .Manufactured exports were characterized by low-value products, which were generated in the leather and leather goods, textiles and apparel, and meat industries, and which generally went to other low/middle-income markets. This may be compared to the traditional coffee and the new cut-flower exports, which accounted for 25 and 7.5 percent of total merchandise exports respectively in 2014–17, and a greater share of these exports were destined for higher income markets. The failure to increase

manufactured exports as a share of total exports suggests limited structural transformation and the significance of the balance of payments constraint on growth through industrialization (Thirlwall 2013; Cramer, Sender, and Oqubay 2019; Lin and Monga 2019).5

The leading motivation behind every economy is to attain a high and sustained economic growth that could further support the overall objective of economic development. To achieve this broad objective, governments over the world have been pursuing various strategies compatible to their respective economies. Trade liberalization, hence is among the many alternatives being in effect towards facilitating the growth process. Countries have embarked themselves in popular economic policies that allow reduction and removal of barriers to trade such as tariff, quotas, and import controls. Among many policies that most countries including Ethiopia have decided to opt-for is trade liberalization of economies (Herath, 2010). Trade liberalization of economies via the reduction or complete elimination of trade barriers has become the most popular economic policy of developed and developing countries today. Import and export tariffs, quotas, export subsidies, technical barriers are the popular trade barriers which have been used during the last few decades. However with globalization of world economies all most all the counties in the world are actively involved with reducing trade barriers among their trade partners. Major objective of moving free trade is to achieve macroeconomic goals of their economies. Basically to achieve high economic growth developing economies are implementing free trade policies during the last few decades. As a result of that trade openness has been widening up in these economies. In the last three decades, trade liberalization increasingly evolved with the expectation of rapid economic growth in Ethiopia (Seid, 2012; Salvatore, 1993).

Trade liberalization is central to the structural adjustment program implemented by most sub-Saharan Africa including Ethiopia. According to Effiomt et al (2011), the corner stone of the SAP induced policy was the opening up of domestic economies to face increased competition in order to ensure efficiency in resources use, removal of wastages, elimination of persistent misalignment in the external and domestic sectors and a general redirection of the economy to the path of recovery and growth. Trade liberalization is one of the most controversial polices in international economics and finance. This is because in a competitive environment prices get lower and products became diversified through which increased welfare emerges gains from specialization and efficiency are also further advantage of economies openness. Therefore, it is quite reasonable that economies generally desire to be economically open.

For most developing countries the 1970s and1980s were decades of deepening economic crisis. These countries suffered from continuous economic recession, rapid inflation, deficits in balance of payment and government budget owing to adverse external and internal factors. As a result, the general conception about the benefit from international trade come to be questioned as the "Prebisch-singer hypothesis" revealed that the terms of trade of the countries was deteriorating this hypothesis has partly served as a basis for inwardly oriented trade regime that many developing countries soon adopted(Mannur,1995).

Ethiopia has not been exceptional and suffered the disastrous economic crisis of the1970s and 1980s.The country experienced severe internal and external imbalance mostly due to the past inappropriate trade policies. The imperial era was characterized by absence of quantitative restriction on trade. This policy focused on promotion export and encouraged import of capital and raw material, but there policies were soon shifted to a restricted one when the derg come to power and the

government started to pursue import substitution stratage. When the Ethiopian People's Revolutionary Democratic Front (EPRDF) took power, significantly policy reform were made to change the past restriction trade regime. The birr has been devalued by 142 %( from birr 2.07 per us dollar to 5:00 per us dollar). In addition custom duties were reduced and export duties were eliminated with the exception of coffee; and the licensing procedure has also been simplified (Befekadu and Berhanu, 1999/2000)

Most of the researches did not consider the link between trade openness and economic growth in Ethiopia. The interaction between trade openness and economic growth rate was limited in that each variable was not studied using Autoregressive Distributed Lag (ARDL) approach. This study, using the data between 1992 and 2017 has been analyzed short run and long run relationship between trade openness and economic growth. Likewise, the direction of causality between the variables will also be estimated.

## 1.2 Statement of the problem

Trade openness is one of the most controversial polices in international economics. How trade openness affects economic growth is a topic that has amassed a large amount of research. Many economists support protectionism may induce faster economic growth while liberal analysts argue that a higher degree of openness leads to a better economic performance. According to Effiomt et al (2011), the corner stone of the SAP induced policy was the opening up of domestic economies to face increased competition in order to ensure efficiency in resources use and a general redirection of the economy to the path of recovery and growth.

For many developing countries, potential adjustment costs are of concern. The transition from restrictive to liberalized trade regime involves cost perhaps the most important cost in this process is unemployment. Removal of quantitative restriction and restriction in tariff rate, cheap imports that flood the domestic market drive out domestic industries from the global market and workers will be left out from their job. Because of high dependence on trade, the countries are also vulnerable to fluctuation in tax revenue induced by trade openness (Thomas et al, 1991).

The situation of developing countries like Ethiopia is being worse because the country's export primary commodities which suffer from low income and price elasticity in the global market. Still now the country's bulk of export come from the agriculture sector and coffee remain to be the dominant export commodity. According to Befekadu and Barhanu 1999/2000), the main constraints to private investment in Ethiopia and what explains the poor performance of this sector are

not lack of sufficient liberalization. Instead, it is all the factors that domestic investors have been complaining about such as shortage of demand and in ability to compete with cheap Imports.

In general, advocators of trade openness argue that it increases real output through shifting resources. Others, however, argue that protection is important to bring the desired growth. These views are also prevalent in Ethiopia. Few studies have been done to investigate the relationship between economic growth and trade openness for Nigeria (Nduka, 2013 and Olufemi, 2004). Bigsten et al. (2000) focused on Ghana. To the best of my knowledge, no study has been done in Ethiopian economies to examine the causal relationship between trade openness and economic growth using ARDL model.

Therefore, this paper investigates issues related to trade policy in a more systematic way by using a time series econometric analysis whether to pursue a further liberalization and to what speed should it be implemented also depends on, among others, the experience the country gained from its past performance.

## 1.3 Objectives of the study

### 1.3.1 General objective

The present study is principally intended to empirically investigate the relationship between trades openness and economic growth in Ethiopia using the time series data set for the period ranging from 1992 to 2017.

### 1.3.2 Specific objectives

Towards attaining the set broad objective, the following specific objectives to be addressed in this study include;

- To identify the short run and long run impact of trade openness on economic growth of Ethiopia;

- Empirically investigating the direction of causality between economic growth and openness variables

## 1.4 Significance of the Study

Over the years, the existence of trade openness has been the subject of considerable interest and debate at country levels. Economic theories and empirical findings reach a variety of conclusions about the impact of trade openness on economic growth. One of the objectives of trade openness is to correct price distortions. These and the subsequent measures taken to increase competition following liberalization and expected to promote the performance of the economic growth by increasing productivity and efficiency. Since the impact of trade openness on economic growth has been very debatable and this issue in Ethiopia has been studied only to some extent this, sheds a light to the existing knowledge and very vital to policy makers, macroeconomists to come up with appropriate polices so as to sustain the existing economic growth of the country.

It may also help to have an idea whether further liberalization is needed in the future or not.

## 1.5 Scope and limitations of the Study

The aim of this study is focused only on investigating the relationship between trade openness and economic growth in Ethiopia using annual data from 1992 to 2017.The first greater challenge of this study is the one associated with data availability. The second challenge while doing this study is the inconsistency of

data from different organizations. So as to avoid such inconsistency attempts made to stick to the same source of data as much as possible even the data that are found in the same source is not consistent over time.

## 1.6 Organization of the study

This study organized in five chapters. The first chapter deals with introduction of the study, The second chapter discusses concepts and theories related to the area of study. The review of the literature includes theoretical as well as empirical review. The third chapter presents the research design and methodology as well as the model specification. Chapter four deal with model estimation and interpretations of results. At the end, chapter five presents the conclusions and policy recommendations of the study

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**CHAPTER TWO**

# 2. LITERATURE REVIEW

## 2.1 Theoretical Literature

The relationship between trade openness and economic growth has caused a lot of on-going debate both in the empirical and theoretical literature around the globe. The relationship between trade openness and economic growth is widely investigated in applied economics. In order to establish the theoretical part, this paper summarizes them into three groups namely the mercantilism, classical economist and Heckscher-Ohlin trade theories. Views on trade vary from one school of thought to another. On the basis that a nation benefits from trade at the expense of the other nations, the Mercantilist School advocated restriction on as imports, provision of incentives for exports, and strict government control of all economic activities. Contrary to this, the Classical economists believe in free trade right from the time of Adam Smith who advocated for a policy of laissez-fair (a little government intervention in the economic system). For Smith, When each nation specializes in the production of the commodity of its absolute advantage and exchange part of its output for the commodity of its absolute disadvantage, both nations end up consuming more of both commodities (Salvatore, 1998:46)

Smith's idea of absolute advantage was later replaced by an influential theory of comparative advantage, initially introduced by Ricardo. According to the comparative advantage theory, countries specialize in the production and export of commodities over which they have less absolute disadvantage. The opening up of free trade between nations leads to an increase in demand for the product of each country, in turn, making them to specialize in the production of that particular good over which they have a comparative advantage. The increased production further

leads to an increased supply of goods and services in the market, in turn enhancing the welfare of the society.

The Classical trade theories (both smith's absolute advantage and Ricardo's comparative advantage) have, however, many limitations that may not work in practice and in some cases does not tally with the situations that exist in developing countries. In short, they are based on the labor theory of value (consider labor as the only factor that determine the value f output); do not consider the role of transport cost in affecting the comparative advantage; assume quick factor mobility across sectors in response to changes in international prices; assume full employment and a perfectly competitive market condition. Obviously, the change in these assumptions has an implication on the prediction of the theories.

An important development in the area of international trade following the Classical theory is the Heckscher-Ohlin theorem. Unlike the former, which assumes that the value of output is determined by the value of labor that entered the production process, the H-O theorem includes capital as an additional factor. It proposes that the immediate cause of international trade is the difference in the relative price of commodities between countries, which, in turn, arise due to difference in factor supplies of the two countries. On the basis of this it predicts that a country will export a commodity that intensively uses its abundant factor and import goods that intensively use its scarce resources. In this case, apart from the gains mentioned under the comparative advantage theory, trade leads to equalization of relative and absolute returns to homogenous factors of production.

Despite its theoretical prominence, the H-O theorem also suffers from many of the Assumptions that it considers. Among others, the theorem assumes that there is no

factor intensity reversal (i.e. if a commodity is labor intensive in a labor abundant country it will remain labor intensive in the labor scarce country, and if it is capital intensive in the capital abundant country it will remain capital intensive in the capital scarce country). If such a situation does not exist the prediction of the theorem fails.

In general, despite the limitations mentioned above, both the classical and the H-O theorem advocate for a liberalized trade system, making the existing restrictions on trade unjustifiable.

Though the classical theory stressed the need for free trade, in 1950s, 1960s and 1970s another view on trade started to emerge. The great depression of the 1930s made the dollar price of primary commodities to fall by 50% between 1929 and 1932 and the value of export by some 60% (Sodersten and Reed 1994:409). This led to the fall in the terms of trade of the primary commodity exporters (developing countries). Since developing countries had already accumulated debt, the fall in prices increased real cost of debt. Besides, the inflow of capital which these countries had become accustomed to was cut off abruptly. These situations made developing countries to believe that the pattern of trade prescribed by the classical theory is no more useful to them and instead prohibited them from reaping the dynamic benefit of industrialization.

Views against the Classical trade theory get momentum after the work of Prebisch, Singer and Myrdal (Salvatore, 1998:337). For them productivity increase in industrial countries result in higher wages and thereby higher prices, while productivity gains in developing countries result in a fall in export prices with a further decline in the terms of trade. They also argued that due to the low-income elasticity of the primary commodities, the terms of trade of developing countries

with the developed nations would further deteriorate. Their point in general is that given the countries, it is not beneficial for the latter to engage in trade with the former as prescribed under the classical theory.

The above conditions forced developing countries to look for an appropriate strategy. Industrialization, in particular, import substitution industrialization (ISI) was considered as a remedy to the problems. To fulfill their objectives, the countries had protected existing domestic industries or promoted new ones through strong effective protection, which rise sharply with the degree of processing. Trade control mechanisms like imposition of surcharge; import licensing, guarantee deposit, prohibition of capital repatriation, and multiple exchange rate system were used to curtail imports so as to encourage domestic industries.

The industrialization strategy, in particular, ISI was expected to bring faster technological progress, reduce unemployment and underemployment, rising the terms of trade and ensuring stable export earnings, which in turn relieve the BOP problem of the countries. Though there were strong arguments behind and countries had pursued it, the ISI brought a limited success or led to failure. Country experience shows that industrialization through import substitution led to inefficient method of production, higher consumer prices, and increased unemployment and underemployment. The lack of raw materials due to scarce foreign exchange led to excess capacity in industries and the protections rather made domestic firms inefficient. The neglect of the agricultural sector led to a fall in export and an increase in import of food items, further aggravating the already uneven income distribution by disfavoring the poor who were employed in the agricultural sector (Sodersten and Reed, 1994)

It has also been argued that protection of domestic industry insulates it from market elsewhere and this is likely to reduce the incentive to adopt new technology and encourage inefficient practices. Practice also showed that despite protections given to domestic industries to strengthen their capacity and competitive position, they rather remain infant, making the existing costly protection structure to continue.

Due to the poor economic performances under the import substitution industrialization, and encouraged by the success of the outward -oriented countries (Hog Kong, Korea, and Singapore), developing countries started to take trade liberalization and outward looking policy measures since 1980s. The policy measures involved a reduction and simplification of average tariff, quantitative restrictions and provision of incentives to the export sector. Different western governments and international financial institutions, particularly the IMF and the World Bank, supported the liberalization policy, and took it as an important component of the Structural Adjustment Program packages.

According to Gauthier (2001), the adoption of more efficient technology or reduction of inefficiency by domestic firms through decreasing costs to resist external competition; exit of inefficient firms and an adjustment by the remaining firms through expanding the scale of their production to exploit economies of scale; and improvement of technical inefficiency by the firms lead to increased performance in the manufacturing sector. Increase in imports and exports following trade liberalization augment the spillover of international technical knowledge.

It is also emphasized that liberalization attained through tariff reduction and change in relative prices brings a proper allocation of resources across domestic

firms and industries, and that exposure of domestic firms to demand from international clients increases their productivity. Experience (in countries like Cote Divore, India and Turkey) shows that increased import competition forced domestic firms to reduce their prices to the level of their marginal cost of production (World Bank 2000). The reduction in average cost following trade liberalization also leads to an increase in the profit of the firms, in turn leading to further entry by new firms. In general, the implication of the points is that trade liberalization increase the capacity, productivity and efficiency of domestic industries.

Though openness is said to have the above beneficial effects, there is a possibility that it generates adverse effects. Strong competition from imports may make existing firms to contract their scale economies or exit their business in some cases. In addition, despite the current trend in favor of trade liberalization and export orientation there is still a case for the ISI strategy. For instance, as sighted in M.Lyakuraw (1992), Burton (1989), described import substitution as a development strategy that seeks to accomplish the objective of learning and in general gaining from rich countries, and at the same time the mechanism that protects domestic economy until it competes in equal terms with international producers. He also added that development is essentially and ultimately a matter of learning and searching and that in this context protection should extend the opportunities for the learning process.

As indicated in Admit 1997, Noir (1994:57) also argued that a firm that starts with a few resources in a fragile economic environment has no chance of success unless it has some protection at least during the early years. The implication is that in LDCs where the industrial sector is at its early stage of development there is a need of protection unlike the proposal of the proponents of trade liberalization.

It must be pointed out, however, that a policy of import substitute ion may be of some benefit in the early stage of development (especially for larger developing nations), while export orientation becomes an absolute necessity only in the latter stage in the development process. Thus, rather than being alternative policies import substitution and export orientation could profitably be applied to some extent sequentially, especially in the larger developing countries (Salvatore, 1998:347). The implication being that the appropriate industrial policy for developing countries at the initial stage is an ISI than liberalization

### 2.1.2 Definition and measurement of trade openness

Industria entary nature of economic policies targeted at shifting resources from low productivity to high-productivity sectors. One such policy is trade liberalization.

Openness to trade in an economy has the potential of engendering productivity growth. Theoretically, various channels through which an open trade regime can lead to improvements in industrial productivity exist in the literature. The channels include access to better and cheaper technology, economies of scale and X-efficiency as a result of exposure to foreign competition. For instance, firms that operate in an open economy have access to foreign technology, adopt the best production techniques and produce on a more efficient scale. With access to foreign technology, economies of scale and spillover effects, openness to trade fosters competition among firms and provides markets for their exports. Enhancing competitiveness among firms for greater productivity is central to an open trade policy (Ekpo and Umoh, 2008).

While much controversy on the trade–productivity link remains, with some studies upholding a positive relationship (Dollar, 1992; Edwards, 1998; Jonsson and

Subramanian, 2001; Sachs and Warner, 1995), others express doubts about the existence of such a relationship (Harrison and Hanson, 1999; Rodriguez and Rodrik, 1999), an examination of the nexus at a country-specific level using disaggregated industrial sector data becomes apt and an important alternative to cross-country panel data analysis which has shown mixed results. A sector-specific analysis accounts for the complexity of economic environment and histories of the sector. For example, Dutta and Ahmed (2001) and Chandran and Munusamy (2009) conducted a sector-level analysis and reported that trade openness is important to the industrial sector.

development remains a driver of structural change and long-run growth for two reasons (Dijkstra, 2000; Zattler, 1996). First, industries (especially manufacturing) have higher productivity growth and technological development than other sectors of the economy, and also technological spillovers. Second, countries that neglect industry depend on primary exports which are subject to long-run deterioration of the terms of trade. However, the extent of industrialization depends on the prevailing macroeconomic environment, the dynamic and complem

### 2.1.3 **Mercantilism theory**

The mercantilism suggests that economic activity is a zero-sum game in which one country's economic benefit was at the cost of another. It is argued that exports should be more than imports, and domestic industry should be protected from import competition in order for a country to be rich and powerful (Olasode, Raji, Adedoyin & Ademola, 2015, Nduka et al. 2013,Edwards, 1998). The theoretical framework that formally relates openness to trade to economic growth is provided by Grossman & Helpman (1991). In this framework, trade openness is seen as having a positive effect on economic growth by facilitating technology spillovers,

which, in turn, would increase international competitiveness, productivity, and export revenues. Other theoretical explanations suggest that trade openness might have a negative effect on economic growth, especially in the case of low income countries.

### 2.1.4 Classical Economist

The absolute and comparative trade theories have long been a considerable influential role while the issue of regional or international trade integration is considered. According to Adam smith, trade between two nations is based on absolute advantage. When one nation is more efficient in the production of one commodity, but there is less efficient in the production of second commodity and the second nation is absolute advantage in the production of second commodity and absolute disadvantage in the first commodity, then both nations can gain by each specializing in the production of the commodity of its absolute advantage and exchanging part of its output with the other nation for the commodity of its absolute disadvantage, due to this trade can be important for efficient utilization of resources and to rise the production of both commodities. These increases in the output of both commodities measure the gains from specialization in the production available to be divided between the two nations through trade (Mankiw, 2010).

The theory of comparative advantage developed by David Ricardo is also of concern. It is the greater absolute advantage or the lower absolute disadvantage that one nation may have over another in the production of a commodity. David Ricardo developed the classical theory of comparative advantage in 1817 to explain why countries engage in international trade even when one country's

workers are more efficient at producing *every* single good than workers in other countries.

Ricardo demonstrated that if two countries capable of producing two commodities engage in the free market, then each country will increase its overall consumption by exporting the good for which it has a comparative advantage while importing the other good, provided that there exist differences in labor productivity between both countries. Widely regarded as one of the most powerful yet counter-intuitive insights in economics, Ricardo's theory implies that comparative advantage rather than absolute advantage is responsible for much of international trade. When nations practice the principle of comparative advantage, this explains that by specializing in goods where countries have a lower opportunity cost, there can be an increase in economic welfare for all countries.

Therefore, According to the law of comparative advantage, even if one nation is less efficient than (has an absolute disadvantage with respect to) the other nation in the production of both commodities, there is still a basis for mutually beneficial trade. The less efficient nation should specialize in the production of (and export) the commodity in which its absolute disadvantage is smaller (this is the commodity of its comparative advantage) and import the commodity in which it's absolute disadvantage is greater (Salvatore, 2004; Obstfeld and Rogoff, 1996).

### 2.1.5 Heckscher-Ohlin Trade Theories

The Heckscher–Ohlin theory of trade reveals, on the other hand, that countries will have a comparative advantage in (and thus will export) products whose production uses their abundant factors intensively and comparative disadvantage in (and thus will import) products whose production uses their scarce factors intensively. Generally; Heckscher-Ohlin (H-O) theory advocated that trade between countries

depends on relative factor abundance. There will be a great mutual beneficial trade if the trading countries have larger differences in technology and factor endowments. Little trade is expected between the countries with similar factor endowments.

### 2.1.6 Macroeconomics Policies and trade liberalization

Trade liberalization policies in the long run are expected to shift resources toward tradable, especially exportable and away from import substitutes. The policies are also said to improve economic welfare by achieving a better allocation of resources (Thomas et al, 1991). The scope of successful trade liberalizing policy depends on macroeconomic and other complementary policies that achieve and maintain stability in the economy and promote reallocation of resources in response to the reform. According to Thomas et al (1991), problems resulting from poor macroeconomic policies may cause liberalization to be perceived as a failure, prompting a return to protectionist policies. Conventionally, providing a realistic exchange rate is considered vital for the successful introduction of trade reform (WDR, 1987). The real exchange rate should help ensure equilibrium in the balance of payment (POBs) and domestic markets and should be compatible with growth in tradable and output. An overvalued currency has an anti-export bias in that it indirectly taxes exportable while favoring non-tradable and importable (WDR, 1987). A real devaluation improves incentives for export industries and production of import substitutes. Trade liberalization must be associated with real devaluation if the current account is not to deteriorate and if the employment losses in protected import-substituting industries are to be compensated by employment gains elsewhere, especially in export industries. Normally, nominal devaluation will be needed to bring about the required real devaluation.

## 2.2 Empirical Literature review

On the empirical front, studies on the issue of trade openness and economic growth have been

examined. There are a large number of empirical studies on trade and economic growth Keho (2017) established a positive effect of trade openness on economic growth in Cote d'Ivoire over the period 1965 and 2014 using the Autoregressive Distributed Lag bounds test to co-integration and the Toda and Yamamoto Granger causality tests. Likewise Frankel and Romer (1999) point out to positive growth effects of trade openness using ordinary least square technique.

Kim and Lin (2009) reinvestigated that whether trade openness contributes to economic growth or not, by applying instrument-variable threshold regression procedure and using data of 61 countries. Their empirical evidence indicated that a stable relationship exists between economic growth and international trade. Das and Paul (2011) have applied GMM approach to investigate the impact of trade openness on economic growth for 12 emerging Asian economies. Their findings indicated that trade openness has a positive impact on economic growth. In addition,

Kim et al. (2011) reinvestigated the trade-growth nexuses in low and high income countries by applying threshold regression approach. Their results disclosed that trade openness boosts capitalization, financial development, productivity, and economic growth in high income countries, and in low income countries the effect is negative and statistically significant.

Deme (2002) investigated trade and growth nexus in the case of Nigeria. His results confirmed that long run relationship exist between trade and economic

growth, and he concluded that trade plays an important role to raise economic growth. In the case of Turkey, Utkulu and Ozdemir (2004) applied endogenous growth theory to consider the relationship between trade openness and economic growth. Their empirical evidence indicated that trade policy have short and long-run effects on economic growth while investments in physical and human capital are determinants of economic growth.

In the case of Indonesia, Simorangkir (2006) applied SVAR model to consider the relationship between trade openness and economic growth. His analysis revealed that, trade and financial openness have a negative effect on domestic output and hence on economic growth. This result illustrates that lack of diversification in Indonesian products created low demand in international market and resulted in low domestic production. Jin (2006) examined the relationship between trade openness and economic growth in the case of Korea and Japan.Their analysis showed that trade openness has a negative effect on economic growth due to inverse impact of financial markets over macroeconomic performance.

Rao (2009) investigated the impact of trade openness on economic growth in Fiji Island. His findings indicated that trade openness contributes to economic growth positively and significantly. Moreover, Daumal and Ozyurt (2010) investigated the relationship between trade and economic growth in the case of Brazil. Their results showed that trade openness have positive impact on economic growth by improving quality of human capital and boosting the industrial sector. Similarly, Jenkins and Katircioglu (2010) investigated direction of causality between trade openness, exchange rate and economic growth and the long run effect of trade openness on economic growth in the case of Cyprus. Their findings indicated that

long run relations between these variables exist and the export-led growth while imports do not Granger cause economic growth.

Recently, in the case of Pakistan, Hye (2011) considered trade-led growth hypothesis. The analysis revealed that human capital and trade openness accelerate economic growth, and suggesting that the performance of human capital must be improved through technical training and education to attain fruits of trade openness on economic growth, and he concluded that negative effects of trade openness on economic growth exist. Additionally, Shahbaz et al. (2011a) tested the impact of trade openness on economic growth in the case of Pakistan, by considering exports as an indicator of trade openness after financial reforms regime. The empirical results confirmed that long run relationship does exist between economic growth and trade openness.

Yanikkaya (2003) and Dollar and Kraay (2004) found a positive impact of trade openness on economic growth especially on developing countries using panel data analysis. Kwame (2013) investigated trade liberalization and economic growth in Ghana over the period 1986 and 2010 and found that trade liberalization enhances GDP growth in Ghana in the long run but hampers growth in the short run using an ARDL approach.

According to many empirical studies, the growth rate of GDP is positively related to the growth rate of trade openness Wacziarg (2001), Sinha and Sinha (2000). However, not everyone agrees that trade openness is of outstanding importance. Rodrik et al. (2002) demonstrate that the strong effect of trade on growth, in both Alcala and Ciccone (2002) and Dollar and Kraay (2003), comes from their choice of measuring openness by using “real openness”, instead of the conventional measures of openness, which always results in positive biased estimations of

openness on growth. In addition to this, it is possible that omitted variables may create a positive relationship between openness and growth (Rodriguez and Rodrik (2001); Hallak and Levinsohn (2004)

Even though technological spillovers, international transmission of knowledge and allocative efficiency are more easily achieved with an open trade regime, there are many studies which support that trade openness negatively affects economic growth. According to Alessandro De Matteis (2004), trade liberalization sets exogenous constraints to economic growth. This is specifically detrimental to young economies, since it contributes to enforce their dependence on international demand and to increase their vulnerability to the fluctuations of international markets.

Rodrik (1992) mentions that openness may cause macroeconomic instability by augmenting inflation, depreciating exchange rates and leading to balance payment crisis while Levine and Renelt (1992) claim that a higher degree of openness negatively affects domestic investments. Battra and Slottje (1993) and Leamer (1995) also suggest that free trade can be a primary source of economic downturn. Trade liberalization implies lower tariffs, making imports more attractive than domestic production. In this case, the domestic economy may suffer a loss.

There are a large number of empirical studies on trade and economic growth in this regard, Herath (2010) examined impact of trade liberalization on economic growth of Sri Lanka. In identifying the impacts of trade liberalization on growth and trade balance, data were collected on a specific time interval before and after the trade liberalization. The time period selected was from 1960 to 2007. Using regression analysis and Chow test to the variables, findings of the study confirmed a

significant positive relationship between trade liberalization and economic growth of Sri Lanka. The result of Chow test proved a clear change of economic growth before and after trade liberalization of the country.

Sinha (2000) conducted a time series analysis using total trade volume as an accurate measure of openness and examined the link between openness and growth for 15 Asian countries for the period 1950 to 1992. They developed a model that specified GDP growth as a function of growth rates of openness (exports plus imports), domestic investment, and population. The coefficient of the growth of openness was found to be significant for only eight of the 15 countries. However, they found support for the proposition that GDP growth rate is positively related to the growth rates of openness and domestic investment, whereas the relationship between GDP growth rate.

Herath (2010) examined impact of trade liberalization on economic growth of Sri Lanka. In identifying the impacts of trade liberalization on growth and trade balance, data were collected on a specific time interval before and after the trade liberalization. The time period selected was from 1960 to 2007. Using regression analysis and Chow test to the variables, findings of the study confirmed a significant positive relationship between trade liberalization and economic growth of Sri Lanka. The result of Chow test proved a clear change of economic growth before and after trade liberalization of the country.

Debel (2012) analyzed that trade liberalization seeks to reform a country's international commercial policies in order to improve economic welfare by achieving a better allocation of resources in the long- run. The results of the estimated model has confirmed undoubtedly that in the observed period, 1974-

2009, trade liberalization has had a positive and significant impact on the export performance of the Ethiopian economy. This implies that policy makers should generate such policies for attracting exports from Ethiopia, which will focus on the utilization of the country's resource endowments in terms of developing new technologies, and improving national capabilities. As a result, openness has lead Ethiopia to economic growth. This suggests that when countries are more open, they are better able to exploit market opportunities through product diversification and differentiation. These results have important implications for national policies and strategies within the trading system of Ethiopia to open up its foreign trade policies in inter regional and global perspective.

Alemnesh (2012) examined the relationship between trade liberalization and economic growth by using time sires econometric analysis. She takes real GDP as a dependent variable and real private investment, real public investment, human capital and trade openness (proxy to determinant of trade liberalization) as independent variable in Ethiopian context. According to her finding trade liberalization have positive long run impact and significant effect on Ethiopian economic growth.

Awokuse (2008) reexamined trade openness and growth nexus by using time series data and Granger causality tests and impulse response in the case of Argentina, Colombia and Peru. Their empirical evidence indicated that the exports led-growth hypothesis in Argentina and Peru. Rao and Rao (2009) investigated the impact of trade openness on economic growth in Fiji Island. His findings indicated that trade openness contributes to economic growth positively and significantly as well as to total factor productivity. Moreover, Daumal and Ozyurt (2010) investigated the relationship between trade and economic growth in the case of Brazil their results

showed that trade openness have positive impact on economic growth by improving quality of human capital and boosting the industrial sector.

Katircioglu et al. (2007) examined relationship between international trade and economic growth in the case of India. Their results disclosed that imports and exports are main drivers of long run growth. Similarly, Jenkins and Katircioglu (2010) investigated direction of causality between trade openness, exchange rate and economic growth and the long run effect of trade openness on economic growth in the case of Cyprus. Their findings indicated that long run relations between these variables exist and the export-led growth while imports do not Granger cause economic growth. Furthermore, Katırcıoglu (2010) explored the relationship between economic growth and trade openness in the case of North Cyprus. The empirical results confirmed the existence of export-led-growth effect and reject the hypothesis of import led- growth does not exist.

In the case of Australia, Singh (2011) applied system-based ML approaches to examine the relationship between trade openness and economic growth. His results showed that the presence of long run relationship between the variables. He also found that exports have significant and positive effect on economic growth. Recently, in the case of Pakistan, Hye (2011) considered trade-led growth hypothesis. The analysis revealed that human capital and trade openness accelerate economic growth, and suggesting that the performance of human capital must be improved through technical training and education to attain fruits of trade openness on economic growth, and he concluded that negative effects of trade openness on economic growth exist.

Shahbaz et al. (2011) tested the impact of trade openness on economic growth in the case of Pakistan, by considering exports as an indicator of trade openness after financial reforms regime. The empirical results confirmed that long run relationship does exist between economic growth and trade openness. Further, results illustrated that export-leads growth hypothesis and exchange rate changes reduce domestic output while capital stock improves the volume of domestic output and hence economic growth.

A number of opinions in empirical literature have expressed different views on the linkage between domestic firms output growth and trade liberalisation in an economy. The contention of negative association between manufacturing sector performance and import penetration will hold given that the foreign competition demonstrate and exercises market power over the local companies firms in the domestic economy. The capacity of local companies to sustain prices over and above the average cost is greatly reduced in industries facing with significant import competition levels. This hypothesis found credence in for Pakistan ( Amjad, 1977), India (Katrak, 1980), Turkey (Foroutan, 1996) and Morocco (addadet. Al. 1996). A Malasian study by Beng and Yen (1977), India (Mitra (1997) and Mexico (Weiss, 199) found concurrence in the supposition that tariffs allow producers to reap high domestic gains. The study of Mexico by Grether (1996) reported that sectors that enjoy less government protective tariffs behaved more competitively. Semenick and Morrison (2000) in another study, found that a reduction in industrial output could result from protectionism because of greater competition than before which may force producers to depart instead of expanding operations.

Protectionist laws attract a several high-cost but small, producers with the consequence for the fragmentation of the home market. An Indian study by Goldar (1986) reported negative effect of Import-substitution policies on total factor

productivity. This conclusion found concurrence in the Turkish industries case (Krueger and Tuncer 1982). Foreign exchange restrictions and non-substitutability between domestic and imports intermediate on the one hand and capital inputs, together with the level of fixed capacity may make an economy idle especially where import-substitution policy is in place. In a study of the Egyptian (Handoussa, Nishimizu and Page, 1986) and Chilean economy by Condon, Corbo and de Melo (1984) shows that the Technical Factor Productivity (TFP) promotes growth after trade opening. A study conducted in Malawi, Mulaga and Weiss (1996) contends that between 1987 and 1991, the slim improvement recorded in TFP was due to trade reforms. The explanation for this being that as companies how hitherto previously faced foreign exchange shortage were able to stock up raw materials and spare parts in order to achieve higher operational capacity. The authors were not able to record linkage between the fall in protection and TFP when TFP estimates adjusted for change in capacity utilisation was used. The TFP in this case, does not reveal improvement in productivity, because of movement from one production frontier to another which do not seem to relate with exposure to foreign competition on a systematical basis.

Nishimizu and Robinson (1984) using the growth decomposition measure found a significant and positive linkage among import liberalization, export expansion, and growth. This arises from critical relevance of non-substitutable intermediate inputs importation, capital goods constraints and foreign exchange restrictions. The result is the growth of TFP in the manufacturing sector and higher level exports due also to the incentives of competitive cost-reducing in explaining the growth of productivity, a multiple regression framework of four industrialized countries: Yugoslavia South Korea, Turkey and Japan. The total factor productivity in South Korea grew at two-digit ISIC level. This was more rapid than the growth of Turkey

and Yugoslavia. The outward-looking strategy adopted by South Korea appears to have promoted infant industries which demonstrated better performance. Turkey entered into rapid and fruitful export promotion during 1963 and 1976. The country experienced successful era of import substitution policies, which allowed its infant industries reached maturity level. The export from 1970 to 1973 in Turkey however declined largely because the government incentives of exports were removed. This is contradictory to the findings of Krueger and Tuncer's (1982) that found that trade protection do not engender productivity growth. Indeed the supposition may not be true that well-defined production technologies do not exist in all plants and machineris within an industry. ybout (1992) went further by measuring plant level growth productivity in Morocco, Chile, and Colombia. The model of Tybout shows that expansion in output came not only from growth productivity, but also that change in productivity accompanied changes in the net entry or scale. Tybout (1992) also reported positively link between growth output and entry which did not significantly connect with the exit of firms, and higher rates of effective protection concomitant with large plant size. This is especially so at the lower end of size distribution.

Based on the argument aforementioned, the hypothesis of positive influence of trade opening on the growth of manufacturing productivity obtained some concurrence in the literature. Some of these works include India (Soo, 2008; Krishna and Mitra, 1997), in Cote d'Ivoire (Harrison, 1993), South Korea (Kim, 2000: Dongsuk 1992), for Mexico, (Weiss, 1992: Tyboutand Westbrook, 1995), Thailand, Indonesia (Kristiono, 1997: Sjoholm, 1997), for Chile, (Rodrigo, 1995) and Sri Lanka (Weiss and Jayanthakumaran, 1994).

Tybout (2000) and Epifani (2003) made a survey of developing countries on the possible impact of trade policies on manufacturing firms. Some of the studies

examined the effect of internal economies of scale as correlate between productivity and trade liberalization. Tybout and Westbrook 1995 additionally concluded that the scale of efficiency gains are negligible and are not related to trade liberalization. Firm-level studies by Pavcnik (2002) and Tybout (2001) also submit that resources re-allocation to from less more productive firms account for the gains in productivity. Tybout (1996) had earlier, using Chilean firm data for the period 1975 to 1985, estimated the turnover effects linked to trade policies. The study reveals importance of net exit on rising aggregate productivity. The critical component of productivity gains, net exit was in fact responsible for the import of the competing industries. For Morocco however, the contrary, net entry caused decline in the aggregate productivity (Haddad, et al 1996). A third source of productivity gains at aggregate level was found to be related with policies of trade liberalization because of improvements of efficiency in intra-firm operations. The growth of productivity was also ascribed to intra-plant movements by Roberts (1996) who for Colombia deployed firm-level data for a period of ten years (1977-1987. Without exploring why liberalization the trade may influence productivity, some industry-level and firm data were estimated by some studies. They report significant and positive association between productivity and trade measures (Haddad 1993, Paus et. al. 2003).

Sharma, Jayasuriya and Oczkowski (2000)'s study was based on the review of Nepalese manufacturing industries. They submit that although exchange rate and trade policy reforms are not sufficient conditions although such can be necessary variables for the improvement of productivity growth in the "least developed" economies. Some other factors such as human capital shortages, appropriate investment policies, and physical infrastructure will have to be addressed if the countries are to harness the potential productivity improvements. Jenkins (1995) in

the Bolivian case, found very little evidence that trade liberalization is a necessary and sufficient condition for rapid productivity growthBolivia experienced lack of investment, a high real rate of interest and lack of organizational change during this period. As a result, increased productivity through these factors was insignificant.

Finally, Njikam, Binam and Tachi (2006) over the period 1965-2000 evaluated the factors accounting the variations, in total factor productivity (TFP) across sub-Sahara Africa (SSA) countries. The study using data in 3-year averages of annual, cross-section data, determined the fixed-effects as well as the seemingly unrelated regression (SUR). The results show that (i) openness to world trade is conducive to TFP in SSA region only if issues related to supply conditions such as poortransport and communication infrastructure, erratic supply of electric energy. Corruption and bad governance, insufficient education of the labour force etc are adequately addressed, (ii) physical capital accumulation is important for TFP, (iii) the size of the financial sector mattes for TFP, in some SSA countries and negative for TFP in other SSA countries.

To sum up, in view of the studies within the literature, it can be stated that no certain agreement has been achieved on the effect of trade openness on economic growth. Despite the strong theoretical support that growth in trade generates continuous economic growth; many times, the failure of the empirical literature to consistently deliver the same picture is a fact. One part of the explanation for this lack of conclusive evidence is due to the inappropriate way in which trade, defined in terms of trade openness, is measured.

# CHAPTER THREE

## 3. RESEARCH METHODOLOGY

### 3.1 Data Type and Source

The time series data set ranging from 1992-2017 is used in the analytical framework of this paper. Each observation has potentially sourced from domestic institutions like; National Bank of Ethiopia (NBE); Ministry of Trade (MT) and Ethiopian Investment Commission (EEC). The data set has all passed through all the necessary tests required for time series data to be in effect.

### 3.2 Research Design

The study used longitudinal research design since it fits the secondary data that will be collected from NBE and ministry of trade.

### 3.3 Methods of data analysis

In this study both simple descriptive and econometrical methods of data analysis are employed.

To analyze the trends of economic growth during the study period, we used tools of descriptive statistical such as trend graphs. To analyze the data, STATA 13 versions have been used as statistical software package for the entire study.

### 3.4 Model Specification

In line with the theoretical propositions reviewed in the literature, the relationship between trade openness and economic growth has been examined by specifying the following model.

RGDPt= *f* (OPNt, FDIt, REERt) ……. (1)

In linear form, equations (1) can be written as:

$lnRGDPt=\beta 0+\beta 1lnOPNt+\beta 2lnFDIt+\beta 3lnREERt+\varepsilon t$…….. (2)

Where, $\beta 1$-$\beta_3$ are parameters; RGDP = Real Gross Domestic Product, FDI = foreign direct investment in the country each year and REER= represents the real effective exchange rate; OT = Trade Openness proxy for (Trade liberalization). Trade openness is equal to the sum of import and export values divided by nominal GDP; thereby all the exports, imports and the GDP are measured in current price and current exchange rates. Whereas, *t* is a time trend and Ln= is Natural logarithm.

**3.5 Description of variables**

| **Variables** | |
|---|---|
| GDP | Dependent variable: Gross value added by all resident producers in the economy |
| OPTN | Independent variables: Making borders of nations more open to trade and giving equal incentives to both export and import competing sectors. |
| Exchange rate | Independent variables: Local currency unit relative to the US dollar |
| Foreign direct investment | Independent variables: is an investment made by a firm or individual in one country into business interest located in another country. |

### 3.6 Unit Root Test

A test of stationarity or non stationarity that has become widely popular over the past several years is the unit root test. Stationary time series are important because if a time series is non stationary, we can study its behavior only for the time period under consideration. Each set of time series data will therefore be for a particular episode. As a consequence, it is not possible to

generalize it to other time periods. Therefore, for the purpose of forecasting, such non stationary time series may be of little practical value (Gujarati, 2004). For this research, the Augmented Dickey-Fuller (ADF) test is used to test for unit root. The ADF test is preferred due to its simplicity and due to the fact that it has widely been used with satisfactory result. The presence of unit root indicates that the variables are not stationary (Gujarati, 2004).The Augmented Dickey-Fuller test is in two forms: one with only intercept and another with intercept and trend.

### 3.7 Co-integration Analysis

We are concerned about the concept of co-integration because making a variable stationary by differencing only gives the short run dynamics while we are also interested in knowing the long run relationship. Economically speaking, two variables will be co integrated if they have long run relationships between them. i.e. co integration implies the existence of long run relationship between economic variables.

### 3.8 Granger Causality Test

Granger Causality test is developed by Granger (1985) and advanced by Sims (1980). In the Granger Causality test, we observed the direction of cause-effect relationship among the variables. The use of causality test is to identify which variable causes another variable in time series analysis. Granger (1985) suggests that if there is a co-integration relation between two variables, then Granger

causality will exist in at least one direction. However, although a co-integration test can determine the existence of Granger causality between variables it cannot determine the direction of this relation. Engle and Granger (1987) indicate that if two variables are co-integrated then a relationship will exist that can be measured by Granger causality test.

### 3.9 Error Correction Model (ECM)

An error correction model is a short run model which reflects the current error in achieving the long run equilibrium relationship among variables. ECM is used to estimate the short run economic growth function and allows us to study the short run relationship among variables under consideration. An important theorem known as the Granger representation theorem, states

that if two variables Y and X are co-integrated, then the relationship between the two can be expressed as ECM (Gujarati, 2004). Generally, since ECM is a short run model, the coefficients of the independent variables show short run relationship of them with the dependent variable.

### 3.10 Diagnostic Checks

#### Normality Test

The model assumes that the random variable u has a normal distribution. This means that small values of u's have a higher probability to be observed than large values. This assumption is necessary for conducting statistical tests of significance of the parameter estimates and for constructing confidence intervals. If the assumption of normality is violated, the estimates of parameters are still unbiased but the statistical reliability by the classical tests of significance (t-statistic and F-statistic) of the parameter estimates cannot be assessed because these tests are based on the assumption of normal distribution of the u's (Gujarati,1995).

### 3.11 Test for Hetroskedasiticity

One of the assumptions of classical linear regression model is the disturbance "Ui" are homoscedastic. That is, they all have the same variance (δ2). If this is not the case i.e. if the variance of Ui is (δ2), indicating that it is varying from observation to observation, we have a situation of hetrosecidacity or non constant variance in the presence of hetrocedacity, the usual hypothesis testing routine is not reliable, raising the possibility of drawing misleading conclusion because it will make OLS estimates to have larger variance and wider confidence interval. Therefore, it's important to consider it (Gujarati, 1995).

### 3.12 Tests for Multicollinearity

One of the assumptions of classical linear regression model is that there is no perfect colinearity among some or all explanatory variables. If the explanatory variables are perfectly linearly related to each other, the problem of multicolinearity will arise. Recently, however, the term multi colinearity is used in broader sense to include the case of perfect colinearity as well as
the case where the explanatory variables are highly linearly related. Not considering the problem of multicolinearity will result in wrong conclusion as a result of large variance and standard error of OLS estimators, wider confidence interval, insignificant "t" value and high R square value and so on. Therefore, it is important to deal with this problem using variance inflation factor (VIF) as dedicating mechanism (Gujarati, 1995).

### 3.13 Test for Autocorrelation

The model assumes that successive values of the random variable u are temporally independent and that the value which u assumes in any one period is independent from the value it assumes in any previous period. This implies that the covariance of ui and uj equals zero. If this assumption is not satisfied, then the value of u in any particular period is correlated with its own preceding value (or values). This is known as autocorrelation or serial correlation of the random variable u (Wooldridge, 2000). Where the random term is autocorrelated, the parameter estimates are still statistically unbiased but the variances of the parameter estimates are likely to be larger or the

Variance of the random term may be seriously underestimated or the predictions based on the parameter estimates will be inefficient in the sense that the variance is large. The durbin-watson statistics test is used to check correlation between the errors in different time periods.

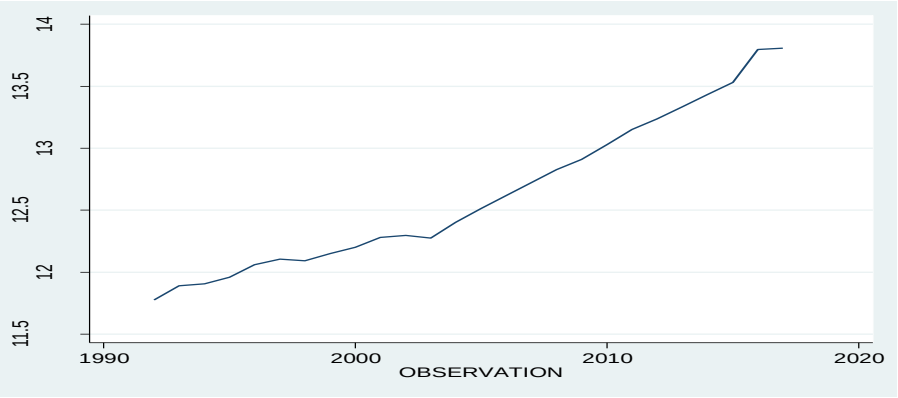
# CHAPTER FOUR

## 4. RESULTS AND DISCUSSIONS

This chapter presents and discusses the results of empirical analysis based on the econometric framework given in chapter three. Preliminary tests that should be undertaken before estimating the VAR approach to co-integration and Granger Causality Test. This chapter contains both the descriptive and econometric analysis. Under the descriptive statistics the statistical tools such as tables and graphs are used. The econometric analysis begins by testing the necessary tests such as stationary tests, diagnostic tests. After passed the necessary tests of co-integration and Granger Causality Tests, both the long run and short run models are estimated using ARDL model and Error Correction respectively. STATA 13 software has been used for analysis of the variables.

### 4.1Descriptive Analysis

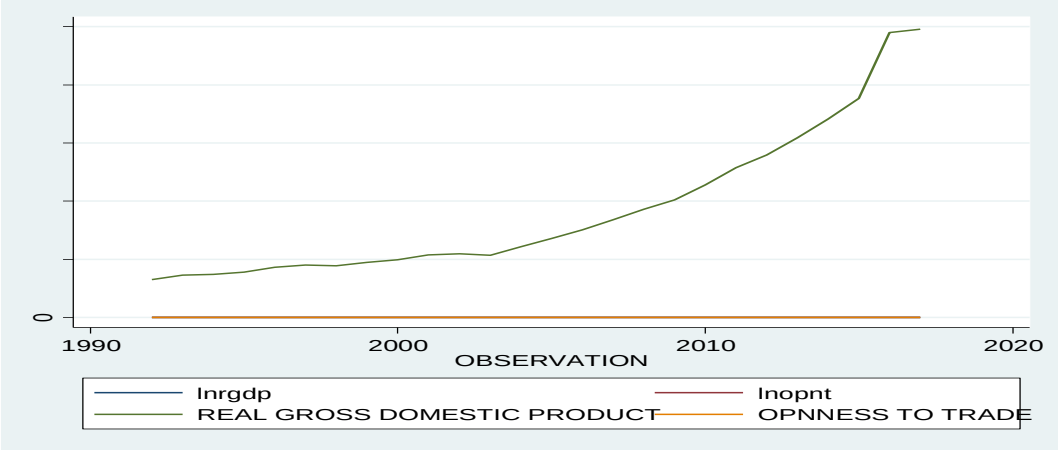
Descriptive analysis is the first step in this research. Before conducting time series analysis, it is advisable to analyze the data using descriptive statistics. This helps to identify the presence of any trending behavior in the variables in question over time. These variables are shown as follows.




Source: Own computation based on NBE data

Figure 4.1: Trends of real GDP and its growth in Ethiopia (1992-2017)

According the above figure 4.1, the Ethiopian economic growth has shown various changes in different political regime. The changes in government structure created a problem of inconsistency in implementing the polices by previous regimes including external and internal wars as well as natural disaster like famine and drought.




## 4.2 The Unit Root Test Analysis

Prior to direct estimation of the model, it is advisable first to conduct the unit root test to check whether the time-series is stationary or not. In order to obtain a consistent and reliable result, we must transform the non-stationary data into stationary data by differencing. There are two main methods to test whether time series are stationary or not, namely graphical method which is informal and then the formal test. This study first presents the visual plot of graphs before the formal test and reported in appendix B of the thesis. The formal tests conducted are ADF. The informal method, however, is not enough to conclude that the data is stationary as it is informal, hence the need for a more formal method to complement it. In this regard, Augmented Dickey-Fuller tests with the ADF methods are performed with different trend assumptions (only intercept both trend and intercept).

Table 4.1: Augmented Dickey-Fuller (ADF) Stationarity Test Result

| Augmented Dickey-Fuller test statistics (ADF Test) | | | | | | |
|---|---|---|---|---|---|---|
| Variables | With Intercept | | | Trend and Intercept | | |
| | At level | At First Difference | Order of Integration | At Level | At First Difference | Order of integration |
| LnRGDP | -3.53 | -4.389 | I(0) at 5% | -0.522 | -6.057 | I(1) at 1% |
| LnOPNt | -1.131 | -3.75 | I(1) at 1% | -1.34 | -4.49 | I(1) at 1% |
| LnFDI | -0.011 | -3.48 | I(1) at 1% | -2.83 | -5.68 | I(1) at 1% |
| LnREER | -3.48 | -4.38 | I(1) at 5% | -4.96 | -4.81 | I(1) ) at 1% |
| MacKinnon (1996) with constant<br>Test critical values 1% -3.621<br>5% -2.943<br>10% -2.610 | | | | With constant and trend<br>Test critical values<br>1% -.4.227<br>5% -3.537<br>10% -3.200 | | |

Source: STATA 13 result

The above table 4.1 reveals that all variables are not stationary in their levels. Hence, we take the first difference of the variables and they become stationary. We can also determine the order of integration of the variables in the process. The ADF result shows that GDP are stationary at level I [0], [with intercept], REER also stationary at level I [0] with intercept and (intercept and trend) yet, trade openness and foreign direct investment are stationary at integrated of order 0ne I [1] at first difference.

## Diagnostic Tests

Diagnostics test are usually undertaken to detect model misspecification and as a guide for model improvement. Multicollinearity test is one of the pre-estimation diagnostic tests. If two explanatory variables are perfectly correlated, it would be difficult to identify the independent impact of each explanatory variable on the dependent variable. In this case a formal test of multicollinearity has to be conducted to determine which variable to retain and which one to exclude from the final analysis. The formal test of multicollinearity is conducted with the help of variance inflation factor [VIF].If VIF is greater than 10 it indicates the existence of multicollinarity among predictor variables. The estimated variance inflation factor (VIF) for this study is reported in appendix part of the thesis. The result shows that the variance inflation factor is less than 10 which confirms the absence of multicolinarity among the independent variables.

The study conducted different post-estimation diagnostic tests to guarantee that the residuals from the model are Gaussian that the assumptions are not violated and the estimation results and inferences are trustworthy. The serial correlation test can be done using the Lagrange multiplier (LM) test. It helps to identify the relationship that may exist between the current value of the regression residuals and lagged values. The study used the LM test to investigate serial correlation. The Jarque-Bera normality test is used to see whether the regression errors are normally distributed. Econometric theory states that the existence of non-normality does not affect and distort the estimator‘s BLUE and consistency property (Enders 1995). The heteroscedasticity test helps to identify whether the variance of the errors in the model are constant or not.

The normality test is undertaken using the Jarque-Bera (J.B.) statistic. The J.B. test result shows the presence of normality for the models such as real GDP, OPNT and FDI. But the normality test result for real effective exchange rate indicates the rejections of the null hypothesis of residuals are normally distributed for the reason that the p-value is less than the standard significance level of five percent. This problem may be raised as a result of lack of large sample property of the variables. This problem can be solved by increasing the sample size of variable. This is impossible due to reliable data constraints in concerned institutions of the country.

## 4.3 Econometric Analysis

### 4.3.1 Determination of Optimal Lag Length for Endogenous Variables

The number of lags included determines Johansen co-integration test and vector error correction estimate results during estimation under ARDL environment. This indicates the importance of determining optimum lag order before the test of co-integration and vector error correction methods. The optimum lag order selection can be performed with the Likelihood Ratio test statistics (LR), the Final prediction Error (FPE),the Akaiki Information Criteria(AIC), the Schwarz Information Criteria(SIC), and the Hannan-Quinn Information Criteria(HQ). As indicated below in table 4.3 out of five information criteria the maximum appropriate lag order of one was chosen in determining VAR model indicated by the "*" in the output. Since the majority is granted.

Table 4.2: Optimal lag Order selection criteria

| Lag | LL | LR | FPE | AIC | HQ | SC |
|---|---|---|---|---|---|---|
| 0 | -18.57 | NA | 0.346 | 1.779 | 1.790 | 1.828 |
| 1 | 33.176 | 103.5* | 0.0034 | -2.834 | -2.810* | -2.735* |
| 2 | 34.294 | 2.235 | 0.0034* | -2.844* | -2.809 | -2.696 |
| 3 | 34.901 | 1.213 | 0.0035 | -2.809 | -2.762 | -2.610 |
| 4 | 34.901 | 0.001 | 0.0038 | -2.718 | -2.659 | -2.470 |

### 4.3.2The Johansen Co-integration Test Result

We are concerned about co-integration since if the variables are not co-integration, we construct only the short run VAR model while we are also interested in knowing the long run relationship. Two variables will be co-integrated if they have long run relationships between them. if there is no co-integration relationship

among the variables then there is no point in estimating VEC model. The guide line is when the trace statistics is more than 5% critical value there is long run relationships among variables.

Table 4.3: Johansen Tests for Co-Integration

| Maximum Rank | Eigen Value | Trace Statistics | (5%) Critical Value |
|---|---|---|---|
| 0 | | 62.88 | 47.21 |
| 1 | 0.79 | 23.447* | 29.68 |
| 2 | 0.43 | 9.35 | 15.41 |
| 3 | 0.269 | 1.49 | 3.76 |
| 4 | 0.057 | | |

Note: * denotes rejection of null hypothesis at 5 percent level.

Based on from the given table above, the null hypothesis of no co-integration among the variable is rejected since the trace statistics of 62.88 is greater than the 5% critical value of 47.21 From this, one can conclude the existence of co-integration relationship between GDP at current price, trade openness, foreign direct investment and real exchange rate for the Ethiopian economy.

### 4.3.3 Granger Causality Test

The presence of causality between the variables is tested by Granger causality test. This is performed to understand the bidirectional causality between the variables. The guide line is that the probability is more than five percent we cannot reject the null hypothesis rather we accept the null hypothesis.

Table 4.4: Granger causality Wald test

| Equation | Excluded | F | Df | Df_r | Prob>f |
|---|---|---|---|---|---|
| RGDP | OPNT | 10.791 | 2 | 15 | 0.0012 |
| RGDP | FDI | 20.477 | 2 | 15 | 0.0001 |
| RGDP | REER | 4.116 | 2 | 15 | 0.0376 |
| RGDP | ALL | 11.44 | 6 | 15 | 0.0001 |
| OPNT | RGDP | 0.299 | 2 | 15 | 0.7453 |
| OPNT | FDI | 0.0659 | 2 | 15 | 0.9364 |
| OPNT | REER | 0.6041 | 2 | 15 | 0.5593 |
| OPNT | ALL | 1.5537 | 6 | 15 | 0.2280 |
| FDI | RGDP | 23.27 | 2 | 15 | 0.0000 |
| FDI | OPNT | 0.4121 | 2 | 15 | 0.6695 |
| FDI | REER | 0.2854 | 2 | 15 | 0.7557 |
| FDI | ALL | 11.82 | 6 | 15 | 0.0001 |
| REER | RGDP | 2.40 | 2 | 15 | 0.1245 |
| REER | OPNT | 2.568 | 2 | 15 | 0.1098 |
| REER | FDI | 3.875 | 2 | 15 | 0.0440 |
| REER | ALL | 5.066 | 6 | 15 | 0.0050 |

Notes: Foreign direct investment and real exchange rate added to the variables to increase the fitness of the model.

The above result indicates trade openness, foreign direct investment and real exchange rate granger causes gross domestic product but gross domestic product foreign direct investment and real exchange rate does not granger causes openness to trade. It also indicates the existence of bi directional causality between gross domestic product and foreign direct investment.

### 4.4.4 Vector Error Correction Model (VECM)

In the previous analysis, it was found that the data has one co-integrating relationship based on the Johansen co-integration test. Hence, VECM is performed by choosing the optimal lag that is chosen based on the information criterion seen in the previous section and by using the result of the Johansen co-integration test. The VECM consists of two parts: the matrix of long-run co-integrating coefficients

that is used to derive the long-run co-integrating relationship, and the short-run coefficients which is for the short-run analysis.

**Long-run Relationship**

The target of this study is to investigate the impact of trade openness on economic growth of Ethiopia and empirically investigating the direction of causality between economic growth and openness variables. Johansen co-integration test indicates the presence of these one co-integrating equations.

**Table 4.5: The Estimated Long- Run Model for LnGDP (Real Gross Domestic Product)**

| Varibles | Coefficients | Standard error | T-statistics |
|---|---|---|---|
| LnOPNT | 0.589 | 0.168 | 3.49 |
| LnFDI | 0.221 | 0.015 | 14.05 |
| LnREER | 0.451 | 0.189 | 2.38 |
| Constant | 13.18 | 0.896 | 14.71 |
| $R^2$ =0.91 | | Adj $R^2$=0.90 | |

**$LnRGDP_t$=13.18 +0.589LOPNTt +0.221LFDIt+0.451LREERt+$\varepsilon_t$**

From the estimated output, we observe that all of the independent variables entered the growth model have significant impact on the economic growth of in the long run. That means; the trade openness variable, foreign direct investment and real exchange rate variables have a positive and significant impact on the economic growth of Ethiopia in the long run. These findings are in line with many theories like; Romer (1996) and Obstfeld and Rogoff(1996) and many empirical literatures in economics. A 1% improvement in a country's level of exposure to international trade increases its economic growth by 0.59%; while a percentage rise in inflow of

FDI improves the economic growth rate in the long run just by 0.22%. On the other hand, with a 1% increase in REER the economic growth rate increases by 0.45% in the long run. Of the variables considered in the model, the long run growth impact of trade openness has been estimated to the dominant one.

**Short Run Error Correction Model**

After determining the long run relationship among the variables in the long run model and their long run coefficients, the next step is to determine the coefficients of the short run dynamics. The error correction term (ECM) indicates the speed of adjustment to restore equilibrium in the dynamic model. It is a one lagged period residual obtained from the estimated dynamic long run model.

**Table 4.6: The Estimated Short- Run Model For Lngdp (Real Gross Domestic Product)**

| Dependent Variable is D( LRGDP) | | |
|---|---|---|
| Error Correction | Coefficients | T-statistics |
| Co-integration | -1.123 | -3.374 |
| ECM(-1) | 0.38 | 2.31 |
| LnOPNT | 0.589 | 0.85 |
| LnFDI | 0.221 | 1.95 |
| LnREER | 0.451 | 2.18 |
| Constant | 13.18 | 11.58 |
| $R^2$ = 0.738 | | Adj $R^2$=0.691 |

Source: Model output

The co- integration coefficient, estimated at -1.123 is negative and highly significant. These shows that the existence of long run causality from independent variables to dependent variable. According to Bannerjee*et al*. (2003) the highly significant error correction term further confirms the existence of a stable long-run

relationship. The coefficients below the co-integration coefficients are short run coefficients. The coefficient of the error term (ECM-1) implies that the deviation from long run equilibrium level of real GDP in the current period is corrected by 38% in the next period to bring back equilibrium. The result shows that trade openness and foreign direct investment have positive but insignificant impact on Ethiopian economic growth in the short run. On the other hand real effective exchange rate has positive and significant impact on Ethiopian economic growth in the short run.

As a result, I suppose that how trade openness affects economic growth in short run depends on a large set of determinants, which account for the proposed heterogeneity across countries, including the existing level of development, the macroeconomic stability or the strength of financial sector, poor over land infrastructures to distant large markets, export dependence only on primary goods and a low level of human capital, technological capacity and institutional quality are all important reasons that can explain the empirical result.

# CHAPTER FIVE

# 5. CONCLUSIONS AND POLICY IMPLICATIONS

## 5.1 Conclusions

The main objective of this study is to examine the relationship between trade openness and economic growth in a given time frame. In doing so, ARDL model was applied to analyze the long run relationship between variables and Error Correction model used for short run relationship analysis. The necessary tests like unit root test were applied using ADF test. As a result, real GDP is stationary at level, I [0], [with intercept], REER also stationary at level I [0] with intercept and (intercept and trend) yet, trade openness and foreign direct investment are stationary at integrated of order 0ne I [1] at first difference.

The result of co-integration test indicates the existence of long run relationships between the variables. Following statinarity test, model stability test was carried out in the study and the result shows the absence of multicolinarity, serial correlation, hetroscedasticity problem and abnormal distribution of the residuals. The findings of this study shows that trade openness, foreign direct investment and real exchange rate exert positive and significant impact on economic growth in the long run. The other objective of this paper is to test the short run relationship between the variables using Error Correction model. The result shows that trade openness, foreign direct investment and real effective exchange rate exert positive and insignificant impact on Economic growth rate of the in short run time period.

## 5.2 Policy Implication

Based on the findings of the study the following policy recommendations are suggested:

- The country needs to diversify and transform its current export items in order to fully exploit the sector from the benefits of trade openness so that it can narrow the ever growing trade deficit of the country. Moreover, the currents government should be able to create suitable environment so that domestic and foreign investors will have confidence in their investment projects.

- Our findings confirm positive and strong complementarily relationship between trade openness and economic growth in the short and long run. This shows that trade openness plays a vital role in economic growth. Thus government should focus on developing human capital, financial sector and trade expansion through appropriate trade policies for sustained long run economic growth.

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# APPENDICES

## APPENDIX:A ADF Unit Root Test Result

## REAL GROSS DOMESTIC PRODUCT (RGDP)

### *Intercept only at level*

```
. dfuller RGDP, regress lags(0)

Dickey-Fuller test for unit root                    Number of obs   =        25
```

| | Test Statistic | Interpolated Dickey-Fuller: 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| Z(t) | 3.530 | -3.750 | -3.000 | -2.630 |

MacKinnon approximate p-value for Z(t) = 1.0000

| D.RGDP | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| RGDP L1. | .1205481 | .0341541 | 3.53 | 0.002 | .0498951 | .1912012 |
| _cons | -7214.056 | 13992.99 | -0.52 | 0.611 | -36160.77 | 21732.66 |

### *Intercept only at first difference*

```
. dfuller diff_lnrgdp, regress lags(0)

Dickey-Fuller test for unit root                    Number of obs   =        24
```

| | Test Statistic | Interpolated Dickey-Fuller: 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| Z(t) | -4.389 | -3.750 | -3.000 | -2.630 |

MacKinnon approximate p-value for Z(t) = 0.0003

| D. diff_lnrgdp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| diff_lnrgdp L1. | -.9592808 | .218579 | -4.39 | 0.000 | -1.412586 | -.5059758 |
| _cons | .076461 | .022085 | 3.46 | 0.002 | .0306596 | .1222625 |

### *Trend and intercept at level*

```
. dfuller RGDP, trend regress lags(0)

Dickey-Fuller test for unit root                    Number of obs   =        25

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)              0.522           -4.380            -3.600           -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9969

------------------------------------------------------------------------------
D.RGDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------+----------------------------------------------------------------------
RGDP   |
   L1. |   .0416232   .0796706     0.52   0.607    -.1236036     .20685
_trend |   2660.422   2428.624     1.10   0.285    -2376.236    7697.08
 _cons |  -14512.06   15443.45    -0.94   0.358    -46539.82    17515.69
------------------------------------------------------------------------------
```

### *Trend and intercept at first difference*

```
. dfuller diff_lnrgdp, trend regress lags(0)

Dickey-Fuller test for unit root                    Number of obs   =        24

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -6.057           -4.380            -3.600           -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

------------------------------------------------------------------------------
D.diff_lnr~p |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 diff_lnrgdp |
         L1. |  -1.344324   .2219454    -6.06   0.000    -1.805885   -.8827636
      _trend |    .005617   .0017945     3.13   0.005     .0018852    .0093488
       _cons |   .0386392   .0222353     1.74   0.097    -.0076016    .0848801
------------------------------------------------------------------------------
```

## OPNNESS TO TRADE (OPNT)

### *Intercept only at level*

```
. dfuller OPNt, regress lags(0)

Dickey-Fuller test for unit root                    Number of obs   =        25

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -1.131            -3.750            -3.000           -2.630
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.7025

------------------------------------------------------------------------------
      D.OPNt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       OPNt |
         L1. |  -.1283584   .1134693    -1.13   0.270    -.3630876    .1063707
             |
       _cons |    .139011   .1293788     1.07   0.294    -.1286295    .4066516
------------------------------------------------------------------------------
```

### *Intercept only at first difference*

```
Dickey-Fuller test for unit root                    Number of obs   =        24

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -3.799            -3.750            -3.000           -2.630
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0029

------------------------------------------------------------------------------
D.           |
 diff_lnopnt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 diff_lnopnt |
         L1. |  -.6304297   .1659465    -3.80   0.001    -.9745817   -.2862777
             |
       _cons |  -.0222252   .0231877    -0.96   0.348    -.0703137    .0258632
------------------------------------------------------------------------------
```

### *Trend and intercept at level*

```
. dfuller OPNt, trend regress lags(0)

Dickey-Fuller test for unit root                    Number of obs   =        25

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -1.340            -4.380            -3.600           -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.8776

------------------------------------------------------------------------------
D.OPNt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------+----------------------------------------------------------------------
OPNt    |
   L1.  |  -.1320069   .0984884    -1.34   0.194    -.3362593    .0722455
_trend  |  -.0103428   .0035405    -2.92   0.008    -.0176853   -.0030003
 _cons  |   .2775184   .1218879     2.28   0.033     .0247384    .5302984
------------------------------------------------------------------------------
```

### Trend and intercept at first diference

```
Dickey-Fuller test for unit root                    Number of obs   =        24

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -4.495            -4.380            -3.600           -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0015

------------------------------------------------------------------------------
D.diff_lno~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
diff_lnopnt  |
         L1. |  -.8624154   .1918416    -4.50   0.000    -1.261372   -.4634589
      _trend |  -.0079483   .0038724    -2.05   0.053    -.0160015    .0001048
       _cons |    .077318   .0531145     1.46   0.160    -.0331396    .1877755
------------------------------------------------------------------------------
```

## FOREIGN DIRECT INVESTMENT

### Intercept only at level

Dickey-Fuller test for unit root — Number of obs = 25

| | Test Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| | | Interpolated Dickey-Fuller | | |
| Z(t) | -0.811 | -3.750 | -3.000 | -2.630 |

MacKinnon approximate p-value for Z(t) = 0.8158

| D.lnfdi | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| lnfdi | | | | | | |
| L1. | -.0735782 | .090717 | -0.81 | 0.426 | -.2612406 | .1140841 |
| _cons | .8105667 | .7062648 | 1.15 | 0.263 | -.6504534 | 2.271587 |

### Intercept only at first diference

Dickey-Fuller test for unit root — Number of obs = 24

| | Test Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| | | Interpolated Dickey-Fuller | | |
| Z(t) | -5.784 | -3.750 | -3.000 | -2.630 |

MacKinnon approximate p-value for Z(t) = 0.0000

| D.diff_lnfdi | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| diff_lnfdi | | | | | | |
| L1. | -1.207173 | .208703 | -5.78 | 0.000 | -1.639997 | -.7743498 |
| _cons | .3362803 | .2441304 | 1.38 | 0.182 | -.1700152 | .8425758 |

### Trend and intercept at level

Dickey-Fuller test for unit root — Number of obs = 25

| | Test Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| | | Interpolated Dickey-Fuller | | |
| Z(t) | -2.836 | -4.380 | -3.600 | -3.240 |

MacKinnon approximate p-value for Z(t) = 0.1842

| D.lnfdi | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| lnfdi | | | | | | |
| L1. | -.5117742 | .1804877 | -2.84 | 0.010 | -.8860828 | -.1374657 |
| _trend | .1713379 | .0632014 | 2.71 | 0.013 | .0402663 | .3024096 |
| _cons | 1.810264 | .7258653 | 2.49 | 0.021 | .3049115 | 3.315616 |

### Trend and intercept at first difference

Dickey-Fuller test for unit root — Number of obs = 24

| | Test Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| | | Interpolated Dickey-Fuller | | |
| Z(t) | -5.680 | -4.380 | -3.600 | -3.240 |

MacKinnon approximate p-value for Z(t) = 0.0000

| D.diff_lnfdi | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| diff_lnfdi | | | | | | |
| L1. | -1.214707 | .2138553 | -5.68 | 0.000 | -1.659443 | -.7699707 |
| _trend | .0131283 | .0350811 | 0.37 | 0.712 | -.0598268 | .0860834 |
| _cons | .1742927 | .4993905 | 0.35 | 0.731 | -.8642466 | 1.212832 |

## REAL EFFECTIVE EXCHANGE RATE

### Intercept only at level

Dickey-Fuller test for unit root — Number of obs = 25

| | Test Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| | | Interpolated Dickey-Fuller | | |
| Z(t) | -3.485 | -3.750 | -3.000 | -2.630 |

MacKinnon approximate p-value for Z(t) = 0.0084

| D.lnreer | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| lnreer | | | | | | |
| L1. | -.4068091 | .1167408 | -3.48 | 0.002 | -.6483058 | -.1653124 |
| _cons | 1.951187 | .566633 | 3.44 | 0.002 | .7790178 | 3.123357 |

### Intercept only at first difference

Dickey-Fuller test for unit root — Number of obs = 24

| | Test Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| | | Interpolated Dickey-Fuller | | |
| Z(t) | -4.732 | -3.750 | -3.000 | -2.630 |

MacKinnon approximate p-value for Z(t) = 0.0001

| D. diff_lnreer | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| diff_lnreer | | | | | | |
| L1. | -.8245075 | .1742479 | -4.73 | 0.000 | -1.185875 | -.4631395 |
| _cons | .0042682 | .0323252 | 0.13 | 0.896 | -.0627701 | .0713065 |

## Trend and intercept at level

Dickey-Fuller test for unit root — Number of obs = 25

| | Test Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| | | Interpolated Dickey-Fuller | | |
| Z(t) | -4.961 | -4.380 | -3.600 | -3.240 |

MacKinnon approximate p-value for Z(t) = 0.0002

| D.lnreer | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| lnreer | | | | | | |
| L1. | -.4593065 | .092585 | -4.96 | 0.000 | -.6513161 | -.2672969 |
| _trend | .0131643 | .0033601 | 3.92 | 0.001 | .0061959 | .0201326 |
| _cons | 2.034492 | .4451633 | 4.57 | 0.000 | 1.111279 | 2.957704 |

## Trend and intercept at first difference

Dickey-Fuller test for unit root — Number of obs = 24

| | Test Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|---|---|---|---|---|
| | | Interpolated Dickey-Fuller | | |
| Z(t) | -4.814 | -4.380 | -3.600 | -3.240 |

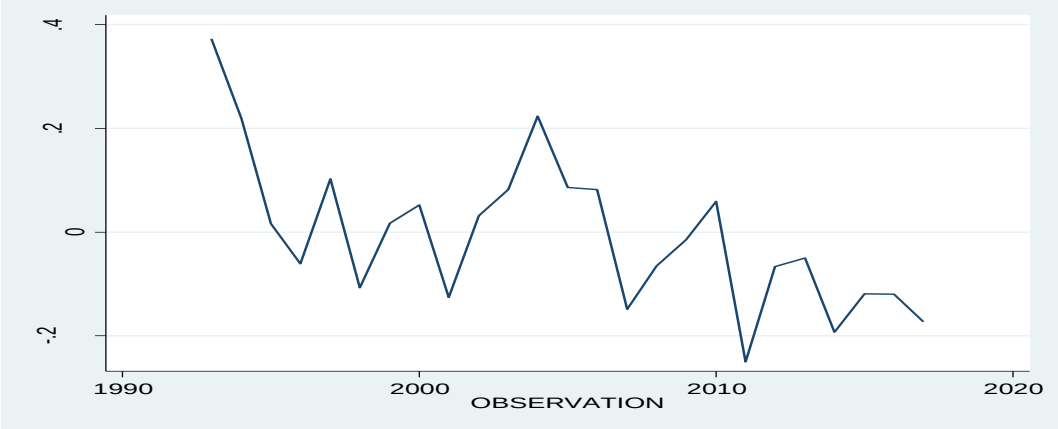
MacKinnon approximate p-value for Z(t) = 0.0004

| D.diff_lnr~r | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| diff_lnreer | | | | | | |
| L1. | -.9177193 | .1906283 | -4.81 | 0.000 | -1.314153 | -.521286 |
| _trend | .0058794 | .0050652 | 1.16 | 0.259 | -.0046543 | .016413 |
| _cons | -.0714779 | .0727127 | -0.98 | 0.337 | -.2226922 | .0797363 |

## APPENDIX: B the Graph of Variables When Differenced

### LnRGDP


### LnOPNT




## APPENDIX C: Lag Order Selection Criteria

```
. tsset OBS, yearly
        time variable:  OBS, 1992 to 2017
                delta:  1 year

. varsoc lnrgdp

   Selection-order criteria
   Sample:  1996 - 2017                              Number of obs      =        22
```

| lag | LL | LR | df | p | FPE | AIC | HQIC | SBIC |
|---|---|---|---|---|---|---|---|---|
| 0 | -18.5715 | | | | .346946 | 1.77923 | 1.79091 | 1.82882 |
| 1 | 33.1765 | 103.5* | 1 | 0.000 | .003442 | -2.83423 | -2.81086* | -2.73504* |
| 2 | 34.2941 | 2.2351 | 1 | 0.135 | .00341* | -2.84492* | -2.80987 | -2.69614 |
| 3 | 34.901 | 1.2138 | 1 | 0.271 | .003542 | -2.80918 | -2.76245 | -2.61081 |
| 4 | 34.9015 | .00101 | 1 | 0.975 | .003895 | -2.71832 | -2.6599 | -2.47035 |

```
   Endogenous:  lnrgdp
    Exogenous:  _cons
```

## APPENDIX D: Unrestricted Co-Integration

```
. tsset OBS, yearly
        time variable:  OBS, 1992 to 2017
                delta:  1 year

. vecrank RGDP OPNt FDI REER, trend(constant) lags(1)

                     Johansen tests for cointegration
Trend: constant                                          Number of obs =      25
Sample:  1993 - 2017                                           Lags =       1
------------------------------------------------------------------------------
                                                              5%
maximum                                            trace      critical
  rank     parms       LL          eigenvalue    statistic    value
    0        4      -652.22853          .          62.8852     47.21
    1       11      -632.50975        0.79351      23.4477*    29.68
    2       16      -625.46316        0.43092       9.3545     15.41
    3       19      -621.53154        0.26987       1.4913      3.76
    4       20      -620.78591        0.05791
------------------------------------------------------------------------------
```

## APPENDIX E: Granger Causality Wald test

Granger causality Wald tests

| Equation | Excluded | F | df | df_r | Prob > F |
|---|---|---|---|---|---|
| RGDP | OPNt | 10.791 | 2 | 15 | 0.0012 |
| RGDP | FDI | 20.477 | 2 | 15 | 0.0001 |
| RGDP | REER | 4.1168 | 2 | 15 | 0.0376 |
| RGDP | ALL | 11.441 | 6 | 15 | 0.0001 |
| OPNt | RGDP | .29978 | 2 | 15 | 0.7453 |
| OPNt | FDI | .06595 | 2 | 15 | 0.9364 |
| OPNt | REER | .60414 | 2 | 15 | 0.5593 |
| OPNt | ALL | 1.5537 | 6 | 15 | 0.2280 |
| FDI | RGDP | 23.278 | 2 | 15 | 0.0000 |
| FDI | OPNt | .41213 | 2 | 15 | 0.6695 |
| FDI | REER | .2854 | 2 | 15 | 0.7557 |
| FDI | ALL | 11.82 | 6 | 15 | 0.0001 |
| REER | RGDP | 2.4012 | 2 | 15 | 0.1245 |
| REER | OPNt | 2.5688 | 2 | 15 | 0.1098 |
| REER | FDI | 3.8751 | 2 | 15 | 0.0440 |
| REER | ALL | 5.0663 | 6 | 15 | 0.0050 |

## APPENDIX F: Vector Error Correction Estimates

| | | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|---|
| RGDP | | | | | | | |
| | RGDP | | | | | | |
| | L1. | -.8663091 | .2705222 | -3.20 | 0.001 | -1.396523 | -.3360953 |
| | L2. | 1.939278 | .2338562 | 8.29 | 0.000 | 1.480928 | 2.397627 |
| | OPNt | | | | | | |
| | L1. | 78936.74 | 30019.43 | 2.63 | 0.009 | 20099.74 | 137773.7 |
| | L2. | 23645.89 | 26589.24 | 0.89 | 0.374 | -28468.07 | 75759.84 |
| | FDI | | | | | | |
| | L1. | 2.937127 | 1.088216 | 2.70 | 0.007 | .8042625 | 5.069992 |
| | L2. | 2.320884 | 2.303463 | 1.01 | 0.314 | -2.193821 | 6.835588 |
| | REER | | | | | | |
| | L1. | -384.8787 | 194.1699 | -1.98 | 0.047 | -765.4447 | -4.312827 |
| | L2. | 319.7229 | 111.4287 | 2.87 | 0.004 | 101.3267 | 538.119 |

## APPENDIX G: Diagnostic Test

### Multicollinarity Test

| Variable | VIF | 1/VIF |
|---|---|---|
| lnreer | 1.71 | 0.584045 |
| lnopnt | 1.54 | 0.648167 |
| lnfdi | 1.16 | 0.863307 |
| Mean VIF | 1.47 | |

### Breusch- Godfrey Serial Correlation LM Test

Lagrange-multiplier test

| lag | chi2 | df | Prob > chi2 |
|---|---|---|---|
| 1 | 18.9593 | 16 | 0.27078 |

H0: no autocorrelation at lag order