



INDIRA GANDHI NATIONAL OPEN UNIVERSITY (IGNOU)

**THE CAUSAL RELATIONSHIP BETWEEN EXPORT AND
ECONOMIC GROWTH: THE CASE OF ETHIOPIA**

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THE CAUSAL RELATIONSHIP BETWEEN EXPORT AND ECONOMIC GROWTH: THE CASE OF ETHIOPIA

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Abstract

The thesis examines the causal relationship between export and economic growth paradigm for Ethiopia, using time series data from 1981 to 2011. The paper employs a variety of analytical tools, including unit root tests, cointegration analysis, Granger causality tests, error correction model coupled with vector auto regression (VAR).

The thesis sets four hypotheses for testing the causal relationship between export and economic growth of Ethiopia. (i) whether GDP and exports are cointegrated, (ii) whether exports Granger cause growth, or (iii) whether growth Granger cause export and finally whether there is no causality relationship between the two variables.

The thesis fails to reject the first two hypotheses, while it fails to accept the hypothesis that growth (GDP) Granger causes Export. That is the causality relationship is unidirectional and it goes from export to economic growth.

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Lists of Abbreviation

ADF: Augmented Dickey Fuller

AH: Ahmad and Harnhirum

AIC: Akaike's Information Criterion

ASEAN: Association of South East Asian Nations

Coef: Coefficient

Dgdp: First difference of GDP

Dx: First difference of Export

ECT: Error Correction Term

ECM: Error Correction Model

ELG: Export Led Growth

FDI: Foreign Direct Investment

Fig.: Figure

GDP: Gross Domestic Product

Ho: Null Hypothesis

HQIC: Hannan and Quinn Information Criterion

IS: Import Substitution

JM: Jung and Marshall

LDC: Least Developed Countries

Max: Maximum

Min: Minimum

NIC: Newly Industrialized Countries

Obs.: Observations

OLS: Ordinary Least Square

pp.: Page

Prob.: Probability

SBIC: Schwarz's Bayesian Information Criterion

Std.Dev.: Standard Deviation

Std.Er.: Standard Error

VAR: Vector Auto Regression

Vol.: Volume

X: Export

WDI: World Development Indicators

Chapter One: Introduction

1.1 Background of the Study

Economic development is one of the main objectives of every society in the world and economic growth is fundamental to economic development. There are many contributors to economic growth. Export is considered as one of the very important contributors among them. There are also some concerns about the trade, especially between the primary and industrial goods exporting countries where the terms of trade are deteriorated against the poorer countries.

One area that has been given much focus in order to promote the economic performance of these countries is external trade. Following the traditional trade argument, trade is viewed as an "engine" if not as a "handmaiden" of growth playing a supportive role in the economic growth of the least developed countries (LDCs).

The economic growth of the present day developed nations like the United States, Canada, Australia, New Zealand (referred as regions of recent settlement) that were once developing nations is largely attributed to international trade [Salvatore, 1990]. Hence international trade has been given much importance in the policy formulation of many LDCs, viewing it as a vehicle to transform the economic performance of these countries.

International trade has also played a crucial role in the historical development of the third world. In the second half of the 20th century, the tremendous economic performance of the "four Asian tigers"- South Korea, Taiwan, Hong Kong and Singapore has been largely attributed to the performance of the external sector where the export sector was given a greater emphasis.

Strong political commitment towards export promotion and the application of appropriate policies together with efficient institutional mechanisms helped these countries attain a higher growth rate of exports and hence of the overall economy.

The success of these East Asian countries coupled with failure of the import substitution (IS) strategy, which once was held by many LDCs as the appropriate policy during the 1950s and 1960s, led most LDCs to give due attention to the export promotion trade strategy. It is argued that this strategy would help primary commodity exporting countries achieve optimal scale and enable them tap foreign technology which is deemed to be important for the growth process of these countries.

Many studies have been conducted on LDCs to check whether exports do contribute to economic growth or not. The results of these studies are very important to forward relevant policy recommendations that would enable these countries enjoy the benefits of economic growth and development in the long-run perspectives.

Although most of the empirical work support the export led economic growth hypothesis, there is no overall consensus on this issue. While some economists (Krueger, 1978; Chenery, 1979; Tyler, 1981; Kavoussi, 1984; Balassa, 1985; Ram, 1985, 1987; Chow, 1987; Fosu, 1990; and Salvatore, 1991) seem to generally agree that exports benefit economic growth, others (Jung and Marshal, 1985; Kawan and Cotsomitis, 1990; Ahmad and Kwan, 1991; Dodaro, 1993; Oxley, 1993; Yaghmaian, 1994; and Ahmad and Harnhirum, 1995) did not find much support to the export led economic growth hypothesis.

Most of the empirical studies have been conducted on the basis of inter-country cross-section data sets but there are large differences between economic and demographic structures of different countries. According to Ram (1987), even if the sample of countries chosen seems homogeneous, using cross-sectional

analysis, it is hard to unveil the important parametric differences across countries. The statistical methodologies employed by researchers who used time series data have concentrated upon simple Granger-type tests assuming that data on variables are stationary (for example Chow, JM, and Ram). But it is now well known fact that many macroeconomic time series are not stationary and contain unit roots and give rise to many econometric problems. The possibilities of spurious regression relationships among variables exist unless an appropriate statistical test of long run relationship takes into account important characteristics of time series data. The time series on the variables in the model should be tested for their long run relationship prior to testing for causality between them. JM conducted their study with time series data for 37 countries for the period of 1950-1981. They found evidence for exports promoting economic growth in only four countries. Chow's sample includes 8 NICs and data for the 1960s and 1970s. He found bidirectional causality in Brazil, Hong Kong, Israel, Korea, Singapore, and Taiwan, unidirectional causality in Mexico and no causality in Argentina. Ram used data for 88 countries for the period of 1960-1982. For more than 80 percent of the countries, he found positive correlation between exports and economic growth. Oxley conducted his study only for Portugal, using data from 1865 to 1985 and rejected exports led economic growth hypothesis but on the other hand found causality from income growth to export growth. Ahmad and Harnhirum (AH) for their study of ASEAN countries used data for the period of 1966 to 1990. The data did not generally support the exports growth link. Singapore is the only single country where they found bidirectional causality between exports and economic growth.

Like other developing economies, the Ethiopian economy is essentially agricultural based and highly dependent on earnings of fragmented household agricultural activities. The performance of the economy is guided by the performance of the agricultural sector. Agricultural commodities dominate the country's export baskets. Coffee is the principal export product of the country.

The share of non-coffee exports has been rising remarkably in recent years attributed to the dropping in the coffee export earnings. The share of non-agricultural exports is very narrow. The major manufacturing export commodities are leather and leather products, frozen meat, sugar and textiles. Ethiopia did not succeed in increasing manufactured exports for its low level of technology and low level of institutional development for the last decades.

Ethiopia, like many other developing countries has actively pursued the import-substitution industrialization strategy during the Imperial and Derge regimes. The World Bank (1987) classified Ethiopia as one of the strongly inward oriented countries during the periods of 1963-73 and 1973-85, which coincides with the Imperial and part of the Derge regimes, respectively. However, the IS trade strategy hadn't performed well, where the import competing industries remained infant and were at their rudimentary stage despite the tariff and non-tariff protection. With the fall of the Derge regime, however, the current regime initiated trade liberalization in which export promotion is the major component of the program.

The Ethiopian economy had recorded a promising growth performance during the imperial regime, which was halted after the mid-1970s. In the Derge regime the overall economic performance was gloomy and real aggregate variables decelerated.

Since 1992, Ethiopia has embarked on reform package with the aim of reversing the deteriorating economic conditions and put the economy in a sustainable growth momentum. However, the economy remains weak and sensitive to shocks. Ethiopia has been showing a remarkable growth during the recent years starting from 2004 where annual growth rate was above 10% and where also the country is among the best performer in GDP growth. (Kagnew Wolde, 2007 & Sisay Menji, 2010).

Hence, a closer look into the policies that were once followed by these governments and an empirical investigation to find out the contribution of exports to economic growth is very essential in order to help the country experience a sustainable economic growth.

Lastly unlike some of the above mentioned studies such as Jung and Marshall (1985) this paper does not assume that the time series data are stationary in their levels, but check the stationarity of both the explanatory (exogenous) and endogenous variables in the models to be estimated, as this assumption can lead to spurious results. It is therefore expected that this study will make some modest but important contribution to empirical literature.

The contribution of this research not only examines the causal relationship between export and economic growth of Ethiopia but also tests the cointegration between export and economic growth of the country and tests the long run relationship between the variables. The findings will help policymakers to evaluate various economic policies, including their impact on foreign exchange, tariff and non-trade barriers, the role of income taxes, the reform of the public sector, and other policies and regulations that directly affect the performance of the export and economic growth sectors.

1.2 Statement of the Problem

Ethiopian Economy is agrarian and agricultural commodities dominate the export basket. The share of non-agricultural product in the total merchandise export is almost insignificant. Coffee, pulses & oil seeds, hides & skins, chat and meat & meat products are the main export earnings of the country. Among these merchandise coffee is the lion share contributor of export earning of the country.

The country's heavy reliance on these few export commodities, which are highly subject to price fluctuation, is one reason for the poor performance of the export sector. Failure of the different government policies to diversify and promote export is also one problem that generally reduced the competitiveness and performance of export sector. Until the Derge regime, the country has been recognized as one of the strongly inward-looking countries. Secured by high level of protection and overvalued exchange rate, the policy of inward-looking has weakened the export sector in particular & economic growth.

Starting from Transitional Government, although the focus of the economic reform program has been to make export an engine of economic growth, it does not seem that the government attempt has brought the required results and thus whether export determine economic growth or economic growth determine the performance of export sector (the causal relationship of export & economic growth or the dual relationship of export and economic growth) needs to be empirically investigated.

This study is therefore, proposed to fill the gap; may be an up to date test of the export and economic growth dual linkage in Ethiopia.

Specifically this study has been examined whether:

- I. Economic growth of the country derives the performance of export
- II. Export performance leads economic growth of the country or
- III. The two ways causal link between them

1.3 Objective of the Study

1.3.1 General Objective

The general objective of this study is to examine the causal relationship between export and economic growth in Ethiopia.

1.3.2 Specific Objectives

- To review the different policies undertaken to diversify and promote export at different period.
- To emphasize possible intervention areas for export performance and economic growth.
- To suggest, policies that would help to enhance export sector of the country and its effective contribution to economic growth.

1.4 Significance of the Study

- ❖ The outcomes of this study may provide useful inputs in the formulation of development plans and policies.
- ❖ It provides an empirical magnitude of the contribution of export to economic growth, which could be important to understand the proportion of the overall economic growth that is attributed to the performance of the export sector.
- ❖ In addition it will shade light on domestic policies and related supply constraints that hinder the performance of the export sector.
- ❖ Understanding these would help policy makers and related bodies take appropriate measures to remove the impediments and be able to fully utilize the benefits of the sector.
- ❖ It also helps to determine whether export performance affects economic growth or economic growth affects export performance.

- ❖ Can serve as a reference to subsequent research works in the area of export-led economic growth in the context of Ethiopia.

1.5 Organization of the Study

The study is structured into four chapters. Following this introduction (Chapter I), Chapter II provides a literature review of related theoretical and empirical studies. The third chapter outlines the methodology used to examine the causal relationship between export and economic growth and summary of findings. The fourth chapter contains some conclusions and recommendations.

CHAPTER TWO: Review of Related Literature

2.1 Theoretical Literature

The argument concerning the role of exports as one of the main deterministic factors of economic growth is not new. It goes back to the classical economic theories by Adam Smith and David Ricardo, who argued that international trade plays an important role in economic growth and that there are economic gains from specialization. It was also recognized that exports provide the economy with foreign exchange needed for imports that cannot be produced domestically. The (Export Led Growth) ELG paradigm has received renewed attention following the highly successful East Asian export-led growth strategy during the 1970s and 1980s, and especially if compared to the overall failure of import substitution policies in most of Africa and Latin America.

The argument of the neo-classical economists is that competition in international market promotes economies of scale and increases efficiency by concentrating resources in sectors in which the country has a comparative advantage. These positive externalities promote economic growth.

2.1.1 The Review of the Theory on the Relationship

In accordance with the Marxist point, the relationship between the two was the relationship between exchange and production in the final analysis. Marx said: "the depth, breadth and the way of exchange are decided by the development and structure of production. ... We can see that all the elements of exchange are included in the production directly, or are decided by it." Essentially, production decides the exchange, but the exchange which is a stage of the exchange, is not merely decided by it and could react to produce under certain conditions. Sometimes, the counteractive of promoting or inhibiting is tremendous. On one hand, the expansion of production needs a growing market; on the other hand, the growing market will promote the expansion of

production continuously. So, production and exchange, affect each other every seconds. This provides a very important revelation to many economists.

2.1.1.1 The Theory of Western Schools on the Relationship

❖ The classical school of economics

They believed that foreign trade promoted economic growth in two ways. On the one hand, foreign trade improved the optimal distribution of resources and productivity consequentially and then stimulated the economic growth; on the other hand, one country could gain raw materials and equipments which it could not produce. Those provided the material basis for economic development. The most famous theories were exports of surplus of Adam Smith, comparative advantage of David Ricardo, the interests of the trade development of John Mueller and “trade is the engine of economic growth” of D • H • Robert Morrison. All these theories interpreted the relationship to some extent but ignored that the international environment is complex and ruleless.

❖ The structure school

The representative is Lewis, who put forward dual economy model which parted a developing economy into capitalist part (the industry sector) and non-capitalist part (the traditional agricultural sector). The capitalist sector was bound to promote the growth of the economy through absorbing and accumulating surplus labor from non-capitalist sector. If the capitalist part produced the exporting goods and the traditional part produced the importing goods, foreign trade would undoubtedly expand the market and demand of products in capitalist part and reduce the wages of labor. Then it would further increase the profit and accumulation of the part and promote economic growth.

❖ **The effect school**

The main point of Max Corden was that he analyzed foreign trade together with macro-economic variables and especially emphasized the impact of trade on the supply of production factors and productivity. Corden recognized that a country's foreign trade would affect macroeconomic from 5 aspects: the revenue effect, the effect of capital accumulation, the substitution effect, the income distribution effect and the effect of the weighted elements. All the above effects were cumulated which meant that the impact of trade on economic growth was strengthened gradually as the development of economy.

2.1.1.2 The New-growth School

Romer, Lucas and Svensson, the representatives of this school, took technology as the core factors to promote productivity. This theory pointed out that the growth of developed countries would be attributed to the improvement of productivity. Based on this fact, the theory made a series of models to study the relationship among international trade, technological progress and economic growth. They viewed that international trade could promote economic growth through technology spillover and external stimulation. On one hand, any technology had a spill-over process. The owners of advanced technologies, whether they had intention or no intention, would gradually make other countries learn these technologies through foreign trade; on the other hand, international trade provided a broader market, more frequent exchange of information and increased competition, which forced every country to develop new technologies and products. The mutual promotion relations between international trade and technical change could ensure a long-term economic growth.

2.1.1.3 The new- trade School

The new-trade theory economist, Haierpoman Paul Krugman believed there were two ways for international trade to promote economic growth. One was the effects of economies of scale brought by trade, and the other was that international trade could promote economic growth through improving the optimal allocation of resources between materials production sector and knowledge production sector.

2.1.2The Main Arguments of Modern Empirical Economics

According to the general understanding of macroeconomics, import is often recognized as a leakage of revenue which will lead to unemployment rather than economic growth. Based on this assumption, the research on relationship between economic growth and foreign trade can be taken for the study of the relationship between growth and export that means to prove the assumptions of export-led economic growth.

2.2 Empirical Literature

These theoretical arguments regarding exports-economic growth relationship have been empirically verified by economists and researchers at different times. A number of studies including Jung and Marshall (1985), Chow (1987), Darrat (1987), Hsiao (1987), Bahmani-Oskooee et al (1991), Kugler (1991), Dodaro (1993), Van den Berg and Schmidt (1994),

Greenaway and Sapsford (1994), and Islam (1998) have had adopted time series analysis for exploring the causal liaison between exports growth and output growth. Using the Granger (1969), Sims (1972) and Hsiao (1987) causality procedures, these studies failed to provide an unvarying conclusion about the export-led growth hypothesis. However, these time series studies were not free from disparagement. Although standard Granger or Sims tests are only valid if the original time series are not co integrated, none of these studies checked the co integrating properties of the time-

series variables involved. When two or more time series variables are co integrated, inferences based on traditional time-series modeling techniques will be misleading, as pointed out by Granger (1988), this is because traditional causality tests would miss some of the “forecastability”, hence, reach incorrect conclusions about causality.

Moreover, all the studies reviewed above used growth of Gross Domestic Product (GDP) and that of exports which are akin to first differencing and filter out long-run information. In order to alleviate such occurrences, co integration and error correction models have been recommended to combine the short-term as well as long run information. Bahmani-Oskooee and Alse (1993) took all these issues into account and employed quarterly instead of annual data for the nine countries studied. The study found strong empirical support for two-way causality between exports growth and GDP growth in eight out of nine countries.

Darrat (1986) worked on four Asian countries, (Hong Kong, South Korea, Singapore, and Taiwan) and found no evidence of unidirectional causality from exports to economic growth in all the four economies. In the case of Taiwan, however, the study detected unidirectional causality from economic growth to export growth.

Kim (1993) has examined the major trends of key macroeconomic variables in South Korea and Chile and correlated them to export performance. Kim identified exports as a major source of economic growth and provided the evidence of the validity of the claim that an open and trade-oriented economy is not only the best guarantee for long-term economic growth, but it lightens the initial impacts of external shocks. Kim, further, mentioned that there are factors other than trade which increase economic growth.

Erfani (1999) examined the causal relationship between economic performance and exports over the period of 1965 to 1995 for several developing countries in Asia and Latin America. The results showed the significant positive relationship between exports and economic growth. This study provides the evidence of export-led growth hypothesis.

Vohra (2001) showed the relationship between the exports and economic growth in India, Pakistan, Philippines, Malaysia, and Thailand for the period 1973 to 1993. The empirical results indicated that when a country has achieved some level of economic development then the exports have a positive and significant impact on economic growth. The study also showed the importance of liberal market policies by pursuing export expansion strategies, and by attracting foreign investments.

Subasat (2002) investigated the empirical linkages between exports and economic growth. The study suggested that the more export-oriented countries like middle-income countries grow faster than the relatively less export-oriented countries. The study further showed that export promotion does not have any significant impact on economic growth for low and high income countries.

Amavilah (2003) determined the role of exports in economic growth by analyzing Namibia's data from 1968 to 1992. Results explained the general importance of exports, but the study finds no discernible sign of accelerated growth due to exports.

Lin (2003) stated that 10 per cent increase in exports cause 1 per cent increase in GDP in the 1990s in China on the basis of new proposed estimation method, when both direct and indirect contributions are considered.

Shirazi et al (2004) studied the short-run and long-run relationship among real exports, real imports, and economic growth on the basis of co-integration and multivariate Granger causality test as developed by Toda and Yamamoto (1995) for the period 1960 to 2003. This study showed a long-run relationship among imports, exports, and economic growth and found unidirectional causality from exports to output. But, it did not find any significant causality between imports and exports.

Thurayia (2004) studied the relationship between exports and economic growth experience in Saudi Arabia and Sudan. Results showed that the growth rate in total

exports in Saudi Arabia had an active role in achieving economic growth while it had a weak influence in Sudan. The results of cointegration and error correction models showed a positive effect of exports on GDP in the short- and long- run, which confirms the validity of the hypothesis of export-led growth in Saudi Arabia, and Sudan.

Mah (2005) studied the long-run causality between exports and economic growth for China with the help of the significance of error correction term, (*EC*). This study indicates that export expansion is insufficient to explain the patterns of real economic growth.

Tang (2006) stated that there is no long-run relationship among exports, real Gross Domestic product and imports. This study further shows no short- and long-run causality between export expansion and economic growth in China on the basis of Granger causality test while economic growth does Granger-cause imports in the short-run.

Jordaan (2007) analyzed the causality between exports and GDP of Namibia for the period 1970 to 2005. The export-led growth hypothesis is tested through Granger causality and cointegration models. It tests whether there is unidirectional or bi-directional causality between exports and GDP. The results revealed that exports Granger-cause GDP and GDP per capita, and suggested that the export-led growth strategy through various incentives has a positive influence on growth.

Rangasamy (2008) examined the exports and economic growth relationship for South Africa, and provides the evidence that the unidirectional Granger causality runs from exports to economic growth.

Pazim (2009) tested the validity of export-led growth hypothesis in three countries by using panel data analysis. And, it is concluded that there exists no significant relationship between the size on national income and amount of exports for these countries on the basis of one-way random effect model. The panel unit root test shows that the process for both GDP and exports at first glance is not stationary, while the

panel co-integration test indicates that there is no co-integration relationship between the exports and economic growth for these countries.

Ullah et al (2009) re-investigated the export-led growth hypothesis using time series econometric techniques over the period of 1970 to 2008 for Pakistan. The results reveal that export expansion leads to economic growth. Elbeydi, Hamuda and Gazda (2010) investigated the relationship between exports and economic growth for Libya for the period 1980 to 2007. The findings indicate that there exists a long-run bi-directional causality between exports and income growth, and thus, the export promotion policy contributes to the economic growth of Libya.

The study of the dynamics of the relation between growth of exports and economic growth has been addressed by a number of researches in the context of India. Nandi and Biswas (1991) found the evidence of unidirectional causality from growth of exports to economic growth. This study does not test for stationarity and conduct Sims causality test on the levels of the income and export variables. Given that the levels of the income and export variables are usually non-stationary, the results are unreliable.

Sharma and Dhakal (1994) offer some evidence of the export-led growth hypothesis for India, but the empirical evidence offered by it is unreliable. The study concludes that the income and export series for India are non-stationary using the Phillip-Perron test. It tests for causality, but does not test for cointegration. However, the correct application of Granger tests requires the identification of a possible cointegrating relationship.

Bhat (1995) re-examines the exports-economic growth nexus for India, and finds evidence of bi-directional causality between growth of exports and economic growth. Xu (1996) confirms rejection of the export-led growth hypothesis for India. Ghatak and Price (1997) conclude that growth of exports is caused by output growth in India.

Dhawan and Biswal (1999) examine the same issue for the period 1961 to 1993, and find that growth in GDP causes growth in exports while causality from exports to GDP appears to be a short run phenomenon.

Nidugala (2000) finds that exports had a crucial role in influencing GDP growth in the 1980s. Anwar and Sampath (2000) examine the export-led growth hypothesis for 97 countries (including India, Pakistan and Sri Lanka) for the period 1960 to 1992. They found the evidence of unidirectional causality in the case of Pakistan and Sri Lanka, and no causality in the case of India. However, Kemal et al (2002) finds a positive association between exports and economic growth for India as well as for other economies of SouthAsia.

In case of India, Chandra (2000; 2002) found bi-directional causal relationship between growth of exports and GDP growth which is a short-run causal relation, as cointegration between growth of exports and GDP growth was not found. Sharma and Panagiotidis (2004) test the export-led growth hypothesis in the context of India, and the results strengthen the arguments against the export-led growth hypothesis for the case of India.

Raju and Kurien (2005) analyzed the relationship between exports and economic growth in India over the pre-liberalization period 1960-1992, and found strong support for unidirectional causality from exports to economic growth using Granger causality regressions based on stationary variables, with and without an error-correction term.

Dash (2009) analyzes the causal relationship between growth of exports and economic growth in India for the post-liberalization period 1992-2007, and the results indicate that there exists a long-run relationship between output and exports, and it is unidirectional, running from growth of exports to output growth.

The conclusion of export having a single causal relationship with economic growth:

Kwan and Cotsomitis (1991), Kwan and Kwok (1995) took use of Granger causality test to study Chinese growth and foreign trade. They come to the conclusion that the output was an exogenous variable and there was a one-way causal relationship between the two. Lee added other variables, such as the trend of time, FDI and the lagging investment and so on, and concluded that export promoted economic growth by using AD.HOC model and regression analysis. But he also found the result was affected by

regional differences. Behzad Yaghmaian verified the assumption of export led economic growth using time-series data and regression analysis. He found that employment and output of manufacturing sector could promote export and economic growth. In the model of classical economics, if we took the statistics of population as labor force, export marked the leading role to economic growth, but it could not be reversed.

In these empirical studies, economists used ordinary least squares (OLS) to test these cross-regional or cross-section data, and the results generally support the promotion of export to growth. But its reliability is questionable: the results from OLS only showed the relevance between foreign trade and economic growth but could not explain the existence of a causal relationship between the two.

The conclusion of economic growth having a single causal relationship with export:

In this problem, Ghartey (1993) made an interesting conclusion. He analyzed respectively the economic data of United States, Japan and Taiwan through cross-section data, and found that the American GDP promoted its export, but Taiwan is quite the opposite and there was a two-way causal relationship between the two in Japan. Sharma & Dhakal (1994) also reached the same conclusion.

The conclusion of there was a two-way causal relationship between the two

Jordan Shan and Fiona Sun (1998) took data from 1987 to 1996 as the samples and tested the two-way causal relationship between the two. They used 6 variables, which were output, export, import, investment, labor and energy consumption, to establish VAR (VAR) model. They make ADF single test and Granger causality test, and then found the result.

The conclusion of there was no causal relationship between the two

Jung and Marshall (1985) analyzed the relationship between GDP and export of 37 developing countries in 1950-1981, and found that there was no causal relationship except Israel.

Though these empirical studies have different conclusion, they are not repellent mutually, because different researchers used different methods. Moreover, so many researchers have a great inspiration to scholars at home.

ChengxiangShen (1999) used Granger causality test and co-integration test to test the hypothesis of "Chinese export-oriented economic growth" by the data of export and GDP in china from 1977 to 1998. He found that there was a two-way causal relationship between the two, but no long-term and stable relations. The studies took only the output and export into account, but import weighed with the export - output association (Grossman, G • M & E • Helpman,1991), so the impact of import on economic growth should not be ignored. China is a developing country and its endowments elements vary considerably with developed countries. The developed countries mainly have advantage in capital and technology, but china mainly in natural resources and labor. This determines the major export products of china are agricultural products and low value-added products, and its import products are high-tech products. It can be said that the import is an important mean to break the bottleneck of economic development and promote economic growth. Meanwhile, the imported products will encourage domestic enterprises to improve product quality and production efficiency, and promote the upgrading of traditional industrial structure. As a result, the research on the relationship of import and economic growth is necessary.

Jiadong Tong (1995) explored the relationship between economic growth and import, and he recognized that import at different times contributed to economy differently, but on the whole, there was a positive correlation between import and economic growth. Jingwen Li (1996) made an empirical analysis on economic growth model and pointed out that export boosted economic growth. FuWeiPeng (1999) found that net exports had less relevance with economic growth. JiaQin Chen (1999) viewed that export had a great role in promoting economic growth. QuanFa Yang (1999) made Chinese data into Balassa model and found that export had a positive correlation with economy. XiaoPeng Liu (2001) started from the relevance of foreign trade and GDP growth rate and

revealed that import had a strong role in the promotion of national economy by analyzing the data of china from 1980 to 1998. He also explained why Chinese export had weak correlation with economy from the angle of export structure. BoNai Fan, XiaoChi Mao, Shuang Wang (2005) studied the relationship through Granger causality model and broad difference approach, using Chinese statistics from 1952 to 2003. The result showed that Chinese GDP and export had a clear one-way causal relationship. That is to say, the export was an important factor to promote Chinese economic growth.

DebeleGemechu (2002) investigated the effect of exports on economic growth of Ethiopia for the period 1960/61-2002, and exports are found to significantly affect the growth of the Ethiopian economy.

It is, therefore, clear from the above literature review that the evidence regarding exports-economic growth liaison is rather ambiguous and mixed. A number of studies support the export-led economic growth while others do not. Furthermore, studies on this issue in the context of Ethiopia are only a few, and again provide mixed evidences. Also, the literature lacks studies including the period of recent global Economy. Therefore, this study is an attempt to investigate the exports-economic growth causal relationship for Ethiopia considering the period of recent global economic problem.

Chapter Three: Methodology and Data Analysis

The sample used in this study consists of the values of exports and GDP of Ethiopia measured in real terms for the year 1981 to 2011. The GDP export regression models estimated are specified as follows in both descriptive and statistical analysis.

3.1 Descriptive Analysis

The mean of Growth Domestic Product (GDP) of Ethiopia from the year 1981 to 2011 is about 9,517.1 million dollar, the maximum value of the GDP over the observation period is (i.e. 1981 to 2011) is 21,616.8 million dollar this is registered for the year 2011 and the minimum value is 5,345.3 million dollar this minimum value is registered in the year 1985. When we come to the descriptive analysis of export, its mean is about 990.3 million dollar. The maximum value export of the country is 21,87.5 million dollar, this maximum value for export is registered in the year 2011. whereas its minimum value is 437.7 million dollar and it is registered in the year 1982 (Source WDI data).

Summaries of GDP and Export (X).

Table 3.1 descriptive summaries of GDP and Export (X)

Variable	Obs	Mean	Std. Dev.	Min	Max
gdp	31	9.52e+09	4.53e+09	5.35e+09	2.16e+10
x	31	9.90e+08	6.45e+08	3.67e+08	2.19e+09

Source: WDI

The correlation between export and GDP is calculated to be 0.94. That means GDP and export of the country is highly correlated for the period undertaken.

Trends of GDP and Export (X) over the year 1981 to 2011

Trends of GDP:

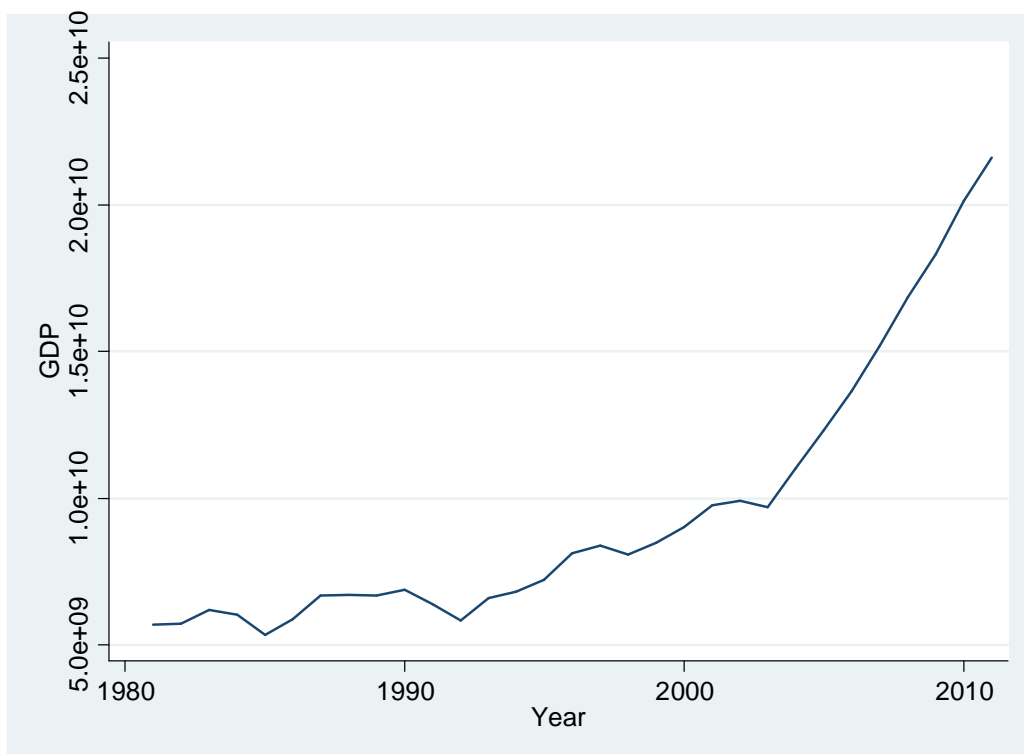


Fig 3.1 the trends of GDP of Ethiopia over the year 1981 to 2011

Source: WDI

The above graph show that the GDP of the country is increasing over the given period of time. Starting from 1981 to 1991 the increasing trend of the GDP is not smooth. However, after 1991 the GDP of the country increase at an increasing rate.

Trends of Export from 1981 to 2011:

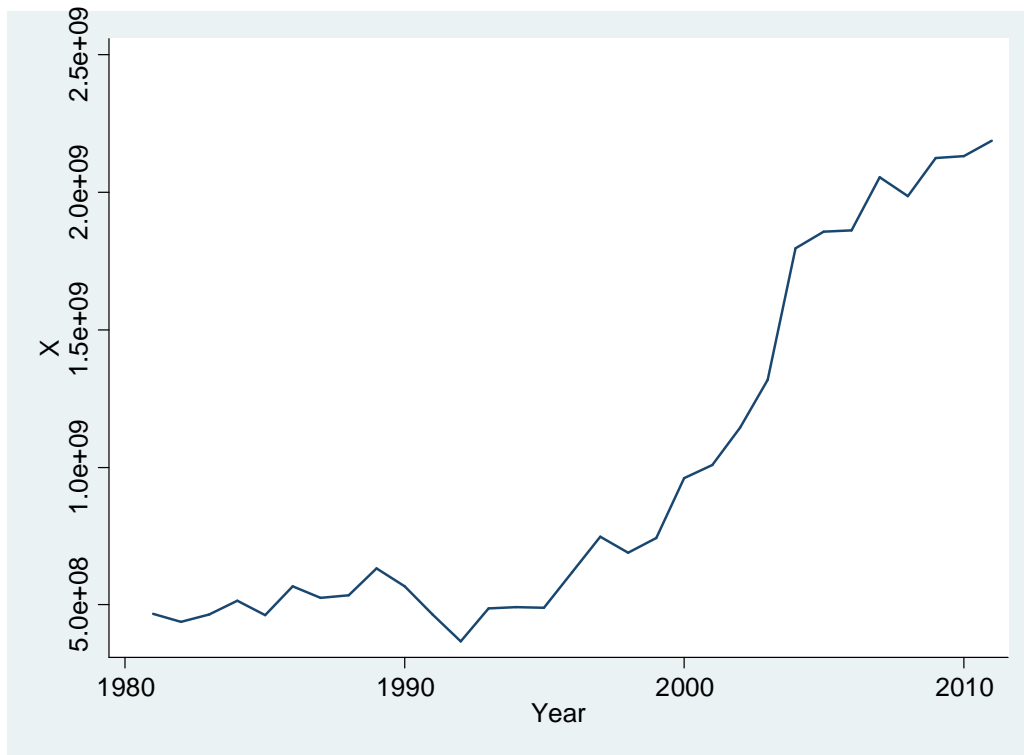


Fig. 3. 2 Trends of Export of Ethiopia from 1981to 2011.

Source: WDI

As shown in the Fig. 3.2 above the trends of Export of the country has mixed trend over the given period of time. From 1981 to 1990 it increases at small rate. But between the years 1990 to 1995 the trends of values of export of Ethiopia decrease. This may be due to the economic policy of the country that discouraged export sector. However, since the year 1996 the trend of Ethiopian export increases at an increasing rate. The value of export of the country is at the lowest level during the year 1982.

The relationship between Export and GDP of Ethiopia:

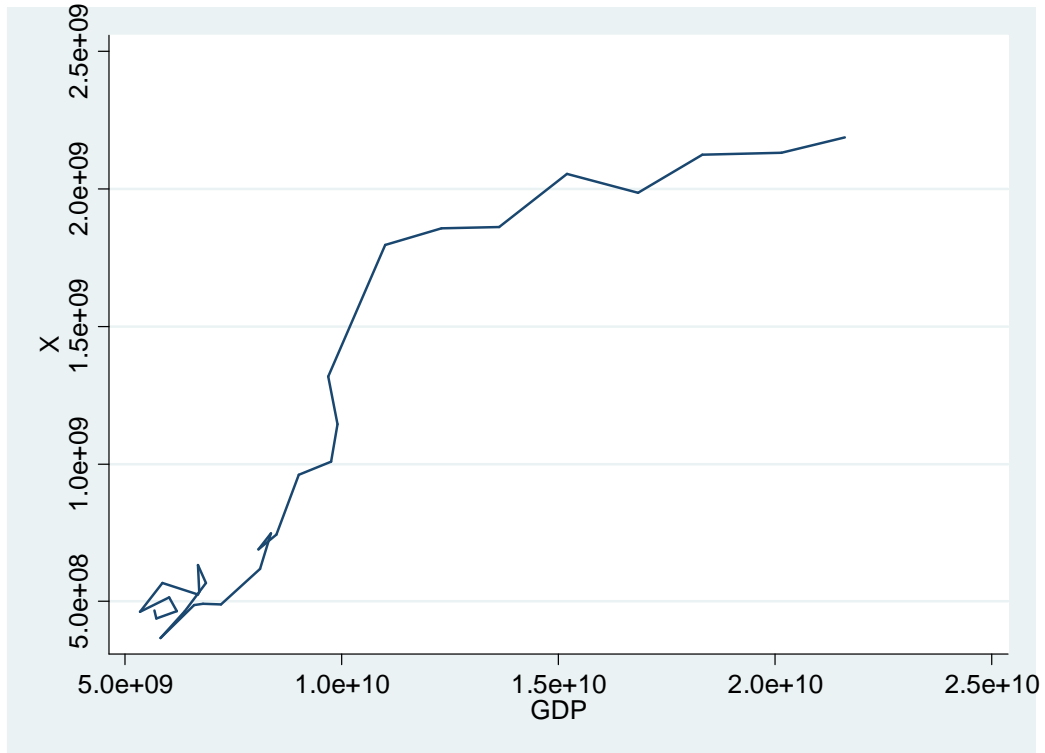


Fig. 3.3 the relationship between Export and GDP of Ethiopia over the year 1981 to 2011

Source: WDI

Fig. 3.3 above shows that at the beginning the relationship between export and economic growth of the country is ambiguous. However, since the period of 1993 both exports and GDP of the country showed increasing trend i.e. the export and GDP of the country has positive relationship.

3.2 Statistical Analysis

The concept of causality due to Granger (1969) is appropriate and used by most of the studies for testing the relationship between economic growth and export. According to the Granger causality test approach a variable Y is caused by X, if Y can be predicted better from past values of Y and X than from past values of Y alone.

In order to test for the casual relationship between export and economic growth of Ethiopia, the paper establishes three hypotheses (i) whether GDP and exports are cointegrated i.e. whether there is long run relationship between the variables, (ii) whether there is bidirectional causal relationship between growth& export, (iii) whether there is unidirectionalcausal relationship between Growth (GDP) &export. (V) Finally, whether there is no causal relationship between Growth (GDP) & export.The data for the above variables were obtained from the WDI (World Development Indicators). All data are in real terms.

By using the following model the causality between the two variables can be tested.

$$GDP_t = \alpha + \beta_0 GDP_{t-j} + \beta_1 X_t + \beta_2 X_{t-i} + U_t, \dots \dots \dots (1)$$

$$X_t = \delta + b_0 GDP_t + b_1 GDP_{t-j} + b_2 X_{t-i} + V_t, \dots \dots \dots (2)$$

Were GDP_t is growth domestic product at time t, X_t , X_{t-i} export at time t, U_t and V_t are mutually uncorrelated error term. GDP_{t-j} and X_{t-i} are the lag values of GDP and Export X. $\beta_0 \dots \beta_2$ and $b_0 \dots b_2$ are the coefficient of the respective variables.

Some previous studies such as Jung and Marshall (1985) were conducted a study with the assumption that the time series data are stationary in their levels, but this assumption is incorrect as some series may be non-stationary. And some studies have demonstrated that non-stationary time series may lead researchers to mistakenly

accept spurious relationships, and thus their results would be meaningless. To avoid the shortcoming of the previous studies we first check for the *stationary* of both the explanatory and endogenous variables in the models to be estimated. We do this in order to establish whether the series had a stationary trend, and, if non-stationary, to establish orders of integration.

3.2.1 Stationary Test

Unit root test or stationary test is conducted using Augmented Dickey-Fuller (ADF) test. Hence, the result of the unit root test with (ADF) is shown in the table 1.

The null hypothesis is that the series has a unit root.

Dickey-Fuller test for unit root for GDP:

Dickey-Fuller test for unit root Number of obs = 30

Table 3.2 Dickey-Fuller test for unit root for GDP

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	5.785	-3.716	-2.624

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

Source: WDI

We can use “P” value to see whether the series has unit root or not. At 95% confidence interval or at 0.05 critical level we see that P value for Z(t) is 1.00, which is greater than 0.05. I.e. 1.00 greater than 0.05. This implies we fail to reject the null hypothesis (the series is non-stationary).

Dickey-Fuller test for unit root for X (Export):

Dickey-Fuller test for unit root Number of obs = 30

Table 3.3 Dickey-Fuller test for unit root for Export (X)

----- Interpolated Dickey-Fuller -----				
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	1.014	-3.716	-2.986	-2.624

Mackinnon approximate p-value for Z (t) = 0.9944

Source: WDI

Accordingly when we see for export (X) the P value which is 0.9944 is greater than 0.05; this implies we fail to reject the null hypothesis (i.e. the series has unit root or is not stationary).

By generating difference for both variables X and GDP, and testing for unit root we obtained the following results as shown below in table 3.4&3.5.

Dickey-Fuller test for Dx:

Dickey-Fuller test for unit root Number of obs = 29

Table 3.4 Dickey-Fuller test for unit root for first difference of Export (X)

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-4.777	-3.723	-2.625

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

Source: WDI

Since stationary test on the original variables has a unit roots, we take the first difference of the operator and test for the stationary or non stationary.

Table 3.5 Dickey-Fuller test for unit root for first difference of GDP

dfullerDgdp, drift lags(0)

Dickey-Fuller test for unit root Number of obs = 29

----- Z(t) has t-distribution -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-2.279	-2.473	-1.314

P-value for Z(t) = 0.0154

Source: WDI

From the table 3.5 we see that the P value for both Dx and Dgdp is less than 0.05; this implies that we reject the null hypothesis that the data has unit root or it is non-stationary and the data is stationary at 5% critical level.

3.2.2 Heteroscedasticity test

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Ho: Constant variance

Variables: fitted values of gdp

Chi²(1) = 27.38

Prob>chi² = 0.0000

From this table 3.7 we see that t statics is 10.18 and P value is 0.000. From statistical table we know that t critical at 95% confidence interval is 1.96. This shows that t calculated (11.94) is greater than t critical.

Decision: $t > 1.96$ significant. Since $10.18 > 1.96$, X export influences GDP, positively.

3.2.5 Cointegration test:

Many macroeconomic time series are not stationary at levels and are most adequately represented by first differences. Even though the individual time series are not stationary, a linear combination of these variables could be stationary (i.e. they may be cointegrated). If these variables are cointegrated, then they have a stable relationship and cannot move "too far" away from each other. In contrast lack of cointegration suggests that such variables have no long run link, in principle they can wonder arbitrarily far away from each other [Rao(1994)].

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

Table 3.8 Cointegration test table

----- Interpolated Dickey-Fuller -----				
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	Value
Z(t)	-3.565	-3.750	-3.000	-2.630

Mackinnon approximate p-value for Z(t) = 0.0065

Source: WDI

3.2.7 Lag Determination for Vector Autoregressive Model (VAR)

Too many lags could increase the error in the forecasts; too few could leave out relevant information. Experience, knowledge and theory are usually the best way to determine the number of lags needed. There are, however, information criterion procedures to help come up with a proper number. Three commonly used are: Schwarz's Bayesian information criterion (SBIC), the Akaike's information criterion (AIC), and the Hannan and Quinn information criterion (HQIC). All these are reported by the command 'varsoc' in Stata.

Selection-order criteria

Sample: 1986 - 2011 Number of obs = 26

Table 3.11 Lag determination for VAR model

```

+-----+
|lag| LL   LR   df  p   FPE   AIC   HQIC  SBIC |
+-----+
| 0 | -1085.41           7.3e+33  83.6468  83.6746  83.7435 |
| 1 | -1076.47  17.879   4  0.001  5.0e+33*  83.2668*  83.3504*  83.5571* |
| 2 | -1076.14  .65555   4  0.957  6.7e+33  83.5493  83.6886  84.0332 |
| 3 | -1071.33  9.6282*   4  0.047  6.4e+33  83.4867  83.6817  84.1641 |
| 4 | -1069.23  4.2022   4  0.379  7.6e+33  83.6327  83.8835  84.5037 |
+-----+

```

Source: WDI

Endogenous: DgdpDx

Exogenous: _conse

Since all the three criteria agree the selection is clear, in our case, all the three criteria suggests lag of 1.

3.2.8 Vector Auto regression Model (VAR)

varDgdpDx, lags(1/1) exog(ecm)

Vector autoregression

Table 3.12 Vector Auto regression model (VAR)

Sample: 1983 - 2011	No. of obs	=	29
Log likelihood = -1199.314	AIC	=	83.26305
FPE = 4.98e+33	HQIC	=	83.38118
Det(Sigma_ml) = 2.86e+33	SBIC	=	83.64023

Equation	Parms	RMSE	R-sq	chi2	P>chi2
----------	-------	------	------	------	--------

Source: WDI

Dgdp	4	5.6e+08	0.4488	23.6151	0.0000
Dx	4	1.2e+08	0.0217	.6441858	0.8862

3.2.8.1 ECM based VAR model

Table 3.13 ECM based VAR model

Coef.	Std. Err.	z	P> z	[95% Conf. Interval]		
Dgdp						
Dgdp (L1.)	.6754062	.1552647	4.35	0.000	.3710929	.9797195
Dx (L1.)	-.4065574	1.067605	-0.38	0.703	-2.499025	1.68591
ecm	-.1245381	.0900093	-1.38	0.166	-.3009531	.0518769
_cons	2.18e+08	1.22e+08	1.78	0.074	-2.15e+07	4.58e+08
Dx						
Dgdp (L1.)	-.0115149	.034402	-0.33	0.738	-.0789416	.0559118
Dx (L1.)	.0672109	.2365493	0.28	0.776	-.3964173	.530839
ecm	-.0085568	.0199434	-0.43	0.668	-.0476451	.0305315
_cons	6.11e+07	2.71e+07	2.26	0.024	8043297	1.14e+08

Source: WDI

The estimated coefficients of the error correction terms and the lagged values of the two series (short-run effects) are given in table 3.13. The upper half of this regression result reveals the case where GDP is the dependent variable and the lower half is the case in which export is the dependent variable. Based on the lag selection result, one year

lagged values of the two endogenous variables (GDP and export) are included. Accordingly, GDP is significantly and positively influenced by its lagged value in the short run. The error correction terms are negative values between zero and one as expected. However, they are statistically insignificant at the conventional 5% significance level.

3.2.9 Granger Causality Test

The purpose of this section of the analysis is to test whether export Granger cause GDP or GDP Granger cause export and to test also the Granger causality between exports and Economic Growth in Ethiopia for the period 1981 - 2011.

The first null hypothesis is that exports (X) do not Granger cause GDP (Y). The second null hypothesis is that GDP (Y) does not Granger cause exports (X).

Pair wise Granger Causality Tests:

Date: 12/29/13 Time: 09:30

Sample: 1981 2011

Lags: 1

Table 3.14 Granger Causality tests

Null Hypothesis:	Obs.	F-Statistics	Prob.
X does not Granger Cause GDP	30	5.43442	0.0275
GDP does not Granger Cause X		0.20451	0.6547

Source: WDI

The above Table indicate that we cannot reject the null hypothesis that GDP Granger causes Export , however, we can reject the null hypothesis that exports does not Granger cause GDP (both at the 5% level of significance). It is important to note, that we used a one-year lag for all the variables used.

From the analysis as we see “P” value for the first null hypothesis(X does not Granger Cause GDP) is less than 0.05 at 5% level of significance. This indicates that we can reject the null hypothesis X does not Granger cause GDP. This implies there is causality relationship from Export (X) to GDP. However, the “P” value for the second null hypothesis (GDP does not Granger Cause X) is greater than 0.05 at 5% level of significance. This indicates that we cannot reject the null hypothesis GDP does not Granger cause Export X. This implies there is no causality relationship from the direction of GDP to Export.

It is possible to conclude that, from this analysis we see that there is unidirectional relationship between export (X) and economic growth (GDP) of Ethiopia based on the real data from the year 1981 to 2011. The direction goes from export (X) to economic growth (GDP).

Chapter 4: Summary of Findings, Conclusion and Recommendations

4.1 Summary of Findings

Economic development is one of the main objectives of every society in the modern world and economic growth is fundamental to economic development. There are many contributors to economic growth. Export is considered as one of the very important contributors among them. There are also some concerns about the trade, especially between the primary and industrial goods exporting countries where the terms of trade are deteriorated against the poorer countries.

One area that has been given much focus in order to promote the economic performance of these countries is external trade. Following the traditional trade argument, trade is viewed as an "engine" if not as a "handmaiden" of growth playing a supportive role in the economic growth of the least developed countries (LDCs).

Some previous studies such as Jung and Marshall (1985) were conducted with the assumption that the time series data are stationary in their levels, but this assumption is incorrect as some series may be non-stationary. And some studies have demonstrated that non-stationary time series may lead researchers to mistakenly accept spurious relationships, and thus their results would be meaningless. To avoid the shortcoming of the previous studies we first check the *stationary* of both the explanatory and endogenous variables in the models to be estimated. We do this in order to establish whether the series had a stationary trend, and, if non-stationary, to establish orders of integration.

The purpose of this study was to test the causal relationship between export and economic growth of Ethiopia taking total export of the country and real GDP of the country for the year 1981 to 2011.

In order to test for the casual relationship between export and economic growth of Ethiopia, the study established four hypotheses (i) whether GDP and exports are cointegrated i.e. whether there is long run relationship between the variables, (ii) whether there is bidirectional causal relationship between growth & export, (iii) whether there is unidirectional causal relationship between Growth (GDP) & export. (V) Finally, whether there is no causal relationship between Growth (GDP) & export. The data for the above variables were obtained from the WDI (World Development Indicators). All data are in real terms

4.2 Conclusion

There are different opinions among economists about the relationship between exports and economic growth. In an attempt to resolve the difference, we examined causality test between exports and economic growth of Ethiopia, using data from the World Development Indicators for the period of 1981-2011. While determining the stationarity of the two variables and their orders of integration, we found that GDP and exports are cointegrated i.e. both GDP and export of the country has long run relationship for the period under consideration. From the analysis we see that there is unidirectional relationship between export (X) and economic growth (GDP) of Ethiopia based on the real data from the year 1981 to 2011. The direction goes from export (X) to economic growth (GDP).

4.3 Recommendation

The immediate policy recommendation that emerges from this study is that the government in power should attempt to diversify and promote exports in order to fully exploit the benefits of the sector and promote economic growth.

The government, all other concerned organization and coffee farmers should work to improve the production and quality of coffee, which is the main export of the country that directly contributes to economic growth.

Rather than exporting primary products, the government should process the primary products and export them as finished and semi-processed goods. In this case even though currently the government is working in improving its export package products, through processing the primary product to finished and semi-finished products in some sectors like leather and leather products, textiles and garment products, the process of improving the quality and quantity of exports of other product should be strengthen.

The government should also relax the FDI polices to attract foreign investor. The foreign investors through FDI bring new technologies to the country and help in improving the qualities and quantities of output of the country and improve productivities of labor and other imputes of the country which directly contributes to the economic growth and export of the country.

The policy implication of the positive association between exports and economic growth reveal that economic reform policies and the shift towards a free market have helped the economy to reallocate its resources to productive uses. Yet, there remain a variety of issues that need to be addressed, including further trade liberalization, further tariff revisions, non- tariff barriers, exchange rate policies, the building up of an efficient development of infrastructure.

Despite the Government's efforts in reforming tariff and custom duties services, there is a need for further tariff reduction. Abolishing all non-trade barriers on import and export is another important issue facing the government. It is important to mention, that Ethiopia has taken serious steps to phase out most of tariff and non- tariff barriers on exports. It required from the government and other concerned bodies in solving most of the problems that have been facing exporters at the ports and red tape. Furthermore, exchange rate stability is another important economic policy, as it does not only affect imports and exports but also FDI, and the stock market.

Finally, it needs to be stressed that the provision of an adequate infrastructure is another important concern for the business communities. Given that the Government has started to give more attention for establishing an adequate infrastructure, it is anticipated that this will have positive impacts on exporters and FDI, and thus finally also on economic growth and socio-economic development.

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Annexes

tsset year

Time variable: year, 1981 to 2011

Delta: 1 unit

a) stationarity test

dfullergdp, lags(0)

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value

Z(t) 5.785 -3.716 -2.986 -2.624

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

dfuller x, lags(0)

Dickey-Fuller test for unit root Number of obs = 30

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value

Z(t) 1.014 -3.716 -2.986 -2.624

MacKinnon approximate p-value for Z(t) = 0.9944

genDgdp=d.gdp

(1 missing value generated)

. genDx=d.x

(1 missing value generated)

dfullerDx, lags(0)

Dickey-Fuller test for unit root Number of obs = 29

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-4.777	-3.723	-2.625

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

dfullerDgdp, drift lags(0)

Dickey-Fuller test for unit root Number of obs = 29

----- Z(t) has t-distribution -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-2.279	-1.703	-1.314

p-value for Z(t) = 0.0154

reggdp x

Source	SS	df	MS	Number of obs =	31
-----+-----				F(1, 29) =	235.80
Model	5.4853e+20	1	5.4853e+20	Prob> F =	0.0000
Residual	6.7463e+19	29	2.3263e+18	R-squared =	0.8905
-----+-----				Adj R-squared =	0.8867

Total | 6.1599e+20 30 2.0533e+19 Root MSE = 1.5e+09

```
-----  
gdp |   Coef. Std. Err.   t   P>|t|   [95% Conf. Interval]  
-----+-----  
x | 6.629225 .4317127  15.36 0.000   5.746273  7.512176  
  _cons | 2.95e+09 5.08e+08  5.81 0.000   1.91e+09  3.99e+09
```

b) Heteroscedascity test

estathetest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of gdp

Chi² (1) = 27.38

Prob>chi² = 0.0000

Since we have heteroscedasticity problem, we use robust.

. reg x gdp , robust

Linear regression Number of obs = 31

F (1, 29) = 142.57

Prob>F = 0.0000

R-squared = 0.8905

Root MSE = 2.2e+08

```
-----  
                  |           Robust  
x |   Coef. Std. Err.   t   P>|t|   [95% Conf. Interval]  
-----+-----  
gdp | .1343267 .0112499  11.94 0.000   .111318  .1573354  
  _cons | -2.88e+08 8.84e+07  -3.26 0.003   -4.69e+08  -1.07e+08
```

```
ecm | -.0051666 .0173902 -0.30 0.769 -.0408484 .0305152
     |
     | _cons | 2.68e+07 2.03e+07 1.32 0.197 -1.48e+07 6.84e+07
```

d) Lag determination for Vector autoregressive model(VAR)

varsocDgdpDx

Selection-order criteria

Sample: 1986 - 2011 Number of obs = 26

```
+-----+
|lag| LL   LR   df   p   FPE   AIC   HQIC  SBIC  |
|---+-----|
| 0| -1085.41                7.3e+33  83.6468  83.6746  83.7435 |
| 1| -1076.47 17.879   4 0.001 5.0e+33* 83.2668* 83.3504* 83.5571* |
| 2| -1076.14 .65555   4 0.957 6.7e+33 83.5493 83.6886 84.0332 |
| 3| -1071.33 9.6282*  4 0.047 6.4e+33 83.4867 83.6817 84.1641 |
| 4| -1069.23 4.2022   4 0.379 7.6e+33 83.6327 83.8835 84.5037 |
+-----+
```

Endogenous: DgdpDx

Exogenous: _cons

e) VAR model

. varDgdpDx, lags(1/1)

Vector autoregression

```
Sample: 1983 - 2011                      No. of obs    =    29
Log likelihood = -1200.268                AIC            = 83.1909
FPE            = 4.62e+33                 HQIC          = 83.27949
Det(Sigma_ml) = 3.05e+33                 SBIC          = 83.47379
Equation      Parns    RMSE    R-sq    chi2    P>chi2
```

Dgdp 3 5.7e+08 0.4124 20.35689 0.0000

Dx 3 1.2e+08 0.0155 .4571969 0.7956

| Coef. Std. Err. z P>|z| [95% Conf. Interval]

-----+-----
Dgdp |
Dgdp |
L1. | .6276203 .1562913 4.02 0.000 .3212949 .9339457
Dx |
L1. | .4299116 .9085202 0.47 0.636 -1.350755 2.210
_cons | 2.10e+08 1.26e+08 1.67 0.095 -3.69e+07 4.57e+08

-----+-----
Dx |
Dgdp |
L1. | -.0147982 .0336464 -0.44 0.660 -.0807439 .0511476
Dx |
L1. | .124683 .1955863 0.64 0.524 -.258659 .5080251
_cons | 6.06e+07 2.71e+07 2.23 0.026 7392022 1.14e+08

f) Granger Causality Test

Pairwise Granger Causality Tests

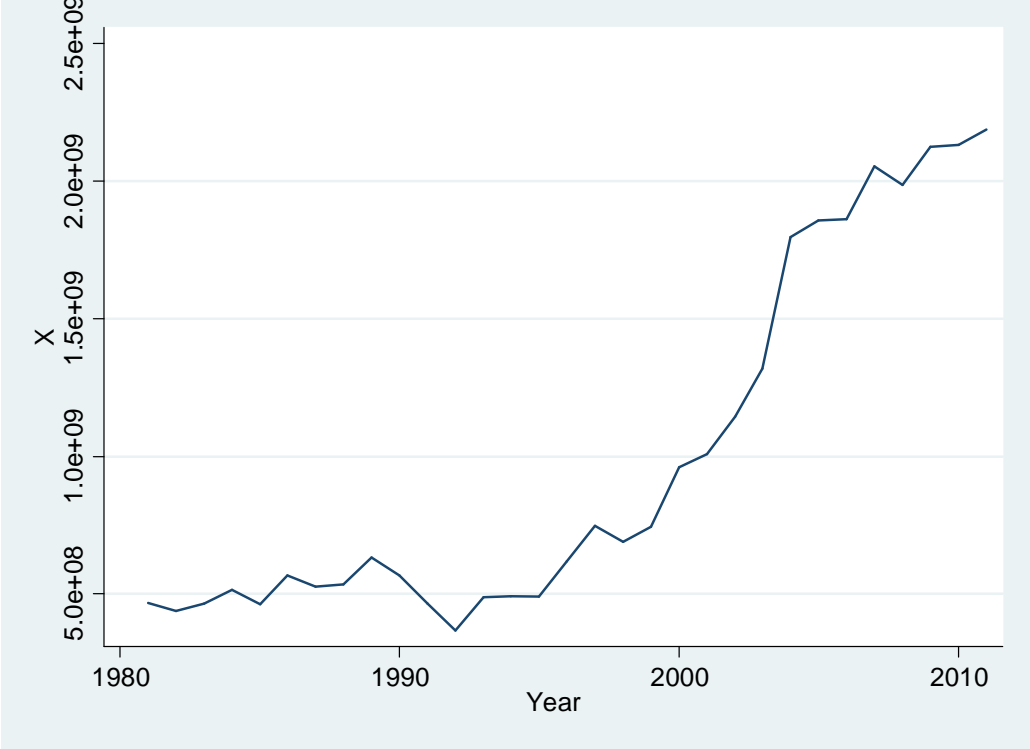
Date: 12/29/13 Time: 09:25

Sample: 1981 2011

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
X does not Granger Cause GDP	30	5.43442	0.0275
GDP does not Granger Cause X		0.20451	0.6547

Trend of export



Trend of GDP

