Developing Country Studies
ISSN 2224-607X (Paper) ISSN 2225-0565 (Online)
Vol.12, No.5, 2022


# The Link between Economic Growth, Exports and Imports in Ethiopia: A Vector Auto Regressive Analysis

Tigist Zelalem Asmare*
Economics Lecturer, PhD candidate Economics
Department of Economics, Bahir Dar University, Bahir Dar,

Professor Jayamohan M.K. PhD Economics
Professor at Bahir Dar University and Jima University; Ethiopia

**Abstract**
The relationship between exports, imports and economic growth of Ethiopia has been investigated in this paper for the period 1981-2018 by using annual data from World Bank. For the analysis, Vector Auto Regressive Model, Johansen co-integration analysis and the Granger-Causality tests were implemented. The outcome of the analysis reveals that there is no co-integration relation between exports, imports and economic growth in Ethiopia. Conversely, we found that there is a strong evidence of bidirectional causality between exports and economic growth and a unidirectional causality from export to import. There is also a causality running from import to exports at a 10% significance level that witnessed weak bidirectional causality between imports and exports. This shed light on the importance of giving more emphasis on export-led growth by Ethiopian policy decision makers.
**Keywords:**Economic Growth, Exports, Imports, Co-integration, Vector Auto Regressive, Granger Causality, Ethiopia
**DOI:** 10.7176/DCS/12-5-02
**Publication date:**May 31st 2022

## 1. Introduction

The fact that makes international trade essential for every country is the difference in endowment of nations with economic, natural and social resource desired for economic development. International cooperation and globalization have created a room for international trade to help countries to satisfy their needs with a limited ability and capability to produce all goods and services. It can also serve as main source of foreign exchange earnings for countries with extra production. International trade in this era became the main factor to raise living standards, providing employment and make possible consumers to enjoy a greater variety of goods and services all over the world ( Helpman and Krugman, 1985).

The dynamic relationship among imports, exports and economic growth in previous studies gives mixed results that can be categorized into three main sorts: unidirectional causality, bi-directional causality and no causality. Romer (1990), Grossman and Helpman (1991), Rivera-Batiz and Romer (1991), hypothesized that as economies become open to international trade it creates a room for an increased number of specialized inputs that might increase economic growth rate.

Import has been considered as an important cannel for the foreign technology and knowledge flow to the domestic economy by recent endogenous growth models. Fullerton, et.al (2012);Abugamea, (2015) and Bakari et.al (2017) attested the critical role of import for economic growth. New technologies that might be embodied in imports of intermediate goods could increase labor productivity over time when workers acquire the knowledge of the new embodied technology (Helpman and Krugman, 1985).

Most of the studies undertaken on international trade can be categorized as studies that consider the association between economic growth and exports, between economic growth and imports or the relationship between the three. In the case of Ethiopia - as to the knowledge of the authors, the only study that tried to articulate the impact of international trade on economic growth is Abdulhamid and Ramakrishna (2002). Their finding underscored that trade variables show an important role in enhancing economic growth in Ethiopia. While other researchers focus on the specific export sectors like agricultural exports, coffee exports etc**.** The import component of international trade has not received much attention in Ethiopian literature. Soresa (2013) analyzed the causal relationship between exports, domestic demand and economic growth in Ethiopia using time series data over the period 1960 to 2011.Domestic demand is measured as household consumption and government consumption. He found a long run association among the variables studied and a dynamic relationship between exports and economic growth and domestic demand and economic growth of Ethiopia.

Unlike other researches on Ethiopian economy, this paper tried to study the impact of imports on economic growth and also its possible effect on the export of the country. It also investigated the existence of a long-run relationship amongst the three variables using co-integration analysis.

Ethiopia- the second heavily populated country in Africa is one among the fastest growing states amid 188

 

member countries of IMF. GDP of the country was growing on a rate greater than 8% per year for more than a decade ahead of 2016. However in recent years Ethiopian economy is full of economic and political unrests. Investigating the Ethiopian economy is important due to this distinctive situation. Therefore the objective of this study is to assess the relationship between exports, imports and economic growth in Ethiopia.

## 2. Literature review

Different researches were done to detect the link between these three variables in different way. The first stripe of empirical analysis separately inspect the impact of exports or imports on economic growth, while the second stripe of empirical analysis examines the collective effect that exports and imports had on economic growth. The review of literature in this study is more profoundly focused on studies that analyze joint effect of exports and imports on growth of an economy.

Theoretically, advocates of the export-led growth hypothesis (Balassa, 1978; Bhagwati, 1978; Edwards, 1998) argue that there is concrete evidence that exports causes economic growth. Several studies have also shown the reverse flow of causation from economic growth to exports growth which is referred as growth-led exports. Krugman, (1984) and Bhagwati, (1988) stated that in the growth-led exports model, the increase in export could be enthused by productivity improvements from an increases in domestic levels of skilled-labor and technology.

On the other hand Import-led growth hypothesis suggests that high growth could be mainly driven by imports growth. According to endogenous growth models domestic firms could use imports as main source of necessary intermediate inputs, technology and R&D knowledge from the rest of the world that can enhance long-run economic growth (Coe and Helpman, 1995; Lawrence and Weinstein, 1999; Mazumdar, 2000).

By implementing Granger-causality, Ramos, (2002) examined the link between imports, exports and economic growth of Portugal during the period 1865 to 1998. The empirical outcome doesn't prove causality between the three variables studied. Even though import does not have a significant causality on export; there is a response effect that runs from between exports to output growth and from imports to economic growth.

Bouoiyour, J. (2003);Awokuse (2007);Kim et al. (2007);ArshiaAmiri et.al (2011);Fullerton, et.al (2012)and Mehdi Taghavi, et.al (2012) applied Granger-causality tests and VEC model to analyze the effect of exports and imports on economic growth. Bouoiyour, J. (2003) attested that Granger causalit runs from imports to GDP, from exports to GDP and from imports to Exports in Morocco over the period1960-2000. Awokuse (2007) found mixed result in Bulgaria, Poland and Czech Republic. There is a bi-directional causality running between exports and economic growth in Bulgaria. But in Czech Republic and Poland there is only a unidirectional causality between imports and economic growth. Kim et al, (2007) found that only imports affect productivity growth significantly in Republic of Korea during the period 1980 to 2003.ArshiaAmiri et.al, (2011) proved a long run unidirectional causality running from exports and imports to economic growth in France over the period 1961-2006.

Fullerton, et.al (2012) showed that imports are more important for economic growth than exports do in Mexico during 1980 – 2007. Mehdi Taghavi, et.al (2012) verified that there a long run association amid exports, imports and economic growth in Iran over the period 1962-2011. There is a positive relationship between exports and economic growth but import and growth are negatively related in Iran.

Hussain and Saaed, (2014); Khairul and Masih,(2014); Andrews, (2015) and Abugamea, (2015) explored the association between export, import and GDP of Saudi Arabia, Malaysia, Liberia and Palestine respectively. Hussain and Saaed, (2014) proved that the three variables have a long-run relationship. They found a unidirectional causality between exports and imports and economic growth and imports in Saudi Arabia for the period 1990 to 2011. KhairulHashim and Mansur Masih (2014), confirmed that there is bidirectional long run relationships between economic growth and exports, economic growth and imports and exports and imports in Malasia for the period 1967- 2010 . Andrews, (2015) found bidirectional causality among GDP and imports and uni-directional causality running from exports to GDP and from exports to imports of Liberia during the period from 1970 to 2011. Abugamea, (2015) showed that there is a long run relationship between growth and imports in Palestine for the period from 1968 to 2012. However there is no evidence on causality among the three variables in the short run.

The relationship between the three variables in India was examined by Hussaini, et.al (2015) and Mehta (2015) during 1971 to 2014 and 1976 to 2014 respectively. Their result showed a long run co-integration relation between economic growth, exports and imports of India. The Granger causality tests showed that economic growth granger causes export but not imports in India and neither import nor export caused economic growth.

Recently Guntukula, (2018) and Reddy (2020) also assessed the contribution of exports and imports to economic growth in India. Guntukula, (2018) used a monthly data from April 2005 to March 2017 while Reddy (2020) used yearly data over the period 1980-2012. Both studies proved that economic growth hasof bi-directional association with exports and in India.

 

Ruranga, et.al. (2020) investigated the Impact of Exports and Imports on Economic Growth in Rwanda using annual data from 1961 to 2018.They proved the absence of long run association among imports, exports and growth. Yet, they found bidirectional causality between imports and GDP and causality runs only from exports to economic growth in Rwanda.

It is worth noticing that, among all previous studies that attempted to explore the causal association between exports, imports and economic growth, no earlier study has examined the Ethiopian economy, which magnifies the contribution of this study to the existing literature.

## 3. Materials and methods

### 3.1. The data

This research utilized annual data for the period 1981 to 2018 in Ethiopia. The data set consists of observation on GDP, exports and imports of goods and services. All the variables are measured in current US$, and fetched from World Bank World Development Indicators 2020.

### 3.2. Methodology

The appropriate methods for time series analysis consist of determining the degree of integration of each variable. Applying linear regression is appropriate if all the variables are integrated in level, (Granger and Newbold, 1974; Engle and Granger, 1987; Phillips and Ouliaris, 1990). However if the variables are all integrated of order one, the model depends on the existence of co-integration among variables studied. Here we have two potential models based on the result of co-integration test. The first option is that if all the variables are stationary at first difference and there is no co-integration relation among variables the unrestricted VAR model is appropriate. On the other hand if there is a co-integration relation amongst the variables studied, we need to use the VECM (Engle and Granger; 1987; Pfaff, 2008 and Johansen, 1995).

### 3.3. Model specification

Early empirical designs well established to catch the causal link between, exports, imports and economic growth by including exports and imports into the aggregate production function. Francisco and Ribeiro (2001), Titus, (2007); Khan, (2012); Turan, (2014) and Saaed, (2015) used this model.

The production function is augmented by including exports and imports as follows:

GDP = f (EPORTS, IMPORTS)

The econometric log-linear format of this function can be presented as;

$$\mathbf{log\ (GDP)_t = \alpha + \beta_1 log(Exports)_t + \beta_2 log(Imports)_t + \varepsilon_t}$$

Where:

**α**: The constant term.

$\beta_1$ and $\beta_2$ are coefficients of variable exports and imports respectively :

ε : is a normally, identically and independently distributed random error term

t : The time trend.

All variables included in the model are measured in current US$

**The VAR representation of our model is**

$$lnGDPt = \alpha + \sum^{k}_{i=1} \beta_i lnGDP_{t-1} + \sum^{k}_{j=1} \delta_j lnEXP_{t-j} + \sum^{k}_{m=1} \theta_m lnIMP_{t-m} + u_{1t}$$

$$lnEXPt = \gamma + \sum^{k}_{i=1} \beta_i lnGDP_{t-1} + \sum^{k}_{j=1} \delta_j lnEXP_{t-j} + \sum^{k}_{m=1} \theta_m lnIMP_{t-m} + u_{2t}$$

$$lnIMPt = \lambda + \sum^{k}_{i=1} \beta_i lnGDP_{t-1} + \sum^{k}_{j=1} \delta_j lnEXP_{t-j} + \sum^{k}_{m=1} \theta_m lnIMP_{t-m} + u_{3t}$$

Where α, γ and λ are constants, β's are coefficients of lagged GDP, δ's are coefficients of lagged EXPORTS , θ's are coefficients of lagged IMPORTS and u's are error terms in each equation.

In a vector autoregressive model all variables are endogenous; the dependent variable is a function of its lagged value and the lagged values of other variables in the model. A n-variable VAR will have n linear equations , in which each variable is explained by its own lagged values, plus current and past values of the remaining n-1 variables. All variables have equal lags k that could be determined by the Lag Selection criteria Stock and Watson (2001)

## 4. Results and discussion

### 4.1. Descriptive analysis

The export to GDP ratio is very low relative to imports to GDP in Ethiopia. Until the mid-1990's the gap was consistent after wards imports to GDP ratio start to increase faster until it reached 40% in 2005 though it continuously decreased to 23% in 2018.

Figure 2 shows that export is not showing considerable improvement throughout the study period. At the beginning, export and import were almost equal, implying that the country's foreign exchange earnings were able to finance its import. After 2000, import is growing faster than exports which explain the country's increasing current account deficit.

 

### 4.2. Tests and Estimations

#### 4.2.1. Unit root test

The presence of a unit root was investigated using a uni-variate analysis of each of the three time series variables. Augmented Dickey_Fuller (ADF) *t*-tests and Phillips and Perron (1988) tests for the individual time series and their first differences are presented in Table 1. Both the ADF and Phillips and Perron (PP) tests witnessed that exports, imports and GDP are non- stationary at level while their first differences are stationary at the 5% significance level.

Both the t-statistics and Mackinnon p-value of ADF and PP tests proved that all the variables have a unit root in level but their first differences are stationary.

#### 4.2.2. Lag order selection criteria

In order to test the co-integration among variables, first we need to determine the lag length existing in the VAR estimate. The VAR Lag order selection criteria method was applied and both the likely hood ratio and Akaike's information criterion recommended two lags, which will be used for all estimations and tests onward.

#### 4.2.3. Testing for co-integration

Co-integration tests are developed to identify whether there is long run equilibrium integration among two or more non-stationary time series variables (Stock and Watson, 1988; Engle and Granger, 1987). Gonzalo and Lee (1997) recommend using both Engle-Granger and Johansen tests to avoid any pitfalls. We applied Engle-Granger and to identify the existence of long run association between the variables studied. However we only reported the Johansen co-integration test results to avoid redundancy.

The maximum eigenvalue and trace statistics are less than the 5% critical value, which means we fail to reject the null hypothesis of no co-integration that confirmed there is no co-integration relation between imports, exports and economic growth in Ethiopia. The Engel Granger co-integration test also supported this result of no co-integration. This suggests that we have to use unrestricted VAR model.

### 4.3. VAR Estimation

The VAR model estimation result identifies whether explanatory variables have effect on the dependent variable or not. The sign of the explanatory variables' coefficients determines the positive or negative relation between the dependent variable and the explanatory variables. A VAR Model is envisioned to summarize the dynamic behavior of the studied variables, all of which are endogenous with respect to one another.

Our VAR estimation result shows that first and second lag of GDP have a positive and negative effect on GDP respectively, but GDP has no any significant effect on both exports and imports. First lag of exports has a positive effect on GDP, exports and imports, while its second lag has a negative effect on exports and imports only. First lag of import has a positive effect only on import, but the second lag has a negative effect on GDP and it has positive effect on export and import. This implies that imports and exports have an impact on the dynamic changes of economic growth in Ethiopia.

### 4.4. Granger Causality Test

Granger Causality Test is applied to confirm whether there is a causal relationship between the three variables encompassed in our empirical investigation.

The first null hypothesis test that GDP does not Granger cause Exports can be rejected because the p-value is less than the 5% significance level, meaning that GDP does Granger cause exports in Ethiopia. However the second hypothesis that GDP does not Granger cause imports , cannot be rejected because the p-value is more than the 5% significance level, here we accept the null hypothesis, that GDP does not Granger cause imports. In the same manner exports does granger cause both GDP and imports. Imports doesn't granger cause GDP but it does granger cause exports.

The granger causality test proved that there is bidirectional causality between GDP and exports and imports and exports of Ethiopia. There is no any evidence on the causality between GDP and Imports.

## 5. Diagnostic tests

### 5.1. Autocorrelation Test

Lagrange-multiplier test has been implemented to check Autocorrelation among the variables studied. The null hypothesis of no autocorrelation cannot be rejected in first and second lags; this implies our model is free from the problem of autocorrelation.

### 5.2. Test for normality

The Jarque-Bera test for normality result does not reject the null of normality. The errors in all the three equations are normally distributed.

 

### 5.3. Stability test

The stability test certifies that stability conditions are satisfied in our VAR model that all the eigenvalues lie inside the unit circle.

### 5.4. Impulse response function

Impulse response function expresses the movement of the response variable along a specific time horizon after a shock in one of the endogenous variables in the system. It explains the degree at which the change in one variable passed to other variables at different stages directly or indirectly.

The impulse response graph puts impulses in raw and responses in column. The graph shows the effect of a shock over eight year period.

Export responds positively to a standard deviation shock in imports up to the 4th period and it became stable afterwards. Exports respond negatively to a shock in GDP.

GDP responds positively to a shock in exports up to period two and its sensitivity starts to decline and stabilize at the end. GDP responds positively to a shock in imports in first period and it responds negatively up to period two and it responds positively after period two.

Imports respond positively to a shock in exports initially and its respond stabilize after period two. Imports do not show a response to the shock in GDP in first period but it responds negatively after period two.

## 6. Conclusion and Recommendation

The principal intention of this study was to investigate the causal relationship among exports, imports and economic growth in Ethiopia. The vector auto regressive model, co-integration and Granger Causality tests are used to contemplate the relationship between these three variables using data from the World Bank data set for the period 1981-2018.

The ADF and PP test for unit root witnessed that all the variables are stationary after first difference. Both the Johansen and the Engel Granger co-integration test results show the nonexistence of co-integration relation among the three variables in Ethiopia, which recommends applying the unrestricted VAR model. The VAR model estimation result shows that both export and import have effect on GDP. And from the Granger Causality test, we found out that export has strong bidirectional causality with GDP and import. However there is no any evidence on a direct causality between GDP and import. This implies that export-led growth is the appropriate policy that Ethiopia should follow. This study passes all the diagnostic tests of autocorrelation, normality and stability. This guarantees that the impulse response function result is also meaningful.

According to the study results, Ethiopia can benefit from development of foreign trade. To overcome the problems existed in foreign trade; Ethiopia should revisit the strategic trade policy of the country in the following manner.

Ethiopia should implement an industrial policy that can diversify its exports and that changes the composition of exports. The country's export is still dominated by primary sector outputs coffee, pulses, flowers and zinc ore.

There should be a strong incentive and support to investors who can change the composition of export from primary products to manufacturing commodities.

There also should be control on the composition of import considering its effect on the export sector of the country.

The limited foreign exchange earnings should be spent on imports that contribute in the improvement of technology and productivity of the country particularly the exportable products.

## Declarations

- Availability of data and materials
  The data used in this research is fetched from World Bank data bank which is publicly available under World Development Indicators (WDI) data catalog. World Bank compiled data on development indicators from officially recognized international sources. It presents the most current and accurate global development data available, and includes national, regional and global estimates. https://databank.worldbank.org/source/world-development-indicators
- Competing interests
  There are no competing interests among authors in the manuscript.
- Funding
  'Not applicable'
- Authors' contributions
  All authors contributed equally to all sections. Both authors read and approved the final manuscript.

 

**References**

Abdul-hamid S, Gollagari R (2000) The effect of trade liberalization on economic growth; the case of Ethiopia. Finance India, vol XVI, (1205-1305)

Abugamea G H (2015) The competitiveness of the Palestinian foreign trade: A co-integration analysis. Economic Research Forum, Working Papers, No. 541

AfafAbdull J, Saaed, Majeed Ali Hussain (2015) Impact of exports and imports on economic growth: Evidence from Tunisia. Journal of Emerging Trends in Economics and Management Sciences, 6, 1, 13-21

AfafAbdull J, Saaed, Majeed Ali Hussain (2015) The causality relationship between exports, imports and economic growth in Jordan: 1977-2012. EPRA International Journal of Economic and Business Review, 3, 7, July 2015

Amiri, Arshia, Gerdtham, Ulf-G (2011) Relationship between exports, imports, and economic growth in France: evidence from co-integration analysis and Granger causality with using geostatistical models. MPRA Paper No. 34190

Andrews AP (2015) Exports, Imports, and Economic Growth in Liberia: Evidence from Causality and Co-integration Analysis. Journal of Management Policy and Practice, 16,3, 95

Awokuse, TO (2007) Causality between exports, imports, and economic growth: Evidence from transition economies. Economics Letters, Elsevier, 94, 3, 389-395

Balassa B (1978) Exports and economic growth: further evidence. Journal of Development Economics, 5, 181 - 189

Bhagwati JN (1978) Anatomy and Consequences of Exchange Control Regimes: Liberalization Attempts and Consequences. Ballinger Publishing Co., Cambridge, MA

Bhagwati JN (1988) Protectionism. MIT Press, Cambridge. Massachusetts.

Bouoiyour J (2003) Trade and GDP Growth in Morocco: Short-run or Long-run Causality? Brazilian Journal of Business and Economics, 3, 2, 14-21

Coe TD, Helpman E (1995) International Research and Development spillovers. European Economic Review, 39, 859-887

Dickey D, Fuller W (1979) Distribution of the estimators for autoregressive time series with a unit root. Journal of American Statistics Association, 74, 427_431

Dilawar Khan, Azra, maryum Umar, Nasreen Zaman, Ejaz Ahmed, Yusra Shoukat (2012) Exports, imports and economic growth nexus: Time series evidence from Pakistan. World Applied Sciences Journal.18,4, 538-542

Edwards S (1998) Openness, productivity and growth: what do we really know? Economic Journal, 108, 383_398

Engle RF, Granger CW (1987) Co-integration and error correction: representation, estimation and testing. Econometrica, 55, 251_276

Findlay R (1984) Growth and Development in Trade Models. Handbook of International Economics, 1, 185-236

Fullerton TMJr, Kababie K, Boehmer C R (2012) International trade and economic growth in Mexico. Empirical Economics Letters, 11, 9, 869-876

Gonzalo J, Lee T (1998) Pitfalls in testing for long run relationships. Journal of Econometrics, 86, 129—154

Granger CWJ, P Newbold (1974) spurious regression in econometrics, Journal of Economics, 2, 111-120

Grossman G, Helpman E (1991b) "Trade, Knowledge Spillovers and Growth," European Economic Review, 35:3, 517–26

Grossman G, Helpman E (1991) Innovation and Growth in the Global Economy. Cambridge, MA: MIT Press

Güngör Turan, Bernard Karamanaj (2014) An empirical study on import, export and economic growth in Albania. Academic Journal of Interdisciplinary Studies, 3, 3

Guntukula R (2018) Exports, imports and economic growth in India: Evidence from co-integration and causality analysis; Theoretical & Applied Economics, 2018

Helpman E, Krugman P (19855) Market Structure and Foreign Trade. Cambridge, MA: MIT Press

Johansen S (1995) Likelihood-Based Inference in Co-integrated Vector Autoregressive Models. Oxford University Press: Oxford

Khairul H, Mansur M (2014) What causes economic growth in Malaysia: exports or imports? MPRA Paper No. 62366

Lawrence RZ, Weinstein DE (1999) Trade and growth: import-led or export-led? Evidence from Japan and Korea. NBER Working Paper, 7264

Mazumdar J (2000) Imported machinery and growth in LDCs. Journal of Development Economics 65, 209–224

Mehdi T, Masoumeh G, Elham M, Hadi PG (2012) Study on the Impact of Export and Import on Economic Growth in Iran. Journal of Basic and Applied Scientific Research 2,12, 12787-12794

Pesaran MH, Shin Y (1995) An autoregressive distributed lag modeling approach to cointegration analysis.

 

DAE Working Paper No. 9514, Department of Applied Economics, University of Cambridge, 35
Pesaran MH, Shin Y, Smith RJ (2001) Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics; 16, 289–326
Pfaff B (2008) VAR, SVAR & SVEC Models: Implementation Within R Package vars. Journal of Statistical Software,27(4)
Phillips PCB, Perron P (1998) Testing for a unit root in time series regression. Biometrika 1988; 75, 2; 335_346
Phillips PCB, Ouliaris S (1990) Asymptotic properties of residual based tests for cointegration.Econometrica58: 165 – 193
Ramos FFR (2001) "Exports, imports, and economic growth in Portugal: evidence from causality and co-integration analysis". Economic Modeling, 18, 613-623
Reddy KK (2020) Exports, imports and economic growth in India: An empirical analysis. Theoretical and Applied Economics, 22, 4, 625, 323-330
Rivera-Batiz L, Romer P (1991) Economic integration and endogenous growth. Journal of Economics, 106; 531_555
Romer P (1990) Endogenous technological change. Journal of Politic Economics; 98, 71_102
Ruranga C, Ruturwa DS, Rwema V (2020) Impact of Exports and Imports on Economic Growth in Rwanda: 1961-2018
Saaed AAJ, Hussain MA (2015) "Impact of exports and imports on economic growth: Evidence from Tunisia". Journal of Emerging Trends in Economics and Management Sciences. 6, 13
Soressa TJ (2013) Exports, domestic demand and economic growth in Ethiopia: Granger causality analysis, Journal of Economics and International Finance.5, 9, 357-372
Stock JH, Watson MW (1988) Testing for common trends. Journal of America Statistic Association 1988; 83(404); 1097_1107
Stock JH, Watson MW (2001) Vector Auto regressions. Journal of Economic Perspectives, 15 (4): 101-115.
Turan G, Karamanaj B (2014) An Empirical Study on Import, Export and Economic Growth in Albania. Academic Journal of Interdisciplinary Studies, 3, 428

**Table 1: Unit Root Test**

| Unit root test app. | Variables | In level | | | In first difference | | |
|---|---|---|---|---|---|---|---|
| | | Test statistics | 5% critical value | Mackinnon app. P-v for z(t) | Test statistics | 5% critical value | Mackinnon app. P-v for z(t) |
| ADF | lnGDP | 0.359 | -2.969 | 0.9799 | -2.950 | -1.694 | 0.0029 |
| | lnEXP | 0.279 | -2.969 | 0.9764 | -3.396 | -2.972 | 0.0111 |
| | lnIMP | 0.861 | -2.969 | 0.9926 | -4.113 | -2.972 | 0.0009 |
| | | | | | | | |
| PP | lnGDP | 1.196 | -2.966 | 0.9960 | -3.512 | -2.969 | 0.0077 |
| | lnEXP | 0.540 | -2.966 | 0.9860 | -4.167 | -2.969 | 0.0008 |
| | lnIMP | 0.607 | -2.966 | 0.9878 | -8.895 | -2.969 | 0.0000 |

**Table 2: VAR Lag Order Selection Criteria for Logs of GDP, Exports and Imports**

| lag | LL | LR | df | p | FPE | AIC | HQIC | SBIC |
|---|---|---|---|---|---|---|---|---|
| 0 | -42.0985 | | | | 0.003088 | 2.73325 | 2.77902 | 2.86929 |
| 1 | 71.3968 | 226.99 | 9 | 0 | 5.50E-06 | -3.59981 | -3.41671 | -3.05562* |
| 2 | 86.6332 | 30.473* | 9 | 0 | 3.8e-06* | -3.97777* | -3.65734* | -3.02545 |
| 3 | 90.515 | 7.7637 | 9 | 0.558 | 5.40E-06 | -3.66758 | -3.20982 | -2.30712 |
| 4 | 97.2143 | 13.399 | 9 | 0.145 | 6.70E-06 | -3.52814 | -2.93306 | -1.75954 |
| 5 | 100.887 | 7.3451 | 9 | 0.601 | 0.000011 | -3.20527 | -2.47286 | -1.02853 |

 

**Table 3: Co-integration test results**

| Maximum Rank | Parms | LL | Eigenvalue | Trace statistic | 5% critical value |
|---|---|---|---|---|---|
| 0 | 12 | 80.885034 | . | **28.1470*** | 29.68 |
| 1 | 17 | 91.015149 | 0.43038 | 7.8868 | 15.41 |
| 2 | 20 | 94.548757 | 0.17824 | 0.8196 | 3.76 |
| 3 | 21 | 94.958549 | 0.02251 | | |
| Maximum Rank | parms | LL | Eigenvalue | **Max** statistic | 5% critical value |
| 0 | 12 | 80.885034 | . | **20.2602*** | 20.97 |
| 1 | 17 | 91.015149 | 0.43038 | 7.0672 | 14.07 |
| 2 | 20 | 94.548757 | 0.17824 | 0.8196 | 3.76 |
| 3 | 21 | 94.958549 | 0.02251 | | |

**Table 4: Step by Step Vector Auto Regression Model**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | lnGDP | lnEXP | lnGDP | lnEXP | lnIMP |
| | | | | | |
| L.lnGDP | 1.243*** | -0.139 | 1.284*** | -0.259 | -0.0167 |
| | (0.158) | (0.225) | (0.151) | (0.175) | (0.260) |
| L2.lnGDP | -0.347** | 0.0890 | -0.347*** | 0.0265 | -0.177 |
| | (0.138) | (0.196) | (0.131) | (0.152) | (0.225) |
| L.lnEXP | 0.378*** | 1.270*** | 0.359** | 0.892*** | 0.560** |
| | (0.121) | (0.172) | (0.147) | (0.170) | (0.253) |
| L2.lnEXP | -0.267* | -0.217 | -0.178 | -0.475*** | -0.470* |
| | (0.149) | (0.212) | (0.149) | (0.172) | (0.256) |
| L.lnIMP | | | 0.117 | 0.158 | 0.360** |
| | | | (0.0986) | (0.114) | (0.170) |
| L2.lnIMP | | | -0.206** | 0.512*** | 0.700*** |
| | | | (0.105) | (0.122) | (0.181) |
| Constant | 0.108 | 0.121 | -0.358 | 3.197*** | 1.427 |
| | (0.541) | (0.770) | (0.753) | (0.873) | (1.296) |
| | | | | | |
| Observations | 36 | 36 | 36 | 36 | 36 |

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

**Table 5: Granger Causality Wald Test**

| Equation | Excluded | chi2 | df | Prob> chi2 |
|---|---|---|---|---|
| | | | | |
| lnGDP does not granger cause lnEXP | | 6.122 | 2 | **0.047** |
| lnGDP does not granger cause lnIMP | | 4.3101 | 2 | 0.116 |
| lnGDP does not granger cause ALL | | 31.391 | 4 | **0.000** |
| lnEXP does not granger cause lnGDP | | 10.369 | 2 | **0.006** |
| lnEXP does not granger cause lnIMP | | 24.701 | 2 | **0.000** |
| lnEXP does not granger cause ALL | | 25.55 | 4 | 0.000 |
| lnIMP does not granger cause lnGDP | | 4.2175 | 2 | 0.121 |
| lnIMP does not granger cause lnEXP | | 5.2595 | 2 | 0.072 |
| lnIMP does not granger cause ALL | | 16.994 | 4 | 0.002 |

When p >5% we cannot reject the null hypothesis

**Table 6: Autocorrelation Test**

| lag | chi2 | df | Prob> chi2 |
|---|---|---|---|
| **1** | **4.2397** | **9** | **0.89494** |
| **2** | **4.4798** | **9** | **0.87710** |

 

**Table 7: The Jarque-Bera Test for normality**

| Equation | chi2 | dfProb> chi2 |
|---|---|---|
| | | |
| lnGDP | 0.969 | 2 0.61588 |
| lnEXP | 0.698 | 2 0.70528 |
| lnIMP | 2.451 | 2 0.29363 |
| ALL | 4.119 | 6 0.66063 |

**Table 8: Eigen value Stability condition**

| Eigenvalue | | Modulus |
|---|---|---|
| .9464026 | + .06281732i | .948485 |
| .9464026 | - .06281732i | .948485 |
| -.5615003 | | .5615 |
| .5482076 | | .548208 |
| .3283957 | + .3858265i | .506661 |
| .3283957 | - .3858265i | .506661 |

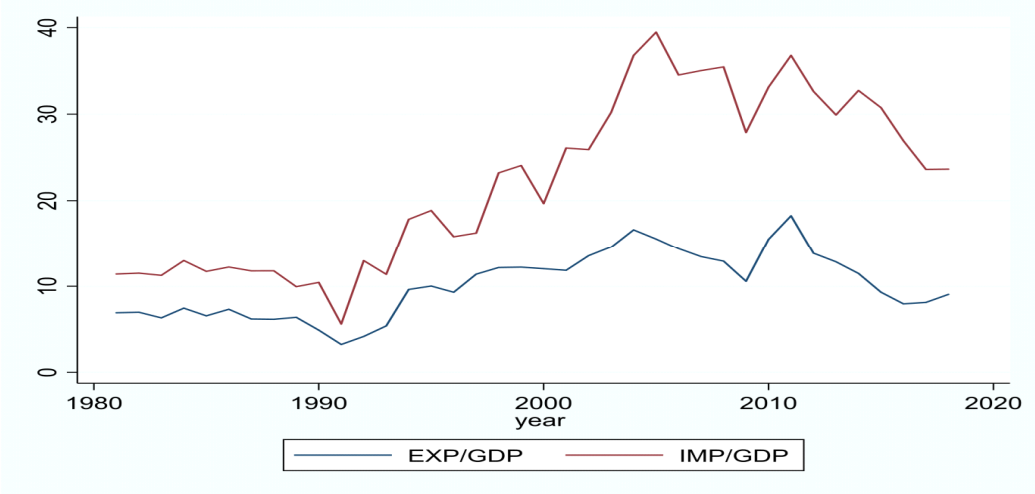


**Figure 1: Export and Import Share to GDP**
*Authors calculation based on World Bank data from 1981-2018*

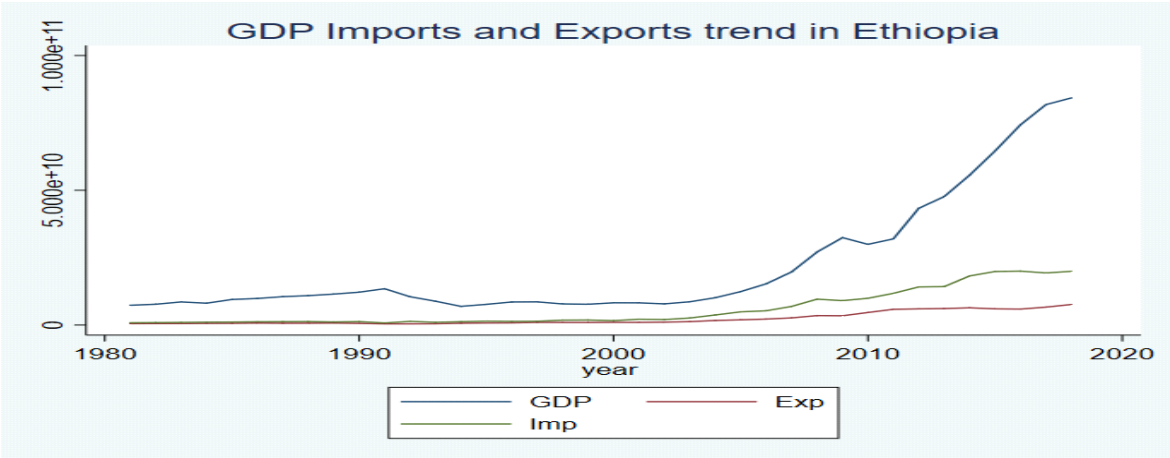


**Figure 2: Trend of GDP, Imports and Exports**
*Authors calculation based on World Bank data from 1981-2018*

 

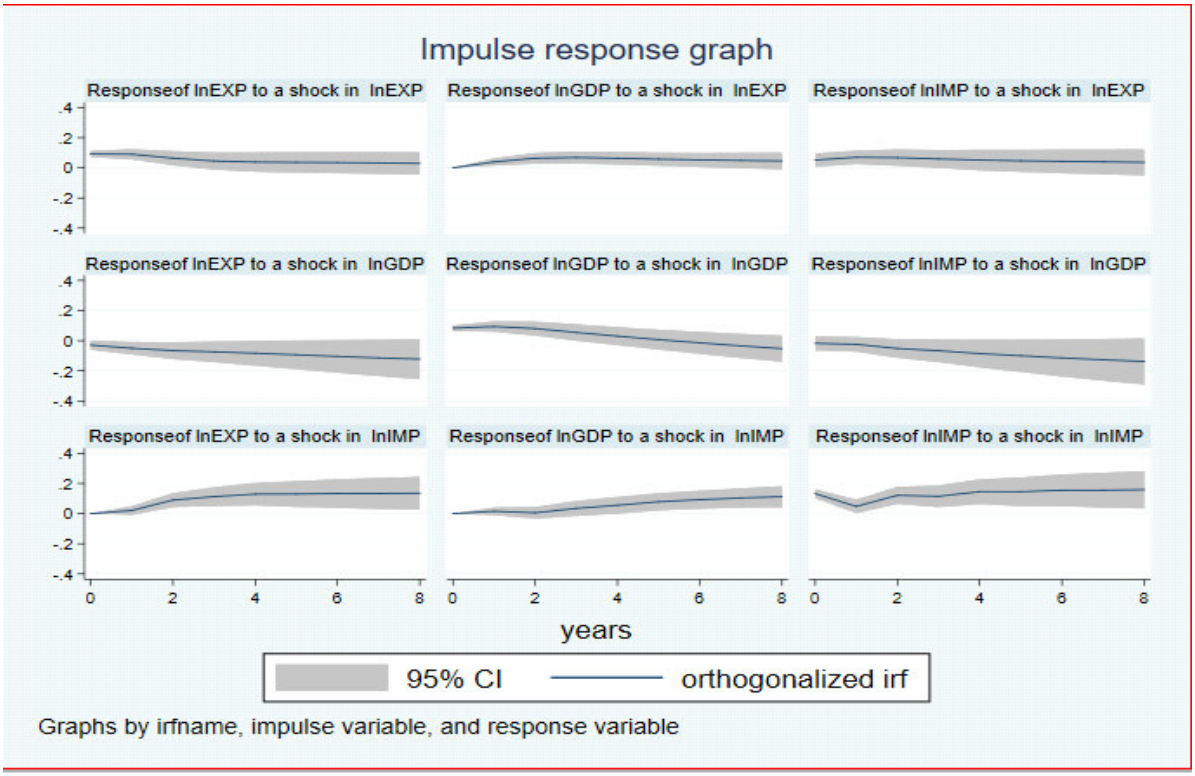


**Figure 3: Impulse Response**