The Causality and Dynamic Relationship between GDP Growth, Export, and Import: Empirical Evidence from Ethiopia.

Asnake Getie Asmare, Liu Haiyun

1 School of Economics, Huazhong University of Science and Technology, Postal Code: 430074 Address: Luoyu Road 1037-Wuhan, China

DOI: https://doi.org/10.15520/jbme.v7i11.2741

Abstract: This empirical study investigated the co-integration and the dynamic relationships between GDP growth, export and import of Ethiopia using time series data from 1981-2017. The stationarity test of variables are done by using Augmented Dickey-Fuller and the Phillips-Perron tests. Choosing the optimum lag of the model are done by using the Akaike Information Criterion. The ARDL and ECM estimation techniques are applied to determine the short-run and long-run relationships among the variables including the Granger causality techniques. For the co-integration test, we found long-run relationships among the variables. This empirical study result found: 1. Positive and significant long-run effect of export for the GDP growth in Ethiopia. 2. A bidirectional long-run relationships between export and imports. 3. A positive and significant short-run relationship between import and GDP growth. 4. There is a correct sign coefficients of the ECM model result with a moderate speed of adjustment to correct the discrepancy between the short run and long-run dynamics. 5. A unidirectional Granger causality from export and imports to GDP growths. 6. A bidirectional Granger causality relationship between export and imports. This study finding implied that the long-run growth of GDP in Ethiopia can be enhanced by encouraging exports and imports.

Key Words: Export; Import; GDP Growth; Ethiopia.

INTRODUCTION

The contribution of trade (export and import) for the economic growth of countries has been argued and supported by both empirical and theoretical literature. However, its impact on the economic growth of countries is different. The differences are related to countries development level, trade and growth policy, specific situations of each country, and the applied empirical measurement systems. Different international trade theories suggest that an increase in international trade openness particularly in export contributes positively to the economic growth of countries. Some of the contributions of export for the economic growth of countries are solving the binding foreign exchange constraints of a nation which can also support to increase imports of capital and intermediate goods. Export and imports of goods and services can benefit countries through improving the efficiency of a nations productivity and quality through competition, enabling the utilization of economies of scale, the circulation of technical knowledge, and learning by doing. (Albiman & Nn, 2016; Otulu & Anderu, 2015; Samimi & Jenatabadi, 2014; Grossman and Helpman, 1991; Mehrshad, Hosseini, & Tang, 2014). Through imported intermediate goods and machinery the domestic economic growth of countries may absorb new technologies including fiscal and human capital, production equipment’s, and improvement of labor forces skills can encourage the productivity of the country. Import can also have a positive impact on the export of the country from imported inputs and primary raw materials and machinery, which can produce goods and services for export to the international markets. Moreover, the GDP growth of countries can increase the domestic economy skill improvements and the production technique efficiency upgrading’s that can increase the export of goods and services of that country (Kim, 2011; Rodrik, 2000; Edwards, 1992). The export-led growth and growth-led export hypothesis show that the increase in export can increase economic growth with export-oriented economic growth strategies and the increase in growth can increase exports with growth-oriented export growth strategies.

The growth-led import and the import-led growth strategies can also be applied to increase the GDP growth of countries based on the specific situations of each country. These mentioned economic growth strategies can be effective in the Ethiopian economy by investigating which strategy can be more effective for supporting the growth of the Ethiopian economy. The main questions addressed in this empirical study concerning Ethiopia are studying the short-run and long-run relationship among export, import, and GDP growth. Moreover, this study examined the Granger causality relationship between these variables. This empirical research paper focuses on the hypothesis of export-led growth, growth-led export, growth-led import, import-led growth, export-led import, and import-led export hypothesis to find the appropriate economic growth strategies for Ethiopian policymakers. The co-integration and causal relationships among GDP growth, export, and import is also investigated for the case of Ethiopian economies. Studying the causal nexus of export, import and GDP growth is an interesting topic from a policy-making point of view of a nation like Ethiopia to follow the right path in government policymaking and implementation of economic policies. The main objective of this research paper is for studying the causal relationship of export, import and GDP growth in the Ethiopian economies for further studies and contributing policy-making inputs and economic analysis mainly on developing and least developed countries. This empirical research paper can contribute to the literature with creating
more understandings about the international trade patterns of Ethiopian economy from several perspectives and examining the potential causal relationship and co-integration among export, import and GDP growth during the last 37 years. How changing export, import, and GDP growth structure of the Ethiopian economy will have influences on the future economic growth of the country.

Studying these mentioned topics could be interesting to contribute additional inputs from both kinds of literature, theoretical and methodological point of views including for policymaking inputs mainly related to least developed countries specifically for Ethiopia. What is the short-run and long-run relationships between export, import and GDP growth on the Ethiopian economy related to the hypothesis of export-led growth, growth-led import, export-led growth, growth led export, import led growth, growth led import, export-led import and import led export strategies are preferable for Ethiopia?. This empirical research paper will have contributions by resolving previous econometric estimation problems and shortcomings. Some of the common problems and bias of the previous similar research studies are related to using non-stationary data without giving attention to the co-integration and time-series stationarity characteristics of the time series data used the empirical research can lead to distorted and biased results, (Hye, 2015; Sims et al., 1990). Testing the joint dependence and interrelationships among variables should be a priority condition for time-series data before applying the estimation processes. Using a non-stationary time series data on the empirical researches can lead to biased and erroneous results, (Coli & Nez, 2012; Sims et al., 1990). In addition to these mentioned previous research bias some researchers had examined other shortcomings related to the characteristics and lags selection criteria’s of the data because of the stationarity issue of variables are sensitive and it affects the selection of the model, (Coli & Nez, 2012; Sims et al., 1990). Moreover, earlier researches using cross-sectional data for estimation of the variables established with the inherent hypothesis of different nations with mutual features did not examine the specific features of each country and it may not be true because of differences in countries economic, political and institutional factors.

This research paper avoids some of the previous empirical research bias and problems on this topic by applying appropriate tests of unit root, optimum lag selection based on the criteria’s, co-integration, Autoregressive Distributed Lag model, and Error Correction Model estimation techniques. This empirical research paper used econometric methods of the Auto-Regression Distributed Lag (ARDL), Error Correction Model (ECM), and Granger causality estimation techniques to examine the short-run and long-run relationships and the causality relationships between variables. The co-integration estimation method using the ARDL model and ECM techniques mostly applied to find the short-run and long-run equilibrium relationship among the variables. Using these empirical methods have advantages in resolving most of the previous empirical research estimation problems and it has multilevel advantages for finding both short-run and long-run relationships among variables including the Granger causality relationships between the variables (Sakyi, Villaverde, Maza, & Nkrumah, 2014; Chang, Yeh, & Chen, 2014; Pesaran et al., 2001). Using the ARDL method has advantages over the other co-integration estimation techniques with the assumption of all the variables are endogenous and it can be used when the variables are fractionally integrated in both first-order or at level, and the parameters can be estimated simultaneously. Furthermore, the ECM model has advantages to find the dynamic equilibrium between the relationships in the short run and long run, and it is used to correct the disequilibrium in the short run with its long-run behavior of economic variables. Finally, using the Granger causality method has also advantages for studying the direction of causality among variables. The following points are discussed about the general background information about Ethiopian economic growth, import and export information. After 1992 the Ethiopian government implemented a diversity of reforms to improve the country’s macroeconomic stability, to facilitate its economic growth, and reducing poverty. Some of the measures taken by the Ethiopian governments are a high amount of tariff and quota reductions, implementation of simple and fast licensing procedures, less government control in foreign exchange, a high privatization policy strategies and soon.

The implementation of this policy reforms in 1992 results in more open trade policy with increased import and export of goods and services and increasing the country’s foreign direct investment inflows. After the government implemented its growth and transformation plan to the country’s developmental strategies the country achieved a high and continuous economic growth rate. The Ethiopian economy achieved with average real GDP growth of 10.4% from 2003 to 2011 that makes the country among the fast-growing economies in Sub-Saharan Africa. According to the National Bank of Ethiopia report from 1992-1995 Ethiopia was achieved a record high growth rate in both the export and import sectors of the country. Some of the reasons for the growth of export and imports of Ethiopia during this time period are related to the government’s implementation of economic reforms in the opening of international trade in both export and import sectors, devaluation of the exchange rate, and different structural adjustment program of the World Bank. The Ethiopian economy especially it’s export sector is mostly subject to fluctuations related to the international market price fluctuation in agricultural commodity because of the country’s export sector dependency mainly on the agricultural sector. The export sector of Ethiopia has been growing with an average rate of 7% yearly from 1981-2008 for merchandise exports and manufacturing exports growth was 4% yearly in the same period. The Ethiopian trade balance is similar to most developing countries trade balance with less amount of export and high amount of imports makes the country in the trade deficit for the last decades.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Literature Review:

Based on different recent empirical literature the causality relationship between export/import and economic growth findings are different depending on each country-specific
economic growth and macroeconomic policy situations, the type of econometric method applications, a number of time periods of study, treatment of variables on the techniques of the relationship between variables, and inclusion of additional interaction variables in the econometric equations. The economic literature and many previous studies suggested that the exclusion of imports in modeling the role of export in economic growths may cause misleading decisions. Based on some research findings of the Export-Growth nexus, still, there is no unquestionable agreement between the growth-led exports and the export-led growths economic growth strategy theory (Furuoka 2018; Lam & Lam, 2013; Giles and Williams, 2000). Other research studies show that there is a two-way causality relationship between growth and exports (Harris, 2018; Werner, 2000). Some of the previous empirical research findings nation that export mainly on industrial products grow higher than those countries mainly exporting primary products, (Balavac and Pugh 2016; Balavac & Pugh, 2016). These show the gain from trade will be for countries focusing in exporting relatively high technology products from the positive externality of trade in boosting the economic growth than the gains of trade in countries mainly exporting primary products. Export has a positive effect on economic growth with the support of the export-led growth strategy, (Mehrshad et al., 2014). But other researchers came up with on the other way of arguments for the export-led growth strategy is, (Kahya, 2011; Yaghmaian, 1994); Temiz and Gökmen, 2010). Some of the empirical study results showed that for countries which achieved some level of development are benefited from exports with encouraging and substantive effect on the growth of its economies (Raza, 2017; Vohra, 2001).

Other researcher observed that export-oriented middle-income level countries grow higher than lower level export-based countries, while the impact of exports for high and low-income countries have only a small impact, (Geda & Hussein, 2015; Subasat, 2002). Some researchers established the causal connection between export and economic growth is bidirectionally supporting both export-led growth and growth-led export strategy, (Odhambo, 2012).

**Export, Import, and Economic Growth Theories:**

Export and imports of goods and services are not only an important determinant factor of economic growth of countries but also it is a fundamental factor for the success of business companies’. The main benefit of export and import of goods and services comes from exchanging resources based on resources endowment and comparative advantage of each country. Some countries may have abundant natural resources and others may be rich in capital and technology products. Countries can export products whatever they are endowed on it and import goods from other countries resources they lack to develop its economy. The export-led growth hypothesis theory focuses on the impact of exports for the economic growth of a nation through increasing foreign exchanges supply, economic growth through knowledge and technology spillovers and other benefits from the global market exosystems. The export-led growth strategy encourages exporters to export more and to diversify the export sector would increase the production capacity of domestic firms through the large global market and domestic firms will create more employment opportunities for the country. The export-led economic growth strategy has been implemented in most developing countries for a long time in order to fulfill their foreign exchange supply needs and to encourage domestic industries growth by using the larger global market accesses. The key concern on examining export-led growth hypothesis is knowing whether the causality drives from growth to export or from export to growth is supported by this theory, subject to the trend of the causality association appropriate economic policies will be delivered. If the causal relationship goes from growth to export, the appropriate policy would be implementing economic growth as a prerequisite for a nation to increase its exports, and if the causality flows from export to growth then export promotion policy can be implemented. If there is bidirectional causality between export and growth implementing both strategies can be the appropriate strategy, (Alvarado, Iniguez, and Ponce 2017; Kahya, 2011).

This strategy suggests that increasing exports increases foreign exchange supply which can support import of essential inputs for the production system of domestic economy and increasing export will have contributions for round income flows in the country, (Kahya, 2011; Oztürk& Acaravci, 2010). The growth-led export hypothesis theory mainly focuses on increasing the growth of domestic production capacity to satisfy the local demands of the market and after satisfying the domestic market and the economy will produce surplus products for export to the global market. The participation of firms in the export market faces a high competition and new market entrance costs related to opening currency accounts, trade permission and transport costs, etc in comparison to locally operating firms so only highly productive firms will survive in the export business, (Huchet-bourdon & Mou, 2018; Wu and Miranda 2015; Melitz, 2003). The channels that promote growth internally to increase the productivity of firms and then starting exports to the outside world is considered as the growth led export hypothesis. With the consideration of countries economic development level, Import and export of goods and services are mostly complementary in nature, imported intermediate goods can be the sources of the manufacturing export products of the country (Kahya, 2011; Kotil and Konur, 2010). Other arguments in the trade and growth works of literature are understanding the macroeconomics theory, the import will have as a negative impact on the economic growth due to its effects leading to unemployment and decreasing revenues of a country while export increases foreign exchange supply and more domestic employment opportunities. However, contrary to this argument, the new trade theory suggests that import can also promote economic welfare and growth by using imported machinery and intermediate goods forusing in the domestic production processes and using imported capital and technology can create high labor productivity and technological progress. Therefore, the import of goods and services can also be important to support the economic growth and technology progress accomplishment of a country, (Ilyke, 2018; Li et al., 2010). Import led growth hypothesis focuses on the importance of imported goods from foreign markets to satisfy the needs of domestic demands. Moreover, importing intermediate goods used in the domestic production sectors to increase local capacity
and productivity can improve the domestic economic growth of the country. The GDP growth of a country can be increased by imported products by getting better access to foreign market technology to complete the production cycle and to optimize the production processes will bring gains to the domestic industry. Different countries have been benefited by applying the import-led growth hypothesis before the first world war with empirical evidence in Poland and Italy, (Pradhan et al. 2016; Albimian & Nn, 2016; Awokuse, 2007; Pisoreti and Rinaldi, 2012).

The development level of countries should be considered for selecting the import led to growth relations in order to take their comparative advantages. Developed countries have capital and technology advantages and developing countries have advantages labor and natural endowments so their export-import structure is designed for developing countries by exporting agricultural and low value-added goods, and importing high technology products for using their domestic development. By using such kind of strategy importing high technology products can resolve the bottlenecks of most developing countries productivity inefficiencies and it will promote these countries economic growths. (Castillo and Vries 2017; Chen 2009). Finally, the growth led imports hypotheses theory implies that the growth of GDP will increase the income of people which creates more demand for consumption both from local and foreign products which increases imported goods and services from abroad. Important empirical evidence supporting the growth led imports hypotheses is empirical research about Italy in the post-second world war, (Albimian & Nn, 2016; Pisoreti and Rinaldi, 2012).

**RESEARCH DATA AND ESTIMATION METHODS**

**Research Data:**
This research paper used yearly time series data from 1981-2017 to study the casual linkage and the dynamic relationship among export, import, and GDP growth in Ethiopia. We used the GDP growth in percentage, natural logarithm form of export, and natural logarithm form of import data of Ethiopia. The data of import and exports are in US S. The data is collected from the database of the World Bank - World- Development- Indicators.

**Research Model and Methodology:**
This research paper used the Autoregressive Distributed Lag (ARDL) model, Error Correction (EC) model, and Granger Causality methods to determine the co-integration, dynamic relationships, and the direction of causality among the variables such as GDP growth (GDPG), natural logarithm forms of export (Ln EXP), and import (Ln IMP). The ARDL model can be applied irrespective of the stationarity of the number of lags that capture the data generation process from a general to more specific modeling structure, (Fernández 2018; Butt, 2010; Pesaran and Smith, 1998; Pesaran and Shin; 1999, and Pesaran et al., 2001). The ARDL model can also have additional advantages for allowing inferences to estimate long-run relationships of variables using a dynamic Error Correction Model (ECM) derived from ARDL, which is not possible in other co-integration techniques, (Alvarado et al. 2017; Butt, 2010; Sezgin and Yildirim, 2002). Using the ARDL method can also have extra advantages for reliable estimations of the long-run bounds jointly integrated regardless of the variables are I (0) or I (1) The ARDL estimator is free from the correlations of residuals and less problem of endogenous variables because of using proper lags (Shrestha & Bhatta, 2018; Jouini 2014b). The other essential advantages of ARDL method is the possibility of estimation even with endogenous explanatory variables in the equation providing robust results in small sample sizes, (Alvarado et al. 2017; Butt, 2010; Alam and Quazi, 2003), which is not possible in the single equations of cointegration analysis of Engle and Granger methods, (Azizi 2018; Rate 2017). To utilize the above advantages this research uses the ARDL modeling approach for discussing the long-run relationship and the cointegration on the variables of GDP growth, the natural logarithm form of export and imports in Ethiopia. The formulation of the augmented classical growth model is applied to capture the causality relationships between GDP growth, logarithm form of export, and logarithm form of imports in Ethiopia as follows: (1). GDPG = f (Ln(EXP), Ln (IMP)), from which we transform the equation into the specific model of this research paper as: (2). GDPG = β0 + β1 log(EXP) + β2 log(IMP) + E. Where GDPG represents growth of gross domestic product, β0 is intercept, β1 and β2 are coefficients of natural logarithm form of export (Ln (EXP)) and imports (Ln (IMP)). t is time trend, and E is the error term. The long-run dynamics of the ARDL model is described as follows:

\[ \Delta GDPG_t = \beta_0 + \sum_{i=0}^{n} \beta_1 \Delta GDPG_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta Ln (IMP)_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta Ln (EXP)_{t-i} - 1 + \delta ECM_{t-1} \]  

Where \( \beta_0, \beta_1, \beta_2, \text{ and } \beta_3 \) are parameters, \( t \)-represents variables lagged by one period, \( \delta ECM \) is change in the GDP growth, \( \Delta GDPG_{t-1} \) is the change in GDP growth lagged by one period, ln (IMP) and ln (EXP) is the natural logarithm form of initial import and initial export of goods and services, and \( \varepsilon \) is the error term. Similar equation can be done for other models when the logarithm form of export is a dependent variable and when the logarithm form of import is a dependent variable in both ARDL model and ECM models separately. For the estimations of the short-run relationships between the variables and to know the speed of adjustments the ECM model is described as follows: (4). \( \Delta GDPG_t = \beta_0 + \sum_{i=0}^{n} \beta_1 \Delta GDPG_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta Ln (IMP)_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta Ln (EXP)_{t-i} - 1 + \delta ECM_{t-1} \)  

Where \( \beta_0, \beta_1, \beta_2, \text{ and } \beta_3 \) are parameters, \( t \)-represents variables lagged by one period, \( \delta ECM \) is log of export, ln (EXP) is the log of exports, ECM is the error correction term which denotes the speed of adjustment to the long-run equilibrium level, and \( \varepsilon \) is the error term. The ARDL method follows two steps for long-run relationships that is examining the existence of long-run relationships among all variables in the equation estimation and estimating both the short-run and long-run coefficients on the same equation, (Sulaiman, Baharin, & Al-, 2019; Sakyi et al. 2014; Pesaran et al., 2001). To run the second step it requires first to find a long run casual relationship in the equation conducted by command limiting assumptions the variables coefficient estimation. The null hypothesis will be \( H_0: \beta_1 = \beta_2 = 0 \).
(There are no long run casual relationships) and the alternative hypothesis are H1: β1 ≠ β2 ≠ 0 (There is long-run relationship). The F-test has a nonstandard distribution which depends on whether the variables in the model are I (0) or I (1) the number of variables and the model contains an intercept (trend) or not. The test includes asymptotic critical value bounds based on whether the variables are I (0) or I (1) or both. Two sets of critical values of I (1) variables are referred to the upper bound critical values and I (0) refers to the lower bound critical values. The null hypothesis is no co-integration among the variables and the alternative hypothesis is there is cointegration among the variables. If the F-statistics value is larger than the upper bound critical value, we can reject the null hypothesis of no cointegration, which confirms that there is evidence of long-run relationships among the variables irrespective of whether the variables are I (0) or I (1). If the test statistics value is below the lower bounds critical value we cannot reject the null hypothesis, and if it is between the upper and lower bound critical values the test will be inconclusive. After the co-integration equation is established, the lag length is selected using the model selection criteria of Akaike’s Information Criteria (AIC) for selecting the maximum relevant lag length. The short-run dynamics specification of the ARDL model is derived by constructing an Error Correction Model (ECM) on which all the coefficients of the short-run equation are relating to the long-run dynamics of the model convergence to equilibrium and the coefficients of the ECM model in the equation represents the speed of adjustment. The coefficients of the ECM model measures the departure from the long-run equilibrium which can be corrected in the short-run. For determining the ARDL model goodness of fit, diagnostic tests of the model are required such as the serial correlation, normality, and heteroscedasticity of the model. The structural stability tests are needed to be tested by using cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals.

**EMPIRICAL RESULTS AND DISCUSSION**

The objectives of this research paper is to investigate the short-run and long-run relationships between GDP growth, export, and imports in Ethiopia using ARDL and ECM model estimation techniques using a time series data of Ethiopia from 1981-2017. Moreover, the Granger causality testing methods are also applied to find the causality relationship between the variables. Applied variables in this empirical research paper are GDP growth (GDPG), natural logarithm form of Export (ln EXP.), and natural logarithm form of Imports (ln IMP) of Ethiopia.

**Stationarity Test Result:**

For the stationarity test of the variables, we used a conventional Augmented Dickey-Fuller (ADF) tests and the Phillips-Perron test (Fernández, 2018; Elliot et al., 1996; Phillips and Perron, 1988). The stationarity test result attached in Table 4.1 indicates that some of the variables are integrated at level I(0) and others at first differences I (1), and some are mixed. This mixed stationarity test result leads us to apply ARDL model which is the appropriate model to estimate a consistent and effective estimations in mixed integration test result cases.

**Table 4.1: Unit Root Test Results Using ADF and PP**

| Variable | Test Type | ADF | PP |
|----------|-----------|-----|----|
|          |           | t-statistics (at Level) | t-statistics (First difference) | t-statistics (at Level) | t-statistics (First difference) |
| Constant |           | -4.248182* | -7.398888* | -4.248182* | -7.398888* |
| GDPG     | Constant & trend | -5.405763* | -5.285705* | -5.405763* | -5.285705* |
|          | None      | -2.818870* | -7.500149* | -2.818870* | -7.500149* |
| Ln EXP   | Constant & trend | -1.003299 | -1.502377 | -1.307463 | -1.502377 |
|          | None      | 1.623048 | -3.499347 | 2.552377 | -3.499347 |
| Ln IMP   | Constant & trend | -1.030201 | -9.027948 | 0.798820 | -9.027948 |
|          | None      | 1.253120 | -6.919328 | 3.066703 | -6.919328 |

Note: * and ** represent a rejection of null hypothesis of presence of unit root at 1% and 5% respectively.

Source: Author’s Calculations Using E-view 10.

**Lag Order Selection:**

Selecting the number of lags and choosing the optimum lag of the model are done using Akaike Information Criterion (AIC) based on, (Nkoro & Uko, 2016; Pesaran and Shin, 1999; Narayan, 2004). We selected lag 2 as the maximum order of lags for this ARDL model and the optimum lag is lag 2 using Akaike Information Criterion as illustrated in Table 4.2.

**Table 4.2: Lag Order Selection Criteria**

| Lag | LogL   | LLR | FPE | AIC | SC  | HQ  |
|-----|--------|-----|-----|-----|-----|-----|
| 0   | -143.732 | NA  | 0.879076 | 8.384700 | 8.518016 | 8.430721 |
| 1   | -68.21776 | 133.7685 | 0.019708 | 4.583872 | 5.117134 | 4.767954 |
| 2   | -49.02556 | 30.70752 | 0.011156 | 4.004461 | 4.934670 | 4.323604 |

Note: * indicates lag order selected by the criteria. Source: Author’s Calculations Using E-view 10.
Co-integration Test Result:
We did a co-integration test to check whether there is a long-run relationship between the dependent and independent variables used interchangeably for all the three variables. The long-run bound test result illustrated in Table 4.3 shows that there is a long-run relationship among the dependent and independent variables used interchangeably for all the three variables.

| Dependent Variable | ARDL (F-Statistics) | Outcome | Decision |
|--------------------|---------------------|---------|----------|
| GDPG (2,0,2)       | 14.06*              | Cointegration | Reject HO |
| Ln EXP (2,0,0)     | 5.82*               | Cointegration | Reject HO |
| Ln IMP (2,0,0)     | 10.81*              | Cointegration | Reject HO |

Critical Values: 1% Lower 1% Upper 5% Lower 5% Upper
Actual sample size 35

Note: The values in parenthesis are selected the number of lags using the AIC criterion.
Source: Author’s Calculations. * indicates the rejection of the null hypothesis at 1% level of significance.

Short-run and Long-run Estimation Results:
After testing the co-integration relationships, we estimate the long-run and short-run coefficients using ARDL and ECM estimation methods as illustrated in Table 4.4 & 4.5, respectively. The short-run estimation result indicated that there is a positive and significant relationship between initial GDP growth and the current GDP growth of Ethiopia. The ECM estimation result illustrated in Table 4.5 indicates that in the short-run the initial values of GDP growth has positive and significant effects on the current GDP growth of Ethiopia at 1% significant level.

| D (GDPG) as Dependent Variable: ARDL (2,0,2) | Coefficient | t-statistic | P-value |
|---------------------------------------------|-------------|-------------|---------|
| GDPG(-1)                                    | -1.502194   | -7.193020   | 0.0000* |
| LNEXP**                                     | 10.63406    | 1.703225    | 0.0996***|
| LNIMP(-1)                                   | -4.910987   | -0.948535   | 0.3510  |
| D(GDPG(-1))                                 | 0.520892    | 3.612431    | 0.0012* |
| D(LNIMP)                                    | 2.694595    | 0.454302    | 0.6531  |
| LNIMP(-1))                                  | 14.50720    | 3.025578    | 0.0053* |
| LNEXP (at level equation)                   | 7.079091    | 1.806380    | 0.0816***|
| C                                           | -110.3154   | -3.677030   | 0.0010* |

| D (Ln EXP) as Dependent Variable: ARDL(2,0,0) | Coefficient | t-statistic | Prob. |
|-----------------------------------------------|-------------|-------------|-------|
| LNEXP(-1)*                                   | -0.460737   | -4.024807   | 0.0004*|
| GDPG**                                       | 0.002709    | 0.775952    | 0.4439 |
| LNIMP**                                      | 0.382977    | 3.975409    | 0.0004*|
| D(LNEXP(-1))                                 | 0.302068    | 1.985062    | 0.0563***|
| C                                            | 1.349201    | 2.466768    | 0.0196**|

| D (Ln IMP) as Dependent Variable: ARDL (2,0,0) | Coefficient | t-statistic | Prob. |
|-----------------------------------------------|-------------|-------------|-------|
| LNIMP(-1)*                                   | -0.491779   | -3.763749   | 0.0007*|
| GDPG**                                       | 0.001946    | 0.398948    | 0.6828 |
| LNEXP**                                      | 0.599155    | 4.005045    | 0.0004*|
| D(LNIMP(-1))                                 | -0.332210   | -2.134993   | 0.0393**|
| C                                            | -1.826024   | -2.614846   | 0.0138**|

Note: Conditional Error Correction Regression Results: When D (GDPG), D (Ln EXP) and D (Ln IMP) are dependent Variables Interchangeably. *, **, and *** represent significance level at 1%, 5%, and 10%, respectively.
Source: Own illustration using E-views 10.
Based on the long run ARDL model estimation result shown in Table 4.4 indicated that export (Ln EXP) has a positive and significant long run relationship with GDP growth. Based on the long-run ARDL model estimation result a 1% increase in export (Ln EXP) enhances GDP growth by 0.106% using conditional error correction regression model estimation result at 10% level of significance. Based on the level equation ARDL long-run estimation results a 1% increase in export (Ln EXP) results 0.071% increase in GDP growth at 10% significance level. This study result indicated that in the long-run export supports the growth of GDP on the Ethiopian economy. Alternatively, in the long-run when export (Ln EXP) is dependent variable GDP growth has a positive effect on export but it is not statistically significant. The empirical study finding shows that there is a long-run positive relationship between GDP growth and export (Ln EXP) in the Ethiopian economy. This empirical result proved previous empirical findings of the export-led growth strategy and the growth-led export strategy can encourage GDP growth in the long-run specifically in the Ethiopian economy. The short-run ECM estimation result implied that export (Ln EXP) is affected by its initial values, for a 1% increase in its initial values of export results in an increase in current export by 0.30% at 5% significance level. This study result also indicated that the long-run relationship between GDP growth and import (Ln IMP) is positive but not significant. This result implies that in the long-run import (Ln IMP) has positive effect on the growth of GDP in the Ethiopian economy. The short-run estimation result of the ECM model in Table 4.5 implied that import has positive and significant effects on the growth of GDP in Ethiopia at 1% significant level. The ECM short-run estimation result indicated that import is negatively affected by its initial values at 1% significance level. The long-run ARDL bound test regression result indicates that there is a bidirectional positive and significant relationship between export (Ln EXP) and import (Ln IMP) at 1% level of significance. Based on the long-run ARDL model estimation result for a 1% increase in export (Ln EXP) results in an increase in import (Ln IMP) by 0.60% and for a 1% increase in import (Ln IMP) results in a 0.38% increase in export both at 1% significance level. This empirical study ECM model estimation result indicated that the coefficients of the ECM term are significant with the right sign (negative sign) for all the three models. The coefficients of the ECM model shows that in the long run for all the three models the independent variables can correct the disequilibrium on the dependent variable on the Ethiopian economy. When GDP growth is a dependent variable the result of the ECM coefficient indicated that the speed of adjustment between the short-run and long-run dynamics is very fast. When Export (Ln EXP) is a dependent variable the result of the ECM coefficient shows that 46.07% of the divergence between the short run and long-run dynamics is corrected within the next year at 1% significance level. Similarly, when import (Ln IMP) as a dependent variable the ECM coefficient implies that 49.18% of the discrepancy between the short run and long-run dynamics is corrected within the coming year at 1% significance level. For these two models the coefficient implied that the speed of adjustment between

| D (GDPG) as Dependent Variable | Coefficient | t-statistic | P-Value |
|--------------------------------|-------------|------------|---------|
| D(LNIMP(1))                    | 0.520892    | 3.838731   | 0.0006  |
| D(LNEXP(1))                    | 2.694595    | 0.757348   | 0.4552  |
| Count-Eq (-1)*                 | 14.50720    | 4.080045   | 0.0003  |
| D (Ln EXP) as Dependent Variable| -1.502194   | -7.889872  | 0.0000  |
| D (Ln EXP(1))                  | Coefficient | t-statistic | Prob.   |
| Count-Eq (-1)*                 | 0.302068    | 2.519358   | 0.0173  |
| D (Ln IMP) as Dependent Variable| -0.460737   | -5.061046  | 0.0000* |
| D (Ln EXP(1))                  | -0.332210   | -2.958625  | 0.0060* |
| Count-Eq (-1)*                 | -0.491779   | -6.896567  | 0.0000* |
| Diagnostic Test Results of the Models using , , and as a Dependent Variable, Respectively | D(GDPG) | D(Ln EXP) | D(Ln IMP) |
| R-squared                      | 72.19%      | 44.31%     | 51.58%  |
| Adjusted R-squared             | 69.49%      | 42.62%     | 50.11%  |
| Akaike info criterion          | 5.92        | -1.65      | -1.06   |
| Normality (Jarque-Bera test)    | 70.34%      | 80.13%     | 56.69%  |
| Breusch - Godfrey Serial Correlation LM Test: | 11.44% | 96.96% | 99.99% |
| Heteroscedasticity test(H0:Homoscedasticity) | 37.70% | 92.20% | 15%   |
| Stability using CUSUM techniques within a 5% significance level | Stable | stable | stable |
| Stability test result using CUSUMSQ techniques within a 5% significance level | Stable | Stable | Stable |

Note: * & ** represents significance level at 1% and 5%, respectively. All diagnostic test results are acceptable based on the criteria. Source: Own Illustration Using E-Views 10.
the dependent and independent variables is moderate but for the first model the speed of adjustment is very fast. The result of the model’s goodness-of-fit test is done and evaluated by using diagnostic tests and the stability tests. The model’s diagnostic tests result in that there is no problem of serial correlation and heteroscedasticity and the models are normally distributed. The estimation models stability test results are also indicated that all the models are stable in both the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) statistics testing methods within 5% significance level.

**Granger Causality Test Results:**

To determine the patterns of relationship between variables Granger has established the causation investigation system (Jouini 2015; Lynn, 2015). If the present and previous values of export or import increase the estimation of the coming values of GDP growth, then it can be said that import or export Granger caused GDP growth. This empirical research Granger causality test result indicates that there is a unidirectional causality relationship from imports (Ln IMP) to GDP growth (GDPG) and, from exports (Ln EXP) to GDP growth (GDPG). The Granger causality test result also implies that there is a bidirectional Granger causality running from exports (Ln EXP) to imports (Ln IMP) in Ethiopia. Based on this empirical research regression result of the pairwise Granger Causality tests we found one-way short-run causality relationship from import (Ln Imp) to GDP growth at 1% significant level which indicates that import causes GDP growth in the short run. The short-run causality between GDP growth and Export shows that export (Ln EXP) causes GDP growth at 1% significant level. The short-run pairwise Granger causality test result shows that there is a bidirectional causality relationship between imports (Ln IMP) and export (Ln EXP) at 5% significant level.

This empirical study proved the presence of a causal link from export to GDP growth of Ethiopia, which is an implication of great consequence on development strategies for developing countries by showing export plays an important role in the economic growth of Ethiopia. Our research Granger causality finding support in the short run both a theory of Export-led growth, import led growth, and export-led import and import led export growth hypothesis in the Ethiopian economy.

**Table 4.6: Granger Causality Test Results**

| The null hypothesis (Ho): | There is No Causality Relationship Between Variables | F-Statistics | Prob. Value | Decision |
|---------------------------|----------------------------------------------------|--------------|-------------|----------|
| Ln EXP does not Granger Cause GDPG | 13.9265 | 0.0001* | Reject HO |
| GDPG does not Granger Cause Ln EXP | 0.20662 | 0.8193 | Accept HO |
| Ln IMP does not Granger Cause GDPG | 12.5589 | 0.0001* | Reject HO |
| GDPG does not Granger Cause Ln IMP | 0.32654 | 0.7239 | Reject HO |
| Ln IMP does not Granger Cause Ln EXP | 4.38792 | 0.0213** | Reject HO |
| Ln EXP does not Granger Cause Ln IMP | 4.91582 | 0.0142** | Reject HO |

Note: *, ** represents level of significance at 1% & 5% level, respectively. Source: Own Illustration Using E-Views 10.

**CONCLUSION**

This empirical research examined the co-integration and dynamic relationships among export (Ln (EXP)), import (Ln (IMP)) and GDP growth (GDPG) of Ethiopia using a time series data from 1981-2017. The ARDL bounds test approach, Error Correction Model (ECM), and the Granger causality methods are applied. This study paper discussed on the economic theories of growth led export, export-led growth, growth led import, import led growth, export-led import, and import led export hypothesis. These hypothesis study result can contribute an important input for future economic empirical studies, policymakers, and other government officials to give a supporting input data for improving the country’s economic growth policy preparations both in the short run and in the long run. Before applying the ARDL model, we examined a unit root test using Augmented Dickey-Fuller (ADF) and PP testing techniques. Selecting the number of lags and choosing the optimum lag of the model is done by using Akaike Information Criterion (AIC). Empirical test results of this study indicated that one variable is stationary at level 1 (0) and the other variables are integrated at first difference 1 (1). This study found a long-run relationship (cointegration) among the variables, which lead to us to apply Error Correction Model (ECM). This research paper empirical finding implied that there is a one-way long-run causality relationship from Export to GDP growth. Moreover, the ARDL model long-run estimation result indicated that there is a bidirectional long-run relationship between exports and imports in Ethiopia. In the long run, there is a positive and significant relationship between export and GDP growth, while the long-run relationship between import and GDP growth is also positive but not significant. The long-run ARDL model empirical result indicates that the elasticity of export with respect to import is 0.383. Moreover, the long-run elasticity of import with respect to export is 0.599. This result implied that the Ethiopian economy trade deficit may continue with the indication of the increase in import results higher than the rise in exports proportionally. However, the rise in export results in the increase in import lower than proportionally. Furthermore, this empirical study result implies that there is a co-integration relationship from the ECM models with the right sign. The error correction model cointegration equation coefficient indicated that the short-run disequilibrium from the independent variables to the dependent variable will be corrected within the coming period. The speed of adjustment is moderate for two models when export and import is a dependent variable, while with a fast speed of adjustment for one model when GDP growth is a dependent variable. The short-run regression result showed that import
enhances GDP growth, while import and export have a positive and significance bidirectional relationship. The Granger causality test result indicated that both export and import causes GDP growth in Ethiopia. Additionally, there is also a bidirectional Granger causality between export and import. In general, this empirical study finding shows that increasing export and import can support the economic growth of the Ethiopian economy in the long run. Based on this empirical study finding the economic growth theories of export-led growth, import-led growth, growth-led import, export-led import, and import led export theories are confirmed in the case of the Ethiopian economy. This study finding policy implication implied that the Ethiopian government can promote the GDP growth of the country by encouraging these mentioned growth strategies.

ACKNOWLEDGMENT

I want to thank my supervisor Professor Liu Haiyun for his supportive guidance in preparing this research paper.

DISCLOSURE STATEMENT

There is no potential conflict of interest in this research paper.

FUND

This research paper didn’t receive any financial grant from governmental, commercial or not-for profit financial agencies.

RESEARCH DATA

The sources of the data that supports this research paper result are openly available at: [https://databank.worldbank.org/data/source/world-development-indicators]; and the final input data is also attached.

REFERENCE

[1]. Agrawal, P. (2014). The Role of Exports in India’s Economic Growth. The Journal of International Trade & Economic Development, 10(3).

[2]. Al-shayeb, A. (2016). Trade openness and economic development in the UAE: an asymmetric approach. Journal of Economic Studies, 43(4), 587–597.

[3]. Albiman, M., & Nn, S. (2016). The Relationship among Export, Import, Capital Formation and Economic Growth in Malaysia. Journal of Global Economics, 4(2), 2–7.

[4]. Ali, G. (2016). Evaluating the Importance of Exports and Its Determinants in Economic Growth of Pakistan: An Empirical Analysis from ARDL Approach. Global Business and Management Research: An International Journal, 8(4), 31–51.

[5]. Ali, S., Alam, K. J., & Islam, S. (2016). Effects of Trade Openness and Industrial Value Added on Economic Growth in Bangladesh. International Journal of Sustainable Development Research, 2(2), 6–11.

[6]. Alvarado, R., Íñiguez, M., & Ponce, P. (2017). Foreign Direct Investment and Economic Growth in Latin America. Economic Analysis and Policy, 56, 176–187.

[7]. Azizi, S. (2018). The Impacts of Workers’ Remittances on Human Capital and Labor Supply in Developing Countries. Economic Modelling, 75(7), 377–396.

[8]. Bakari, S., & Mabrouki, M. (2017). Impact of Exports and Imports on Economic Growth: New Evidence From Panama. Journal of Smart Economic Growth, 21(1), 67–79.

[9]. Balavac, M., & Pugh, G. (2016). The Link Between Trade Openness, Export Diversification, Institutions and Output Volatility in Transition Countries. Economic Systems, 02(01).

[10]. Baldwin, R. E. (2004). Openness and Growth: What is the Empirical Relationship? University of Chicago Press, 02.

[11]. Butt, M. S. (2010). Trade Liberalization and Total Factor Productivity Growth (1971-2007). Pakistan Economic and Social Review, 48(1), 61–84.

[12]. Camarero, M., & Mart, I. (2016). Trade Openness and Income: A Tale of Two Regions. The World Economy, 386–408.

[13]. Castillo, J. C., & Vries, G. D. (2017). The Domestic Content of Mexico’s Maquiladora Exports: A Long-Run Perspective. The Journal of International Trade & Economic Development, 8199(8), 1469–9559.

[14]. Chang, D., Yeh, L., & Chen, Y. (2014). The Effects of Economic Development, International Trade, Industrial Structure and Energy Demands on Sustainable Development. Sustainable Development, 390(3), 377–390.

[15]. Chen, H. (2009). A Literature Review on the Relationship between Foreign Trade and Economic Growth. Journal of Economics and Finance, 1(1), 127–130.

[16]. Coli, A. D. C. M. Miguel A. I., & Nez. (2012). Advanced Statistical Methods for the Analysis of Large Data Sets. Springer.

[17]. Fernández, V. C.-F. T. (2018). The Long-Run Impact of Foreign Direct Investment, Exports, Imports, and GDP: Evidence for Spain from an ARDL Approach. European Historical Economics Society, 128(4).

[18]. Furuoka, F. (2018). Exports and Economic Growth in Sub-Saharan Africa: New Insights from Innovative Econometric Methods Exports and Economic Growth in Sub-Saharan Africa. The Journal of International Trade & Economic Development, 00(0), 1–26.

[19]. Geda, A., & Hussein, E. (2015). The Potential for Internal Trade and Regional Integration in Africa. JAT, 2(1–2), 19–50.

[20]. Gerdtham, A. A. and U.-G. (2011). Relationship between exports, imports, and economic growth in France: evidence from cointegration analysis and Granger causality with using geostatistical models. MP RA Munich Personal RePEc Archive, 10(10).

[21]. Harris, L. (2018). The Dynamics of Globalization: Eight Skeptical Theses. Asia and Africa in the Global Economy, United Nations University Press, 02(02), 23–39.

[22]. Ho, S.-Y., & Ilye, B. N. (2018). Short- and Long-term Impact of Trade Openness on Financial Development in Sub-Saharan Africa. Munich Personal RePEc Archive, 13(84272).
23. Huchet-bourdon, M., & Mou, C. L. e. (2018). The Relationship Between Trade Openness and Economic Growth: Some New Insights on the Openness Measurement Issue. The World Economy, 41(2), 59–76.

24. Hye, Q. M. A. (2015). Exports, Imports and Economic Growth in China: An ARDL Analysis. Journal of Chinese Economic and Foreign Trade Studies, 5(1), 42–55.

25. Jouini, J. (2014a). An International and Comparative Review Linkage Between International Trade and Economic Growth in GCC Countries: Empirical Evidence From PMG Estimation Approach. The Journal of International Trade and Economic Development, 10(4), 37–41.

26. Jouini, J. (2014b). Linkage Between International Trade and Economic Growth in GCC Countries: Empirical Evidence From PMG Estimation Approach. The Journal of International Trade & Economic Development, (5), 37–41.

27. Jouini, J. (2015). The linkage between International Trade and Economic Growth in GCC Countries: Empirical Evidence from PMG Estimation Approach. The Journal of International Trade & Economic Development, 8199(3), 1469–9559.

28. Kahya, M. (2011). An Analysis of the Relationship Between Foreign Trade and Economic Growth in Turkey Over the Period 1980-2009. Website Wwww.Ehl.LaSe, (6).

29. Keho, Y. (2017). The Exports And Economic Growth Nexus In Cote D’Ivoire: Evidence From A Multivariate Time Series. Asian Journal of Economic Modelling, 5(2), 135–146.

30. Kim, D. H. (2011). Trade, Growth, and Income. Journal of International Trade and Economic Development, 20(5), 677–709.

31. Lam, R. C., & Lam, R. C. (2013). Export and growth: a linkage effect perspective. International Journal of Development Issues, 12(1), 53–66.

32. Lynn, K. K. (2015). An Analysis Of The Relationship Between Foreign Trade And Economic Growth In Myanmar During 1990-2014. International Journal of Business and Administrative Studies, 4(4), 114–131.

33. Mehrshad, S., Hosseini, P., & Tang, C. F. (2014). The Effects of Oil and Non-oil Exports on Economic Growth: A Case Study of the Iranian Economy. Economic Research-Ekonomska Istraživanja, 27(1), 427–441.

34. Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) Cointegration Technique: Application and Interpretation. Journal of Statistical and Econometric Methods, 5(4), 63–91.

35. Odhiambo, K. T. M. (2012). A Dynamic Causality Test of Exports and Economic Growth in Zimbabwe. International Journal of Economic Policy in Emerging Economies, 5(3), 231–242.

36. Otalu, J. A., & Anderu, K. S. (2015). An Assessment of the Determinants of Industrial Sector Growth in Nigeria. Journal of Research in Business and Management Volume, 3(7), 1–9.

37. Pradhan, R. P., Arvin, M. B., Hall, J. H., Nair, M., Pradhan, R. P., Arvin, M. B.,…Nair, M. (2016). Trade Openness, Foreign Direct Investment, and Finance-Growth Nexus in the Eurozone Countries. The Journal of International Trade & Economic Development, 8199(11).

38. Rate, R. E. (2017). Real Exchange Rate and Manufacturing Export Competitiveness in Eastern Africa. Journal of Economic Integration, 32(4), 891–913.

39. Raza, M. X. Y. (2017). Relationship Between Export and Economic Growth of Pakistan. International Journal of Economics, Commerce and Management, V(2), 210–231.

40. Sakyi, D., Villaverde, J., Maza, A., & Nkrumah, K. (2014). An International and Comparative Review Trade openness, Income Levels, and Economic Growth: The Case of Developing Countries. The Journal of International Trade and Economic Development, 10(3), 37–41.

41. Samimi, P., & Jenatabadi, H. S. (2014). Globalization and Economic Growth: Empirical Evidence on the Role of Complementarities. PLOS ONE, 9(4), 1–7.

42. Shrestha, M. B., & Bhatta, G. R. (2018). Selecting Appropriate Methodological Framework for Time Series Data Analysis. The Journal of Finance and Data Science, 4(2), 71–89.

43. Sulaiman, A., Baharin, R., & Al-, A. A. (2019). Impact of Import and Export Application of ARDL Model on Egypt. International Journal of Asian Social Science, 9(1), 1–10.

44. Tahir, M., Arturo, M., Estrada, R., & Khan, I. (2015). The role of trade openness for industrial sector development: panel data evidence from the SAARC region. Journal of Asia Business Studies, 10(1), 93–103.

45. Tapşin, G. (2015). The Relationship Between Foreign Trade and Economic Growth in Turkey. International Review of Research in Emerging Markets and the Global Economy (IRREMEM), 1(3), 417–429.

46. Wu, R., & Miranda, M. J. (2015). Exports, Investment, and Production Growth: A Dynamic Heterogeneous Firm Model with Learning and Entry Costs. The Journal of International Trade & Economic Development, 8199(12), 1469–9559.