International Journal of Scientific Research and Management (IJSRM)
||Volume||10||Issue||08||Pages||EM-2022-3725-3731||2022||
Website: www.ijsrm.in ISSN (e): 2321-3418
DOI: 10.18535/ijsrm/v10i8.em02

A Causal Analysis on Foreign Trade and Economic Growth: The Case of Somalia

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Abstract
The relationship between foreign trade and economic growth is one of the most important research areas in the literature because the direction and importance of this relationship can vary from country to country and from time to time. In this study, the causal relationship between Somalia's gross domestic product (GDP), exports and imports for the period 2008-2021 was investigated. Data were obtained from the World Bank database and the website of the Organisation of Islamic Cooperation. For this purpose, whether the series used in the study are stationary or not was investigated by the ADF test and it was determined that all series were integrated at the first level. Johansen Co-integration Analysis was carried out to test the existence of a long-term relationship between the series due to the same level of integration of the series. Here, according to the results of both the trace statistics and the maximum eigenvalue statistics, it is concluded that there is no cointegration vector and it is decided that there is no cointegration relationship between the series. This means that GDP of Somalia is still not largely dependent on the country's domestic production, but depends on other factors such as remittances by Somalis living abroad and financial support from the international community, including budget subsidies, development projects and money spent on refugee problems.

Keywords: Imports, Exports, Economic Growth, Causality, Var model.

1. Introduction

One of the most important indicators that both economists and countries have emphasized from past to present is economic growth. Economic growth can be expressed as an increase in gross product and per capita income (Sungur, Aydın, & Eren, 2016: 187). As a concept, we can define economic growth as an increase in the production capacity of countries and an increase in national income (Tırașoglu, 2013: 375). When today's states are examined, it is seen that every country has a more or less open economic structure. Export and import are among the basic elements for the development and growth of this economic structure. Export is defined as the sale of goods produced by a country to another country or countries, while import is defined as bringing or purchasing goods from another country.

The relationship between exports and economic growth in open economies can be handled in four different ways. The one-way causality relationship from exports to economic growth is called "Export-Led Growth (ELG)". In this hypothesis, exports are shown as the main reason for economic growth, and there are four different approaches in the theoretical infrastructure of this hypothesis. Another relationship between economic growth and exports is a one-way causality relationship from economic growth to exports, and we can call this hypothesis "Exports with Growth Traction".

In this study, it is aimed to determine the relationship between economic growth, import and export. In the study, Somalia was discussed by using Johansen Co-integration and Granger causality test. As the study period, the data in the last 14 years (2008-2021) were examined. In the second part of the study, a literature review on similar subjects will be made and the country(s) used in the relevant studies, the period, the variables used and the results obtained as a result of the method obtained will be examined. In the third part, econometric analysis will be done and the conclusion part and the results of the analysis will be given.

2. Literature Review

TANG (2006) examined the relationship between GDP, Exports and Economic growth between 1980 and 2005 in Hong Kong. ARDL and Granger causality tests were applied to reach the results. The results revealed that there is a bidirectional causality between Exports and Economic Growth in Hong Kong between the relevant years. Apart from this, no causal relationship was found between service exports and GDP (Tang, 2006: 30).

KÖSEKAHYAOGLU and ŞENTÜRK (2006) examined the relationship between exports and economic growth between 1980 and 2005 by considering Argentina, Brazil, India, Turkey, Czech Republic, Hungary, Poland and China in their study. As a result of the study conducted by applying the Granger causality test, while the hypothesis tested for Argentina, Brazil and India from eight countries was not supported, it was concluded that there is a strong causality relationship between exports and national income in the examples of Turkey, Czech Republic, Hungary, Poland and China (Kösekahyaoğlu & Şentürk, 2006: 42).

OSKOOEE and OYOLOLA (2007) examined 44 developing countries from their study. In the study, it is aimed to reach the results by using the relationship between export and economic growth, cointegration and error correction model. According to the results, it was seen that there is a bidirectional causality between the two variables. According to other findings, the export-led growth hypothesis is valid in 60% of the countries used in the study (Oskooee & Oyolola, 2007: 9).

JORDAAN and EITA (2007) investigated the relationship between Exports, GDP and GDP Per Capita in Namibia between 1970 and 2005 by using cointegration and Granger causality tests. As a result of the research, it was concluded that there is one-way causality from exports to GDP and per capita GDP. These findings show that the export-led growth strategy has a positive effect on economic growth (C.Jordaan & Eita, 2007: 540).

MAHADEVAN (2009) examined the relationship between Exports, Imports, Economic Growth and GDP in Singapore. In his study, based on the years 1974-2004, Toda Yomato aimed to reach a conclusion with the help of causality, cointegration and VAR models. As a result of the empirical study, the author revealed that there is a bidirectional causality between Import and Economic Growth, Export and Economic Growth (Mahadevan, 2009: 243-244).

Reizman, Summers, and Whiteman (1996) concluded from their study that imports play an important role in the relationship between exports and economic growth. According to their findings; if imports are not taken into account, the export-economic growth relationship reveals false results. According to the results obtained by the authors by creating a multivariate time series model between exports, imports and economic growth; there is a one-way causality relationship from export growth to GDP growth in 30 countries out of 126 countries.

SANDALCILAR (2012) examined the relationship between Economic Growth and Exports in BRIC (Brazil, Russia, India, China) member countries. In the study, the period between 1993 and 2010 was selected and panel unit root, panel cointegration and panel causality tests were applied as methods. Empirical results show that there is causality from exports to economic growth in both the short and long run. This supports the export-led growth hypothesis (Sandalcılar, 2012: 161).

GUAN and HONG (2012) examined the relationship between Exports, Imports and Economic Growth in the United States. Cointegration, VAR and Granger Causality tests were used as a method based on the years 1960-2010. The results showed that there is a bidirectional causality between exports and economic growth, and a unidirectional causality from imports (Guan & Hong, 2012: 39).

3. Econometric Method

In the econometric framework, the concept of stationary basically refers to a situation where the mean and variance of a series do not change over time, and the covariance does not change depending on time in any two temporal sections. The concept of stagnation is a situation that needs to be investigated in terms of eliminating possible false relationships.

There are many methods for investigating the stationary of the variables considered in an analysis. In addition to the tests developed on this subject, graphical methods can also give an idea for determining the stationary of a series. However, it is difficult to decide whether a series is stationary or not with graphical

methods. For this reason, unit root tests developed on this subject are frequently used in applied research. The Extended Dickey Fuller (ADF) test is one of the most developed and frequently applied unit root tests.

3.1. Extended Dickey Fuller Test

Dickey and Fuller started their work by taking a data creation process as a first-order autoregressive process. Basically first-order autoregressive process

$$Y_t = \rho Y_{t-1} + \varepsilon_t \quad (1)$$

He stated that the series is stationary in the case of |ρ|<1. Afterwards, the expression Y (t-1) was removed from both sides of the equation and the equation was rearranged to be δ=ρ-1.

$$\Delta Y_t = \delta Y_{t-1} + \varepsilon_t \quad (2)$$

Equality has been achieved. Therefore, stationary is valid at δ=0.

The author developed the test and adapted it to higher order autoregressive processes. In addition, constant term and trend variables were added to the model, and a test was performed for three different models as unconstant-no-trend, constant-no-trend and constant-trend. In this case, the models are expressed as follows, respectively.

$$\Delta Y_t = \delta Y_{t-1} + \sum_{i=1}^{k} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (3)$$
$$\Delta Y_t = \mu + \delta Y_{t-1} + \sum_{i=1}^{k} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (4)$$
$$\Delta Y_t = \mu + \beta T + \delta Y_{t-1} + \sum_{i=1}^{k} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (5)$$

The stationary condition for all three models does not change and is expressed as δ=0.

One of the important points in this test, which is called the ADF test, is to determine the number of lags in the models. For this purpose, the lag number that minimizes the Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC) values is used as the appropriate lag number.

3.2. Cointegration Analysis

The existence of a systematic movement between the variables in the long run is expressed by the concept of cointegration. Co-integration analyzes can be performed to determine whether series that are not stationary but integrated at the same level come to equilibrium in the future and act in a position that affects each other. In more mathematical terms, series that are not stationary on their own but whose linear combinations are stationary are considered cointegrated.

Johansen Cointegration Analysis is one of the most frequently used analysis methods when more than two variables are handled. This method is basically based on Vector Autoregressive Models (VAR). Again, the appropriate number of delays in a VAR model is also valid for Johansen Cointegration Analysis. For example, for a VAR model 1 lag number consisting of two variables can be specified as. Matrix representation of a VAR model with k passes when the number of variables is expanded can be displayed as Here, taking the difference of the equality, the equality converted to this format.

$$X_t = \beta_0 + \beta_1 X_{t-1} + \beta_1 Y_{t-1} + \varepsilon_{1t} \quad (6)$$
$$Y_t = \alpha_0 + \alpha_1 X_{t-1} + \alpha_1 Y_{t-1} + \varepsilon_{2t} \quad (7)$$
$$Z_t = \sum_{i=1}^{k} A_i Z_{t-i} + \varepsilon_t \quad (8)$$
$$\Delta Z_t = \sum_{i=1}^{k-1} r_i Z_{t-i} + \pi Z_{t-i} + \varepsilon_t \quad (9)$$

This transformation can be described as the cointegration transformation. In the equation, the π matrix is expressed as π=αβ. In this expression, β indicates the cointegration matrix, while the parameter α indicates the weights of the parameters of each cointegration vector.

In Johansen Cointegration Analysis, the rank of the π matrix shows the cointegration relationship. When the rank is 0, it can be said that there is no cointegration relationship, while in the case of r, it can be said that there are r cointegration relationships.

To determine the rank of the π matrix, Johansen developed two separate tests using the trace statistics and the maximum eigenvalue statistics. Trace statistic when showing λ eigenvalues and maximum eigenvalue statistic can be calculated as

$$\lambda_{iz} = -T\sum_{i=1}^{k}\ln(1-\lambda_i) \quad (10)$$
$$\lambda_{max} = -T\ln(1-\lambda_i) \quad (11)$$

3.3.Granger Causality Analysis

Granger Causality Analysis was developed to determine from which variable to which variable the causality of the relationship is in case of a lagged relationship between the two variables. On the other hand, causality is basically based on economic theory, the existence of a statistical relationship should not always be perceived as a causal relationship.

Granger (1969) developed a test for this purpose in his study. This test is basically based on a VAR model. For example, a two-variable model is displayed as.

$$X_t = \alpha_1 + \sum_{i=1}^{n}\theta_i X_{t-i} + \sum_{j=1}^{m}\delta_i Y_{t-j} + \varepsilon_{1t} \quad (12)$$
$$Y_t = \alpha_2 + \sum_{i=1}^{n}\beta_i X_{t-i} + \sum_{j=1}^{m}\gamma_i Y_{t-j} + \varepsilon_{2t} \quad (13)$$

Here, Granger's basic approach is whether the prediction of the Y variable is successful in the case where the lagged values of the X variable are used than when it is not used. The fact that the case where lagged values are used is more successful shows that the X variable is the Granger Cause of the Y variable. In general, the possible situations can be summarized through these two equations as follows:

• If the lagged values of X and Y in Equations (12) and (13) are not different from zero, it can be said that these two variables are not Granger Causes of each other.

• If the lagged values of X and Y in equations (12) and (13) are different from zero, it can be said that these two variables are Granger Causes of each other.

• If the lagged values of Y in Equation (12) are significant and the lagged values of X in Equation (13) are meaningless, it can be said that Y is the Granger Cause of X.

• If the lagged values of Y in Equation (12) are meaningless and the lagged values of X in Equation (13) are significant, it can be said that X is the Granger Cause of Y.

4. Data and Empirical Findings

In this study, the causal relationship between Somalia's gross domestic product (GDP), exports (EXPORT) and imports (IMPORT) for the period 2008-2021 was investigated. Data were obtained from the World Bank database and the website of the Somali Statistics Office.

In order to analyze whether the causality relationship mentioned above exists, first of all, it was investigated whether the series used in the study contain unit root, in other words, whether they are stationary. Extended Dickey Fuller Test (ADF) results performed for this purpose

• Constant-Trendless

• Fixed-Trendless

• Fixed-Trend

It was applied for the models and the results are given in Table 1.

Table 1 ADF Unit Root Test Results

	Fixed-Trendless		Constant-Trendless		Fixed-Trend	
	t-statistics	p-value	t-statistics	p-value	t-statistics	p-value
GDP	1.05	0.91	-0.28	0.90	-2.78	0.24
D_GDP	-2.67	0.01	-3.47	0.04	-6.84	0.00
EXPORT	0.46	0.80	-0.96	0.73	-1.79	0.65
D_EXPORT	-2.95	0.01	-3.30	0.04	-5.49	0.01
IMPORT	1.00	0.91	-0.55	0.85	-2.29	0.41
D_IMPORT	-2.80	0.01	-3.52	0.03	-6.05	0.01

As can be seen in the table above, the gross domestic product of Somalia is first level integrated. For this purpose, the variable was made stationary by taking the first order difference of this variable (D_GDP). The same is true for export and import variables. These variables were not found to be stationary at the level, but became stationary when first-order differences were taken. Variables are made stationary by taking the first order difference for the export variable (D_EXPORT) and taking the first order difference for the import variable (D_IMPORT).

Since the three series used in the study were integrated at the same level, cointegration analysis was performed to determine the existence of a long-term relationship between the variables. For this purpose, it will first be established

• No fixed term-no trend

• Fixed term-trend

• Linear-constant-term-trendless

• Linear- constant term-trend

• Quadratic-constant-termed-trend

The appropriate model was determined among the models. Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC) were used to determine the appropriate model. The model that made these criteria the smallest was evaluated as the appropriate model.

Table 2 Determination of the Appropriate Model for Cointegration Analysis

Model	**AIC**	**SIC**
No fixed term-no trend	125.22	125.83
Fixed term-trend	124.67	125.32
Linear-constant term-trendless	124.09*	124.82*
linear-constant term-trend	124.23	125.00
Quadratic-constant termed-trend	124.28	125.13

Table 2 shows the AIC and SIC values of the possible models for the structure of the model to be established for cointegration analysis. Among these values, the linear, constant term and trendless model was determined as the most suitable model according to both criteria.

After determining the appropriate model, Johansen Cointegration Analysis was performed and the results are given in Table 3.

Table 3 Johansen Cointegration Test Results

		İz		**Maximum Eigenvalue**	
hypotheses	**Eigenvalu**	**test Statistics**	**p-value**	**test Statistics**	**p-value**
No	0.80	27.41	0.09	19.14	0.09
No more than 1	0.49	8.28	0.44	8.15	0.36
No more than 2	0.01	0.13	0.72	0.13	0.72

According to the Johansen Cointegration Test results in Table 3, both the trace and the maximum eigenvalue test statistics did not show the existence of a long-term relationship between the variables. In the tests for the existence of at most 2 cointegration vectors, the null hypotheses that the cointegration vector exists were rejected at the 95% confidence interval.

Granger Causality Analysis was used for the existence of a causal relationship between the variables. For this purpose, first of all, a Vector Autoregressive Model (VAR) was established and the appropriate delay number was determined.

Table 4 VAR Model Number of Lags

Number of lags	AIC	SIC	HQ
0	124.30	124.39	124.20
1	124.87	125.23	124.47
2	119.63	120.26	118.93
3	-57.41*	-56.50*	-58.41*

Table 4 shows the AIC, SIC and Hannan Quinn Information Criteria (HQ) values for determining the appropriate lag number to be used in Granger Causality Analysis. Here, tests could be made up to 3 lags due to the availability of data, and since the information criteria took the smallest value in the third delay, the appropriate number of lags was determined as 3.

Table 5 Granger Causality Analysis Results

Null Hypothesis	F-Statistics	p-value
D_GDP Is Not a Granger Cause of D_EXPORT	0.17	0.91
D_EXPORT Is Not a Granger Cause of D_GDP	0.09	0.96
D_IMPORT Is Not a Granger Cause of D_EXPORT	0.17	0.91
D_EXPORT Is Not a Granger Cause of D_IMPORT	0.09	0.96
D_IMPORT Is Not a Granger Cause of D_GDP	1.00	0.50
D_GDP Is Not a Granger Cause of D_IMPORT	1.21	0.44

According to the Granger Causality Analysis results in Table 5, it can be said that there is no causal relationship between gross domestic product, exports and imports for Somalia in the period considered.

5. Conclusion And Recommendations

The progress of international trade increases the productivity of countries, ensures technological development, increases foreign exchange input and thus leads to growth. For this reason, foreign trade is one of the most basic factors affecting the development level of a country.In this study, the causality relationship between GDP, exports and imports was investigated by using 2008-2021 period data for Somalia. For this purpose, whether the series used in the study are stationary or not was investigated by the ADF test and it was determined that all series were integrated at the first level. Johansen Co-integration Analysis was carried out to test the existence of a long-term relationship between the series due to the same level of integration of the series. Here, according to the results of both the trace statistics and the maximum eigenvalue statistics, it is concluded that there is no cointegration vector and it is decided that there is no cointegration relationship between the series.

Granger Causality Analysis was conducted to investigate the existence of a causal relationship between the variables used in the study. For this purpose, first of all, a VAR model was established and the appropriate delay number was determined as 3. Afterwards, Granger Causality Test was performed and it was decided that there was no causality relationship between the variables. However as It can be seen the result above The GDP of the country does not affect by foreign trade and foreign trade not effect by GDP, so that means the economy is still not depend on the domestic production of the country but it depends on other factors such as the remittances of Somalis living abroad, Revenues from the telecommunications service sector and the financial support of the international community including budget subsidies, development projects and money spent on refugee issues.

So the government should work on increasing the domestic production of the country by taking these steps;

- ✓ Developing economic infrastructure.

- ✓ Promoting industrial production
- ✓ Strengthening the internal financial sector
- ✓ Attracting foreign investments to the country
- ✓ Promoting agricultural production

Implementing to the above steps can help Somalia; Benefiting from the country's resources such as agriculture, animals and sea products, also can help increasing foreign trade, reducing unemployment and increasing employment. If as a result achieving economic independence.

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