Export Led Growth in Libya Empirical Investigation

KHUMKHEM Mossttafa (PhD)[1]

[1] *Lecturer-economic Department Faculty of Economics Azzaytuna University Libya (LIBYA)*

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Abstract

The aim of this paper is to examine the nexus between exports and economic growth in Libya through time-series analysis. The study investigates how exports have led to the overall economic development in Libya, indicating a higher bias on export lead economic growth hypotheses. The paper is divided into four sections. The first section is an introduction of the paper, the second section presents identification of economic growth and trade indicators, the third section presents the empirical results of research objective, and the fourth section concludes the paper.

Introduction

Libya is one of the middle-income countries in Africa that has for decades been using foreign trade as a vehicle of economic growth, as opposed to many other countries that have been using foreign aid for the same purpose. Foreign trade favours different types of exports and import that leads to different outcomes of economic growth. Libya, being a dessert country cannot rely on primary goods to spur its economy. Primary goods are regarded as agricultural products, and other raw material and economic growth based on these products is regarded as primary-export led growth (Ashley, 1988).

For many countries in Africa, reliance on exports of raw materials and food remains principles means by which they generate resources, for economic growth. However, Libya cannot depend on these primary exports as a vehicle of economic development.

For Libya to increase the quality of life of its citizens, GDP and GDP's socially acceptable distribution has to be achieved through macroeconomic policies. There are different approaches that this target can be achieved through, of which promotion of exports is one. In particular, in the post-1980 period, with the motivation provided by the Washington Consensus, economist and researchers are concerned with how promotion of exports may lead to higher economic growth and vice-versa (Berndt, 1991). Literature indicates that there are two hypotheses to this argument: one group of economist favours the export led economic growth while others are in favours of growth driven export hypotheses.

Though most of the existing evidence indicates that the relationship between economic growth and exports is bi-directional, the research presented in this chapter is concerned with export lead hypothesis in the case of Libya. The chapter attempts to investigate whether Libya's export has led to the observed state of economic growth in the country. Therefore, the chapter does not deal directly with policies of export promotion such as subsidies and exchange rate depreciation. The bi-directional relationship between export and economic growth in many instances has been blamed for the indecision of many policy makers and researchers in developing countries. Governments are caught between open economies that promote international trade and concentrating on economic activities that would lead to higher international trade. To evidence this, it should be noted that the, rapid growth observed in China, and India is largely because of expansion of their exports. The successes witnessed in these two countries are because of open economies and access to technology through globalization of their economies. Export from a country leads the country to access international markets, which in turn demands increased production and efficient allocation of resources (Phillips and Perron, 1998).

Thus, trade invariably contributes to economic growth by way of generating long-term gains.

Therefore, Libya is an interesting case study of export lead economic growth relationship.

Indicator of Economic Growth

GDP is the ever-controversial icon from the statistics world. It ignores values like the environment and social cohesion, it measures growth, but not destruction, and it measures income, but not equality.

Yet most people including businesses and governments swear by it. Value of goods and services produced in a country is subject to the statistics, which are not easy to gather. Moreover, many undocumented parts of the economy, such as the black market, make the calculations further difficult.

Calculation of GDP is a sophisticated procedure that must have the ability to include each and every value addition in the accounts from as small as a service of hair cut to as large as the production of aeroplanes. Each component is measured in terms of relative price in GDP.

Indicators of Trade

Exports and Imports

Exports and imports of a country are separately used as indicators of trade Libya international trade was highly limited to few goods prior to 1961 due to shortages in foreign earning exchanges.

The levels of goods and service imported and exported from Libya was not high before the discovery of the crude oil in the country. Volume of international trade was as low as $178 million US dollar in 1960 and translated to $2933 billion dollars by 1970. This was affected by the low level of human capital and other economic weakness in the economy. An increase in exportation of Libya crude oil to European countries in and establishment of the first ship part in 1961 was a turning point to the country's international trade. The port aided the country in shipping large quantities of crude oil to European countries (Giovannetti, 1989).

The average value in 1970-2008 was about11820$ million while the growth rate during that period is approximately equal to the rate of growth of exports during the same period, which amounted to 28.2%. This was ranging between the highest rate in 1974, which rose to 89%, and lowest in 1975, which fell to – 5%, coinciding with the rate of export growth, which confirms the that foreign trade growth rate effected by export growth. This was due to the oil boom and the economic recovery experienced by the country during this period, which was caused by the high revenues of oil exports.

This led to the rise in the value of exports, and its impact on the rising value of imports from consumer and capital goods needed for development programs in that period (Shaltout, 1987).

The last decade in the 20th century had many of turmoil in the global economy. This in turn negatively affected developing countries. It was at one time described as lost decade for developing countries, due to the accumulation of external debt with a very high international interest rates, and deterioration in terms of trade exchange. Technological progress in advanced countries led to deterioration of demand for raw materials. This period witnessed a decline in the rates of growth of international trade as a reaction to the low rate of growth in the value of exports and imports as shown by the decline in the value of foreign trade of 23953 million Dinar in 1981 to million 16415 in 1985, and continued to fall to 12541 billion in 1988. The average value during the period was 16747 million; the rate of growth of foreign trade during that period fell to – 9% in Libya.

In this period, the value of foreign trade in each year was lower from the previous year; the rate of growth in 1981 was about – 16.6% and – 5% and – 5 % in 1985 and 1988 respectively. This was due to the decline of exports caused by the low oil prices, which was caused by the global economic crisis.

To counteract these effects of economic crisis, Libyan policy makers followed the policy of austerity (Dakhil, and Yousef, 2002). The policy was aimed at influencing on the value of imports.

All these factors influenced negatively on the value of foreign trade and Libya's growth rate during that period.

In the period 1989-2003, in response to fluctuations evident during that period in the value of exports and imports, the value of foreign trade fluctuated, with a general trend of the value of foreign trade rising to 18591 million in 1990, which was 12957 million in 1989, then drops to $16597 million

in 1991. This trend continued between high and low on average of $14614 million, it ends at $15393 million in 2002. The fluctuation was due to the non-stability of external and internal political and economic factors at the time. Most of it emanating from economic embargo imposed on Libya during the period as well as entry of the private sector in various economic fields, in addition to other reasons mentioned in earlier.

There has been considerable development in the value of international trade since the embargo was lifted. This period synchronizes with the suspension of economic sanctions imposed on Libya, which led to the recovery of both exports and imports. Exports during this period reached 28%, the imports growth rate was 35% leading to an increase in the rate of growth value of international trade during the same period to 30.8% and its ratio between 29%, 34% and 56% during the years 2003, 2005 and 2008 respectively. The value of foreign trade rose from 19902$ million in 2002 to 34994$ million in 2005, and continues to rise to 76042$ million in 2008.

Data

The research is a time-series analysis; therefore, the data is annual data. Economic activities have long term effects on each other, monthly or quarterly data might not capture the long-term effect.

This is a reason that annual data is used in the time-series analysis. Data is collected from 1963-2008. The period is chosen because in early 1960s, Libya entered into the regime of oil trade and sent the initial crude oil shipment to Europe. 2008-09 is an era of the global crisis and the reason to use data before 2009 is to exclude the effect of the global crisis on the estimates. The data is retrieved from the sourced in nominal terms that is in current prices. Inflation deflator is used to transform the data into real terms. Hence, the data used throughout the empirical process of the research is in real prices.

Sources of Data

Most of the data used is sourced from the Libyan Central Bank, International Monetary Fund, World Bank and other internet sources that are publicly available. The Central Bank of Libya provides excellent gross domestic product or national income of Libya since 1960s. The Wall Street Journal provides the financial analysis and data reports for Libya within the same period of investigations.

The census bureaus of Libya and its central statistic office provide private and public expenditure data for the Libyan economy. Economic growth data for Libya is available on a yearly basis. Data used in this study is obtained from various sources. The Central Bank of Libya has in its resources the World Development Indicator (WDI). All the data is either real or indexed. If real data is not available in real form, it is transformed from nominal to real using an indicator of inflation.

Model Specification

The objective in the section is for the relationship between trade and economic growth. Let *X*, *M*, and *Y* are the indicators of exports, imports, and economic growth of Libya. Then a linear relationship between the three variables can be represented as:

$$Y_t=f(X_t, M_t) \qquad (1)$$

Equation 1 is a representation of economic growth as a linear function of exports and imports. If economic growth is considered an autoregressive process (a process, which depends on the past values of itself), then equation 1 might become:

$$Y_t=f(X_t, M_t, Y_{t-1}) \qquad (2)$$

Equations 1 and 2 can be written as regression equation as follows:

$$Y_t=\alpha_1 + \beta_{11}X_t + \beta_{12}M_t + u_{1t} \qquad (3)$$

$$Y_t=\alpha_2 + \beta_{21}X_t + \beta_{22}M_t + \beta_{23}Y_{t-1} + u_{2t} \qquad (4)$$

Where, α_1 and α_2 are intercept values of the indicator of economic growth in equation 3 and 4 respectively. β_{11} and β_{21} measure the effect of exports of Libya and β_{12} and β_{22} measure the effect of imports of Libya on the economic growth of the country in equation 3 and 4 respectively. β_{23} in equation 4 measures the effect of economic growth of Libya in the previous on economic growth of Libya in the current year. u_{1t} and u_{2t} are the error terms of the two regression equations, these error terms capture the effect of all those factors that are not included in the equations 3 and 4. *X* and *M* are measures of exports and imports.

Mythology

Augmented Dickey Fuller test (Test of Stationary Series)

We perform a unit root test on each variable in our model using the Augmented Dickey-Fuller (ADF) test. ADF test is applied on each time series. Let A_t be a time series, and then following hypothesis can be formulated to test the existence of unit root in Y_t.

$$\Delta A_t=\alpha + \gamma t + \beta A_{t-1} - \theta_1 \Delta A_{t-1} + \mu_t \ldots$$

$$H_0: (\alpha, \gamma, \beta)=(\alpha, 0, 0) \ldots \upsilon \ldots H_1: (\alpha, \gamma, \beta) \neq (\alpha, 0, 0)$$

The joint hypothesis $\gamma = \beta = 0$ is tested performing F-test. If the null hypothesis is not rejected, the next step is the test $\beta = 0$ using t-statistics. Following is the estimation equation,

$$\Delta A_t=\alpha + + \beta A_{t-1} - \theta_1 \Delta A_{t-1} + \mu_t \ldots$$

$$H_0: (\alpha, \beta)=(0, 0); H_1: (\alpha, \beta) \neq (0, 0)$$

Rejection of H_0 requires that series contain a unit root and should contain a drift term. The above-described form uses the values of *Y* and hence it is called the level form. If *Y* is replaced by its initial difference or changed difference with evidence of unit roots, the series are said to be integrated of order one – I (1), meaning that they must be modelled in first difference ($\Delta A_t=at - A_{t-1}$) to make them stationary. A time series is stationary if it does not change overtime, which implies that its values have constant variability. This enables us to avoid the problems of spurious regressions that are associated with non-stationary time series models.

After the confirmation that unit root vanishes at first difference form or second difference form, the series a used to find out long-run relationship. As a non-stationary series, even if not related in the short run, may be related in the long run to the other series. By the short run or long run, it is meant that for annual time series, the complete effect of independent variables on the dependent variable can occur within one year or in more than one year respectively. Johansen's Co integration Test is used to determine the long-run relationship between the variables.

Johansen's Co integration Test

After testing for unit roots, we proceed to test for co integration (long run relationship between variables). This study uses Johansen and Juselius's (1990) definition of co integration. Johansen's co integration procedure was used to test for the possibility of at least one cointegrating vector between variables in the models. Co integration between two series depicts existence of a significant relationship between two variables. Though Ordinary Least Square (OLS) method also does the same, co integration is useful where the series are non-stationary at level form while OLS estimates are spurious in situation. Let *A* and *B* be two non-stationary time series such that their difference with lagged term is stationary.

$$A_t=\alpha + \beta B_t + \mu_t \qquad (20)$$

Where, μ is the residual term. If μ is stationary, then *A* and *B* are cointegrated. For this purpose, ADF test is employed on the residual term. Remember that in OLS, residual terms are assumed to be white noise, that is their mean is zero and variance is constant. Mathematically,

$$E(\mu) = 0,$$

$$Var(\mu) = \sigma$$

Also, the error terms are assumed to follow a normal distribution. Symbolically,

$$\mu \sim N(0, \sigma)$$

Therefore, t-statistics is not appropriate as it uses the values of mean and standard deviation.

Software packages contain a built-in program to test co integration using Trace statistics and Max Eigen statistics. To enhance further clarification of the change in the dependent variable, Vector Error Correction Model is useful.

Vector Error Correction Model (VECM)

Once it is confirmed that the dependent variable is affected by the independent variables in the long run, the changes that occur in the dependent variable in the short run as well as in the long run can be determined by VECM. The result of a VECM depicts whether the dependent variable is above the equilibrium level or below the equilibrium-level and how much of the equilibrium level is achieved in one year. By equilibrium level, it is meant that the value of dependent variable includes the complete effect of the independent variable. In this way, it can be described that how much time is required for a time series variable to adjust in the long run. Let *A* and *B* are two time-series with co integration between them tested via following co integration equations:

$$A_t=\alpha + \beta B_t + EA_t \qquad (21)$$

$$B_t=\theta + \lambda A_t + EB_t \qquad (22)$$

Where, α and θ are intercept values of *A* and *B* respectively. β is the effect of *B* on *A* and λ is the effect of *A* on *B*. *EA* and *EB* are the error term of equations 21 and 22 respectively. Equation 21 and 22 together form a model whose Vector Error Correction Model (VECM) is as follows consisting of two equations:

$$\Delta A_t = \varphi + \psi_1 \Delta B_{t-1} + \psi_2 EA_{t-1} + \mu_t \qquad (23)$$

$$\Delta B_t = \theta + \lambda_1 \Delta A_{t-1} + \lambda_2 EB_{t-1} + \upsilon_t \qquad (24)$$

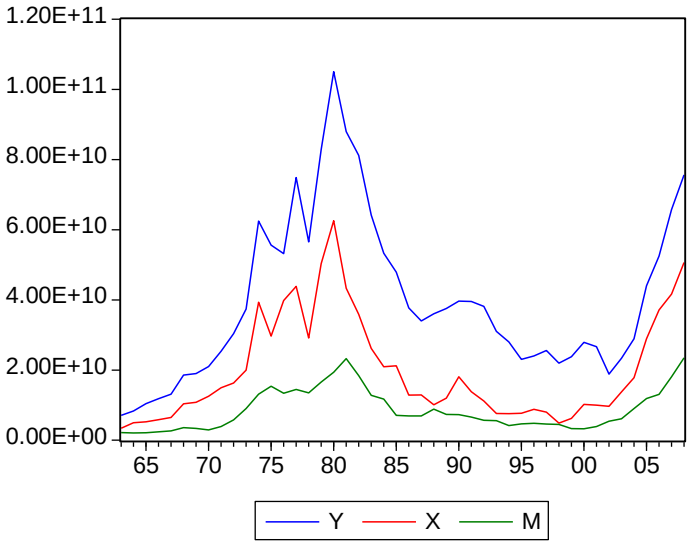
The symbol Δ represents the difference of the corresponding variable from its lagged value. φ and θ are the intercept values of Δ*A* and Δ*B* respectively. ψ_1 is the effect of the change in *B* in the previous year on the change in *A* in the current year and λ_1 is the effect of the change in *A* in the previous year on the change in *B* in the current year. EA_{t-1} and EB_{t-1} are the lagged values of the error terms in equation 19 and 20 respectively. They are called error correction terms with coefficients ψ_2 and λ_2.

According to Robinson (1992), "the error correction term captures the long run relationship, short run dynamics is provided by the lagged values of the difference terms". Using these methods of investigation enables the researcher to prove causality advanced by the granger causality test. The test uses the t statistics and F statistics to test the lagged values of each explanatory variables being investigated. In order to accept the null hypothesis, t-test for the lagged error correction coefficients is to be statistically significant for long term due to the bidirectional causation between the variables (Caner and Kilian, 2001). A significant coefficient of the error correction term implies disequilibrium in the value of the dependent variables. If ψ_2 has a negative sign, it implies *A* is below the equilibrium level, and a positive sign implies that *A* is above the equilibrium level. The magnitude of ψ_2 shows how much of the value of *A* is adjusted in one year towards the equilibrium level. Similar association is defined between λ_2 and *B*.

Empirical Results

This section presents the results of the empirical estimation. As an indicator of trade, data on Libya's total annual export and total annual imports from 1963 to 2008 is collected. GDP of Libya is taken as the indicator of economic growth. Following figure illustrates line graph of the three variables.

Fig. 5.1 Graph of GDP, Exports, and Imports of Libya for 1963-2008



In the above figure, graph of Libya's export, import, and economic growth followed a similar pattern from 1960s to 1980s. The three variables show a drastic increase in their values after 1970.

The level of Libya's export, import, and GDP remained high, with fluctuations, till 1980. After 1980, the three variables declined with a high rate until 1985 and then with low rate until 2000. After 2000, values of the three variables start to increase, reaching at the level of that in 1975. Exports of Libya remained higher throughout the period 1963-2008 but the gap between exports and imports start to reduce after 1985 until 1988. Little changes are observed in imports and the reason of reduced the gap between imports and exports is the decline in Libya's exports. Libya has an average annual GDP of $39.8 billion in the period 1963-2008. In the same period, average annual value of Libya's exports and imports is $19.9 billion and $ 8.58 billion respectively. Maximum GDP of Libya is observed to be $105 billion in 1980, soon after Gaddafi took charge in1970. Minimum GDP of Libya during 1963 and 2008 is observed to be $7.11 billion in 1963. That was the time when Oil field and Oil terminal operations started in Libya and lasted till 1966. Exports and imports of Libya reached the maximum level of $62.6 billion in 1980 and $23.5 billion in 2008 respectively. Imports of Libya are at an increasing trend this is one reason that the highest level of exports during 1963-2008 is observed in 2008.

In section 4.7.3, Augmented Dickey Fuller test is introduced to test stationary series. The test is applied here on GDP, exports, and imports. Following table summarises the result of ADF test.

Table 5.1 Intermediate ADF Test Results Series: Y, X, M

	Level From		**First Difference Form**	
Series	**Prob.**	**Unit Root**	**Prob.**	**Unit Root**
Y	0.5746	Yes	0.0000	No
X	0.6478	Yes	0.0000	No
M	0.6428	Yes	0.0089	No

First, ADF test is employed on the data at level form (without taking any difference) and p-values of the test statistics is calculated to be greater than 0.1 for each of the series of GDP, exports and imports. This shows that there exists unit root in the three series and the series are non-stationary.

Then, ADF test is applied on the first difference (current value subtracted from the previous value) of the series. At first different form, p-value of the each of the series of GDP, exports and imports is less than 0.01. This implies that, there is no unit root in the series at first difference form and at firs difference form, the three series are stationary. As the series, are stationary at difference form, co

integration among the variables can be tested. Johansen co integration is tested using Trace and Max Eigen statistics. Following are the output of the co integration test.

Table 5.2 Unrestricted Co integration Rank Test (Trace) Series: Y, X, M

Hypothesized N. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.
None*	0.345285	31.82515	29.79707	0.0288
Atmost1	0.206660	13.18871	15.49471	0.1081
Atmost2	0.065964	3.002559	3.841466	0.0831

Table 5.3 Unrestricted Co integration Rank Test (Maximum Eigenvalue) Series: Y, X, M

Hypothesized N. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.
None*	0.345285	18.63644	21.13162	0.1078
Atmost1	0.206660	10.18615	14.26460	0.2000
Atmost2	0.065964	3.002559	3.841466	0.0831

According to the results of co integration test using trace statistics, the hypothesis of no-co integration is rejected while the hypothesis of at most one co integration is not rejected. This suggests that there exist one co integration relationship among the three series. However, the result of co integration test using Max Eigen statistics shows that the hypothesis of no co integration is not rejected as the Eigen value is less than the critical value. Therefore, there is no co integration among the variables. This result is same as that found by Abou-Stait (2005) for the case of Egypt. No co integration among Libya's GDP, exports, and imports shows that although the difference of these series with previous values is stationary, there is not linear relationship among them in the long run.

The cointegration equations, uses lagged values of series in the expression. Multiple equations incorporating lagged terms can be formed taking each variable as dependent. Such a model can be formed as either VECM (Vector Error Correction Method) or VAR (Vector Autoregressive Method) as described in Chapter 4. In the presence of co integration, VECM is used otherwise VAR model is used to evaluate temporal dependence in a multivariate time series. Following is the output of the VAR model.

Table 5.4 Vector Auto regression Estimates Series: Y, X, M

	Y	X	M
Y(-1)	-0.488275	-0.841194*	-0.128477
	(0.33342)	(0.26711)	(0.07211)
	[-1.46443]	[-3.14929]	[-1.78168]
Y(-2)	0.734647*	0.314569	0.066116
	(0.34252)	(0.27439)	(0.07408)
	[2.14485]	[1.14642]	[0.89253]
X(-1)	1.479536*	1.420975*	0.332061*
	(0.43095)	(0.34524)	(0.09320)
	[3.43316]	[4.11593]	[3.56278]
X(-2)	-0.920781*	-0.369983	-0.085895
	(0.41690)	(0.33398)	(0.09016)
	[-2.20863]	[-1.10780]	[-0.95266]
M(-1)	2.624424*	2.430216*	0.989338*
	(0.94184)	(0.75451)	(0.20369)
	[2.78648]	[3.22091]	[4.85699]
M(-2)	-1.035737	-0.624907	-0.386945
	(0.91443)	(0.73255)	(0.19777)
	[-1.13265]	[-0.85305]	[-1.95659]

Constant	7.02E+09*	5.69E+09*	1.36E+09*
	(3.0E+09)	(2.4E+09)	(6.4E+08)
	[2.37907]	[2.40678]	[2.12838]
R-squared	0.893736	0.843013	0.924128
Adj. R-squared	0.876504	0.817556	0.911824
F-statistic	51.86500	33.11480	75.11063

*Note: * shows the significance at a 0.05 level of significance*

Values of R-squared and adjusted R-squared of each of the three autoregressive-models is greater than 0.8 and F-statistics are significant which shows that the model is overall significant. Individual significance of the variables and the lagged terms show that sign of the coefficient of the first lag is opposite of that of the second lag. GDP of Libya is affected positively and significantly by the second lag term of GDP. The first lag of exports has a positive and significant effect on Libya's GDP while the second lag of exports has a negative and significant effect on the GDP. The first lag of imports has a positive and significant effect on GDP while the effect of the second lag of imports on GDP is negative and insignificant. In the equation where Libya's export is taken as the dependent variable, effect of the first lag of GDP on exports is negative and insignificant while the effect of the second lag of GDP on exports is positive and significant.

Exports is positively and significantly affected by its first lag while negatively and insignificantly affected by the second lag. Effect of imports on exports is positive and significant for the first lag while negative and insignificant for the second lag of imports. Equation of Libya's imports shows that, in the long run, Libya's GDP has no significant effect on the imports. Exports in the previous year have a positive and significant effect on the imports while in the second previous year; the effect becomes negative and insignificant. Imports of Libya in the current year are significantly affected by its value in the previous year. Cause and effect relationship between the three variables are tested via Granger Causality. If the test-statistic is significant, it supports the notion that the dependent variable granger causes the excluded variable. Output is given in the following table.

Table 5.5 VAR Granger Causality/Block Exogeneity Wald Tests Series: Y, X, M

Dependent variable: Y			
Excluded	**Chi-sq**	**df**	**Prob.**
X	11.86094	2	0.0027
M	7.781673	2	0.0204
All	28.37540	4	0.0000
Dependent variable: X			
Excluded	**Chi-sq**	**df**	**Prob.**
Y	13.01579	2	0.0015
M	10.48841	2	0.0053
All	21.05661	4	0.0003
Dependent variable: M			
Excluded	**Chi-sq**	**df**	**Prob.**
Y	3.575131	2	0.1674
X	14.54069	2	0.0007
All	23.22073	4	0.0001

The output of VAR Granger Causality/Block Exogeneity Wald test shows that the GDP of Libya granger causes exports and imports. Even if economic factors other than GDP keep changing, any change in GDP will have a positive effect on both the exports and imports of GDP. As the measure of economic growth, GDP includes value of total production in Libya, increased level production affects the level of exports directly. Also, GDP is a measure of income, high income of a country results in increased purchases from other nations, given the microeconomic concept of income effect.

However, the concept of substitution effect results in decrease in purchase given an increase in the income. According to both concepts, the effect of Libya's income change on the country's imports is significant. Results also show that the Exports of Libya Granger causes GDP and imports. This is because exports earnings contribute the value of GDP directly as income. Mostly, Libya is involved in bilateral trade of mutual benefits with the major trading partners. Therefore, an increase in exports with the partner results in increased imports from the trading country. Results also indicate that imports of Libya Granger cause exports but not GDP. The reason behind exports causing imports is also the reason behind imports causing exports. Hence, lagged values of Libya's import cannot be used to predict the country's GDP.

Conclusion

This paper identified the association between Libya's economic growth and trade. International trade is indicated via exports and imports as the indicator trade openness is not found to have significant correlation with economic growth. Results showed that exports affect income of Libya significantly unlike imports. Moreover, the cause and effect relationship between imports and economic growth of Libya is not significant. On the other hand, cause and effect relationship between exports and economic growth of Libya is significant. Policymakers can use exports of the country to predict and plan for economic growth of Libya.

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