Co- integration and Causality Relationship Between Capital Goods Imports and Economic Growth of Libya During (1970 -2018)

Dr . EL MASHAT ESSADQ ALI ABUD

Gharyan University , Faculty of Accounting

المستخلص:

تناقش هذه الورقة العلاقة بين واردات السلع الرأسمالية والنمو الاقتصادي في ليبيا، وقد استخدمت بيانات سلاسل زمنية سنوية خلال الفترة 1970–2018. وتم استخدام تقنية التكامل المشترك لتحديد علاقة التوازن طويلة المدى ، بين مغيرات الدراسة . وفقا لاختبارGrange ونموذج VECM، تؤكد نتائج التكامل المشترك وجود علاقة واحدة طويلة الامد بين هذه المتغيرات، وقد تم تقدير نموذج متجه تصحيح الخطأ وتحديده في جزأين، الجزء الاول هو دراسة تأثير النمو الاقتصادي على واردات السلع الرأسمالية على المدى الطويل والقصير، والجزء الثاني هو دراسة تأثير واردات السلع الرأسمالية على النمو الاقتصادي على المدى الطويل والقصير، حيث تشير النتائج الي وجود علاقة سببية كبيرة على المدى الطويل تمتد من النمو الاقتصادي إلي واردات السلع الرأسمالية وليس العكس، اما بالنسبة للعلاقة قصيرة المدى، تشير النتائج إلى وجود علاقة سببية باتجاه واحد من واردات السلع الرأسمالية الى النمو الاقتصادي ولا توجد سببية تنائية الاتجاه بين النمو الاقتصادي وواردات السلع الرأسمالية.

الكلمات المفتاحية : النمو الاقتصادي، واردات السلع الرأسمالية، التكامل المشترك، سببية قرانجر، نموذج متجه تصحيح الخطأ .

Abstract:

This paper discusses the relationship between capital goods imports and economic growth in Libya, and annual time series data was used during the period 1970-2018. And the technique of joint integration was used to determine the long-term balance relationship between the study variables. According to the Grange test and the VECM model, the results of joint integration confirm that there is one long-term relationship between these variables, and the error correction vector model has been estimated and defined in two parts, the first part is the study of the impact of economic growth on the imports of capital goods in the short and long term, and the second part is the study of the impact Capital goods imports on

economic growth in the short and long term, where the results indicate a significant causal relationship in the long run that extends running from economic growth to imports of capital goods and not the other way around. As for the short-term relationship, the results indicate a unidirectional causality relationship running from imports of goods Capitalism to Economic Growth There is no bidirectional causality relationship between economic growth and imports of capital goods.

Keywords: Economic Growth, capital goods Imports, Granger Causality, Cointegration , VECM.

1- **Introduction**

Import plays an important role in overcoming the gap between resource supply and it's demand in the economic sphere, especially in developing countries no country can produce all goods to meet production needs and thus import goods and goods from other countries . Developing countries often import capital and heavy machinery from developed countries. to create a productive growth sector that can- contribute to developing countries economic growth most developing

countries rely heavily on imports of goods and services that can be added and cannot be produced locally or at a cheaper price. Libya is also a developing countries import country of heavy machinery from developed countries, where empirical studies show that import, such as export, is an important determinant of productivity. In addition, the positive effects of imports are not only due to the competitive pressure resulting from the importation of consumer goods, but also to the technological transfer of capital goods imported from developed countries that can stimulate economic growth (directly or indirectly).

The analysis of the relationship between economic growth and imports of capital goods in the Libyan economy helps to better understand the potential contribution such as the contribution of exports to economic growth , causal relationship between total imports and economic growth was limited and mixed . while no study had yet examined the causal relationship between capital goods imports and economic growth of Libya's economic , Therefore, this study will fill this literature gap and reconsider the causal relationship between capital goods imports and economic growth in Libya , and Detecting various causal effects that can have an effect Between capital goods imports and economic growth In this study.

1.1 Statement Problem

Previous empirical studies on the relationship between trade and economic growth in the economies of developing and developed countries have always identified trade as exports. Similarly, these studies focus only on the relationship between exports and economic growth and ignore the role of imports in economic growth. However, the almost complete disregard for imports remains astonishing, as intuition and economic theory show that imports can be an important channel for technology transfer, productivity growth, and economic growth. Such neglect is also unfortunate because it helps to promote deep regional bias against imports because the theoretical relationship between imports and economic growth is more complex than exports and growth. Many researchers have conducted studies on the Libyan economy. However, most of these studies are based on descriptive statistics of economic data. Researchers are limited to conducting empirical work using macroeconomic estimates and trade variables. There are few attempts to apply simple econometric analysis to data., Therefore, this study attempts to promote a more balanced and comprehensive approach to analyzing the relationship between capital goods imports and economic growth in the Libyan economy using Modern econometric analysis, which in turn contributes to increasing the empirical studies on this relationship in the literature of development and economic growth.

1.2 Hypotheses Of The Study

The paper draws on five hypotheses to test causation and common integration between the capital goods imports and economic growth of Libya as following :

H_{01} : there is a common integration between capital goods imports and the economic growth .

H_{02} : there is long-run relationship running from the economic growth to the capital goods imports .

H_{03} : There is a long-term relationship running from the capital goods imports to the economic growth .

H_{04} : There is a short-term significant causality relationship running from the economic growth to the capital goods imports .

H_{05} : There is a short-term significant causality relationship running from capital goods imports to economic growth .

H_{06} : There is bidirectional significant causality relationship between the capital goods imports and the economic growth.

1.3 Objectives Of the Study

The main objective of this study is to highlight the importance of the imports sector in the economy of Libya this study provides evidence of causality between imports and economic growth in long and short-term especially capital goods imports.

2. Literate Review

Theoretical models have shown the positive and negative effects of economic growth on imports Economic growth can be determined by increasing capital imports. Although it is emphasized that import activities can stimulate economic growth (directly or indirectly), the idea that expanding the import of capital goods prior to economic growth is the subject of The most debate in the literature of economic growth and development, It is believed that increased economic activity stimulates imports through consumption. On the other hand, economic growth improves the efficiency of imported alternative companies and leads to an increase in the domestic market, changes the quality of manufacturing and economic structure of modern economic activity and can be considered as a source of positive external operations for others Sectors. Therefore, it will increase potential growth in the economy and thus contribute to economic development. Production can also be seen as an essential means of job creation, poverty reduction and the promotion of economic development and growth policies.

The purpose of this paper is to examine the causal relationship between capital goods imports and economic growth in the Libyan economy during the period 1970-2018. Unlike previous studies, which most of it studied the causal relationship between total imports and economic growth only , and does not focuses on capital goods imports and its relation to economic growth , the most important of these studies are these Literary Studies following :

The study of (Islam, F., Muhammad Adnan Hye, Q., & Shahbaz, M. (2012) applied Auto-Regressive Distributed Lags (ARDL) to cointegration to explore long-run relation; and Granger procedure within Vector Error Correction Model (VECM) to test direction of causality between imports and economic growth for a sample Countries ,, of ten each from high; upper-middle; lower middle and low-

income–nations. they found there is a long-run bidirectional causality between imports and economic growth in high-income nations except Japan.

The study of (Ali, G., & Li, Z. (2016) student the role of imports and its determinants in economic growth in Pakistan applying ARDL Bound testing approach. This study found optimistic and noteworthy effect of imports and its determinants, and other trade policy variables too isupportive of Pakistan economic growth.

The study of (Fukushige, S. S. M. (2007) investigated the causal relationships among exports, imports, and economic growth in North Korea by using time series data for the period between 1964 and 2004. The empirical results show that there was Granger causality from imports to GNP in the first half of the period. However, there was a causal relationship from GNP to imports in the second half of the period. This implies that economic growth stimulates imports in North Korea. therefor The North Korean economy escaped many economic crises that .at the end The findings revealed import-led to economic growth in North Korea.

The main objective of study (Rufus, M. M.(2015) was to investigate the relationship between exports, imports and economic growth in Kenya. for the period 1960 to 2010 , Correlation analysis was employed. The findings revealed that exports led to economic growth. There was a strong positive or direct relationship between the exports and the economic growth. However, the correlation coefficient exports and economic growth compared to the correlation between the imports and economic growth was slightly small. For this case, it would mean that imports had a greater impact on economic development in Kenya. Also, the findings indicated that there was a strong positive or direct relationship between the imports and the economic growth in the country. It was easy to conclude that that the association is very strong as compared to exports. This may be attributed by the huge quantity of imports capital goods main in the agriculture, industry and transport sector in Kenya during the same period.

This study of (Uğur, A. (2008) attempted to analyze empirically the relationship between imports and economic growth in Turkey. In order to make an elaborate examine of the import-economic growth relationship, import was analyzed to its categories and then a multivariate VAR analys was used to determine the relationship. Empirical results derived from IRFs and VDCs show that while there is a bidirectional relationship between GDP and investment goods

import and raw materials import, there is a unidirectional relationship between GDP and consumption goods.

The study of (Lee, J. W. (1995). presented an endogenous growth model of an open economy in which the growth rate of income is higher if foreign capital goods are used relatively more than domestic capital goods for the production of capital stock. Empirical results, using cross data for The Developing Countries during period 1960-1985 ,the Results confirm that the ratio of imported to domestically produced capital goods in the composition of investment has a significant positive effect on per capita income growth s across countries, in particular, in developing countries. Hence, the composition of investment in addition to the capital goods is highlighted as an important determinant of economic growth..

This study of (Habib, G ; Abderrahmane, T., & Lakhdar, A. 2014) aimed to measure the impact of imports on the economic growth in Algeria, basing on time series from 1990 up to 2010, the study showed that Algeria has proceeded to liberalize its trade since 1990. It indicated the Algerian imports' tendency to EU countries and the countries of North America. The study indicated also the importance of imports in the Algerian economy since the latter is yield. The study has confirmed the contribution of each of the raw materials and industrial supplies positively on economic growth, which confirms Algeria's adoption on imports in the productive sector to the outside world (where the contribution of each unit of the raw materials and industrial supplies was 22.21 and 5.97 in Gross Domestic Product GDP), and through this study, Finally, the study indicated that imports play a key role on growth economic through the impact of capital goods imports on growth .

The study of (Fernández-Núñez, T; Maesso, M., & Márquez, M. A 2016) Theories of endogenous growth emphasize that imports of inputs (intermediate and capital goods) and foreign direct investment [FDI] may play a key role on economic growth as a means of international diffusion of technology and knowledge. Nevertheless studies which analyze together the importance of both imported inputs and FDI for economic growth are less frequent. also this study contributed for two goal The first aim is to examine the simultaneous impact of the different categories of imports by end-use and FDI on the economic growth in 53 countries during 1996-2010. The second target is to capture the different responses in the economic growth derived of the consideration of advanced and

emerging economies. results reveal that imports of inputs (intermediate and capital goods) play a key role on growth economic while FDI is not significant.

The study of (EbrahimiI ; Nasser 2017) analyzed the relationship of imports and economic growth in Iran using unsystematic cointegration methods and neural networks and to compare them with each other. The data used in this study are the real gross domestic product (GDP) and the total capital goods imports of Iran during the years 1961 to 2010. In this study, the concerned time series were tested by unit root testing. Then the data were examined and the results were analyzed using an autoregressive distributed lag modeling, error correction model, and maximum likelihood method of Johansen-Julius. The statistical and estimated processes of the present study were carried out and using artificial neural networks were also modeled . The findings showed that no cointegration relationship is supported between GDP and imports when the real GDP is a dependent variable and total import is an independent variable. However, the existence of cointegration relationship between total import and real GDP is supported when the total import is a dependent variable and the GDP is an independent variable shows a reliable result. The study of EbrahimiI, Nasser (2017) analyzed the relationship of imports and economic growth in Iran using systematic and unsystematic cointegration methods and neural networks and to compare them with each other. The data used in this study are the real gross domestic product (GDP) and the total capital imports of Iran during the years 1961 to 2010. In this study, the concerned time series were tested by unit root testing. Then the data were examined and the results were analyzed using an autoregressive distributed lag modeling, error correction model, and maximum likelihood method of Johansen-Julius. The statistical and estimated processes of the present study were carried out and using artificial neural networks were also modeled . The findings showed that no cointegration relationship is supported between GDP and imports when the real GDP is a dependent variable and total import is an independent variable. However, the existence of cointegration relationship between total import and real GDP is supported when the total import is a dependent variable and the GDP is an independent variable shows a reliable result.

(Awokuse 2007, Kim et al. 2007; Rahman Shahbaz 2011). Shahbaz and colleagues. 2012; Awokuse 2007) They analyzed Turkish imports in different categories, which shows that the scientific process between imports and growth depends on the type of goods. Specifically, they used for Granger approach to the

test of causation . from the Results They concluded that there is a bi-directional reason between economic growth and overall imports.

Chen, Jefferson ; Singh 1992 and Zhao, X ; & Wu, Y. 2007) have studied experimentally the transition to a market economy and the import-led growth hypothesis presented by (Narayan, P. K. 2005). suggests an important source of economic growth. According to the model that generates the effects on economic in that study growth , The study reached to these results as following: First, the import of capital goods develops industrial infrastructure, and thus promotes economic growth. Second, that the quantity of capital goods that a country can import limits the rate of economic growth that can be achieved, thirdly , that the quantity of capital goods that a country can import limits the rate of economic growth that can be achieved.

(Lawrence ,1999) shows empirically that import competition brought about growth in US industries. is that imports contributed to total factor productivity growth for manufacturing industries on the panel data set. And therefore the influence on US economic growth.

Augier, P ; Cadot, O & Dovis, M. (2013) found that in the Brazilian manufacturing sector, the competitive effects of total imports on competition are large even though the also effect of capital imports on labor productivity is small .

3. Data and Methodology

3-1 . Data

The data used for this study are based on data on the Libyan economic time series in US dollars covering the period from 1970 to 2018. The two economic variables included in this study are capital goods imports and real GDP, a measure of economic growth. Data were obtained from the Libyan Central Bank and some local statistics. Both of these series are converted to a record format(natural logarithm) , Changing the registry can reduce the problem of heterogeneity because it presses the scale at which variables are measured, reducing the decimal difference between two values to a two-level difference (Gujarati, D. N. 2009). The time series in this study analyzes the variables as follows:

LNGDP = Economic Growth.

LNCAPIMT = Capital Goods Imports.

The "LN" prefix refers to the natural logarithm of the time series in question, and "D" refers to the relevant time difference. All economic estimates were made in this paper using observations wearing soft, (Eviews Version 10 and stata Version 12).

In this study we will examine causal relationship between capital goods imports and economic growth using annual time series for Libyan economic for the same Previous period , This study used two models for the empirical analysis of the causality between The two economic variables included in this study :

First model the analysis of the of capital goods imports as a dependent variable and the economic growth as an independent variable, which requires the use of the model (VECM) (vector error correction model) or model (VAR) (Vector Auto Regression model) to analyze the significant long-term and short-term causal relationship from economic growth to capital goods imports .The second model Analysis of economic growth as a dependent variable and the capital goods imports as an independent variable which also requires the use of the model (VECM) or the model (VAR) to analyze the significant long-term and short-term causal relationship from capital goods imports to economic growth.

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At first , we will determinate the degree of integration of each variable. If the variables are all integrated in level, we apply an estimate based on a linear regression. However, if the variables are integrated in the first difference we will look into the cointegration between the variables. In this step, if the cointegration test denotes the absence of cointegration relationship, we will use the model (

VAR) . but if the cointegration test the presence of a cointegration relation between the different variables studied, the model (VECM) will be applied.

3-2 Testing for stationarity

Before testing the ***Johansen*** integration and Ganger relationship, the econometric methodology needs to examine the installation process for each individual time series. This study uses the Dickey-Fuller (ADF) and Phillips-Perron (p.p) sterilizers to examine the data series stability of the study variables.

3 .2.1 unit roots test

The next step is to show how stationary can be tested. Many empirical papers concerning cointegration start with using either ADF test or (p.p) test for stationarity of the economic data [Kasa (1992), Richards (1995).

We will test whether there are one or more unit roots in the data - whether the individual series are I(1), the performing such tests at the beginning of any analysis is necessary because of the possibility of getting misleading results if non-stationary variables are included. There are various ways to test for stationarity, but the most commonly used test is the Dickey-Fuller test ADF (Dickey and Fuller, 1979).

3 .2.2 Phillips and Perron (p.p) test

The Phillips and Perron (1988) test is a generalisation of the ADF test procedure that allows for weak assumptions regarding the distribution of errors. This study employs the Phillips-Perron test to test for the existence of unit roots in the variables. The advantage of the Phillips-Perron test is that it allows for the effect of serial correlation and heteroskedasticity .There is evidence that the Phillips-Perron test Supports the augmented Dickey-Fuller test (Davidson, R., & MacKinnon, J. G. 1993) If the variables are found to be I(1) stationary.

3.3 Cointegration Analysis

The concept of joint integration was developed by Engle and Granger. If two or more strings are the same, but the linear group is constant, then the chain is said to be interrelated.

In general, two methods are widely applied to test integration. One is the Engle-Granger test, which is used only in one series. The alternative approach is Johansen's fitting for a multivariate case. The Johansson setting allows for the testing of long-term equilibrium assumptions between variables. In order to investigate the relationship between capital goods imports and economic growth, Johansson's integration technique is used in this study.

1.3.3 Johansen and Juselius Cointegration Test

procedures uses two tests to determine the number of cointegration vectors: the Maximum Eigenvalue test and the Trace test. The Maximum Eigenvalue statistic tests the null hypothesis of r cointegrating relations against the alternative of r+1 cointegrating relations for r = 0, 1, 2…n-1. This test statistics are computed as :

$$LR_{\max\, r}(r/n+1) = -T * \log(1-\hat{\lambda})$$

Where is the Maximum Eigenvalue and T is the sample size. Trace statistics investigate the null hypothesis of r cointegrating relations against the alternative of n cointegrating relations, where n is the number of variables in the system for r = 0, 1, 2…n-1. Its equation is computed according to the following formula:

$$LR_{\mathrm{tr}\, r}(r/n) = -T * \sum_{i=r+1}^{n} \log(1-\hat{\lambda})$$

In some cases Trace and Maximum Eigenvalue statistics may yield different results and [$\hat{\lambda}$] indicates hat in this case the results of trace test should be preferred (Johansen, S., & Juselius, K. (1990).

4 . Lag length selection

Before the Johansen test, the length of the delay and the determination of the inevitable elements must be determined first.

The choice of the delay period depends mainly on the information criteria According (Bozdogan ; Hamparsum ,1987) there are four types of criteria for the length of underdevelopment, Standard Bayezian Schwartz (SBC), Standard Akaike (AIC), and) Hannah Cowen Standard (Headquarters

Probability Ratio Test (LR) .The best model to determine the optimal delay length is the model that works to increase the LR, or reduce the previous information standards. Compared to the LR test.

5. Vector Error Correction Model (VECM)

When the variables are and cointegrated, the suitable method to examine the causality relationship is the Vector Error Correction model. The VECM is equivalent to VAR model in first differences with only one difference: the addition of a vector of cointegrating residuals (Liu, X., Shu, C., & Sinclair, P. (2009). Therefore, the VECM is represented as follows :

$$\Delta LNCAPIMT_t = \alpha 0 + (LNCAPIMT_{t-1} - \gamma\, LNGDP_{t-1}) + \Sigma\, \alpha 1i \Delta LNCAPIMT_{t-i} + \Sigma\, \alpha 1i \Delta LNGDP_{t-i} + v1t \ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$\Delta LNGDP_t = \beta 0 + \delta 2\,(LNCAPIMT_{t-1} - \gamma\, LNGDP_{t-1}) + \Sigma\, \beta 1i \Delta LNGDP_{t-i} + \Sigma\, \beta 2i \Delta LNGDP_{t-i} + v2t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where (LNCAPIMT) and (LNGDP) refer to Capital Goods Imports and economic Growth , respectively, the (LNCAPIMTt−1 − γLNGDPt−1) is an error correction term taken from the cointegrating equation in which (Δ) refers to the first difference operator. (δ1, δ2) represent the error coefficients which capture the adjustments of both (ΔLNCAPIMT) and (ΔLNGDP) to long-run equilibrium. In addition, the coefficients on (ΔLNCAPIMTt ,ΔLNGDPt), which are (α1i , α2i , β1i and β2i), are expected to capture the short-term dynamics of the model. For that reason, inferences regarding the causality between Capital Goods Imports and economic Growth can be made as follows (LNCAPIMT) causes (LNGDP) if either (δ1) is statistically significant (the long-run causality) or the (α2i) s are jointly significant (short-run causality). Likewise, :

(LNCAPIMT) causes (LNGDPt) if (δ2), is statistically significant (the long-run causality) or the (β1i) s are jointly significant (short-run causality). For (δ1 = δ2 = 0) which implies no long-run equilibrium relationship between Capital Goods Imports and economic Growth.

5-1 .Granger-causality test Under the Vector Error Correction (VEC) Model

According to the equations of VECM (1) and (2), the causality between the variable (LNGDPt−1) and a variable (LNCAPIMTt−1) can be made as follows.

The variable (LNGDP $_{t-1}$) causes a variable (LNCAPIMT$_{t-1}$) in two cases; in the first case ($\delta 1$) is statistically significant (the long-run causality relationship) while in the second case the ($\alpha 2i$) are jointly significant (short-run causality relationship). Likewise, the variable (LNCAPIMT $_{t-1}$) causes (LNGDP $_{t-1}$) if either ($\delta 2$) is statistically significant (the long-run causality relationship) or the ($\beta 1i$) are jointly significant (short-run causality relationship). For ($\delta 1 = \delta 2 = 0$) which means there is no long–run equilibrium relationship between (LNCAPIMT $_{t-1}$) and (LNGDP $_{t-1}$). From equations (1) and (2), it is clear that the causality test in the VECM framework reduces to the Standard Granger-causality test in the VAR framework (Hall, S., & Asteriou, D. (2011).

4. Empirical results and discussion

4,1 unit roots tests

The Figure 1 and 3 depicts that both variables, LNGDP and LNCAPIMT, are not constant at their levels. while the Figure 2 and 4 depicts that both variables , become constant after the first difference DLNGDP and DLNCAPIMT.

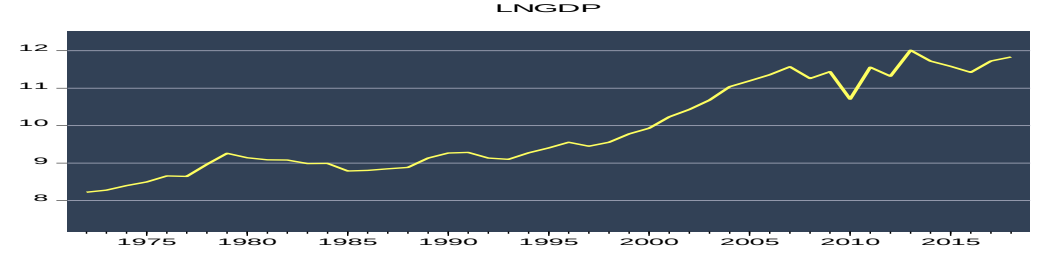

Figure 1

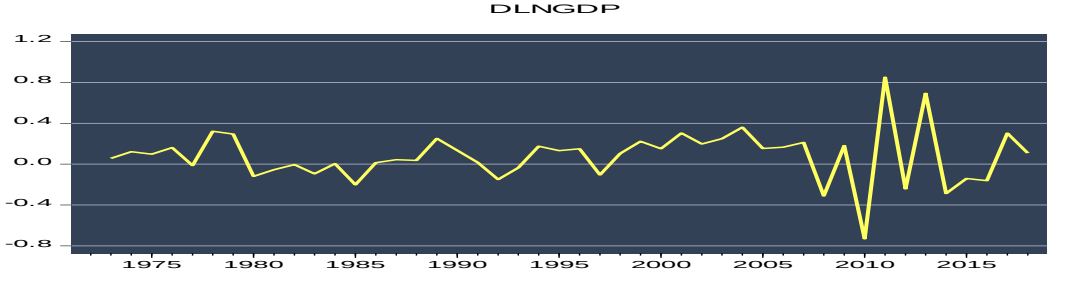

Figure 2

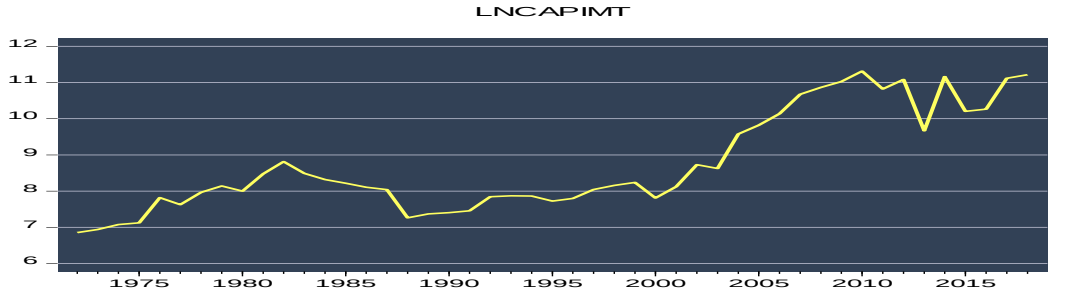

Figure 3

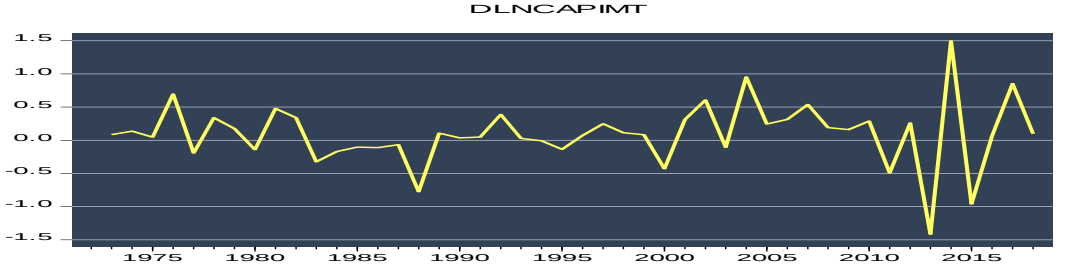

Figure 4

Table 1. Results of (ADF) Unit root test for level and first differences

	critical value		1st diffrenece	Leve	level	
		ADF test	ADF test	1%	5%	10%
LNGDP	Intercept	0.35004	3.70464	-3.18588	-2.92097	-2.60306
	Constant and Trend	-2.26773	-3.67500	-3.18091	-3.51552	-3.18825
	Non	1.79572	-3.11614	-2.6657	-1.94949	-1.61213
LNCAPIT	Intercept	1.77665	8.56492	-3.58474	-2.92814	2.60225
	Constant and Trend	-2.81616	8.56350	-4.170583	-3.51074	-3.18512
	Non	1.68807	8.07165	-2.61736	1.94831	-1.69222

Table 2 . Results of (PP) Phillips-Perron test for level and first differences*

	level	1st diffrenece	Leve	critical value		
		pp test	pp test	1%	5%	10%
LNGDP	Intercept	-0.2735	9.5208	-3.6811		-2.6014
	Constant and Trend	-2.1949	9.4389	-3.9107		3.1855
	Non	3.5714	8.4423	-1.92481		-1.6123
LNCAPIT	Intercept	-1.7323	-11.4602	3.5647	-.9281	2.6022
	Constant and Trend	-3.2818	17.2844	-4.1756	-.5130	-3.3861
	Non	-0.9374	9.5402	-2.5161	1.9181	1.6132

The (ADF) and (PP) results indicate that both variables, LNGDP and LNCAPIMT, are not fixed at their levels. In other words, they have a root unit. We then repeated the unit root test for the first difference of the two variables. The results indicate that LNGDP and LNCAPIMT become constant after the first difference, because the calculated values (in absolute value) are greater than the critical values (absolute value) at 1%, 5%, 10% of importance as in Table (1 and 2) .

4.2 Lag order selection

To ensure proper specification of our models , it is necessary to determine the optimum lags lengths (p), which are determined using five criterions: table (2) states that SIC suggests the use of (1) delay in the system, also AIC suggests delay (1) , SIC is best test for medium samples (Lütkepohl, H., & Poskitt, D. S. 1991), while at the same time, deceleration 1 is the smallest possible gap, Multivariate residues are natural and homogenous, with no evidence of serial correlation. Therefore, one arrears (p=1) are approved at the level .

Table 3 . Lag Order Selection Criteria for LNGDP LNCAPIMT

Lag	LogL	LR	FPE	AI	S	HQ
0	-94.67232	NA	0.307478			4.526595
1	-10.59404		0.007421	0.521445*	1.017565*	0.862440
2	-6.821972	6.666905	0.007512		1.191999	0.933458
3	0.935388	12.98907*		0.607656	1.181070	0.819114
4	6.788931	9.256766			1.258692	0.793319*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

4.3 Johansen Cointegration Test

Johansson's method of cointegration is based on two levels of testing: impact testing and eigenvalue testing. , as in Table NO (4) and (5) .

Table 4 . Johansen Co-integration Test Statistics Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.317882	17.22741	15.49471	0.0272
At most 1	0.000279	0.012537	3.841466	0.9106

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

denotes rejection of the hypothesis at the 0.05 leve

**MacKinnon-Haug-Michelis (1999) p-values

Table: 5 Unrestricted Cointegration RankTest (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.317882	17.21487	14.26460	0.0166
At most 1	0.000279	0.012537	3.841466	0.9106

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 leve

**MacKinnon-Haug-Michelis (1999) p-values

The results of table 4 and 5 indicate the results of the co-integration test. There are two test statistics for cointegration , the Trace test and Maximum Eigen value test. The Trace-Statistic value is shown to be greater than the critical values at the 5% levels. Therefore, we reject the null hypothesis of no co-integrated equation among the variables. Thus, we conclude that there is one co-integrated equation among the variables. The results of Maximum Eigen value test statistics also Show same here. Finally, we can say that there is one cointegration relationship , so the error-correction model can be retained.

5-The Results of Estimation VECM

Once the variables are fixed in order 1, and there is a 1 cointegrating cooperative relationship , the econometric ruler instructs us to use the error correction model. The estimate of the relative error correction model is determined in two parts , the first part is to study the impact of economic growth on capital goods imports in long-term and short term the second part is to study the impact of capital goods imports on economic growth in long-term and short term .

5. 1 First part

In our studies , the objective of an estimate an error correction (ECM) model is to determine the effect of economic growth on capital goods imports also the effect of capital goods imports on economic growth (both short-term and long-term), the first part of the VECM estimation show the effect of economic growth on capital goods imports as table 6 .

Table:6 Vector Error Correction Estimates , LNCAPIMT= F (LNGDP)

Cointegrating Eq:	CointEq1
LNCAPIMT(-1)	1.000000
LNGDP(-1)	-0.891403 (0.07872) [-11.3239]
C	1.248748

From table 6 it can be formally d deriving the long-run cointegration equation (3) between capital goods imports and economic growth as following:

1.248748 - 0.891403 LNGDP ……..... (3)= LNCAPIMT

Equation 3 refers to the VECM equation, which demonstrates that there is a significant negative long-run relationship between the capital goods imports LNCAPIMT and the economic growth LNGDP , this means that the economic growth impacts negatively on the capital goods imports thus decreasing economic growth will lead to increasing in the capital goods imports about 89% , the negative relationship between capital goods imports and economic growth can be explained by increasing the share of imports of capital goods in a large part of the GDP in Libyan economy , as support for locally produced goods (Herzer et al., 2006). Also this category of imports also subject to excess price fluctuations Which does not provide knowledge about that Myrdal, 1957) , but this considered insufficient to explain the direction of the long and short relationship between the capital goods imports LNCAPIMT and the economic growth LNGDP.

5.2 Short-Run Causality Relationship under the VECM Running from economic growth to capital goods imports .

we used error correction terms equation 4 , D (LNCAPIMT) as estimated to (VECM) equation NO 4 , in order to firstly estimate the probability values, and secondly, to know the direction of the long and short-run relationship from the economic growth to capital goods imports as in tables 7 and 8 .

Estimated Model Equation

Equation *D(LNCAPIMT) = C(1)*(LNCAPIMT(-1) - 0.891402837031*LNGDP(-1) + 1.24874773162) + C(2)*D(LNCAPIMT(-1)) + C(3)*D(LNCAPIMT(-2)) + C(4)*D(LNCAPIMT(-3)) + C(5)*D(LNCAPIMT(-4)) + C(6)*D(LNCAPIMT(-5))*

*+ C(7)*D(LNGDP(-1)) + C(8)*D(LNGDP(-2)) + C(9)*D(LNGDP(-3)) + C(10)*D(LNGDP(-4)) + C(11)*D(LNGDP(-5)) + C(12) …… (4)*

At this stage, from the estimation of the Vector Error Correction Model, we applies the VECM using the equation : D (LNCAPIMT) as a dependent variable to see if an independent variable economic growth is sufficiently significant to explain the capital goods imports as dependent variable in table 7 . we also used the Wald test to ascertain the short-run relationship between them .

Table :7 Results of Vector Error Correction Model Using Equation D(LNCAPIMT)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.431000	0.199204	-2.163616	0.0389
C(2)	0.108632	0.193114	0.562529	0.5781
C(3)	-0.428976	0.188081	-2.280800	0.0301
C(4)	0.191760	0.150292	1.275917	0.2121
C(5)	-0.147116	0.150679	-0.976356	0.3370
C(6)	0.309705	0.171190	1.809128	0.0808
C(7)	-0.213462	0.327709	-0.651377	0.5199
C(8)	-0.502099	0.303600	-1.653815	0.1090
C(9)	0.391738	0.276119	1.418728	0.1666
C(10)	-0.470623	0.303248	-1.551940	0.1315
C(11)	0.180732	0.310981	0.581167	0.5656
C(12)	0.103038	0.082698	1.245954	0.2228

F statistic=5.2109 R-squared= 0.6640

Dependent Variable: D(LNGDP)
Method: Least Squares (Gauss-Newton / Marquardt steps)

The long-run causality relationship exists if the sign of the C (1) is negative, significant and the probability value is less than 5%. Consequently, it can be said that there is a negative long relationship running from the economic growth to the capital goods imports because the value of C (1) is negative - .431000 and the probability value is significant; less than 5%. Furthermore, from the C (1), it can determine the speed of adjustment, which equals 43% .

Also from Table 7 , the F-statistic value is 6.2109 which is considered highly significant equal zero at the 5% level, but does not mean the existence of short-run relationship running from economic growth to capital imports , which will be tested by applying the Wald test.

The three result is R-Squared, it can determine the percentage of the change in the D(LNCAPIMT) as dependent variable, which is explained by the economic growth as an independent variable. The R-Squared equals .6640 that means just 66.40 % of the change in the capital goods imports can be explained by the economic growth whereas the 33.60 % is unexplained, which belongs to the variables not involved in this study .

after we had employed the VECM using the equation (4): *D(LNCAPIMT)*, The next step is applies the Wald test to detect if there was any the short-run causality relationship running from the economic growth to capital goods imports as shown in table 8.

Table 8. Wald test using equation *: D(LNCAPIMT*

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	1.378432	(5, 29)	0.2613
Chi-square	6.892159	5	0.2288

The estimation of the Wald test, as in table 8, demonstrates that it can accept the null hypotheses

Null Hypothesis **:** C(7)*D(LNGDP(-1)) + C(8)*D(LNGDP(-2)) + C(9)*D(LNGDP(-3)) + C(10)*D(LNGDP(-4)) + C(11)*D(LNGDP(-5)=0

This is because the probability value of Chi-square is 0.2288 as in table 8 which is more than 5%. This implies that there is no short-run causality relationship running from economic growth to capital goods imports.

Based on the above analysis, to estimate VECM using equation: (LNCAPIMT) as a dependent variable, at the end it can be said that there is a long-term negative causal relationship extending from economic growth to capital imports , whereas there is no short--term causal relationship running from economic growth to capital goods imports .

5. 2 **second part:**

Likewise, we can apply the VECM again, but this time using the Equation D (LNGDP) as the dependent variable, rather than D (LNCAPIMT) , to know:

firstly , is the capital goods imports was sufficiently significant to explain the changes that occurred in economic growth as the dependent variable.

Secondly, is there long and the short-run relationships from the capital goods imports to the economic growth as in table 10 . From this table, three issues can be detected.

The first issue is that the type of the long- run relationship is a negative or the positive, which runs from the capital goods imports to the economic growth.

The second issue is the possibility of applying the Wald test to know if there was short causality relationship running from the capital goods imports to the economic growth.

The third issue was determining the percentage of the changes in the economic growth which can be explained by the capital goods imports movements as an independent variable. table 10 shows that .

The second part of the VECM estimate is showen in Table 11. it Explain a long-term causal relationship and short-term causal relationship from capital goods imports to economic growth.

5.2.1.Short-Run Causality Relationship under the VECM Running from capital goods imports to economic growth.

From table 9 it can be formally deriving the normalized long-run cointegration equation between economic growth and capital goods imports.

Table:9 Vector Error Correction Estimates , LNGDP, = F (LNCAPIMT)

Cointegrating Eq:	CointEq1
LNGDP(-1)	1.000000
LNCAPIMT(-1)	-1.121827 (0.09836) [-11.4051]
C	-1.400879

1.21827- 1.400878 LNCAPIM …….. (5) = - LNGDP

Equation 5 refers to the VECM equation, which demonstrates that there is a significant negative long-run relationship between economic growth and capital goods imports .

Equation 6 shows the results of the estimation of short- and long-term error correction coefficients between economic growth and capital goods imports at the following estimate :

Equation ***: D****(LNGDP) = C(1)*(LNGDP(-1) - 1.12182725751*LNCAPIMT(-1) - 1.40087924308) + C(2)*D(LNGDP(-1)) + C(3)*D(LNGDP(-2)) + C(4)*D(LNGDP(-3)) + C(5)*D(LNGDP(-4)) + C(6)*D(LNGDP(-5)) + C(7)*D(LNCAPIMT(-1)) + C(8)*D(LNCAPIMT(-2)) + C(9)*D(LNCAPIMT(-3)) + C(10)*D(LNCAPIMT(-4)) + C(11)*D(LNCAPIMT(-5)) + C(12)* ***……..****(6)*

From table 10 it can be said that there is no a negative long relationship running from the capital goods imports to the economic growth because the value of C (1) is not negative .211167 and the probability value is significant; more than 5%. Furthermore, from the C (1), it can determine the speed of adjustment, which equals 21 % .

From Table 10 , the F-statistic value is 2.582431 which is considered significant equal zero at the 5% level, that mean the existence of short-run relationship running from the capital goods imports to the economic growth , which will be tested by applying the Wald test .

Table :10 Results of Vector Error Correction Model Using Equation D(*LNGDP*)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.211167	0.149164	1.415673	0.1675
C(2)	-0.491154	0.275284	-1.784174	0.0849
C(3)	0.186623	0.255032	0.731764	0.4702
C(4)	-0.530077	0.231947	-2.285340	0.0298
C(5)	-0.483759	0.254736	-1.899063	0.0675
C(6)	0.100798	0.261232	0.385855	0.7024
C(7)	0.243594	0.162221	1.501622	0.1440
C(8)	0.211656	0.157993	1.339655	0.1908
C(9)	0.130437	0.126249	1.033177	0.3101
C(10)	-0.176082	0.126574	-1.391142	0.1748
C(11)	-0.076112	0.143804	-0.529278	0.6006
C(12)	0.150601	0.069469	2.167891	0.0385

F statistic*= 2.582431* ***R-squared****= 0.494833*

Dependent Variable: D(LNGDP)
Method: Least Squares (Gauss-Newton / Marquardt steps)

From R-Squared, it can be determined that the percentage of the changes in the economic growth , which is explained by the capital goods imports as an independent variable. The R-Squared equals 0.494833 that means just 49.4833 % of the economic growth that can be explained by changes in the capital goods

imports while the 50.5167 % is unexplained, which belongs to the variables not included in the this study.

Likewise, after this, we employed the VECM using the equation; D (LNGDP) as the dependent variable, rather than the Equation D (LNCAPIMT). we can now employ the Wald test under the VECM using the equation D(LNGDP) as the dependent variable to test if there was a short-run causality relationship running from capital goods imports to economic growth. the table 12 shows that the Wald test accepts the null hypothesis:

Null Hypothesis: C(7)=C(8)=C(9)=C(10)=C(11)=0
Null Hypothesis : C(7)*D(LNCAPIMT(-1)) + C(8)*D(LNCAPIMT(-2)) + C(9)*D(LNCAPIMT(-3)) + C(10)*D(LNCAPIMT(-4)) + C(11)*D(LNCAPIMT(-5) =**0**

Table 11: Wald test using equation *: D(LNGDP)*

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	3.970971	(5, 29)	0.0073
Chi-square	19.85485	5	0.0013

from the table 11, the probability value of the Chi-square is 0.0013 i, which is less than 5%. This implies that there is short-run causality relationship from capital goods imports to economic growth .

According to the results of the VECM using the Equation D(LNGDP) as the dependent variable, there was no a long-run causality but there is a short-run causality relationship running from capital goods imports to economic growth.

To confirm the previous results in respect to the short-run causality relationship between economic growth and capital goods imports in the part one and two . We applied the Pairwise Granger causality test using the first difference series of the previous variables , both variables are integrated of order one, I~(1) , the results as in the table 12.

Table 12: Pairwise Granger Causality Test Results for the European Union

Null Hypothesis:	Obs	F-Statistic	Prob.
LNCAPIMT does not Granger Cause LNGDP	45	0.34702	0.7089
LNGDP does not Granger Cause LNCAPIMT		8.61659	0.0008

from table 12 It can be seen that there is no a short-run Granger-causality relationship from economic growth to capital goods imports one lag , because the probability value (0.0008) in this case for are less than 5% , but there is a short-run Granger-causality relationship from capital goods imports to economic growth one lag, because the probability value (0.7089) more than 5% . this result confirms the result obtained from the Wald test application in the first and second part of this study .

6 . CONCLUSION

The purpose of this study is to determine the relationship between capital goods imports and the economic growth of the Libyan economy in the period 1970-2018. The Johansen test, the VECM model and the Granger Causality tests were used to examine the Causality relationship between capital goods imports and economic growth in the long-term and short-term . According to our empirical analysis, Dickey-Fuller (ADF) and Phillip Person (pp) showed that both economic growth and capital goods imports were not fixed in the series, while they were fixed in the first series of differences. Thus, all variables were treated as integrated in the results of a single order of cointegration of Johansen test. which indicate that There is evidence of a single relationship between economic growth and capital goods imports, means that economic growth and capital goods imports are moving together in a long-term relationship. Therefore, it can be said that the first objective of this study was achieved.

While the causal relationship was examined by applying the Granger causality test under VECM, this study also applied the Wald test in the VECM model, in order to verify the causal presence in the short-term between variables in this study , according to the overall study aim, and hypotheses. The study confirmed the that there is a common integration between capital goods imports and economic growth , there is long-run relationship running from the economic growth to the capital goods imports ,there is a short-term significant causality relationship from imports goods capital to economic growth . and there is no

bidirectional significant causality relationship between capital goods imports and economic growth . The results of the Granger Causality (Pair-Wise) test supported the earlier hypothesizes . At the end we Recommend that the Libyan economy need to carry out economic reform policies on different fronts; mainly by liberalizing exchange rates, interests rates, pricing policies, opening up domestic markets , rationalizing government expenditure, reforming monetary and taxation systems, and high use the capital goods imports designed to promote the economic growth in the short-run , While not relying solely on capital goods imports alone in economic development programs of the Libyan economy in the long-run.

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