



THE CAUSALITY RELATIONSHIP BETWEEN EXPORTS, IMPORTS AND ECONOMIC GROWTH IN JORDAN: 1977-2012

ABSTRACT

The aim of this study is to explore the casual relationship between exports, imports and Gross Domestic Product (GDP) for Jordan utilizing annual data from 1977 to 2012. The question of whether strong economic performance is export-led or growth-driven. This question is important because the determination of the causal pattern between export and growth has important implications for policy-makers' decisions about the appropriate growth and development strategies and policies to adopt. The Johansen cointegration, Vector Error Correction Model (VECM) and Granger causality test have been performed, using such modelling framework enabling it possible to test both export lead economic growth (ELG) and import –lead growth (ILG) hypothesis in Jordan. Using Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) stationarity test, the variable proved to be integrated of the order 1(2) at second difference. Johansen and Juselius Cointegration test was used to determine the presence or otherwise of a cointegrating vector in the variables. Both Trace and Max-Eigen value indicated a cointegration at 5% level of significance indicating that the variables have a long run relationship. To determine the direction of causality among the variables, at least in the short run, the Granger causality was carried out to show that there is a causal relationship between the examined variables. Import was found to Granger cause GDP The causal nexus is unidirectional from import to GDP but not vice versa.

This paper makes a significant contribution to understanding the relationship between the GDP, exports and imports in the context of Jordan, where this relationship has not been examined before.

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1. INTRODUCTION

The relationship between exports and economic growth was an important issue among economists, and many researchers tried to investigate this relationship. There are four possible propositions on a relationship between exports and economic growth: exports-led growth (ELG), growth-driven exports (GDE), feedback relationship

between exports and economic growth and finally, it is possible that there is no relationship. Some of the researchers found unidirectional causality and some of them found bidirectional causality and of course some of them could not find any evidence for causality between exports and GDP.

There are many contributors to economic growth. One of the elementary economic questions is how countries can accomplish economic growth. One of the answers to this question relies on the exports-led growth (ELG) hypothesis which claims that exports growth is a key factor in promoting economic growth.

The main purpose of this study is to investigate the causal relationship between GDP, exports and imports in Jordan within an integrated frame work that explores the role of both exports and imports. This study contributes to the literature in several ways. Firstly, in contrast to most previous studies of cross countries in economic-lead growth (ELG), in particular this study focuses on one individual study of a country namely Jordan, *The Johansen cointegration, vector error correction model and Granger causality test have been performed, using such modelling frame work enabling it possible to test both export lead economic growth (ELG) and import – lead growth (ILG) hypothesis in Jordan. Secondly, the study also adopts recent time series methodology by specifying causal model based on vector error correction models (VECM)[1]. In addition to testing the in Granger causality between exports, imports and economic growth, such behaviour in the long run could also be investigated through cointegration.*

Economists behind the exports-led growth hypothesis consider that exports can serve as an engine of growth. The increases in the output demand of a country through the growth of exports allow the exploitation of economies of scale for an economy. The expansion in exports promotes specialization in the production of exports products, which in turn boost the productivity level and cause the general level of skills to rise in the exports sector. The pace of economic development of a nation presents one of the most essential issues in economic debate. A nation could accelerate the rate of economic growth by promoting exports of goods and services

A large number of empirical studies have been devoted during the last two decades to scrutinize the role of exports on economic growth, using either cross-section or time series data. Most studies conducted on the effect of exports on economic growth have usually employed multivariate causal model while ignoring the contribution of imports. In addition, earlier studies employing cross-country analysis were criticized for their simplified assumptions of similar economic structure and level of technology used throughout the different countries studied. As more data became available, more recent analysis have focused on single country using time series study [2]

In theory, it is widely argued that there is a two-way causal relationship between exports and economic growth. Consequently, an extensive empirical literature exists on the relationship between exports and growth. Yet, relative to the empirical literature on exports and economic growth, the number of empirical studies on the relationship between imports and growth is quite limited, because the theoretical relationship between imports and economic growth tends to be more complicated than that between exports and growth.

The role of exports in economic performance of developing countries like Jordan has become one of the more popularly researched topics during post liberalization period. Exports are the most significant source of foreign exchange, which can be used to ease pressure on the balance of payments and generate much-needed job opportunities. Exports can help the country to integrate in the world economy and help to reduce the impact of external shocks on the domestic economy. Exports allow domestic production to achieve a high level of economies of scale.

However, the empirical evidence on the causal relationship between exports and growth is diverse. There is a substantial literature that investigates the relationship and causation between exports and economic growth, but the conclusions still remain a subject of debate. In particular, available time series studies fail to provide consistent support for the exports-led growth hypothesis while most cross-sectional studies provide empirical evidence in support of the hypothesis.

The strong correlation of exports (imports) and GDP growth rates is irrelevant between the relationship of exports (imports) and the GDP trend development as it may arise from a purely short run relationship. In order to test the existing long run relationship among GDP, exports and imports, the theory of cointegration developed by Engel and Granger [3] and [4] among others has to be applied. To this end we analyze annual data for Jordan using a (VECM).

However with respect to previous papers that studied the relationship between exports and economic growth, it is obvious a uniform consequence could not found from Literature of this issue. The results vary in different countries and also variety might be because of econometric methods. Therefore this paper attempts to evaluate the direction of causality between exports, imports and economic growth in Jordan during 1990-2011, covering a period of 21 years.

The rest of the paper is organized as follows: Following the introduction is the review of related

literatures in section two. Section three highlights the methodology employed in the study and the sources of data. Empirical results and analysis will be done in the fourth section while the conclusions are presented in section five.

2.LITERATURE REVIEW

Specifically in developing countries, the relationship between foreign trade and economic growth continues to be an issue, keeping its validity in both theoretical literature and empirical literature. Foreign trade based growth is the most important development strategy so that the developing countries can realize their economic growth. Hence, the relationship between foreign trade and growth has been the subject of research for economists. While many studies carried out in this area reveal that there is a specific relationship between foreign trade and growth, while it does not reveal a significant relationship in the other areas.

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Economic development is one of the foremost objectives of every economy in the world and economic growth is primary to economic development. There are many contributors to economic growth. One of the elementary economic questions is how countries can accomplish economic growth. One of the answers to this question relies on the exports-led growth (ELG) hypothesis which claims that exports growth is a key factor in promoting economic growth. There exists a vast literature that discovers the link as well as direction of causation between a country's exports and a country's economic growth. An affirmative link between exports and economic growth has been identified for different countries by Many other studies have not found any positive link between exports and economic growth. There could be the possibility of no link existing between exports and economic growth and as well there could be the link of any of the following types: [5],

The relationship of causality from exports to economic growth is called export-led growth. It could be interpreted as unidirectional causality from exports to economic growth but not *vice versa*.

The exports-led growth hypothesis (ELGH) assumes that export advancement is one of the key indicators of growth. It encourages that the overall progress

of countries can be achieved not only by mounting the quantity of manpower and investment within the economy, but also by increasing exports. According to its advocates, country's exports can act as an "engine of progress".

Another relationship of causality from growth to exports is called growth-led exports and it tells that there is unidirectional causality from economic growth to exports but not *vice versa*.

There is also a possibility of two way causality link from exports to growth and from growth to exports. The association between exports and growth is often attributed to the possible positive externalities for the domestic economy arising from participation in world markets, for instance from the reallocation of existing resources, economies of scale and various labor training effects.

The competitiveness in global markets may lead to product innovation and force domestic producers to reduce various inefficiencies. An increase in trade helps in producing more income (increased GDP) and more income smoothens the progress of more trade and the result being a 'virtuous circle'[6] This type of feedback has also been identified by Grossman and Helpman in their research. Exports expansion is believed to lead to and lead by an improved allocation of all types of resources, economies of time and scale, improvements in production techniques by widening knowledge and technical base, through multilateral international arrangements for transfer of technology, accumulation and formation of capital, raising the level of employment by jobs creation and thus, economic growth and development In developing countries exports promotion is a source to fill the imbalances in the external sector. It also assists the economic planners to ensure about the scale and pace of economic recovery. The concept of trade openness is from classical school of economics and from the theories of Adam smith and davit Ricardo. [7]

Theory of international trade also relates trade and international development. Economic gains of specialization, discernible in enhanced exports, entails in higher levels of GDP, thus exports directly contributing to growth in national income. Thus contribute heavily to foreign exchange earnings and improving the balance of payment situation. It is argued that international trade or trade openness plays a significant role in country's economic progress and there are economic gains from specialization. It has been commonly viewed that being a component of GDP, exports contribute directly to national income growth and are among the most important sources of foreign exchange earnings that lessen the strain on

the balance of payments and create employment opportunities. Furthermore, opening the trade is also central in international concerns about tariffs and trade barriers where trade theory suggests that all parties on aggregate will improve their welfare position in relation to their closed economy situation.[8].

There are several empirical researches to test the importance of exports in the process of economic development. In the context of east Asian countries, time series analyses that tested the ELG hypothesis, showed mixed results. For example, a study tested the ELG hypothesis for five ASEAN economies (i.e., Malaysia, Indonesia, Singapore, Thailand, and the Philippines) over the period 1966-1986. They did not detect a co-integrating relationship between the countries' exports and their economic development. In fact, Ahmad and Harnhirun's (1996) empirical findings indicated that economic growth had been causing the expansion of exports, and not *vice versa*. [9]

Chow found strong bidirectional causality between exports growth and industrial development. Theoretical agreement on exports-led growth emerged among neoclassical economists due to the success of the free-market, and outward-oriented policies of the East Asian Tigers (World Bank 1993) [10]. Several researchers. Works on India and finds evidence of unidirectional causality from exports growth to economic growth. [11]. Bhat Re-examines the exports-economic growth nexus for India, and finds evidence of bi-directional causality between exports growth and economic growth [12]. Ghatak and Price conclude that exports growth is caused by output growth in India [13]. Khan find strong evidence of bi-directional causality between exports growth and economic growth for Pakistan. [14] Also examine the exports-led growth hypothesis for 97 countries (including India, Pakistan and Sri Lanka) for the period 1960- 1992. They find evidence of unidirectional causality in the case of Pakistan and Sri Lanka, and no causality in the case of India. [15] However, find a positive association between exports and economic growth for India as well as for other economies of South Asia. [16] shows industrial production and exports are co-integrated and long-run unidirectional causality from exports to growth in Bangladesh [17], also support causal nexus between exports and growth for Bangladesh. [18]

Investigated the Granger-causality between exports, imports, and economic growth in Portugal over the period 1865-1998. The role of the imports variable in the investigation of exports output causality is emphasized, enabling one to test for the cases of direct causality, indirect

causality, and spurious causality between exports growth and output growth. The empirical results do not confirm a unidirectional causality between the variables considered. There is a feedback effect between exports output growth and imports output growth. More interestingly, there is no kind of significant causality between import exports growths. Both results seem to support the conclusion that the growth of output for the Portuguese economy during that period revealed a shape associated with a small dual economy in which the intra-industry transactions were very limited. [19]

Examined the causal relationship between exports growth and economic growth (and vice versa) for 20 countries; they found some support in favor of the exports-led growth hypothesis, though the evidence is at most inconclusive in evaluating competing hypotheses. [20]

analyzed the relationships between exports, import and economic growth for the 13 transition economies by using panel unit root, panel cointegration and causality tests based on panel VECM (vector error correction model), their empirical findings show that the growth-led export hypothesis is valid in those countries. [21]

chose Singapore as a case study to examine the relationship between the origins of the East Asian exports and the economic growth.. The empirical findings indicated that despite a negative long run relationship between exports and economic growth, Singapore's heavy reliance on exports does not seem to have produced negative effects on the nation's economic growth. This was because the increase in export dependency was an effect, and not a cause, of the country's output expansion. [22]

examined the validity of exports-led growth hypothesis for Asia's four little dragons with employing exports and GDP models, the results shows that ELG is valid only for the case of Hong Kong and Singapore [23]

3. DATA AND MODEL SPECIFICATION

In this study, annual data of GDP, exports, imports are taken from World Development Indicator (WDI) and Passport, Euromonitor International's gateway to global strategic intelligence, covering the period 1977-2012 for Jordan. All data are expressed in logarithms in order to include the proliferate effect of time series and reduce the problem of heteroscedasticity.

The empirical model used to test the relationship between GDP, exports(X) and imports (M). Can be specified by the following form:

$$LGDP_t = S_0 + S_1 LX_t + S_2 LM_t + v_t \text{-----(1.1)}$$

Perron has shown that a structural change in the mean of a stationary variable tends to bias the standard ADF tests toward non-rejection of the hypothesis of a unit

root. Therefore, this study has conducted Phillips Perron (PP) unit root test along with the ADF test. [24] The test is based on the following regression equation:

$$\Delta Y_t - \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^k \rho_i Y_{t-i} + v_t \text{-----(1.2)}$$

Where $\Delta Y_t = Y_t - Y_{t-1}$ and Y is the variable under consideration, k is the number of lags in the dependent variable chosen by Akaike Information Criterion and V_t is the stochastic error term. The null hypothesis of a unit root implies that the coefficient of Y_{t-1} is zero.

The cointegration test is possible to carry on after accomplishing the unit root test, in order to examine the existence of a stable long-run relationship between export, import and GDP. To verify cointegrated relationship among the variables, Johansen cointegration test [25] and [26] has been performed only on integrated of order two, i.e. I(2)

according to unit root tests of ADF, variables. The Johansen method applies maximum likelihood procedure to determine the presence of cointegrating vectors in non-stationary time series as a vector autoregressive (VAR) framework:

$$\Delta Y_t = c + \sum_{i=1}^k \Gamma_i \Delta Y_{t-i} + \Pi Y_{t-1} + v_t \text{-----(1.3)}$$

Where, Y_t is a vector of non-stationary variables and c is the constant term. The information on the coefficient matrix between the levels of the Π is decomposed as $\Pi = \alpha \beta'$ where the relevant elements the S matrix are adjustment coefficient and the S

Matrix contains co-integrating vectors. Johansen and Juselius specify two likelihood ratio test statistics to test for the number of cointegrating vectors. The first likelihood ratio statistics for the null hypothesis of exactly r cointegrating vectors against the alternative r+1 vector is the Maximum Eigen value statistic. The second statistic for the hypothesis of at most r cointegrating vectors against the alternative is the Trace statistic.

Critical values for both test statistics are tabulated in Johansen and Juselius .To examine the causality for GDP with export and import, Granger causality [27] and [28] test was performed only on cointegrated variables. In the absence of any cointegrating relationship between the variables, the standard Granger causality test method can be applied. The Granger method seeks to determine how much of a variable, Y, can be explained by past values of Y and whether adding lagged values of another variable, X, can improve the explanation. Once the Johansen cointegrating test is completed, this study is likely to undertake the Granger causality test to check the casual direction between economic growth, exports and imports

4. RESULT ANALYSIS
Test for integration (Unit root):-

Several procedures for the test of order of integration have been developed. The most popular ones are Augmented Dickey fuller (ADF) test [29], and the Phillip-Perron (PP). ADF test[30] relies on rejecting a null hypothesis H_n of unit root, (the series are non-stationary) in favor of the alternative hypothesis (H_a) of stationary.

In order to investigate the stationary properties of the data, a univariate analysis of each of the three time series (GDP, exports, and imports) was carried out by testing for the presence of a unit root. Augmented Dickey Fuller (ADF) t-tests and Phillips and Perron tests for the individual time series and their first differences are shown in Table 1. The lag length for the ADF tests was selected to ensure that the residuals were white noise. It is obvious from the ADF and Phillips and Perron (PP) tests that at conventional levels of significance. all the variables were differenced once the PP test were conducted on them, the result reveals that all the variables became stationary after the first differences, on the basis of this, the null hypothesis of no stationary is rejected and it is safe to conclude that the variables are stationary. This implies that the variables are integrated of order 1(1).



The result in table 1 shows that all the variables were not stationary in levels. This result provides strong evidence of non stationarity. Therefore, the null hypothesis is accepted and it is sufficient to conclude that there is a presence of unit root in the variables at levels, following from the above result., However, ADF test indicate that

exports, imports and GDP are statistically significant at 1% significance level after the first difference I(1), I conclude that all series the variables –LM, (LX) and LGDP are integrated of order I(1).Therefore, this is a necessary step in order to test the cointegration of the variables.

Table: 1 Unit Root Tests (ADF, PP) on LGDP, LX and LM: 1977-2012

| Variable | ADF | | PP | | |
|----------|--------|--------------------------|--------|--------------------------|------|
| | Level | Δ 1 st | Level | Δ 1 st | |
| LX | 0.9841 | 0.0003* | 0.9874 | 0.0003* | I(1) |
| LM | 0.9886 | 0.0003* | 0.9849 | 0.0003* | I(1) |
| LGDP | 0.9883 | 0.0006* | 0.9849 | 0.0006* | I(1) |

Note: * denotes Significance at 1% level, respectively. Mackinnon (1996) critical value for rejection of hypothesis of unit root applied.

Source: Author’s Estimation using Eviews 8.0.

Cointegration Test Result:-

It is also important to test for long run relationship between variables before testing for the causality so the next step of our analysis to test for cointegration, using Johansen.

The variables GDP, exports and imports must be nonstationary before taking the first difference, and become stationary after the first difference. Trace statistics shows that p-value less than 0.01, meaning that we can reject H_0 . What is H_0 ? H_0 is that there is no

cointegration. So we have to accept H_a , meaning that there are 1 long run equilibrium relationship among these variables. That’s mean GDP, exports and imports has a long run association. It is the outcome of Trace statistics. Similarly with Max-Eigen value statistics, those variables are cointegrated. Empirical results from cointegration test are shown in Table 2. We can easily run VECM to check the causality between GDP, exports and imports.

Table: 2 Output for Eigen Value Test and Trace Statistics

| Unrestricted Cointegration Rank Test (Trace) | | | |
|---|------------|---------------------|---------------------|
| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value |
| None * | 0.558047 | 32.68160 | 29.79707 |
| At most 1 | 0.133612 | 4.918812 | 15.49471 |
| At most 2 | 0.001247 | 0.042434 | 3.841466 |
| Trace test indicates 1 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values | | | |
| Unrestricted Cointegration Rank Test (Maximum Eigenvalue) | | | |
| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value |
| None * | 0.558047 | 27.76279 | 21.13162 |
| At most 1 | 0.133612 | 4.876378 | 14.26460 |
| At most 2 | 0.001247 | 0.042434 | 3.841466 |

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

* denotes rejection of the hypothesis at the 0.05 level

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

If there exists a cointegration between variables there is causality among these variables at least in one direction. Therefore to determine the direction of causality VECM which is based on Wald test was applied. Lag-length

selection using Akaike’s information criterion (AIC) and Schwarz information criterion (SC) indicated 1 lags (Appendix A, Table A1); therefore VECM can be specified as follows.



Vector Error Correction Model (VECM):-

As, GDP, exports and imports are cointegrated, a VECM (vector error correction model) representation would have the following form, in equation (1.4), (1.5) and (1.6).

$$\Delta GDP_t = \sum_{i=1}^k S_1 GDP_{t-i} + \sum_{i=1}^k r_1 \Delta e \text{ xport}_{t-i} + \sum_{i=1}^k r_2 \Delta i \text{ mport}_{t-i} + Z_1 EC1_{t-1} + v_{1t} \quad (1.4)$$

$$\Delta e \text{ xport}_t = \sum_{i=1}^k M_1 GDP_{t-i} + \sum_{i=1}^k N_1 \Delta e \text{ xport}_{t-i} + \sum_{i=1}^k r_3 \Delta i \text{ mport}_{t-i} + Z_2 EC2_{t-1} + v_{2t} \quad (1.5)$$

$$\Delta i \text{ mport}_t = \sum_{i=1}^k G_1 \Delta GDP_{t-i} + \sum_{i=1}^k J_1 \Delta e \text{ xport}_{t-i} + \sum_{i=1}^k r_4 \Delta i \text{ mport}_{t-i} + Z_3 EC3_{t-1} + v_{3t} \quad (1.6)$$

where “ Δ ” is the difference operator; k, is the numbers of lags, S_1, r_1, M_1 and N_1, G_1 and J_1 are all short run coefficients to be estimated, $EC1_{t-1}$ represents the error correction term derived from the long-run cointegration relationship and v_{1t} and v_{2t} the serially uncorrelated error terms in equation (1.4),(1.5) and (1.6) respectively. Unidirectional causality from Granger causes GDP will occur in the equation, if the set of estimated coefficients on the lagged exports (r_1) coefficient are not zero (short run causality), and if the error correction coefficient (Z_1^*) of $EC1_{t-1}$ is negative and significant, meaning that exports Granger causes GDP in the long run. Similarly, unidirectional causality from GDP to exports (GDP Granger causes exports) will occur in the equation (1.4). If the set of estimated coefficients on the lagged GDP (M) coefficients

are non-zero (short run causality). And the error correction coefficient (Z_2^*) of $EC2_{t-1}$ is significant (long run causality). If both variables Granger causes each other, then it is said that there is a two-way feedback relationship between export and GDP. Error correction term has long run information as it is derived from the long run cointegrating relationship. Also, if the set of estimated coefficients on the lagged GDP (G1) coefficients are non-zero (short run causality). And the error correction coefficient (Z_3^*) of $EC3_{t-1}$ is significant (long run causality). If both variables Granger causes each other, then it is said that there is a two-way feedback relationship between GDP and imports. error correction term has long run information as it is derived from the long run relationship (Appendix A, table A2)

Table 3: Granger Causality Tests of the Model

Dependent Variable: D(LGDP)

Method: Least Squares

Date: 12/13/14 Time: 11:33

Sample (adjusted): 1980 2012

Included observations: 33 after adjustments

$$D(LGDP) = C(1)*(LGDP(-1) - 0.334149115547*LEX(-1) - 0.376470875588 *LIM(-1) - 5.26719821065) + C(2)*D(LGDP(-1)) + C(3)*D(LGDP(-2)) + C(4)*D(LEX(-1)) + C(5)*D(LEX(-2)) + C(6)*D(LIM(-1)) + C(7)*D(LIM(-2)) + C(8)$$

| | Coefficient | Std. Error | t-Statistic | Prob. |
|------|-------------|------------|-------------|--------|
| C(1) | -1.806851 | 0.468988 | -3.852662 | 0.0007 |
| C(2) | 0.744507 | 0.393347 | 1.892747 | 0.0700 |
| C(3) | 0.265209 | 0.412549 | 0.642855 | 0.5262 |
| C(4) | -0.133931 | 0.207949 | -0.644057 | 0.5254 |
| C(5) | -0.075297 | 0.210705 | -0.357358 | 0.7238 |
| C(6) | -0.524284 | 0.231558 | -2.264160 | 0.0325 |
| C(7) | -0.395684 | 0.207480 | -1.907098 | 0.0681 |
| C(8) | 0.120001 | 0.029335 | 4.090753 | 0.0004 |

| | | | |
|--------------------|----------|-----------------------|-----------|
| R-squared | 0.466370 | Mean dependent var | 0.076297 |
| Adjusted R-squared | 0.316954 | S.D. dependent var | 0.114920 |
| S.E. of regression | 0.094978 | Akaike info criterion | -1.663130 |
| Sum squared resid | 0.225520 | Schwarz criterion | -1.300340 |
| Log likelihood | 35.44164 | Hannan-Quinn criter. | -1.541062 |
| F-statistic | 3.121283 | Durbin-Watson stat | 1.867393 |
| Prob(F-statistic) | 0.016474 | | |



Table 3 indicates that the EC_{t-1} in mode 1.1 tested by equation (1.4) is (-1.8068) of one period lag residual of co integrating vector between export and GDP, that is mean LGDP dependent variable and (LX) and (LM) are independent variable. The coefficient C (1) is negative and significant because p-value = 0.0007 < 0.01, then when the p-value < 0.01 becomes significant, it means that GDP has long run causality on exports and imports, that it means GDP causes exports and imports in the long run. It suggests the validity of long run association among variables. This means that the speed of adjustment towards long run equilibrium state is 180.68%. What about short run causality from GDP to exports, and from GDP to Imports, we can also check that. We shall use chi-square (value

Wald statistics) to check short run causality from GDP to exports and from GDP to imports, see table (4 and 5).

The results in Table 4 and 5, indicate that The chi- squares probability value 0.7267 which is greater than 0.05, meaning that we cannot reject H_n and reject H_a , meaning that $C(4)=C(5)= 0$. It means that all the GDP having 2 lags Jointly cannot cause imports, meaning that there is no short run causality coming from GDP to imports. Similarly the chi- squares probability value 0.0609 which is greater than 0.05, meaning that we cannot reject H_n rather than reject H_a , meaning that $C(6)=C(7)= 0$. It means that all the GDP having 2 lags jointly cannot cause exports, meaning that there is no short run causality coming from GDP to exports.

Table 4: Wald Test

Wald Test:

Equation: Untitled

| Test Statistic | Value | df | Probability |
|--|-----------|-----------|-------------|
| F-statistic | 0.319224 | (2, 25) | 0.7296 |
| Chi-square | 0.638449 | 2 | 0.7267 |
| Null Hypothesis: C(4)=C(5)=0 Null Hypothesis Summary: | | | |
| Normalized Restriction (= 0) | Value | Std. Err. | |
| C(4) | -0.133931 | 0.207949 | |
| C(5) | -0.075297 | 0.210705 | |

Restrictions are linear in coefficients.

Table 5: Wald Test

Wald Test:

Equation: Untitled

| Test Statistic | Value | df | Probability |
|--|-----------|-----------|-------------|
| F-statistic | 2.797893 | (2, 25) | 0.0801 |
| Chi-square | 5.595787 | 2 | 0.0609 |
| Null Hypothesis: C(6)=C(7)=0 Null Hypothesis Summary: | | | |
| Normalized Restriction (= 0) | Value | Std. Err. | |
| C(6) | -0.524284 | 0.231558 | |
| C(7) | -0.395684 | 0.207480 | |

Restrictions are linear in coefficients.

GRANGER CAUSALITY TEST RESULTS

Correlation does not necessarily imply causation in any meaningful sense of the word. The econometric analysis has full of magnificent correlations, which are simply spurious or meaningless. To investigate the causality between GDP imports and exports, simple Granger causality test has been performed by estimating the bivariate autoregressive processes for GDP, imports and exports. The objective of this exercise is to test the exports led growth (ELG) or imports lead GDP hypothesis for Jordan empirically. Furthermore, building on preceding analysis, it can be argued that exports growth can stimulate investments, especially if there exists a productivity differential between the exports sector and the non-export sector. In such cases, investment would be expected to increase in those sectors of the economy where productivity and returns are higher. Equally well, it is theoretically plausible to expect the reverse: the case where increased investment would also stimulate exports growth. Whether investments are in social overhead capital (infrastructure) or in specific industries.

Granger causality tests are conducted to determine whether the current and lagged values of one variable affect another. One implication of Granger

representation theorem is that if two variables, say X_t and Y_t are cointegrated and each is individually $I(1)$, then either X_t must Granger-cause Y_t or Y_t must Granger-cause X_t . This causality of cointegrated variables is captured in Vector Error Correction Model (VECM). In a VECM long and short-run parameters are separated. In the present study linear combinations of stationary variables are found stationary, that is, the variables are cointegrated.

Cointegration implies the existence of Granger causality. However, it does indicate the direction of the causality relationship. Therefore, the vector error correction Model (VECM) model is employed to detect the direction of the causality. Engle and Granger (1987) argued that if there exists a cointegration between variables there is causality among these variables at least in one direction. Therefore to determine the direction of causality VECM causality which is based on Wald test was applied. Lag-length selection using Akaike's information criterion (AIC) and Schwarz information criterion (SC) indicated 1 lags (Appendix A1), therefore VECM can be specified as equations 1.4, 1.5 and 1.6 above.

Table: 6 Granger causality test on GDP, exports(X) and imports (M): 1977 - 2012

| Null Hypothesis | Lags: 2 | | Lags: 3 | | Lags: 5 | |
|--------------------------------|-------------|---------|----------------|----------------|-------------|---------|
| | F-Statistic | Prob | F-Statistic | Prob | F-Statistic | Prob |
| LX does not Granger Cause LGDP | 0.32773 | 0.7232 | 0.19100 | 0.9016 | 1.36179 | 0.2802 |
| LGDP does not Granger Cause LX | 0.09860 | 0.9064 | 0.38126 | 0.7673 | 2.09456 | 0.1085 |
| LM does not Granger Cause LGDP | 5.76817 | 0.0078* | 3.04600 | 0.0465* | 2.78822 | 0.0455* |
| LGDP does not Granger Cause LM | 1.60020 | 0.2192 | 0.96756 | 0.4229 | 0.69918 | 0.6304 |
| LM does not Granger Cause LX | 0.9064 | 0.1916 | 1.85831 | 0.1905 | 1.20631 | 0.3420 |
| LX does not Granger Cause LM | 0.72420 | 0.4933 | 0.41106 | 0.7480 | 0.55394 | 0.7337 |

The output (Table 6) Granger causality shows a causal relationship between the examined variables. This is the test of ergogeneity of dynamic terms where the null hypothesis is that the (LX) does not Granger cause of LGDP, and (LM) does not Granger causes LGDP, and LM does not Granger cause LX. Four alternative lag lengths have been used to see how sensitive the causality tests to desired lag length. The result based on the Granger causality test at 5% level of significance will help to investigate and give meaningful conclusion. To stay on the safe side, While the null hypotheses is exports does not Granger cause of economic growth, Wald test statistics could not reject the null hypothesis, which means exports are not Granger cause of GDP. But Wald test statistics reject the null hypotheses of imports does not Granger

cause GDP that means imports is Granger cause of GDP at different significant level for different lag length, but not vice versa. LGDP does not cause LIM, but LIM causes LGDP at different significant level for different lag length. So, in overall it is found that LIM cause LGDP but LGDP does not cause none LIM and LEX. Therefore causality indicates unidirectional causality from imports to economic growth.

Finally, we have to check the model efficiency, whether the model has ARCH affect, histogram-normal, serial correlation and hetercedasticity.

First we check for histogram-normal, if Probability = p-value >0.05, meaning that the residual is normal, so Jarque-Bera p-value=0.9587 which is greater than 0.05, meaning that the residual is normally distributed.

Now we check for ARCH affect. We found that R^2 probability = p-value= 0.0542 which is greater than 0.05, meaning that we cannot reject H_0 , rather accept H_1 , meaning that there is no ARCH affect.

Now we check for serial correlation. We run the autoregressive model with the dependent variable as independent variable with lag (-1), we find that the model has no serial correlation, when obs' R^2 , p-value =0.3658 which is greater than 0.05, we cannot reject H_0 , rather accept H_1 , meaning that this model does not have serial correlation. Finally, we check for Heteroscedasticity we find that the model has heteroscedasticity when obs' R^2 corresponding to p-value=0.0414 less than 0.05, meaning that the residuals in the model has Heteroscedasticity.

5. CONCLUDING REMARKS

The study focuses on finding a relationship between three important components of an economy namely exports, Imports and GDP. The study investigate the following hypotheses: (i) whether exports, imports and GDP are cointegrated using the Johansen approach, (ii) whether export Granger causes GDP, and (iii) and whether import Granger causes GDP.

In this analysis, it also fail to find support for the hypothesis that exports Granger cause GDP and imports granger cause GDP.

Prior to the cointegration test, we tested for stationary of the variables using augmented dickey-fuller (ADF), the variable proved to be integrated of the order I(1) at first difference. Johansen and Juselius cointegration test was used to determine the presence or otherwise of a cointegrating vector in the variables. Both Trace Maximum Eigen value indicated 1 cointegrating relationship between exports, imports and GDP at 5% level of significance pointing to the fact that the variables have a long-run association. In the existence of cointegrating relationship; it is possible to move for standard Granger causality test to find out possible causal relationship among the variables. The empirical analyze of causality indicate unidirectional causality from imports to GDP. As import does lead GDP, it indicates imports of Jordan lead GDP significantly,

Conclusively, though long-term relationship was found among the variables used in this study. The discovery of a imports-led GDP (LIM'!LGDP) .

The finding is that the coefficient of error correction model (ECM) is negative and significant because p-value =0.0007< 0.01 , then when the p-value < 0.01 becomes significant, it means that GDP has long run causality on exports and imports. It means that GDP causes exports and imports in the long run. It suggests the validity

of long run association among variables, which means that the speed of adjustment towards long run equilibrium state is 180.68.%.

Finally, we checked the model efficiency to determine whether the model has ARCH affect, the residuals are normally distributed, the model has Serial correlation and that model has heteroscedasticity. The empirical test shows that the model has no serial correlation, no ARCH affect, the residuals are normally distributed but the model has hetroscedasticity which is not desirable.

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Appendix A

Table A1

VAR Lag Order Selection Criteria
 Endogenous variables: LOGGDP LOGEX LOGIM
 Exogenous variables: C
 Date: 12/13/14 Time: 02:03
 Sample: 1977 2012
 Included observations: 33

| Lag | LogL | LR | FPE | AIC | SC |
|-----|-----------|-----------|-----------|------------|------------|
| 0 | -0.526068 | NA | 0.000249 | 0.213701 | 0.349747 |
| 1 | 97.76760 | 172.7586* | 1.11e-06* | -5.198036* | -4.653852* |
| 2 | 104.8791 | 11.20595 | 1.27e-06 | -5.083580 | -4.131257 |
| 3 | 115.0649 | 14.19844 | 1.23e-06 | -5.155449 | -3.794987 |

* 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