Testing the causality between Exports, Oil Rent, and Gross Domestic Product in Kuwait: An empirical study for the period (1980 -2017)

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Abstract: The study of the relationship between oil prices, exports, and economic growth has captured the interest of economists for decades, especially for oil-exporting countries. This study intends to determine the relationship and the direction of causation among oil rent, exports, and economic growth in the short-run and long-run, and the causation effects among the variables. Time series data collected from both the world bank and International Monetary Fund databases for the period 1980 to 2017. The series tested for stationarity, cointegration, and causation using the unit root, cointegration, and pairwise granger causality tests. The results revealed that there was a long-run association among the variables. On the other hand, causation only exists between export and economic growth in both directions. Eviews10 statistical software used for the analysis.

Keywords: Exports, Oil Rent, GDP, Cointegration, Pairwise Granger Causality Test

اختبار السببية بين الصادرات وإيجار النفط والناتج المحلي الإجمالي في الكويت: دراسة تجريبية للفترة (1980 - 2017)

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الملخص: استحوذت دراسة العلاقة بين أسعار النفط والصادرات والنمو الاقتصادي على اهتمام الاقتصاديين لعقود، وخاصة بالنسبة للبلدان المصدرة للنفط. هدفت هذه الدراسة إلى تحديد العلاقة واتجاه العُلاقات بين إيجار النفط والصادرات والنمو الاقتصادي على المدى القصير والمدى الطويل وكذلك آثار السببية بين المتغيرات. تم جمع بيانات السلاسل الزمنية من كل من قواعد بيانات البنك الدولي وصندوق النقد الدولي للفترة من 1980 إلى 2017. واختبرت السلاسل من حيث الاستقرار، التكامل والسببية باستخدام اختبارات جذر الوحدة، التكامل المشترك، والسببية الزوجية لجرانجر. أوضحت النتائج وجود ارتباط طويل الأمد بين المتغيرات. من ناحية أخرى، يوجد السببية فقط بين الصادرات والنمو الاقتصادي في كلا الاتجاهين.

الكلمات المفتاحية: الصادرات، عائد النفط، الناتج المحلي الإجمالي، التكامل المشترك، اختبار السببية الزوجي لجرانجر

Introduction

Early studies in trade theory revealed that export is a function of international trade where goods produced in one country bilaterally shipped among countries for sale or trade. Sales from exports contribute to a nation's gross domestic product and play an essential role in a developed economy. A widespread debate among economists has focused on the relationship between export growth and economic growth because a successful macro-economic strategy leads to a better quality of life for people. As a consequence, rapid GPD growth has become an essential objective for many countries, including Kuwait.

The return from high oil prices has always been an essential tributary of economic growth, especially in the oil-exporting countries of the modern era, due in large part to the increased dependence on oil products. Moreover, the price of oil is of remarkable importance to the world's economies today, as oil is the largest commodity traded globally, in terms of size and value, and the correlation of energy-intensive goods and services with energy prices.

Therefore, sudden changes in oil prices have significant implications for both Oil producing and consuming countries. Therefore, many economists believe that there is a strong relationship between the rate of economic growth and oil prices, knowing that it is not sure to consider the oil price as an economic indicator of GDP growth (Adelman, 2004). Furthermore, Oil rent regarded as profit coming out from selling oil. It is Revenue minus production cost of oil. World Bank also reveals countries ranking comparing their oil rent vs. GDP. Kuwait, Iran, and Saudi Arabia are the countries with the highest oil rent vs. their GDP.

Important questions immediately rise; however: Does the promotion of exports and oil rent lead to higher economic growth or vice versa? Both exports of goods and services oil rent are driving forces for foreign income, and this can relieve the pressure on budgetary expenses and create new employment opportunities. An export-led growth strategy and increasing oil rent, therefore, aims to encourage producers to find new markets for their goods through various economic and governmental policies. This study addresses the above question by examining the causality between exports, oil rent, and Kuwait's economic growth.

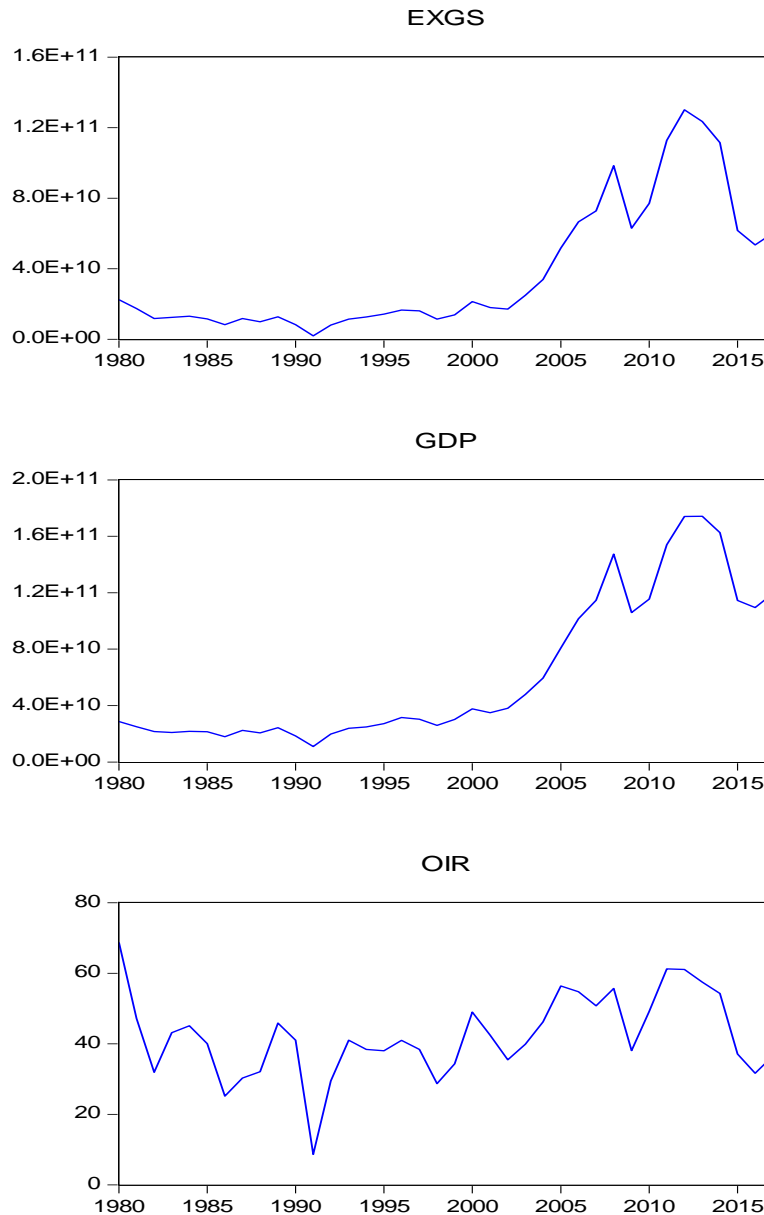**Overview of Kuwait's Exports, Gross Domestic Product and Oil Rent trends**

Figure (1) Exports, GDP, Oil Rent Trends

Figure (1) reveals the following facts:

First, Exports and GDP experiences constant movements between 1980 and 2000

followed by incremental increases. In 2001, annual exports and gdp started to increase until 2007, when they began sharply decreasing again. In 2010, export growth and gdp accelerated until the end of 2012, when exports and gdp broadly plateaued. By the beginning of 2013, exports and gdp declined rapidly until the beginning of 2016, when a moderate recovery began.

Second, for oil rent, figure1 shows how Kuwait's Oil rent has experienced a downward trend since the late 1970s to 1982, with there being some fluctuations between 1983 and 1990, and that is primarily due to two factors: a sharp fall in the price of oil and changes in oil exports. The years 1991 and

1992 experiences a sharp decline in oil rent, followed by a sharp increase in 1993. For the period 1994 to 2016, oil rent experienced moderate fluctuations, which reflect the linear dependence of Kuwait's economy on oil production and the absence of a diversified economy.

Annual data for the exports, gross domestic product, and oil rent collected from the World Bank's and IMF's databases for the 1980−2017 period.

Problem Statement

Achieving sustainable economic growth has been a challenge facing all countries, rich or poor, especially the oil-exporting countries that depend mainly on natural resources such as oil. There are vast differences in the point of view of the impact of exports and oil rent on economic growth in countries of different economic levels. Also, whether they are oil-producing or exporting countries, so, all these controversies had a strong incentive to investigate the relationship and causation effects of oil rent and exports on gross domestic product. To achieve sustainable development, especially in light of the possibility of declining oil revenues.

Research Question

Important questions immediately rise; however: Does the promotion of exports and oil rent lead to higher economic growth or vice versa?

This study addresses an important question;

Does the promotion of exports and oil rent lead to higher economic growth or vice versa?

Research Objectives

This study conducted with the primary objective of investigating the relationship between exports, oil rent, and economic growth in Kuwait. More specifically, it aims to:

1- determine the long-term relationship between exports, oil rent and economic growth in Kuwait;

2- examine the short-term relationship between exports, oil rent and economic growth in Kuwait; and

3- test the causality patterns between exports, oil rent, and economic growth in Kuwait.

Research Importance

The importance of this research consists of two folds; 1) revealing the major determents of economic growth, and 2) introducing viable recommendations to assist the policymakers in developing their strategic plans in terms of prioritizing their economic goals.

Research Methodology

This study aims to find out the causality effects between the dependent variable and the explanatory variables. The Granger Causality method is the statistically validated method for finding out if one variable drives another. For example, changes in oil prices may affect GDP (Fratzscher, 2009), but changes in GDP may not affect the price of oil (Gisser et al., (1986)).

The Granger causality test relies on F-tests to examine whether lagged information on a variable Y provides any statistically significant information about a variable X in the presence of lagged X. If not, then "Y does not Granger-cause X."

In completing this study, samples were used based on 37 years of annual data. Data were collected for exports and expressed as a measure of export growth, Oil Rent as a measure of oil revenue, while economic growth measured by the gross domestic product (GDP). All variables expressed in terms of USD (U.S. dollars). The data collected from the World Bank and IMF databases.

The methods applied to analyze the data were a unit root test, Johansen cointegration, and the Granger causality test. Johansen cointegration used to discover the relationship between exports and economic growth over the long term. In contrast, the Granger causality test used to observe the causality relationship between exports, oil rent, and economic growth.

First, however, the unit root test was applied to determine the stationarity of the series at the level and first difference by using the augmented Dickey-Fuller test (ADF) and Phillips and Person test (P.P).

Finally, the EVIEWS10 econometric software used to analyze all data and interpret the findings. The collected raw data transformed into information that could help answer the research question and identify the long-run relationship between export, oil rent, and economic growth, as well as the direction of causations among the variables.

Research Hypothesis

Since this research paper aims to test the causality between Exports, Oil Rent, and Gross Domestic Product, thus the hypotheses will be as follows:

Null hypothesis H_0:

GDP does not Ganger Cause Exports
Exports do not Granger Cause GDP
Oil Rents does not Granger Cause Exports
Exports do not Granger Cause Oil rent
Oil rent does not Granger Cause GDP
GDP does not Granger Cause Oil rent

Alternative hypothesis H_1:

GDP does Ganger Cause Exports
Exports do Granger Cause GDP
Oil Rents does Granger Cause Exports
Exports do Granger Cause Oil rent
Oil rent does Granger Cause GDP
GDP does Granger Cause Oil rent

Statistical Method of Analysis

This study employed empirical analysis to examine the effects of exports on economic growth. Annual data for the 1980–2017 period used for Kuwait. The estimating equation for this study was:

$$GDP_t = \beta_0 + \beta_1 EXP_t + \beta_2 OIR_t + \varepsilon_t \qquad (1)$$

Where GDP_t is the gross domestic product for period t, and EXP_t is the total exports for period t, OIR is the oil rent for period t. And to avoid autocorrelation, the equation must use the log for all variables. So, the percentage of change for independent variables could be seen when the independent variables changed by around 1%. Also, ε_t is the error term.

$$LnGDP_t = \beta_0 + \beta_1 LnEXP_t + \beta_2 LnOIR_t + \varepsilon_t \qquad (2)$$

Unit Root Test

Because many macroeconomic economic variables are non-stationary, so, stationarity tests carried out. Unit root test, namely (Dickey and Fuller,1979; Phillips and Perron,1988) tests and the Durbin-Watson Statistic suggested by Sargan, and Bhargava (1983) used to determine whether the time series are stationary in first differences or levels. Following this, the Johansen and Juselius (1990) used to establish a long-term relationship among the variables. Finally, the famous Granger causality test was applied to examine the causality relationship between exports and economic growth, accurately to identify whether exports affect economic growth or if economic growth drives the demand for more commodities in the economy.

Co-integration Test

A cointegration test used in this study to examine the long-term relationship between the variables under consideration, and the process starts by considering the following VAR model, with X_t defined as the log of exports.

$$X_t = c + \sum_{j=1}^{p} \Gamma_j \Delta X_{t-j} + \varepsilon_j \quad (3)$$

Here, If the variables in X_t are I (1), the VAR in equation (3) is non-stationary. And if no cointegration exists, statistical inference is not possible with the commonly used methods. Having this

said, the difference of the series should be determined, and a first difference VAR of the form should be estimated.

$$\Delta X_t = c + \sum_{j=1}^{p} \Gamma_j \, \Delta X_{t-j} + \varepsilon_j \ (4)$$

Integration vectors give rise to the stationary variables. Reaching this case, the VAR in Eq. (4) can be written as:

$$X_t = c + \sum_{j=1}^{p} \Gamma_j \, \Delta X_{t-j} + \prod X_{t-1} + \varepsilon_t \ (5)$$

In Eq. (5), $\prod$ represents a rank r matrix that can divide into

$$\prod = \alpha\beta' \ (6)$$

Where α is a three $\times$ r loading matrix, and β is a 3$\times$ r matrix of cointegrating vectors, with r being the number of cointegration vectors (Ighadaro, 2010).

The number of cointegration vectors tested by using cointegrated VAR, shown in Eq. (5).

Granger Causality Test

The Granger causality test was employed to examine the causal relationship between the two variables under consideration. Here, If the p values of the variable Y significantly contribute to forecasting the value of another variable, such as X, then Y has a Granger causal relationship with X and vice versa. The test based on the equation below.

$$Y_t = \gamma_0 + \sum_{z=1}^{p} \gamma_z Y_{t-z} + \sum_{i=1}^{q} \lambda_i X_{t-1} + \mu_t \ (7)$$

$$X_t = \varphi_0 + \sum_{z=1}^{p} \delta_z X_{t-z} + \sum_{i=1}^{q} \psi_i Y_{t-1} + \varepsilon_t \ (8)$$

Where Y_t and X_t are the variables under consideration, μ_t and ε_t are the error terms, and t represents the time, and z and i are numbers of lags. The null under consideration is that $\lambda_i = {}_i = 0$ for all i, while the alternative hypothesis is that $\lambda_i \neq 0$ and $_i \neq 0$ for at the least some i. If i is significant, but i is not substantial, then X is Granger causal to Y. If both coefficients are substantial, however, the causality runs both ways.

The rest of this research paper consists of the literature review, empirical results, and the conclusion and recommendations.

Literature Review

The relationship between exports, oil rent, and economic growth in Kuwait are still fraught with controversy and divergent views. This research paper seeks to address this issue by verifying the causal link between these three factors.

The comparative advantage has been the focus of classical economic theory for its importance as a basis for success the specialization of one country in the production of a specific good as a result of its comparative advantage over other countries. Besides, classical trade theory emphasizes transportation as

a tool to facilitate commodity movements and develop exports among nations. And this has led to improved productivity and more significant economic gains thanks to economies of scale (Doraisami, 1996; Deme, 2002; Mahadevan, 2009; Ozturk and Acaravci, 2010).

Furthermore, trade exchange contributes to the transfer of knowledge, skills, and the localization of technology, which in turn leads to a) product development and enhanced competitiveness, b) more foreign exchange to purchase imports, and buy equipment for local production. It should be mentioned that these benefits cannot be achieved without an economic and political environment that supports economic growth that balances exports and imports with high productivity and advanced competitiveness in the global market.

Mehrara and Firouzjaee (2011) suggest that export growth will boost GDP through the improvement of human capital, workforce skills, and technology. According to this study, estimating the export demand equations helps in obtaining the relative price and income elasticity, which has important implications for export-led growth policies. Therefore, the higher the income elasticity of the export demand, the more that exports will generate growth (Bahmani-Oskoee *et al.*, 1991). And it will also increase the price elasticity and make exports more competitive in the international market (Kumar and Pacheco 2012).

Furthermore, Khan *et al.* (2012) examine the long-run correlation among the economic growth, exports, and imports of Pakistan using time series data for the 1972—2009 period. They apply the Engle and Granger (1987) causality test and cointegration via a VECM method in their study. The results show the existence of a long-term correlation between exports, imports, and economic growth in Pakistan.

Mourad, M. and Hadadah, A. (2019) researched GCC countries focusing on the annual rates of change for the gross national expenditure, the gross domestic product (GDP), and oil prices (dollars per barrel). They found out that the three variables are linked by a long-term equilibrium relationship in both Saudi Arabia and Qatar, no for the other countries, using the appropriate technique (ARDL/Bounds Testing methodology).

Furthermore, an increase in oil prices has a positive impact on the oil-exporting countries, and vice versa. For oil-importing countries, and the opposite expected when the price of oil falls. Increasing oil prices divert income from importing countries to exporting countries through trade. Consequently, the economies of the oil-exporting countries are witnessing remarkable economic growth associated with the increase in oil prices.

The impact of oil rents on economic growth and has received a great deal of attention

from economists over the last decades, Bjorvatn and Farzanegan (2013)conducted a study over 120 countries. They found out that Resource rents crowd out the manufacturing sector and lead to lower real GDP per capita.

In conclusion, many previous studies rely on cointegration and Granger causality methods to know the impact of exports on economic growth in all economies of the world.

Only a few studies have used alternative models such as the Toda-Yamamoto Granger, ARDL, and Sims causality approaches. All empirical studies use a unit root test to find the stationarity of the time series data in level and first difference. Also, the augmented Dickey-Fuller and Philips and Person tests are other well-known approaches applied in past studies.

This research will help identify factors that influence economic growth, namely the effect of export growth and oil rent. As a consequence, this study may aid Kuwait's government by shedding some light on the impact of export growth and oil rent changes in Kuwait. The result of this study will establish whether changes in exports and oil rents have significant consequences for the economic growth of the country. And it will contribute to the body of knowledge and help policy formulation. Also, the study will show the relationship between exports, oil rents, and economic growth.

Ultimately, the study will be able to estimate whether export growth and oil rent are appropriate for boosting the economic growth of a developed or developing country. The research will also act as a reference and guideline for future research.

This study aims to find out the nature of the relationship between exports, oil rent, and economic growth, so 37 years of macroeconomic data for the 1980—2017 period was studied. It aims to establish whether exports and oil rent affects economic growth or whether economic growth drives both exports and oil rents growth.

Results and Discussion

Unit Root Test Results

To examine the stationary properties of the export and GDP variables, the Augmented Dickey-Fuller and P.P tests produced the results shown in Table 1. These results separated into the level and first difference under constant and constant with the trend.

Table (1) Unit root test results

ADF UNIT ROOT TEST				
Variable	ADF value (constant included)		ADF value (constant and linear trend	
	Level	First differenced	Level	First differenced
Export	-1.117726	-4.871062	-2.498193	-3.229203
Oil Rent	-3.868748	-7.330419	-4.322261	-7.201166
GDP	-0.666413	-4.933585	-2.356152	-4.875473
Critical values	1%	-3.621023	-3.626784	-4.234972	-4.339330

ADF UNIT ROOT TEST					
	5%	-2.943427	-2.945842	-3.540328	-3.587527
	10%	-2.610263	-2.611531	-3.202445	-3.229230

Phillips and Perron TEST					
Variable		P & P value (constant included)		P & P-value (constant and linear trend	
		Level	First differenced	Level	First differenced
Export		-1.232293	-4.760817	-2.198479	-4.672090
Oil Rent		-3.950503	-12.34579	-4.474400	-11.98962
GDP		-0.752069	-4.832638	-2.155956	-4.760663
Critical values	1%	-3.621023	-3.626784	-4.226815	-4.234972
	5%	-2.943427	-2.945842	-3.536601	-3.540328
	10%	-2.610263	-2.611531	-3.200320	-3.202445

The results from the table (1) indicate that export and GDP are non-stationary at the level with intercept or with intercept and trend (t-statistics less than the critical values at 1%, 5%, and 10%). Still, Oil Rent is stationary at the level with intercept or with intercept and trend (using ADF and P-P tests). After taking the first difference, export and GDP became stationary, with intercept, or with intercept and trend (t-statistics higher than the critical values at 1%, 5%, and 10% (using ADF and P.P Tests).

Co-integration Test Results

This study aims to assess how exports and GDP relate to each other in the long term if such a relationship exists. Results from the unit root test revealed that both variables are non-stationary at the level under intercept and intercept with the trend. As well as that both are stationary at first difference under both intercept and intercept with the trend. Therefore, to identify the relationship between exports and GDP, a cointegration test was performed.

Table (2) Results of the cointegration test

Rank	Max-Eigen Statistic	Critical Value (Eigen) at 5%	Prob.**	Trace Statistic	Critical Value (Trace) at 5%	Prob.**
None * (r=0)	28.090	21.131	0.004	43.968	29.797	0.0006
At Most 1* (r ≤ 1)	14.098	14.264	0.053	15.87	15.494	0.0438
At most 2 (r ≤ 2)	1.780	3.841	0.182	1.780	3.841	0.1821

*represents a rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug_Michelis (1999)p-values

The results of the cointegration tests reported in Table 2 show that both the Maximum Eigen Statistic and the Trace Statistic are present in Kuwait's economy at the 5% level for both two variables. It means that a long-term equilibrium relationship does exist between exports, oil rent, and GDP.

For the null hypothesis, the Trace Statistic is 43.96834, which is higher than the Critical Value (Trace) of 29.79707 at a significance level of 5%. It clarifies that this equation has a long-term relationship between variables at a significance level of 5%. Besides, the Trace Statistic based on rank $r \leq 1$, the values are also higher than the Critical Value (Trace), the Trace Statistic value is 15.87833, which is higher than the Critical Value (Trace) of 15.49471 at a significance level of 5%.

However, for the Max-Eigen Statistic, the value at rank $r = 0$ is 28.09001, which is higher than the Critical Value (Eigen) of 21.13162, showing a long-term relationship between variables at a 5% significance level. On the other hand, at rank $r \leq 1$, the Max-Eigen Statistic value (14.09831) is lower than the Critical Value (14.26460). At rank $r \leq 2$, the Trace and Max-Eigen statistic values are smaller than the Critical Values at a significance level of 5%.

Pairwise Granger Causality Test Results

Since the cointegration test cannot be used to determine the direction of any relationship between the variables, a pairwise Granger causality test was applied to determine whether the paired time series data has a correlation or not (i.e., whether there is a causal relationship between two variables). The association for the Granger causality test applied for all variables. When the F-statistic is lower than the F-critical, it means that there is no Granger causality among the variables. The time-series data checked before running the causality test by applying the unit root and cointegration tests.

Table (3) Results of the pairwise Granger causality test, Lags 3

Null Hypothesis	Obs	F-Statistic	Prob
GDP does not Ganger Cause Exports	35	8.3659	0.0004
Exports do not Granger Cause GDP	35	7.8505	0.0006
Oil Rents does not Granger Cause Exports	35	0.0885	0.9657
Exports do not Granger Cause Oil rent	35	1.9888	0.1385
Oil rent does not Granger Cause GDP	35	0.1100	0.9535
GDP does not Granger Cause Oil rent	35	1.7581	0.1780

The Granger causality test results are shown in Table 3, representing the pairwise Granger causality among export, oil rent, and GDP.

For the relationship between export and GDP, the results show that the export does Granger cause GDP because the significance level is less than 5% (P-value = 0.0006, F- Statistic = 7.8505). Furthermore, the results also show that GDP does Granger cause export at a significance level of 5% (P-value = 0.0004, F-statistic = 8.3659).

In contrast, there is no causality between neither oil rent and export nor between oil rent and gdp. In summary, among the three variables under consideration, only export and gdp does granger cause each other.

Conclusion and Recommendations

Table (4) Results of the hypothesis testing

Hypothesis	Statement of hypothesis	Results
H1	GDP influence Export	Accepted
H2	Export influences GDP	Accepted
H3	OIR Influence EXGS	Rejected
H4	EXGS Influence OIR	Rejected
H5	OIR Influence GDP	Rejected
H6	GDP Influence OIR	Rejected

Source Eviews 10

In conclusion, the hypotheses accepted, as described in Table 4. The results revealed that GDP significantly influenced exports, so hypothesis H1 is accepted. Also, exports do have a significant effect on GDP, so hypothesis H2 is Accepted.

On the other hand, H3, H4, H5, and H6 rejected, which means no causality effects among the rest of the variables.

In terms of recommendations, Kuwait's government should increase the openness of domestic markets to enhance its aim of building a comparative advantage and economies of scale. However, the government must also formulate economic policies that direct more national resources to open their market to learn about new technologies from developed countries and improve productivity.

To incorporate these superior technologies, Kuwait's government should encourage local investors to improve and facilitate the transfer of knowledge from their foreign counterparts.

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