Exploration of the Effect of Oil and Non-Oil Export on Economic Growth in the Kingdom of Saudi Arabia

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Research

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Abstract

The tactical master plan for the Kingdom of Saudi Arabia aims to resolve the Kingdom's economy from its reliance on oil revenues by diversifying its economy. Therefore, this research explores the impact of oil and non-oil export revenue on economic growth. Unit root test analysis illustrates that the series becomes stationary when level and first difference is considering and having a one lag length. Johansen co-integration test indicates the presence of both periods among the models. The outcomes indicate a short-run causal effect from both oil and non-oil export to economic growth.

Additionally, Impulse Response Function and Variance Decomposition also indicated that non-oil export revenue could act better than the revenue generated by oil export. However, the granger causality test indicates no causal relationship among any parameters. Policies recommend that by promoting the non-oil export will enhance the economic progress.

Introduction

Nowadays, economic growth is every nation's concern, and in such a milieu growth process has received particular attention from academicians, economists, and policy planners. Economic growth is regarded as noteworthy in any nation's economic growth, and many factors play a significant role. Solow (1956) mentioned the neoclassical growth theories advocated the three chief techniques to increase economic growth, i.e., labor, capital, and technological advancement. In developing countries, economic growth is the most vital concern in deciding the country's economic policies and future goals. Economic growth depends on certain Gross Domestic Products (GDP), which should increase as the population of Middle East countries are growing with time (Abdulkadhim and Saeed, 2017).

GDP decides the living standards of the people; therefore, Middle East countries gave special attention to their economic growth as the demand for countries' natural resources is reducing with time due to technological advancement in oil-consuming products. Usually, Middle East countries survive on their oil reservoirs; however, exhausted resources worried the Middle East countries think tank to shift their approach in other developing sectors to increase their GDP with time (Abdulkadhim and Saeed, 2017).

In the Middle East countries, oil contributes the most as an exporting product. According to IMF (2016), Kuwait, KSA, and Qatar exported 80% of their oil reservoirs, followed by Oman and Bahrain, with more than 60%. UAE has the least exporting power contributing 28.5% of its exports. It is a fact that the exports of one country will help to identify the foreign exchange reservoirs, which ultimately shows the purchasing power of that particular country (Thirlwall, 2000). As the economy rises, the nation will spend the amount on those goods productive for their growing economy.

In 2010, Saudi Arabia was the world's most abundant petroleum liquids and the world's second-largest crude oil producer after Russia. The economy of the Kingdom of Saudi Arabia is heavily dependent on crude oil. Oil revenue accounts for 80–90% of total Saudi revenue and over 40% of the country's gross domestic product, Aljebrin, (2017). Saudi Arabia was the world's major oil-exporting country, and 16.1% of world oil exports in 2018 reduced to 13.3% of world export in 2019.

Saudi Vision 2030, the tactical master plan for the Kingdom of Saudi Arabia, aims to resolve the Kingdom's economy from its reliance on oil revenues by diversifying its economy by implementing numerous economic and social initiatives like health, education, infrastructure, recreation, and tourism. The vital aims comprise reinforcing economic and investment activities, increasing non-oil international trade, and promoting a softer and more secular image of the Kingdom.

For the last few years, the price of oil has fallen significantly in the international market due to which the income of many oil-exporting countries has reduced considerably, of which Saudi Arabia is also one. Saudi Arabia is investing more and more in the non-oil sector besides dependence on oil income, so dependence on oil reduces.

Saudi Arabia's non-oil economy grew by 3.3% in 2019, its fastest rate since 2014; even the energy sector contracted and slowed overall growth. The retail, hotel drove most of the increase in output, and financial sectors, attracting increased investment as the Kingdom moves away from dependence on oil revenues (Arab news 2020).

Saudi Arabia's government has estimated that 42% of its non-oil economy for 2019 will generate taxes on goods and services. Taxes on income, profits, and capital gains are expected to yield about 5% of revenue, Statista (2020). On a positive note, as a non-oil activity has expanded rapidly since 2014, we believe that the increase in high investment in non-oil activity in 2020 has been a critical support factor, with more remarkable growth with larger projects.

Gulf oil-exporting economies have started 2020 with an uncertain outlook as oil markets again come under pressure from the spread of Covid-19 beyond China-hitting demand for crude oil and aviation fuel as people stay at home and factories reduce production. The countries expect the recently disclose Jafurah field to be a significant contributor to GDP growth over the coming decade (Arab news 2020).

LITERATURE REVIEW

Most of the research in this area established the causality among the oil and non-oil exports in different countries economic growth. Some of the studies in connection to the current study are mention below. Merza (2007) advocated that there is a dual causation link among oil export and economic growth, and proposed one-way causatives flowing from non-oil exports to economic growth in Kuwait. Aljarrah (2008) established that non-oil export had a positive weight on economic growth in Saudi Arabia. Similarly, Akeem (2011), Olurankinse and Bayo (2012), Adenugba (2013), Ude and Agodi (2014), Abogan (2014) and Ifeacho et al. (2014) also revealed that non-oil export had a noteworthy association with the economic growth, which indicated that the rise in the non-oil export leads to a remarkable expansion in the outcomes of economic enhancement in the Nigerian economy.

Mehrabadi et al. (2012) found that both oil and non-oil export had a positive consequence on Iranian economic development. Monir, et al. (2012) scrutinized the effects of oil and non-oil sector export on economic growth and revealed that non-oil export and oil export both have a positive effect on Iranian economic growth. Mohsen et al. (2012) inspected the causal relationship between government expenditure and non-oil revenues in a panel of 11 selected oil-exporting countries. They indicated a strong causality from GDP and non- oil revenues to government spending in the oil-exporting countries. However, in both run, government spending does not have any significant effects on revenues. Esfahani et al. (2012) developed a theoretical long-run growth model for oil-

exporting nations. Their model included these main parameters: real output, real money balances, inflation, exchange rate, oil exports, and real foreign output, although the role of investment and consumption analyses in a sub-model. They revealed the presence of binary long-run relationships, i.e., an output equation as predicted by the theory and a standard real money demand equation with inflation acting as a proxy for the (missing) market interest rate. Their outcomes displayed that oil exports and foreign output influence real output in the long run. However, inflation has a significant negative long-run effect on real GDP, which proposed economic inefficiencies and is matched by a negative association between inflation and the investment–output ratio.

Aladejare and Saidi (2014) analyzed the effect of crucial determinants of the non-oil sector on Nigeria's economy by using the bound test. The results have shown that in the short and long run, the export of non-oil significantly influences the development of the country's economy. The study's findings also suggested that a rise in inflation is complement by an inverse relationship between the exchange rate and the growth of Nigeria's economy. However, the real interest rate does not have a significant effect on the growth of the economy. Hosseini and Tang (2014) explored the effect of oil exports and non-oil on economic growth. Their results revealed a one-way causal relation between exports of non-oil and oil towards the Iranian economy's growth. Additionally, they revealed that oil export had reverse consequences on economic growth and further advocated promoting non-oil exports to energize long-term economic expansion. Mehrara (2014) examined that non-oil trade does not significantly influence 11 oil-exporting countries' economic progress in the long-run and short-run, whereas oil revenues and GDP have a strong causal relation in these countries.

Mohsen (2015) investigated the role of oil and non-oil export for the Syrian economy and proposed that GDP was strongly related to oil and non-oil exports. He developed dual causatives among all the parameters in the short-run, and for the long-run, he found dual causation among GDP and non-oil export and established one-way causation from oil export to GDP.

Raheem (2016) explored the effect of oil exports and non-oil on Nigeria's economic growth. He discovered one-way causality among oil export to GDP for the short-run, whereas, in the long-run, there is a dual causality flowing from oil export to GDP. His finding also revealed that one-way causation among non-oil to GDP. Additionally, the results also indicated that oil export and economic growth were inversely related, while non-oil export and economic growth were positively related.

Anthony-orji et al. (2017) investigated the effect of non-oil export on capital formation and economic growth for Nigeria and found that non-oil export had a strong influence on both parameters.

Aljebrin (2017) investigated the effect of crucial determinants of non-oil export on the growth of Saudi Arabia's non-oil economy and found that non-oil export has a significant positive relationship with both in the long and short run. Furthermore, capital has also strongly related to non-oil economic growth for both. The relationship of labor with non-oil economic growth is also positive and significant in the long-run; however, in the short run, the relationship between is positive but insignificant.

Olayungbo and Olayemi (2018) analyzed the relationships among the revenues from non-oil trade, government spending, and the growth of Nigeria's economy. They displayed a negative effect of Government spending on both run, whereas; non-oil revenue presented a strong influence on economic growth. Their findings also exposed that non-oil revenue produced a negative shock on economic growth; however, government spending produced a positive economic growth shock.

Alam et al. (2018) compared the countries Oman and UAE's economic situations concerning their dependence on oil from the last 06 years, from 2010 to 2015. They used descriptive statistics and regression analysis to test the hypothesis and found that the Oman and UAE have significant differences in economic development. UAE requires fewer Oil resources in comparison to Oman. The GDP of Oman was lower than in the UAE. The present research is first in its kind, analyzing the effect of oil and non-oil trade on the development of Oman and UAE economy.

Khayati (2019) explored the relationship between exports of oil and non-oil trade and the growth of the Bahrain economy. He discovered the co-integration outcome to be strongly influenced by both oil and non-oil export on economic growth in both long and short-run and revealed that oil export has a strong influence on economic growth. Further, he suggested that Bahrain should expedite the broadening process of the economy and enhance its industrial and service sectors to hike the percentage of non-oil export. It would diminish the impact of abrupt change in oil prices and boost capital efficiency and labor productivity in the global market.

Adedigba and Samuel (2019) investigated the role of oil and non-oil revenue in Nigeria's economic development process, where economic development was peroxided as the human development Index. The Johansen Co-integration outcomes revealed the presence of long-run association among the variables. The error correction estimates showed that oil revenue has a negative but significant relationship with the human development index, while non-oil revenue has a positive but insignificant relationship with the human development index. Moreover, he emphasized the diversification of exportable products and suggested a need to boost security surveillance on the high sea to reduce smuggling, which will reduce the illegal export of crude oil.

This study's core idea is to create an econometrical model that investigates the link concerning real GDP, revenue generated by oil export, and revenue generated by non-oil export and identifies the causality among parameters. The specific motive of this paper is to investigate the connection among real GDP, revenue generated by oil export, revenue generated by non-oil export, and if there be any significant impact from the shock in the Kingdom of Saudi Arabia.

Methodology & Model Specification

Annual time-series data from 2005 to 2019 were collected from the Saudi Arabian Monetary Agency, having 14 observations taken in our study, which should be sufficient to capture the short run as well as the long-run correlation between real GDP, revenue generated by oil export, and revenue generated by non-oil export in this model. The study applies the macro-economic model used by Mohsen (2015) and Adedigba and Samuel (2019), where the endogenous variable is GDP assuming other parameters to be constant, while the revenue generated by oil and non-oil export is an exogenous variable.

$$Economicgrowth = f(oilrevenue, non - oilrevenue)$$

All the variables are used in a real term and transformed into a logarithmic function:

$$LY_t = log\left(Y_t\right)$$

This can also be characterized in a log-linear econometric format as:

$$lng_t = \beta_o + \beta_1 lno_t + \beta_2 lnn_t + \epsilon_t$$

Where, *β0*: constant term, *β1*: coefficient of the variable (revenue generated from oil export), *β2*: coefficient of variables (revenue generated from non-oil export), *t*: The time trend and t: The random error term assumed to be normal, identically and independently distributed.

Long-run model can be expressed as:

$$lng_t = a_0 + a_1 lne_t + a_2 lnr_t + \epsilon_t$$

Short run Model can be expressed as:

$$\Delta lng_t = a + \sum_{i=1}^{k-1} \beta_i \Delta lng_{t-i} + \sum_{j=1}^{k-1} \emptyset_j \Delta lno_{t-j} + \sum_{m=1}^{k-1} \theta_m \Delta lnn_{t-m} + \lambda_1 ECT_{t-1} + u_{1t}$$

Where;

- *lng* = log value of Economic Growth measured in terms of real GDP
- *lno* = log value of revenue generated from oil export
- *lnn* = log value of revenue generated from non-oil export
- *k-1* = the optimal lag length is reduced by 1
- $\beta_i, \emptyset_j, \theta_m$ = short-run dynamic coefficients of the model's adjustment long-run equilibrium
- λ_i = speed of adjustment parameter with a negative sign
- ECT_{t-1} = the error correction term is the lagged value of the residuals obtained from the co-integration regression of the dependent variable on the regressors.
- u_{it} = residuals in the equations

Results And Discussion

Descriptive statistics and the correlation matrix of the log form data are present in table-1. The correlation matrix shows a mixed correlation bond between the parameters as real GDP has a strong positive bond with revenue generated by non-oil export and weak but positive bond with the real GDP and the revenue generated by oil export. The data will be analyzed for the test of stationary by Augmented Dickey-Fuller test and Phillips-Perron test, as described in table-2 the series became stationary at the level and first difference having a VAR lag length criterion to be one as presented in table-3.

The Johansen co-integration test results as present in table 4, which indicates that in the long run, revenue generated from non-oil export (*lnn)* has a positive impact on economic growth (*lng*). In contrast, revenue generated from oil export *(lno)* does not positively impact economic growth (*lng)*, on average, ceteris paribus. The factors are statistically relevant. Hence, the null assumption of no co-integration is rejecting against then alternative of a co-integration association in the model.

Co-integration test result indicates cointegrating equation at the 0.05 level, and provides the existence of both short-run and long-run equation between the revenue generated from oil export, revenue generated from non-oil export, and economic growth which can express as:

$$lng = -0.179309(lno) + 0.538869(lnn)$$

Based on the Johansen co-integration test reveals that the three variables are cointegrated, which obliges us to use the VEC model for a further test of significance. The long-run VEC model can express as:

$$ECT_{t-1} = \left[Y_{t-1} - \eta_j \chi_{t-1} - \xi_m R_{t-1} \right]$$

$$ECT_{t-1} = 1.00 lng_{t-1} + 0.179309 lno_{\varvec{t-1}} - 0.538869 lnn_{\varvec{t-1}} - 10.60331$$

The short-run equation model can express as:

$$\Delta lng_t = -0.387247 ECT_{t-1} - 0.161171 lng_{t-1} - 0.114727 lno_{t-1} + 0.366491 lnn_{t-1} + 0.005023$$

The above equations reveals as the previous year deviation from the long-run equilibrium corrected in the current period at an adjustment speed of 38.725%. A percentage change in revenue generated in oil export is associated with a decrease of 0.1147% in economic growth, on average, ceteris paribus in the short-run. Moreover, a percentage change in revenue generated from non-oil export is associated with a 0.3665% increase in economic growth on an average ceteris paribus in the short-run.

Table-5 depicts the model's diagnostic test, which predicts the serial correlation, normality, and Heteroskedasticity to be significant and stable. Tables-6 and table-7 based on t-stats and Wald tests reveal the short-run causal effect of the variable between the revenue generated by both oil and non-oil to economic growth.

The impulse response function used to describe the positive effects of exogenous impulses/ shock to an output included in the model. As per the above diagram, the response of revenue generated by oil export (LNO) to one standard deviation shock to economic growth (LNG) reveals that there is a sharp drop is visible for the short-run, i.e., from period one to three. From period four, there is a considerable increase till period six and then gradually decline till period eight afterward become consistent for the rest of the period. Hence, the shock in the LNO will have a positive stimulus on LNG for both the periods, although in the short-run, it is a steep decline and become stationary in the long run.

Also, the figure-2 shows the response of revenue generated by non-oil export (LNN) to one standard deviation shock to economic growth (LNG) reveals a marked decline that is visible for the short-run, i.e., from period one to three from period four, there is abrupt increase till six after that it becomes steady for the rest of the period. Hence, the LNN shock will have a positive stimulus on LNG for both the periods, although in the short-run, it is a steep decline and become stationary in the long run.

The variance decomposition (VD) for 1-year to 10-year forecast horizons will apply in this study. The VD concerns the extent to which variables are dependent on each other, and it provides information about the relative importance of each random innovation in affecting the variables in the model during the forecast horizon. In other words, The VD indicates the amount of information each variable contributes to the other

variables in the autoregression. It determines how much of each variable's forecast error variance can be explained by exogenous shocks to the other variables—the forecast error variance decompositions of the variables in our model, as given in Table-9. In the short-run, 100% of the forecast error variance in real GDP is explained by itself in one period. Contribution of LNO and LNR are having a feeble influence or zero in predicting LNG in the future; it is approximately 87% for period three in the forecast error variance in real GDP is explained by itself; the contribution of LNO is approx. 2% of the forecast error variance in real GDP and 7% is LNN's contribution to the forecast error variance in real GDP. Whereas, in the long-run, approx. 92% of the forecast error variance in real GDP is explained by itself for 10; the contribution of LNO is approximately 2% of the forecast error variance in real GDP, and 7% is the contribution of LNN in the forecast error variance in real GDP for ten years. Hence, the period three denotes short-run where real GDP is 87% forecasted, and period ten is denoted as long-run where real GDP is 92% forecasted by itself.

Pairwise Granger causality test reveals that there is no causal relationship among revenue generated by oil and non-oil export to economic growth; this might be due to inadequate time-series data to cover up the significant causation. However, the literature available (Gummi et al. 2017; Mohsin, 2015; Khayati, 2018) suggested the presence of causality among variables.

Conclusion

Using annual series data over the period 2005–2019, this study analyses the exploration of revenue generated from oil and non-oil export on economic growth in the Kingdom of Saudi Arabia. The data set statistically tested for correlation tests and shows the relationship between the variables to be positively correlated. The ADF & Phillips-Perron unit root test signifies that the parameters became stationary at the level and first difference having a lag length criterion assumed to be one lag. The co-integration outcomes reveal a negative influence of revenue generated by oil export on economic growth. In contrast, non-oil export revenue has a positive effect on economic growth, but there is no long-run causal relationship among the parameters.

Nevertheless, there is a short-run causal influence by both revenues generated by oil and revenue generated by non-oil export on economic growth. Impulse Response Function foresees that non-oil export revenue has a more significant impact on economic growth compared to revenue generated by oil export. Likewise, Variance decomposition (VD) also discloses the same outcomes. Finally, the Granger causality test indicates no causal effect among any parameters. Our analysis's outcomes indicate no causality running from economic growth to revenue generated from oil export and no causal effect flowing from economic growth to revenue generated from non-oil export. Built on the conclusions of this study, the Saudi government should expand its export, shorten the export procedures, improve Saudi industry, and rise the ratio of non-oil exports in total Saudi exports to lessen the effect of oil prices fluxes on the Kingdom's, simultaneously enhancing the quality, productivity, and competitiveness of the Saudi products in global markets.

Limitation Of The Study

The current paper is based on time series analysis for a specific period and a specific country and based on an Ordinary Least Square technique with the assured assumption of *ceteris paribus.*

Declarations

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AUTHOR'S CONTRIBUTIONS

All authors read and approved the final manuscript.

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Not applicable.

AVAILABILITY OF DATA AND MATERIALS

Data will be available only on reasonable request from the authors.

COMPETING INTERESTS

The authors declare that they have no competing interests

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Tables

Table-1 Descriptive statistics with the correlation matrix

Dependent Variable	Mean	Median	Maximum	Minimum	Jarque-Bera	Probability	LNG	LNE	LNR
LNG	14.60	14.65	14.79	14.364	1.637	0.44	1		
LNE	13.60	13.55	14.05	13.144	1.089	0.58	0.043	1	
LNR	11.94	12.09	12.369	11.174	1.639	0.4	0.941	0.336	1

source: Authors computation on Eviews 10

Table-2 Summary of Unit Root test				
	Augmented Dicky-Fuller		Phillips-Perron	
	t-statistics	Prob.	Adj. t-statistics	Prob.
Level				
LNG	-1.13522	0.6699	-1.1594	0.6599
LNO	-2.19341	0.2164	-2.2693	0.1936
LNN	-2.28446	0.1893	-4.7344	0.0028*
1st Difference				
LNG	-3.03066	0.0581***	-3.0319	0.058***
LNO	-3.30794	0.0364**	-3.6507	0.0202**
LNN	-2.81639	0.0828***	-2.6931	0.1013
2nd Difference				
LNG	-4.40598	0.0073*	-7.7354	0.0001*
LNO	-4.54069	0.0051*	-9.1276	0.00*
LNN	-4.13152	0.0111**	-6.3661	0.0003*
*,**,*** represents the 1%,5% &10% level of significance				

Table-3 VAR LAG LENGTH/ORDER SELECTION CRITERIA						
Lag	Log L	LR	FPE	AIC	SC	HQ
0	30.59262	NA	2.88E-06	-4.24502	-4.11465	-4.27182
1	62.99235	44.86116*	8.36E-08*	-7.84498	-7.323485*	-7.95217
2	72.99165	9.230125	9.87E-08	-7.998715*	-7.08611	-8.186298*
Source: Authors computation on E-views 10						

Table-4 Johansen Co-integration Test								
	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.*	Max-Eigen Statistics	0.05 Critical Value	Prob.*	Inference
None*	0.87131	39.5371	29.7971	0.0028	26.6541	21.1316	0.0075	VECM
At most 1	0.46332	12.8831	15.4947	0.1192	8.0906	14.2646	0.3696	
At most 2	0.30834	4.79249	3.84147	0.0286	4.79249	3.84147	0.0286	
LNG			LNO			LNN		
1			0.179309			-0.538869		
			0.02089			0.0166		
Source; Authors Own Calculations, Eviews 10								

Table-5 Diagnostic tests for VECM				
VECM Residual Serial Correlation LM Tests				
Lag	LRE*stat	Df	Prob.	Inference
1	4.6556	9	0.8632	No Serial Correlation
	Rao F-stat	Df	Prob	
	0.4386	9,7.5	0.8775	
VECM Residual Normality Tests				
Jarque-Bera	Df	Prob.		Significant
6.0353	6	0.419		
VECM Residual Heteroskedasticity Tests				
Chi-sq	Df	Prob.		Homoskedasticity
50.2974	48	0.3826		
Source; Authors own calculations, Eviews 10				

Table-6 Regressors & ECT t-stats			
	t-statistic	Prob.	Inference
ECT	-1.6796	0.106	No long-run causal effect
LNO	-2.0386	0.0527***	Short-run causal effect
LNN	2.54679	0.0177**	Short-run causal effect
*,**,*** represents 1%, 5% & 10% Source; Authors computation E-views 10			

Table-7 VEC Granger causality/ Block Exogeneity Wald Tests				
	Chi-sq	Df	Prob.	Inference
LNO	4.15585	1	0.0415**	Short-run causal effect
LNN	6.48614	1	0.0109**	Short-run causal effect
**, represents 5% significance level Source; Authors computation E-views 10				

Table-8 Variance Decomposition Analysis Results				
Period	S.E.	LNG	LNO	LNN
1	0.02545	100	0	0
2	0.05061	84.8369	6.51566	8.64742
3	0.06246	86.7895	4.54398	8.6665
4	0.07051	88.4922	3.56947	7.93837
5	0.07823	89.5906	2.96524	7.44415
6	0.08583	90.222	2.5777	7.2002
7	0.09283	90.9603	2.282	7.0277
8	0.09926	91.0768	2.0504	6.8728
9	0.1053	91.3844	1.8709	6.7447
10	0.11105	91.6268	1.7289	6.644
Authors Computation on E-views 10				

Table 9 Pairwise Granger Causality Test				
Null Hypothesis	Observations	F-Statistic	Prob.*	Inference
LNO does not Granger Cause LNG	14	0.29522	0.5977	Rejected
LNG does not Granger Cause LNO		0.80102	0.39	Rejected
LNN does not Granger Cause LNG	14	2.97814	0.1123	Rejected
LNG does not Granger Cause LNN		0.02534	0.8764	Rejected
LNN does not Granger Cause LNO	14	0.45805	0.5125	Rejected
LNO does not Granger Cause LNN		0.61616	0.4491	Rejected
Source: Authors Own calculations: Eviews10				

Figures

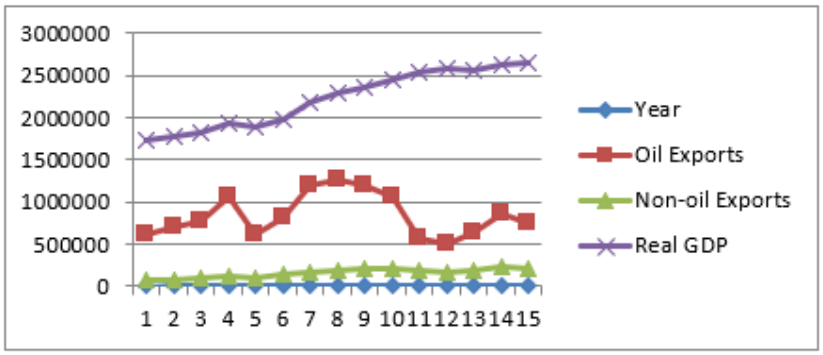

Figure 1

Represents the data (Million Riyals)

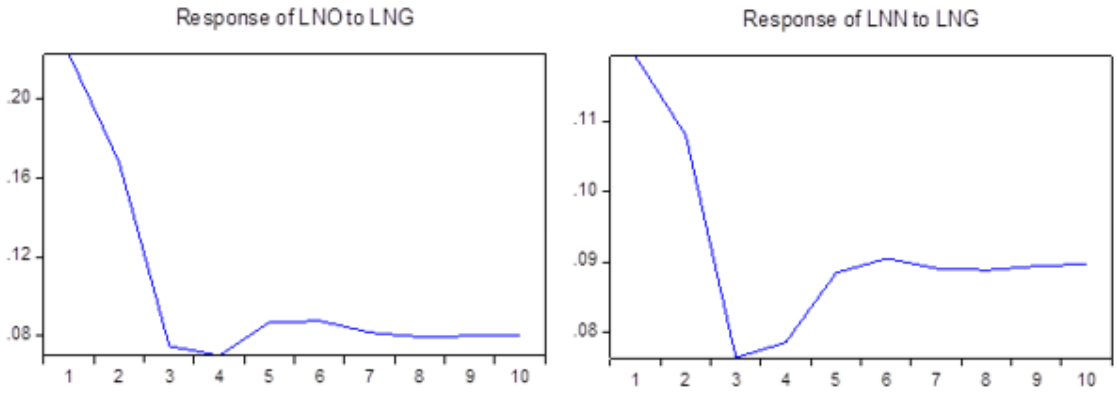

Figure 2

Impulse Response Function Test Results