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Relationship Between Oil Revenues and Gross Domestic Product of Oman: An Empirical Investigation

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ABSTRACT

Oil revenues are a significant contributor to Oman's total revenues. This study empirically examines the long run and short run causal relationship between oil revenues, real gross domestic product (GDP) and Real GDP from petroleum activities of Oman from 1985 to 2017. The Johansen Cointegration test and vector error correction (VEC) Model are used to investigate the cointegrating, long run, and short run relationship. Direction of short run causality is examined through the Wald coefficient restriction test, VEC Granger/Block Exogeneity Test and pairwise Granger causality test. Results show that a statistically significant long run relationship exists between oil revenues, GDP and GDP from petroleum activities. In the short run, however, a weak significant relation exists between GDP and real oil revenues. Variance Decomposition of Forecast error of GDP shows that 48% of variation in GDP can be explained by oil revenues. Through Impulse Responses Function results, it is concluded that initially there is a sharp rise in oil revenues after which oil revenues tend to fall.

Keywords: Real Oil Revenues, Real Gross Domestic Product, Vector Error Correction Model
JEL Classifications: E60, O11

1. INTRODUCTION

The Sultanate of Oman is a booming economy in the Middle East and enjoys stable political, economic and social system. Commercial production of oil started in 1967 and ever since oil revenues have been a significant and major contributor to total revenue. Government revenues depend upon global oil prices, global demand for oil, oil reserves and oil production capacity. Oil revenues have facilitated major advancements in social and economic development including the establishment of modern infrastructure. However, reliance on oil revenues poses serious threats.

This study proposes to examine the long run equilibrium, short run relationship and the direction of causality between oil revenues, gross domestic product (GDP) from the Petroleum sector and GDP of the Sultanate of Oman from 1985 to 2017. It also investigates how GDP from petroleum sector and Oil revenues react to an external shock from GDP and the extent to which innovations in GDP from oil sector and oil revenues can explain movements in GDP.

The Harrod Domar Model and the Dutch Disease model can explain the relationship between oil revenues and GDP. The following section briefly presents the theoretical underpinnings of the study.

2. THE ORETICAL UNDERPINNINGS OF THE STUDY

The Harrod Domar Model postulates the importance of investment and capital formation in maintenance of desired growth rate. The actual growth rate in the economy is a function of capital output ratio and saving income ratio i.e. GC = S, G= ΔY/Y is the actual rate of growth, C = I/ΔY is the marginal capital output ratio and S= S/Y is the saving income ratio.

$\frac{\Delta Y}{Y}\frac{I}{\Delta Y}=\frac{S}{Y}$ which implies the investment must be equal to savings.

The warranted Growth rate (G_w) is full employment rate of growth. $G_w C_r = S$, where Cr is the required capital output ratio. Thus, $G_w = S/Cr$. If the economy is to grow at the warranted rate than income must increase in the ratio of S/Cr. This rate of growth will ensure full employment. The natural growth rate G_n is the maximum growth rate possible with given natural resources, population and technology. Equality between the actual growth rate, warranted growth rate and natural growth rate would ensure full employment of labor and capital.

Solow and Swan (1956) further developed the Harrod Domar model. According to the Solow and Swan model output growth is also a function of technological change. When the economy is in a steady state, technological change determines economic growth, whereas savings determine income levels.

The two-gap growth model extended the Harrod Domar analysis. According to this model, growth is constrained by domestic savings and foreign exchange reserves.

$$Y = C+I+(X-M)$$

$$Y-C = I + (X-M)$$

$$S = Y-C$$

$$M-X = I-S$$

I−S is the savings gap and M−X is the foreign exchange gap. Oil revenues can help in reducing both theses gaps.

The three-gap model said that fiscal revenues can be another constraint in economic growth. Rent seeking activities in oil exporting countries can increase domestic savings, provide the necessary foreign exchange and fiscal revenues, thereby simultaneously relaxing all the three constraints.

Cordon and Neary (1982) put forth the Dutch disease model to explain the harmful consequences of a booming natural resource sector. According to the authors, a resource discovery and/or increase in the price of the natural resource lead to deindustrialization of the economy through the resource movement and spending effect. The consequences of a booming sector are appreciation of real exchange rate, inflation and decline of manufacturing and agricultural sector. Based on these theoretical underpinnings, the study seeks to examine the relationship between oil revenues, GDP and GDP from Petroleum sector.

3. REVIEW OF EMPIRICAL LITERATURE

This section reviews studies on the relation between oil prices, oil price changes and oil revenues and GDP. Aliyu (2009) empirically examined the impact of oil price shocks on the macro economy of Nigeria using linear and non-linear models. Data from 1980 to 2007 on nominal GDP and Consumers Price Index were sourced from Central Bank of Nigeria (CBN) statistical bulletin whereas data on Oil prices was obtained from the IMF website. Real GDP and oil prices were transformed into their logarithmic forms and their trends revealed strong relationship amongst them. Stationarity of the variables was checked using the Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test. Results of the Granger causality tests block exogeneity and pair wise causality show that there is significant relationship between oil prices and real GDP. The Vector Auto regression results show that in both linear and non-linear models, oil price increases have a positive effect on the real GDP of oil exporting countries.

Ogbonna and Ebimobowei (2012) in their research paper titled "Petroleum Income and Nigerian Economy: Empirical Evidence" state that as per the Harrod (1939) and Domar (1946) growth model, the Nigerian economy is at an advantage as it can use the petroleum resources for economic growth. They however state that the Nigeria is one of the poorest countries in the world. According to the authors, the natural resource curse (Sachs and Warner, 2001) is responsible for the sustained underdevelopment of the Nigerian economy. They thus seek to find out the effects of petroleum income on the economy of Nigeria. The macro economic variables used in the study are GDP, Per Capita GDP and inflation. Data on the selected variables is collected from CBN, the National Bureau of Statistics (NBS), and the Nigerian National Petroleum Corporation (NNPC). Using simple regression analysis, the authors inferred that the relationship of petroleum income with GDP and per capita income was statistically significant where as inflation had a negative relation.

Christian and Teymur (2014) examine the relation between oil prices, GDP and investment in Iran and GCC countries. The study is based on the neo classical growth theory, which states that long run economic growth takes place through technological progress. The international oil prices and OPEC quotas exogenously determine oil revenues. A proportion of these revenues are invested implying faster capital accumulation. A permanent effect on per capita GDP will occur in the steady state if the growth in oil revenues is above the threshold limit. Data on GDP, investment, population and inflation from 1980 to 2012 is sourced from the IMF World Economic Outlook, Central Bank of Iran and Penn world tables. Oil revenues are converted into domestic currencies using the nominal exchange rates and then deflated using the CPI. The GDP deflator is used to convert nominal to real variables. Results show that co integration exists between oil prices, GDP and investment.

Mehrara (2014) investigated the relation between non-oil trade, GDP and oil revenues in eleven selected oil-exporting countries. Panel data from 1970 to 2011 is obtained from the World Bank Development indicators. Results of the panel co integration test, Granger causality test state that there is long run causality from oil revenues and GDP to non-oil trade.

Nagmi and Aimer (2016) examined the impact of oil price changes on the economic growth of Libya from 2000 to 2015 using Johansen co-integration test, impulse response function, and variance decomposition tests. GDP data was sourced from the IMF database whereas crude oil prices (WTI) were obtained from U.S. energy information administration. The results of the co integration test reveal that there is no long run relation between crude oil prices and GDP in Libya. Impulse response functions show that in the short run oil shocks have a positive effect on the GDP.

Vohra (2017) studied the relation between oil prices, economic growth, budget deficit and current account balance of GCC countries from 2000 to 2015. Pearsons correlation was used to test the empirical model cai = β0 + β1 Δyi + β2 Δpi + ε. Country wise analysis revealed a weak positive relation between current account balance as percentage of GDP and economic growth for Oman where as it was moderate for oil price changes. According to the study, low oil prices have caused budget deficits and potential for instability.

Al Rasasi et al. (2018) empirically examine the relation between oil revenues and economic growth of Saudi Arabia from 1970 to 2017. ADF test, PP test were used to check the stationary properties of the variables. Through the results Johansen and Juselius co integration test, the authors conclude that there is a long run relationship between real oil revenues and output. The OLS regression coefficients highlight the important role played by oil revenues. A 10% increase in Saudi Arabia's oil revenue caused a six point five rise in non-oil output. Oil revenues were transmitted into the economy through government spending.

Based on theoretical and empirical literature, the current study seeks to examine the empirical relationship between real GDP, real GDP from petroleum activities and real oil revenues. The following section discusses the econometric methodology employed in the study.

4. DATA AND RESEARCH METHODOLOGY

The study examines the relationship between real oil revenues, Real GDP from Petroleum Activities (henceforth referred to as GDP Oil) and Real GDP of Oman from 1985 to 2017. Real GDP is defined as the gross value of final goods and services produced in Sultanate of Oman during the year at 2010 prices. The National Centre for Statistics and information classifies GDP into the petroleum and non-petroleum sector. Real GDP from petroleum activities can be defined as the gross value of petroleum products produced during the year at 2010 prices. Real Oil Revenues are income generated through domestic and international sale of petroleum products at 2010 prices. All the variables are measured in Omani Rials.

Data on nominal oil revenues and GDP is collected from the various editions of Statistical Yearbook, Ministry of National Economy, Sultanate of Oman. The GDP deflator, with base year 2010, is used to convert oil revenues at current prices to real oil revenues. The study uses splicing technique to convert real GDP and real GDP from petroleum activity series with base years 1998 and 2010 to the base year 2010. The time series data from 1985 to 2017 is transformed to its logarithmic form.

The ADF test and PP test are used to test the Stationary properties of the variables. All the variables were stationary at their first difference. After determining the optimal lag length, the co integration properties of the variables are tested using the Johansen co integration test. Since the Johansen cointegration test resulted in one co integrating relation, the long run and short run dynamics of the relation between oil revenues and GDP was tested using vector error correction model (VECM). Direction of causality between oil revenues, GDP and GDP Oil was tested using the t-statistic of the repressors, Wald Coefficient test, and Wald block exogenity test. Unidirectional and bidirectional causality was tested using pair wise Granger Causality test. Each of these tests check the robustness and confirm the other test. Impulse Response function was used to find the impact of innovations in GDP Oil and Oil revenues on GDP. Variance decomposition of forecast error was used to investigate the impact of shocks arising from other variables. Diagnostic tests for serial auto correlation, normality and heteroscedascity are performed. Finally, the stability of the model is tested through CUSUM test and CUSUM squares test. The analysis is performed using Eviews 10.

5. EMPIRICAL FINDINGS

This section reports the findings of the study.

5.1. Stationary Test

Stationary properties of the time series data of real Oil revenues, real GDP and real GDP Oil is tested using the unit root test. The hypothesis that the series is stationary is tested against the alternative that the series is non-stationary. The ADF test and the PP test are used to check the presence of unit roots. The following Table 1 displays the results of the ADF and PP test statistic.

The series are not stationary at level but at the first difference the null hypothesis, the series has unit root, is rejected. Stationarity at the first difference implies that though the variables seem to be drifting apart in the short run, convergence may occur in the long run. Econometric procedure provides two popular methods for testing the cointegration properties of the variables: The Engle Gagner and Johansen cointegration test. The current study utilizes the Johansen cointegration test as more than two variables are involved and the assumption of stationarity at first difference is satisfied.

Table 1: Stationary status: Results of unit root tests

Variables	At level		At first difference		Inference
	ADF test statistic	PP test statistic	ADF test statistic	PP test statistic	
Log OR	−1.81	−2.62	−5.8	−5.77	I(1)
Log GDP	−1.7	−2.01	−4.05	−4.01	I(1)
Log GDP Oil	−2.12	−2.42	−3.67	−3.7	I(1)

Source: Author's own calculation using E-views 10. Log OR: Log of real oil revenues, Log GDP: Log of real GDP, Log oil: Log of real GDP from Petroleum activities. ADF: Augmented dickey fuller, PP: Phillips-Perron, GDP: Gross domestic product

5.2. Johansen Cointegration Test

Johansen cointegration test is sensitive to the selection of lag length. Lag is the time lapse which the dependent variable requires to respond to the independent variable. Selection of an optimal lag length is important as too many lags cause loss of degrees of freedom, multicollinearity, serial correlation in the error terms and misspecification errors. The current study selected lag 3 as the optimal lag length based on the Akaike Information Criteria. This test is performed either at level data or its log transformation. The current study performs the test on the log transformation of the variables. The Null hypothesis H_0: There are no cointegrating equations is tested against the alternative that H_0 is not true through the trace statistic and max eigen statistic. The following Table 2 presents the results.

Results of both, the trace statistic and max eigen statistic reject the null hypothesis of no cointegration between the variables in favor of the alternative that at most one cointegration equation is present. Thus, Real GDP, GDP Oil and Oil revenues are related in the long run and can be combined in a linear fashion. The normalized co integrating equation coefficients are

LogGDP	LogOil	LogOR
1.00000	−0.908397	−0.332474
	(0.04379)	(0.00960)

From the coefficients of the normalized equation, we can observe a long run positive relation between GDP Oil and real oil revenues.

Short run shocks in real oil revenues, real GDP Oil and real GDP may cause divergence in the short run but in the long run all three variables will converge. The following section discusses the results of the VECM.

5.3. VEC Analysis

To understand the long run convergence of Oil Revenues, GDP and GDP Oil, the VECM is used. VECM restricts the behavior of the variables to converge to their integrating relationship while allowing for short term adjustments. This restriction results in the loss of degree of freedom, so VECM is run at P-1 that is 2 lags. All variables in the VECM model are endogenous and the target variable real GDP is entered first in the VECM system.

The error correction term signifies the speed at which the variables will converge in the long run by gradually correcting a series of deviations in oil output and revenues from the long term equilibrium through short term adjustments. Thus, the error correction term should be negative (lie between zero and negative one) and statistically significant to allow economic interpretation. As can be observed from Table 3, the error correction term −0.339364 is statistically significant at the 1% level.

The cointegrating equation for the model is:

$$ECT_{t-1} = [1.000GDP_{t-1} - 0.6510607\text{Log GDP Oil}_{t-1} - 0.365480\ \text{LogOR}_{t-1} + 0.933824]$$

The long run cointegrating equation implies that, other things remaining the same, a 10% increase in real GDP Oil is associated with a 6.5% increase in real GDP where as a 10% increase in real oil revenues is associated with a 3.6% increase in the real GDP. Statistical significance of the coefficients of the error correction terms of real GDP, real oil revenues and real GDP Oil is tested through *t* statistic. Results are presented in the following table:

The long run causal relationship is examined through the statistical significance of the coefficients of the explanatory variables and the error correction term. From P-values given in Table 3, all the ECT coefficients are statistically significant. Thus, a causal relation between real GDP, GDP Oil and OIL Revenues exists.

The VEC equation with real GDP as the target variable is estimated as follows:

$$\Delta GDP_t = -0.3394ECT_{t-1} - 0.05816\Delta GDP_{t-1} + 0.35625\Delta GDP_{t-2} + 0.3441\Delta \text{GDP Oil}_{t-1} - 0.367114\Delta \text{GDP Oil}_{t-2} - 0.079651\Delta OR_{t-1} - 0.056155\Delta OR_{t-2} + 0.035971$$

From the coefficient of the error correction term we can infer that previous years deviations in GDP Oil and oil revenues from the long run equilibrium are corrected in the current period at an adjustment speed of 34% and is statistically significant at P = 0.00. The statistical significance of the coefficients of VEC equation are presented in the following Table 4.

The second lag of GDP Oil is statistically significant at P = 0.05 and the first lag of oil revenue is significant at 10% level.

To examine the joint significance of the coefficients of GDP Oil and oil revenues on real GDP, Wald coefficient restrictions test is used. The null hypothesis for the test is no granger causality.

There is no sufficient evidence to reject the null hypothesis that in the short run, GDP Oil granger causes real GDP whereas at the 10% significance level, we can infer that oil revenues granger cause GDP (Table 5).

The VEC Granger/Block Exogeneity test is used to understand the short run causal relationships. The results of the test are presented in the following table:

From the probability values of the Chi-square statistic (Table 6), we can see that when Real GDP is the dependent variable, GDP Oil has no causal relationship whereas Oil revenues have a short

Table 2: Unrestricted cointegration rank test

Hypothesized no. of CEs	Trace statistic	0.05 critical value	Prob.	Hypothesized no. of CEs	Max eigen Statistic	0.05 critical value	Prob.
None*	39.18569	29.79707	0.0031	None*	26.09031	21.13162	0.0092
At most 1	13.09538	15.49471	0.1114	At most 1	12.54330	14.26460	0.0919

Source: Author's own calculation using E-views 10. *Denotes rejection of null hypothesis at 5% level run causal on real GDP at the 10% significance level in the short run. The joint effect of both GDP Oil and oil revenues is significant in the short run at 10% level.

From the values of the Chi-square statistic, we can infer that real GDP, Oil revenues individually and jointly have a significant causal relationship with GDP oil (Table 7).

From the probability values of the Chi-square statistic, we can see that there is no sufficient evidence to reject the null hypothesis Real GDP and GDP Oil do not granger cause oil revenues (Table 8).

Table 3: Statistical significance of VEC coefficients

ECT coefficent	Coefficients	t-statistic	P-value
Real GDP	−0.339364***	−3.264281	0.0017
GDP Oil	−0.364938 ***	−2.750088	0.0077
OIL Revenues	1.528265**	2.157371	0.0346

Source: Author's own calculation using E-views 10. ***indicates 1% level of significance, **indicates 5% level of significance. VEC: Vector error correction, GDP: Gross domestic product

Table 4: Statistical significance of VEC coefficients

Variables /Adjustment term	Coefficients	t-statistic	P-value
ECT_{t-1}	−0.3394***	−3.264281	0.0036
ΔGDP_{t-1}	−0.0582	−0.226701	0.8827
ΔGDP_{t-2}	0.3563*	1.692010	0.1048
$\Delta GDP\ Oil_{t-1}$	0.3441	1.596577	0.1246
$\Delta GDP\ Oil_{t-2}$	−0.3671**	−2.044438	0.0531
ΔOR_{t-1}	−0.0797*	−1.941858	0.0651
ΔOR_{t-2}	−0.0562	−1.597210	0.1245
Constant	0.0359***	3.907711	0.0008

Source: Author's own calculation using E-views 10. ***Indicates 1% level of significance, **indicates 5% level of significance, *indicates 10% level of significance. VEC: Vector error correction, GDP: Gross domestic product

Table 5: Wald coefficient restrictions test

Test statistic	GDP oil	Probability	Oil revenues	Probability
F-statistic	2.173221	0.1376	2.265381	0.1274
Chi-square	4.346441	0.1138	4.531662*	0.1037

Source: Author's own calculation using E-views 10. *Indicates 10% level of significance. GDP: Gross domestic product

5.4. Direction of Causality

The pairwise Granger causality test was used to infer the direction of causality. The test results are presented in the following Table 9.

5.5. Variance Decomposition

To identify the relative impact of real GDP, GDP oil and oil revenues have on real GDP, Variance Decomposition analysis is used. The variance decomposition of forecast error gives percentage unexpected variations in the real GDP, GDP oil and oil revenues which is due to shocks from other variables. Variance Decomposition for the GDP is presented in Table 10.

In the short run period, 100% of the forecast error is explained by GDP itself and GDP Oil and oil revenues are strongly exogenous, that is they have a very weak influence. As we move from period one to period ten the influence of real GDP on itself reduces and from strong endogenous effects in period one we have weak endogenity in period 10. Influence of GDP Oil and oil revenues increases from period one to ten. The Wald coefficient test (Table 5) results also state that oil revenues granger cause real GDP and there was no sufficient evidence to reject the hypothesis that GDP Oil granger causes real GDP (Table 6). Oil revenues explain 48% of real GDP variation in the long run.

5.6. Impulse Response Function

Impulse Response Function was used to trace the effects of shocks from the error terms of GDP Oil and Oil Revenues on Real GDP. If the error term of GDP increases by one standard deviation, this shock will cause an increase in GDP till period 6 after which there is a decline in GDP. GDP Oil increases up till period 5 after which there is a decline. However in period 10, GDP Oil rises as a response to a one standard deviation shock from real GDP. Oil revenues increase sharply till period 6 after which there is a sharp decline (Table 11). The tabular and graphical representation of the Impulse Response Function is as follows:

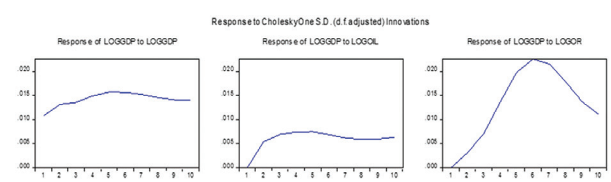


Table 6: VEC granger/Block exogeneity test (Dependent variable Δ GDP)

Independent variables	Chi-square	Probability	Inference
ΔGDP oil	4.346441	0.1138	GDP Oil does not have short run causal relationship with GDP
ΔOil revenues	4.531662*	0.1037	Oil revenues have weakly significant short run causal relationship with GDP
Joint	8.609003*	0.0717	Both oil revenues and GDP Oil have weakly significant short run causal relationship with GDP

Source: Author's own calculation using E-views 10. *Indicates 10% level of significance. VEC: Vector error correction, GDP: Gross domestic product

Table 7: VEC granger/Block exogeneity test (Dependent variable Δ GDP oil)

Independent variables	Chi-square	Probability	Inference
ΔGDP	6.851371**	0.0325	GDP has a short run causal relationship with GDP Oil at the 5% level
ΔOil revenues	6.747091**	0.0343	Oil revenues have a significant short run causal relationship with GDP Oil
Joint	13.58155***	0.0088	Both GDP and Oil revenues have a significant short run causal relationship with GDP Oil

Source: Author's own calculation using E-views 10. ***Indicates 1% level of significance, **indicates 5% level of significance. VEC: Vector error correction, GDP: Gross domestic product

Table 8: VEC granger/Block exogeneity test (Dependent variable ΔOIL Revenues)

Independent variables	Chi-square	Probability	Inference
ΔGDP	1.575606	0.4548	No evidence of short run causal relationship
ΔGDP oil	1.736976	0.4196	No evidence of short run causal relationship
Joint	2.715132	0.6066	No evidence of short run causal relationship

Source: Author's own calculation using E-views 10. VEC: Vector error correction, GDP: Gross domestic product

Table 9: Pair wise granger causality test

Null hypothesis	F-statistic	Probability	Inference
GDP Oil does not granger cause GDP	0.51523	0.6759	Uni directional Causality from GDP to GDP Oil
GDP does not granger cause GDP Oil	3.14345**	0.0447	
Oil Revenues does not granger cause GDP	2.53504*	0.0818	Uni directional causality from OR to GDP
GDP does not granger cause OR	0.68913	0.5679	
OR does not granger cause GDP Oil	3.84139**	0.0230	Uni directional causality from OR to GDP Oil
GDP Oil does not granger cause OR	1.19573	0.3335	

Source: Author's own calculation using E-views 10. **Indicates 5% level of significance, *Indicates 1% level of significance. GDP: Gross domestic product

Table 10: Variance decomposition of real GDP

Period	SE	Real GDP	GDP oil	Oil revenues
1	0.01	100.00	0.00	0.00
2	0.02	88.14	8.93	2.94
3	0.02	77.59	12.68	9.73
4	0.03	64.94	12.31	22.75
5	0.04	53.42	10.63	33.95
6	0.05	46.29	9.15	44.56
7	0.06	43.01	8.28	48.71
8	0.06	42.19	7.96	49.85
9	0.07	42.66	7.99	49.34
10	0.07	43.57	8.52	48.18

Source: Author's own calculation using E-views 10. Cholesky Ordering: Real GDP, GDP Oil, Oil Revenues. GDP: Gross domestic product

Table 11: Impulse response function

Period	Real GDP	GDP oil	Oil revenues
1	0.010	0.000	0.000
2	0.013	0.005	0.003
3	0.014	0.007	0.007
4	0.015	0.007	0.014
5	0.016	0.007	0.020
6	0.016	0.007	0.022
7	0.015	0.007	0.022
8	0.015	0.006	0.018
9	0.014	0.006	0.014
10	0.014	0.006	0.011

Source: Author's own calculation using E-views 10. Cholesky Ordering: Real GDP GDP Oil oil revenues. GDP: Gross domestic product

Table 12: Diagnostic tests

Diagnostic test	Probability
LM test for serial autocorrelation	0.2953
Jacque Berra test for normality	0.4885
VEC residuals heteroscedascitity test	0.5961

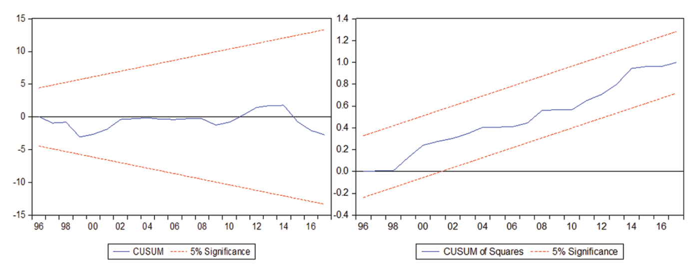
Source: Author's own calculation using E-views 10. VEC: Vector error correction

6. DIAGNOSTIC TESTS

Diagnostic tests were performed to check for the presence of serial auto correlation in the residuals, normality of residuals and heteroscedascity. Serial autocorrelation was tested using LM test. There is no sufficient evidence to reject the null hypothesis that there is serial autocorrelation at lag h and at lags 1 to h. The Jacque Berra Test for normality shows that residuals are normally distributed for each variable and the entire model. The VEC residuals hetroskedasticity test was used to test if the residuals are homoscedastic. There is no sufficient evidence to reject the null hypothesis that the residuals are homoscedastic (Table 12).

7. STABILITY TEST

CUSUM and CUSUM of Squares test was used to check for the long run and short run parameter stability. Movement outside the 5% critical lines denotes parameter instability. From the graphs depicted below, the Cumulative Sum and Cumulative Sum of Square lies within the 5% critical lines. Thus, it can be concluded that the model is stable.



8. CONCLUSION

The Harrod Domar model, two gap and three gap model highlight the importance of savings, investment and foreign exchange earnings in economic growth. The Dutch disease model states that a booming natural resource sector can lead to deindustrialization in the long run. Empirical literature has found a statistically significant positive relation between oil prices and GDP (Aliyu, 2009; Christian and Teymur, 2014; Vohra, 2017), oil price changes and GDP (Ogbonna and Ebimobowei, 2012; Mehrara, 2014; Nagmi and Aimer, 2016) and Oil revenues and the non-oil sector (Al Rasasi et al., 2018).

Oman is an open economy with oil revenues being a significant contributor to the total revenues. Al Saqri (2010) in his doctotoral thesis entitled "Petroleum Resources, Linkages

And Development: The Case Of Oman" examines the linkage between the oil sector and economic development in Oman. The primary objective of the study was to examine how the Sultanate of Oman can transform from an Oil Dependendent to a non oil depependent economy by the year 2020. Masan (2016) in his thesis entitled "Oil and macroeconomic policies and performance in Oman" examined the relation between Oil revenues and macroeconomic policies in Oman. The current study seeks to bridge the gap in existing literature by examining the long run and short run relationship between oil revenues, Real GDP from Petroleum activities and Real GDP. It also investigates the direction of causality and the response to an external shock from GDP and the extent to which innovations in GDP from oil sector and oil revenues can explain movements in GDP.

The findings suggest the existence of a long run signifcant relation between the variables. However in the short run a weak significant relation between oil revenues and real GDP was observed. Variance Decomposition of forecast error for GDP shows that in the short run period, 100% of the forecast error is explained by GDP itself where as in the long run Oil revenues explain 48% of real GDP variation. Findings from the Impulse response function lead us to conclude that a one standard deviation increase in real GDP will cause an increase in itself in the short run whereas there is a sharp rise in oil revenues. Based on these findings, the authors suggest that Sultanate must diversify its revenues sources to attain and maintain a stable growth rate. A further study on the relationship between oil revenues and key macro-economic performance indicators such as inflation, real exchange rate and fiscal balance of Oman will contribute to the better understanding of the role oil revenues. As oil revenues are transmitted in Oman's economy through Government expenditure, a study on the relationship between government expenditures and economic growth is desired.

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