Oil Revenue, Public Spending, Gross Domestic Product and Employment in Saudi Arabia

Tarek Tawfik Yousef Alkhateeb[1], Zafar Ahmad Sultan[2]*, Haider Mahmood[3]

[1]Department of Marketing, College of Business Administration, Prince Sattam bin Abdulaziz University, Alkharj, Saudi Arabia & Department of Agricultural Economics, Kafr Elsheikh University, Egypt, [2]Department of Economics; L.S. College, Muzaffarpur; B.R.A. Bihar University, Muzaffarpur; Bihar, India, [3]Department of Finance, College of Business Administration, Prince Sattam Bin Abdulaziz University, Alkharj, Saudi Arabia. *Email: zsultan.sultan@gmail.com

ABSTRACT

Saudi Arabia has largest oil production and exports in the world. Oil's revenues form the backbone of the economy and it is also a main source of government revenue which determines the major economic activities in the country. This paper has investigated the relationship between oil revenue and employment level by augmenting two more variables like gross domestic product (GDP) and public spending for a period 1991-2016. We find that there is a cointegration among oil revenue, GDP, public spending and level of employment in Saudi Arabia. The vector error correction model results show that oil revenue and public spending are causing the level of employment in Saudi Arabia. This study observes that declining oil price and its consequent impact on oil revenue may pose a challenge to the economy unless it diversifies its economic base and reduces its dependence on oil sector. Therefore, we recommend the government to reduce oil dependency to improve employment level.

Keywords: Oil Revenue, Employment, Causality
JEL Classifications: C22, E24, H50

1. INTRODUCTION

The oil revenue plays an important role in Saudi economy. Revenue from oil constitutes key factor for favorable balance of payments (BOP), the government income and economic prosperity of the country. This prosperity began with oil price boom in 1973 and continued until 1980. During this period, the production of oil also rose. As a result, the revenue from this sector increased from about 30 billion Saudi Arabian Riyal (SAR) in 1972 to more than 380 billion SAR in 1981. After that, the revenue from this sector dipped to about 50 billion SAR in 1988 owing to decline in both price and production of oil. The revenue again rose to 140 billion riyal in 1990 mainly because of more production and also remained at that level throughout the decade.

The trend in oil revenue has also affected the country's gross domestic product (GDP) as the revenue from oil constitutes a large proportion of GDP. Oil revenue has also been used in financing government spending that stimulated the investment and growth in the economy. Resultantly, GDP has been growing at 15.2 % during

1970-74 and at 8.7% during 1974-1980. During 1980-1984, GDP growth rate became negative (−4.1% per annum) and recorded at modest growth of around 3% during 1985-1994. During the last decade of the 20th century, the GDP almost remained stagnant. In this scenario, the recent shocks in oil price are also expected to adversely affect the oil based economy like Saudi Arabia by affecting government revenue, foreign exchange reserves, and its financial viability to meet growing needs of the economy.

Table 1 reveals the importance of oil in Saudi Arab's economy during 1991-2016. We find that the price of oil remained on downward trend during 1991-1999. During this period, the share of oil revenue in government revenue also dropped from 77.8% to 70.8 %. However, with the rise in price of oil in 2003 and thereafter, the proceeds of the government from oil increased and its share in government revenue increased from 78.8% in 2003 to about 92% in 2012. Again, with a recent dip in the price, its share goes down to 64.2% in 2016. But, it still constitutes a very high proportion and excess dependence on a single source. This sector has contributed 35.1% in country's GDP in 1991which

Table 1: Importance of oil in KSA

Years	Oil price ($ Per Barrel)	Oil revenue to government revenue (%)	Oil revenue to GDP (%)	Oil exports to total exports (%)	Employment rate (%)
1991	18.6	77.8	35.1	90.9	93
1999	17.44	70.8	31.5	88.0	95.7
2003	28.1	78.8	39.7	87.8	94.4
2011	107.5	92.5	50.5	88.6	94.2
2012	109.5	91.8	49.7	88.4	94.5
2014	96.3	87.5	42	85.5	94.3
2016	40.7	64.2	24.5	79.5	94.4

Source: Saudi Arabian monetary authority (SAMA). GDP: Gross domestic product

has been declined to 31.5% by 1999. This is partly because of decline in oil price. With a rise in oil price since 2003, this sector's contribution has increased to almost about half of the GDP of the country. However due to recent decline in oil price since 2014, its share in GDP has declined to 24.5 % in 2016. But, still oil exports in total exports have been observed over 90 % throughout the period.

During 1970-1990, the growth of employment in Saudi Arabia was at 7% then it slowed down owing to declining oil revenue (Cappelan and Choudhry, 2000). The oil price was moderate since 1991, the employment fostered also at moderate rate (1.6%). However with a rise in oil price since 2003 and consequently increased in government's revenues and expenditures, employment also grew at a higher rate of 3.9% in 2003-2013 than that of previous period. The employment growth rate has, once again, slowed down to 2.7% since 2014. From the above discussion, we observe that oil revenue plays an important role in Saudi economy which stimulates the economic activities and also raises the level of employment in the economy. In summary since a rise in oil price in the 1970s, the employment grew rapidly. In the 1990s, the employment growth rate was moderate and this period also witnessed moderate level of oil price. During 2003-2013 again with the rise in price and consequent increase in oil revenue, the employment level grew at 4%. The employment growth has, once again, slowed down to 2.7% since 2014 because of recent oil price crisis.

Since oil price plays significant role in generating revenue for the government which stimulates the all kinds of economic activities in the economy and generates employment as well. The falling oil price in the world market and consequent decline in oil revenue may impose fiscal constraint on government expansionary policy which may have negative impact on employment generation in the country. Therefore, it is very pertinent to observe and to verify the exact impact of oil revenue on the employment in Saudi Arabia. Though effect of oil price has been tested by Alkhateeb et al. (2017) but still oil revenue consists of oil price and quantity sold. We cannot ignore the quantitative aspect of oil revenue. Therefore, we are claiming for an empirical contribution and the objective of our present research is to test the effect of oil revenue with some supporting variables of GDP and a policy variable of public spending on employment of Saudi Arabia. The hypothesis of this research is as a positive contribution of oil revenue, GDP, public spending on the level of employment in Saudi Arabia.

2. LITERATURE REVIEW

The relationship between proceeds from the natural resources and overall economic growth has been the subject matter of researches since oil shock of 1970s. A term "Dutch disease" formed in 1977 to pronounce the negative impact of increase in revenue from discovery of natural gas in Netherland on her manufacturing sector. It is found in many cases that growth of some sectors (based on natural resources) leads to a large inflow of foreign currency. Resultantly, this adversely affects the other sectors like manufacturing and agriculture by appreciating the domestic currency. Because, appreciation of local currency may be responsible for less-competitive exports and imports may become cheaper on the other hand. Thus it adversely affects the growth of other sectors in the economy and overall growth of the economy as well.

In the empirical studies, Hooker (1996) studied the causal link between oil price, economic growth and employment in USA by using quarterly series of two periods for comparison. A causal effect was found from oil-prices to income and employment in first period but insignificant effect was found on second subset of the data. Gil-Alana (2001) applied cointegration approach to investigate a link in oil-prices and unemployment in Australia and found oil price as a major responsible factor for unemployment in the economy. Ghalayini (2011) probed the influence of oil-prices on income of oil-exporting and oil-importing countries. He included in his study countries like Russia, China, India, GCC and OPEC. He did not report any significant relation except a unidirectional relation from oil-prices to income in GCC countries. Altay et al. (2013) investigated the causality in oil-prices, GDP and employment by using quarterly data of a period 2000-2012 for Turkey. They reported a short run unidirectional effect from oil-prices towards the employment and long run effect from oil-prices towards both GDP and employment. While studying impact of oil-income on growth of industries in Nigeria for period 1970-2013, Ijirshar (2015) has established direct relation between these variables. He claimed that increase in industrial growth is generally associated with increase in employment too. Thus, he infers a positive relation in oil-income and employment.

Millington (2016) found a hostile effect of falling oil-prices on Canadian economy in terms of GDP, employment, and tax revenues. He used multi-regional input-output approach to test the effect of falling oil-prices on macroeconomic performance of Canada by using two sets of seven years projected data. In first

set, price of oil rises to \$73 per barrel and it reaches to \$53 per barrel in second set. The inferences drawn from the study is that the fall in oil price would have even further an adverse impact on Canadian economy. Hamilton (2016) has found that decline in employment are owing to decline in oil price while studying the economic and employment impact after decline in oil price in West Texas. Burakov (2017) asserted a direct relation in oil-prices and economic activities for oil exporter country Russia for a period 1990-2015 as major proportion of her income is out of oil revenue. He also found a cointegration and short run causality between oil price and economic activities. He explained that the increased economic activities, due to rising oil-prices, require more people to work which would also lead to create more employment resultantly.

Regarding Saudi Arabia, there is a paucity of studies enquiring the effect of oil-revenues on macroeconomic situation of Saudi Arabia in general and its impact on employment in particular. Council of Saudi Chambers (2009) conversed oil-price falling problem in 2008. The council observed that the price of oil came down to below \$40 per barrel because of global financial recession, due to strategic stock of giant countries like USA and China and due to fluctuation in exchange rate. It was also observed by the Council that the decline in oil price had caused reduction in investment in petroleum sector in Saudi economy. Further, this decline in investment led to slow growth in economic activities and level of employment. The council suggested that diversification of economy is required in order to reduce the excess dependence of economy on oil sector. Alkhateeb et al. (2017) inspected the asymmetrical effect of oil price on employment using data of 1980-2015 for Saudi Arabia. They found the positive contribution of oil-prices in employment generation. Further in asymmetry analysis, they corroborated that positive movements in oil-prices have greater positive effects on employment than that of negative ones.

From the reviewed literature, the relation among oil-prices, income and employment have been corroborated. In the relationship of oil-prices and employment, the most of the studies have been ignoring the quantity of oil sold component of oil revenue like a recent study of Alkhateeb et al. (2017). Considering the importance of this fact, this present paper is going to enquire the effect of oil-revenues, with some supporting variable of GDP and policy variable public spending, on employment of Saudi Arabia for an empirical contribution in the employment literature of Saudi Arabia.

3. METHODOLOGY

In Saudi Arabia, the oil sector constitutes a major sector of the economy. Any change in the sector also affects the GDP and other macroeconomic variables of the country. The revenue from oil sector is also a main source of government revenue which forms the basis of government expenditure on different activities. A drop in oil revenue may adversely affect the government expenditure and its expansionary policy of economic development consequently and this may also adversely affect the level of employment in the economy. Therefore, we may suppose a positive association between oil revenue and employment in oil exporting economy like KSA. Further, the government spending may also lead to enhance the economic activities both in the public sector as well as private sector. Consequently, the growth in the both sectors may lead to increase in GDP as well. Further, growth in GDP may consider as one of the major and important determinants of employment growth in the economy.

With this background, the following employment model for Saudi Arabia may be specified by considering the endogenous nature of model:

$$N_t = f(OR_t, GDP_t, GEXP_t) \tag{1}$$

Where,
N refers to number of labor employed,
OR is revenue from oil sector,
GDP stands for gross domestic product,
$GEXP$ denotes public spending, and
t refers to time period.

Selection of appropriate model is important for getting unbiased and efficient estimate of the parameter. Because of certain advantages, a log-linear setting may be preferred over a linear model. Thus, a log-linear approach has been designated to estimate the nexus between employment and oil revenue. The log-linear model can be expressed as:

$$lN_t = a_0 + a_1 lOR_t + a_2 lGDP_t + a_3 lGEXP_t + e_t \tag{2}$$

Here l is natural logarithm of the variables. On the basis of above discussion, we may expect positive contributions of all our hypothesized variables in employment creation. Oil revenue may enable the government, by providing government revenue out of it, to finance its expenditure for the economic growth and development. Therefore, more oil revenue may be followed by more public expenditure. It not only generates more employment directly in the public sector but may also boost the private sector's activities and it may generate more employment in private sector too. Then, public and private expenditures collectively may have multiplier effect in increasing income and employment in the economy.

Considering the possible problem of endogeneity of our model, we are applying vector error correction model (VECM) to capture the causal relationships in the model. Since the data used is of time series in nature. Therefore, presence of unit root needs to be ruled out before applying cointegration and causality tests. For the purpose, ADF and KPSS test have been selected. If the unit root is present and afterwards data on all the variables happens to be integrated at same level i.e., at first difference. Then we may employ cointegration test to verify long run behavior of the model. We have selected Johansen cointegration test for this purpose. In the presence of cointegration, we can apply VECM to find the causal directions in our model. The negative and significant ECT_{t-1} coefficient would confirm us long-run causality. While, joint significant first differenced parameters may capture the short run causal effect of our independent variable towards employment.

The annual series on our selected variables in equation 1 has been collected from SAMA and UNCTADSTAT for a sample period 1991-2016.

4. EMPIRICAL ANALYSES

The confirmation of order of integration is necessary before applying cointegration test. We have applied ADF and KPSS tests. The outcomes in Table 2 exhibit that unit-roots are presented in the all leveled variables in analyses of both ADF and KPSS tests. However by taking first difference, all variables are exhibiting the stationarity behavior. Therefore, we can conclude the order of integration as I(1).

After finding the I(1), we are proceeding for Johansen cointegration. Since the selection of number of lag period is very important as it may affect the results of cointegration. We have applied various criteria for the purpose. Maximum 3 period lags are assumed initially to select appropriate number of lag period in Table 3. From the results, it is observed that most of the criteria are prescribing that appropriate number of lags should be two. Particularly, AIC is showing optimum lag as 2 and AIC results can be considered as best due to parsimonious nature of this criteria. Hence, 2 period lags have been selected to estimate Johansen cointegration test.

Table 2: Stationarity tests

Variables	Level		First difference	
	C	C&T	C	C&T
ADF test				
lN_t	−0.396	−2.6933	−3.1561**	−6.6357*
lOR_t	−1.1577	−1.3695	−4.4656*	−4.4372*
$lGEXP_t$	−0.3071	−2.0506	−5.3508*	−4.3849*
$lGDP_t$	1.0344	−1.7447	−4.5127*	−5.0903*
KPSS test				
lN_t	0.3773	0.1295	0.4800**	0.1632**
lOR_t	0.3365	0.1136	0.5200**	0.1685**
$lGEXP_t$	0.3385	0.1379	0.5591**	0.2489*
$lGDP_t$	0.4406	0.1409	0.5200**	0.3019*

*and** designates stationarity at 1% and 5%

Considering the 2 as optimum lag length, we employ the Johansen cointegration in Table 4. Trace statistic of Johansen cointegration is suggesting the two cointegrated vectors in our model. Further, Eigen values suggest at least one cointegrated vector in the model. Considering the results of both statistics, we can corroborate the presence of cointegration in our proposed model and we may also proceed for causality analyses through VECM.

Having a cointegration, VECM has been utilized to examine causality in our equation 2 and results, with considering employment as dependent variable, are stated in Table 5. We are only presenting the causality results of causality equation assuming employment as dependent variable because of our projected hypotheses of this study. From the results, the coefficient of ECT_{t-1} is corroborating an existence of long run causality from our independent variables towards the employment through a negative and significant parameter at 1% level. This verifies the fact that revenue from oil sector, GDP and public spending are Granger causing to employment level in Saudi Arabia.

Long run causality results are implying that higher oil revenue owing to higher oil price or more production or both would increase the level of employment in the Kingdom and vice-versa. Further, public spending is also supporting to the employment level in Saudi Arabia. Therefore, we can claim that public spending of Saudi government is creating pleasant effects on the employment through directly employment in the public sector and also through the indirect effects of increasing economic activities due to higher public spending. Our endogenous nature of model is also suggesting that more oil revenue may also improve the fiscal position of the country as oil revenues are major source of public revenues. Further, oil revenues are providing more leverage to the government to increase the level of expenditure on various developmental and welfare activities. This may stimulate the overall economic activities and increases the level of income and employment in the country as well. Due to the possible endogenous effects of income, public spending and oil revenue in the Saudi Arabia, our hypothesized variables have multiplier effects and

Table 3: Lag selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	51.4330	NA	1.90e−07	−4.1246	−3.9271	−4.0749
1	147.9878	151.1292*	1.77e−10	−11.1294	−10.1419*	−10.8811
2	169.2945	25.9385	1.30e−10*	−11.5908*	−9.8135	−11.1438*
3	182.6040	11.5734	2.51e−10	−11.3569	−8.7897	−10.7112

*Indicates lag order selected by the criterion

Table 4: Johansen's cointegration

Cointegrated vectors	Max-Eigen statistic	Critical value (at 5%)	Trace statistic	Critical value (at 5%)
None	42.0212*	32.1183	86.4974*	63.8761
At most 1	19.4811	25.8232	44.4762*	42.9153
At most 2	14.1553	19.3870	24.9952	25.8721
At most 3	10.8399	12.5179	10.8399	12.5179

Table 5: Granger causality based on VECM: Employment as dependent variable

Independent variable	$lGDP_t$	lOR_t	$lGEXP_t$	Joint	ECT_{t-1}
Chi-square (P-values)	0.7985	0.0068***	0.0216**	0.0005***	−0.4027***

***and** designates significant at 1% and 5%

spiral effects on the employment level. Further, the most of oil revenue is in form of foreign reserves due to exports of oil. Therefore, it may also improve the BOP position of the country which enables the country to import more of capital to fulfill the growing developmental needs of the economy. Converse would be happened in the case if oil revenue declines and employed would be negatively affected with fall in oil revenue as per the present oil price crisis period. Furthermore, the short run causality also demonstrates that oil revenue and government expenditure are causing the level of employment in the country.

5. CONCLUSIONS AND RECOMMENDATIONS

Oil sector is a backbone of Saudi economy due to its heavy dependence on this sector. Further, oil revenue may affect the economic activities and employment level at larger scale. Therefore, this paper investigates the oil-revenue and employment nexus in Saudi Arabia by considering supporting variable of income and policy variable of public spending. For analyses, we utilize the ADFand KPSS unit root tests, Johansen cointegration test and VECM based causality test by utilizing a sample period of 1991-2016. We found the one as order of integration and cointegration in our proposed model. In the long run, VECM results show that oil-revenue, public spending and income are causing the level of employment of the country. In the short run, oil revenue and public spending are causing to the level of employment in the country. Thus, we may say that the increasing oil revenue are blessing for the economy in supporting the public spending and income and employment levels. Conversely, declining oil price and its consequent impact on oil revenue, like the recent oil price crisis, may pose a challenge to the economy in terms of public revenue, income and employment losses unless this economy diversifies its economic base.

Based on the results, we recommend the Saudi economy to put efforts in increasing the oil price by signing agreements with other oil exporters to increase the oil revenue which can support employment resultantly as per our estimated results. In addition, the oil revenue should be invested in the other sectors of economy to achieve the diversification policy and to support employment in the sectors other than oil sector. Further, we recommend

the government to increase its spending by deficit financing to support the country in the present scenario of oil-prices dump and to support the greater economic activities and employment level. Particularly, spending on educational institutes may be very helpful in generating employment if these could produce graduate according to needs of labor market. These strategies of increasing oil production and deficit financing may give a multiplier effect to boost the economic activities and may accelerate the employment in the kingdom. In large, in order to minimize the employment loss due to oil reliance in the long run, the economy needs to be diversified and reduce its dependence on oil sector.

REFERENCES

Alkhateeb, T.T.Y., Mahmood, H., Sultan, Z.A., Ahmad, N. (2017), Oil price and employment nexus in Saudi Arabia. International Journal of Energy Economics and Policy, 7(3), 277-281.

Altay, B., Topcu, M., Erdogan, E. (2013), Oil price, output and employment in Turkey: Evidence form vector error correction model. International Journal of Energy Economics and Policy, 3, 7-13.

Burakov, D. (2017), Oil price, economic growth and emigration: An empirical study of transmission channels. International Journal of Energy Economics and Policy, 7(1), 90-98.

Cappelan, A., Choudhary, R. (2000), The Future of the Saudi Arabian Economy: The Possible Effects on The World Oil Market, Report No. 2000/7. Norway: Research Council of Norway.

Council of Saudi Chambers. (2009), The Council of Saudi Chambers Discussed with the U.S. Delegation Cooperation in Energy. Saudi Arabia: Infrastructure Sectors.

Ghalayini, L. (2011), The interaction between oil price and economic growth. Middle Eastern Finance and Economics, 13, 127-141.

Gil-Alana, L.A. (2003), Unemployment and real oil prices in Australia: A fractionally cointegrated approach. Applied Economics Letters, 10, 201-204.

Hamilton, D.K. (2016), Economic and Employment Impact of the Decline in Oil Prices. Texas: Centre for Public Services, Texas Tech University.

Hooker, M.A. (1996), What happened to the oil price-macro economy relationship? Journal of Monetary Economics, 38, 195-213.

Ijirshar, V.U. (2015), The empirical analysis of oil revenue and industrial growth in Nigeria. African Journal of Business Management, 9(16), 599-607.

Millington, D. (2016), Low Crude Oil Price and Their Impact on Canadian Economy, Study No. 156. Alberta: Canadian Energy Research Institute.