Oil Price and Slumps Effects on Personal Consumption in Saudi Arabia

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ABSTRACT

Oil price movements and its macroeconomic effect may have deep effects on the oil exporting economy like Saudi Arabia in terms of personal consumption and welfare derived from the consumption. This present research targets to isolate the relationship between oil price and personal consumption per capita using a period 1970-2016 and applying cointegration technique. We find that all variables are the first different stationary and long and short run relationships are also corroborated. We find the positive relationship between oil price and personal consumption per capita in both long and short runs which suggest that oil price has direct effect on the consumption of the Kingdom in case of any movement. Moreover, we find that the oil price crises have insignificant effects on the personal consumption per capita hence the economy's consumption is supported by non-oil sector in the slump periods. Based on findings, we suggest the diversification policy to the Saudi economy for a smooth consumption pattern in the long run.

Keywords: Personal Consumption Per Capita, Oil Price, Oil Price Slumps, Cointegration
JEL Classifications: E21, Q21, H12

1. INTRODUCTION

A stable consumption pattern is very important for the overall welfare and health of the economy. It is also a major part of aggregate demand which supports the demand for factors of production including investment and employment in any economy. Directly, the consumption is mostly determined by the income at micro or macro level but it is also influenced by the factors which determine the income level in the countries. Oil revenues are the major income source of most of oil exporting countries then Saudi Arabia is not an exception. More than half of the Saudi Arabian income has been sourced from the oil revenues in most of years before oil price crisis of 2014. Albeit, more than 40% of Saudi income is consisted of oil-income even during the slump period. Oil price crisis may directly be affected the income of oil exporting countries as oil revenue/ income is directly linked with the oil price. Consequently, the oil price crisis may also affect the personal consumption in the country.

Mehra and Ptersen (2005) initiate the potential relationship between oil price and consumption. They argue that the consumption is delayed in the days of oil price shocks. Further, the other economic activities like investment and other aggregate expenditures are also closely link to the oil price shocks. Moreover, they also argue that oil price may have asymmetrical effects on the consumption expenditures because of real balance adjustments. In the empirical testing of this relationship in US economy, they find that increasing oil price has adverse effect on the real consumption levels due to a fact that US is a net oil-importer but the decreasing oil prices could not affect the consumption level significantly. Odusami (2010) re-investigates the effects of oil prices on the consumption-wealth ratio in the US economy. He finds the oil price as a significant determinant of the consumption-wealth ratio. Therefore, he concludes that oil price shocks are very important in explaining the household consumption behavior. Moreover, he notices that the relationship between consumption-wealth ratio

and oil price has been found more flexible and smoother than that of past 30 years.

Donayre and Wilmot (2016) investigate the non-linear effects of oil price shocks on the income and inflation in the Canada. They find that positive oil price shocks have greater magnitude of effects on the income than that of negative shocks. Further, oil price shocks have positive effects on the inflation and magnitude of negative shocks are found larger than that of positive shocks on the inflation. Moreover, the asymmetrical effects are found dominant in the recession period with compare to the expansion period. In a panel setting, Wang (2013) investigates the asymmetric effects of oil prices on the personal consumption in the industrialized countries. They corroborate the asymmetry in the relationship of oil price and consumption. They find that increasing oil price has larger effect on the consumption than that of the decreasing oil price. They explain that increasing oil price has negative effect on the consumption only below a threshold point. After this point, rising oil prices are going to be reflected in the cost of production and are increasing the value of consumption due to cost push effects.

Above discussions have highlighted the effects of oil price for the oil importers where the oil price is a symbol of cost push inflation. But, the positive movement of oil price may have pleasant income effect and it may have also positively effects on the consumption through rising income of oil exporting countries. In this context, Nyangarika et al. (2018) investigate the strength of correlation in the oil price and income level of oil producing countries including the Saudi Arabia. They find a high correlation between oil price and income level of oil producing countries in case of Russia and Saudi Arabia. Algaeed (2017) investigates the effect of oil price shock and oil revenues on the consumption in Saudi Arabia using a period 1985-2015. He finds that oil price shock and oil revenues significantly impact the consumption in the regression analysis.

In case of Saudi Arabia, some studies have also investigated the effects of oil prices and revenues on the macroeconomic performance of the country in terms of investment and employment generation (Alkhateeb et al., 2017a; Alkhateeb et al., 2017b; Mahmood and Alkhateeb, 2018). As, increasing oil price and revenues are expected to increase the income and economic activities which may also have positive effects on the consumption consequently. Maalel and Mahmood (2018) extend this discussion by finding the positive relationship between income-oil dependency and economic growth in some of Gulf Cooperation Council countries. Further, some studies find that oil-export dependency of Saudi Arabia has negative consequences in terms of depressing the economic growth and polluting the environment (Maalel and Mahmood, 2018; Mahmood and Alkhateeb, 2017). Although, some studies have also investigated the direct effect of oil price on the income and consumption (Nyangarika et al., 2018; Algaeed, 2017). But, the investigation of oil price along with two recent oil price slumps is missing in the Saudi energy literature and this study is going to fill this gap.

2. METHODOLOGY

The objective of this research is to test the isolated relationship between personal consumption and oil price. While regressing the oil price on personal consumption, we cannot ignore the two recent oil price slumps of 2008 and 2014. Considering, we may assume our model:

$$LCONPC_t = f(LOP_t, D2008_t, D2014_t) \qquad (1)$$

Here, $LCONPC_t$ is our dependent variable and is representing the natural logarithm of personal consumption per capita. whereas, LOP_t is a natural logarithm of oil price. Oil price is expected to have positive impact on the personal consumption level. Because, Saudi income is mostly depending on the oil price and revenue. Any positive movement in oil price is good news in terms of increasing income and consumption as a results. On the other hand, any negative movement in oil price may be considered as a bad news in terms of decreasing income and economic activities and decreeing consumption consequently. $D2008_t$ assumes zero before 2008 and one afterwards to capture the oil price crisis of 2008 and $D2014$ assumes zero before 2014 and one afterwards to capture the oil price crisis of 2014. Both oil price crises are expected to depress the income and overall economic activities. Therefore, these are expected to have negative effects on the personal consumption. All the data is collected for a period 1970-2016 from World Development Indicators.

The stationarity and normality may be tested by the unit root analysis before moving toward cointegration analysis. We are utilizing the most efficient version of unit root test for a small sample size proposed by Ng and Perron (2001). After the integration analysis, we may move for long run relationship and we are exploiting the Auto-Regressive Distributive Lag (ARDL) cointegration test of Pesaran et al., (2001) which is efficient in case of a mix order of integration (Mahmood and Chaudhary, 2012). The ARDL model of the equation 1 may be framed as:

$$\Delta LCONPC_t = \delta_0 + \delta_1 LCONPC_{t-1} + \delta_2 LOP_{t-1} + \delta_3 D2008_{t-1}$$
$$+\delta_4 D2014_{t-1} + \sum_{j=1}^{p} \varphi_{1j} \Delta LCONPC_{t-j}$$
$$+\sum_{j=0}^{q} \varphi_{2j} \Delta LOP_{t-j} + \sum_{j=0}^{q} \varphi_{3j} \Delta D2008_{t-j}$$
$$+\sum_{j=0}^{q} \varphi_{4j} \Delta D2014_{i-j} + \psi_{it} \qquad (2)$$

After selection of lag lengths, we need to test here the cointegration on the null hypothesis of $d_1 = d_2 = d_3 = d_4 = 0$, and rejection of it may indicate the cointegration and long run relationship in the model. Further, coefficients of lagged level variables after normalizing may explain the long run effects and lagged difference variables may explain the short run effects in the equation 3 if eta is found to be negative and significant.

$$\Delta LCONPC_t = \sum_{j=1}^{p} \lambda_{1j} \Delta LCONPC_{t-j} + \sum_{j=0}^{q} \lambda_{2j} \Delta LOP_{t-j}$$
$$+\sum_{j=0}^{q} \lambda_{3j} \Delta D2008_{t-j} + \sum_{j=0}^{q} \lambda_{4j} \Delta D2014_{i-j}$$
$$+\tau ECT_{t-1} + \varepsilon_{it} \qquad (3)$$

3. RESULTS AND DISCUSSIONS

We start the data testing with unit root test proposed by Ng and Perron (2001). Table 1 demonstrates that both oil price variable and consumption per capita are non-stationary at levels and stationary after first differences. Therefore, the unit root results are corroborating the stationarity and normality of data to proceed the cointegration analysis.

Table 2 depicts the cointegration's results after the unit root analysis. We also incorporate the two dummies tom capture the two recent oil price crises 2008 and 2014. The F-value of bound test is larger than upper critical bound value at 5% level of significance and corroborates the cointegration. Further, negative parameter of error correction term is also corroborating the long and short runs relationships in the model. Moreover, all diagnostic tests are approving the authenticity of the estimated ARDL model. So, long and short runs results may be further discussed.

The long run results indicate that oil price has a positive effect on the consumption per capita in Saudi Arabia. Further, elasticity parameter suggests that 1% increase in oil price would have 0.563% positive movement in the consumption level. Oil revenue has supported the income by more than 40% in the recent oil price crisis. This percentage was more than 50% before the recent crisis of 2014. Due to this dependency, oil price may have effect on the income and consumption per capita. This finding is in line with the finding of oil price and revenue effects on employment and investment (Alkhateeb et al., 2017a; Alkhateeb et al., 2017b; Mahmood and Alkhateeb, 2018). Further, it is in contrast with negative relationship of oil price and personal consumption (Wang, 2013). The negative effects of oil price may be explained in a way that Wang (2013) investigates this issue in case of industrialized economies and rising oil price is a reason of a cost push inflation in the industrialize economies due to the oil price as component of the cost of production. However, our estimated positive effect of oil price corroborates the situation that Saudi Arabia is a majorly oil producer and exporter in the world and any oil price positive movement is a signal of higher income level and vice versa in case of negative movement.

Our second objective is to trace the effects of two most recent oil price slumps/crises on the consumption per capita. For this purpose, we regress the two dummies of D2008 and D2014. In the long run results, we find that both slump periods have insignificant effects on the consumption of the Saudi Arabia. However, the Saudi income is heavily depending on the oil production, price and revenues. But, these insignificant effects of oil price crises are translating that the personal consumption is supported by non-oil income of the country. Specially, the service sector has played a good role in supporting the Saudi economy in the crisis period. Therefore, the consumption is not affected by a fall in oil sector income.

In the short run results, we may observe the same directions of relationship between oil price and consumption. However, elasticity parameter is declined significantly. It shows that short run oil price movements have a minute effect on the consumption behavior of the Saudi Arabia. This result corroborates the insignificant effects of oil price crises as the crises do not stay for a long time hence has meager effects. Further, the consumption lag has a strong positive effect on the subsequent consumption. It means that consumption is a strong component of income as well. So, increasing income as a results of increasing consumption may positively affect the subsequent consumption as well. Moreover, the effects of oil price crises are again found insignificant in the short run which shows a capacity of economy to bear the shock of oil income in the days of crisis. Lastly, the speed of convergence is recorded at very low level i.e., 13.7% a year which shows that any divergence of consumption path needs to be re-adjust in >7 years.

4. CONCLUSIONS

The relationship of oil price and personal consumption may be expected as positive in the oil exporting country like Saudi Arabia. We test this relationship using the period of 1970-2016 and ARDL cointegration test after testing the level of integration. Further, we target to test the two recent oil price slumps of 2008 and 2014 because these slumps may depress the income and personal consumption consequently. We find the long and short runs relationships in the hypothesized model of personal consumption. Further, we find a positive impact of oil price on the personal consumption in both long and short runs. This result indicates that oil price has demand pull effect rather than cost push effect of rising oil price in the country due a heavy income-dependence of the Kingdom of Saudi Arabia. Secondly, two recent oil price crises of 2008 and 2014 have insignificant effects and indicate that non-oil income of the Kingdom has been supported the personal consumption during the oil price crises' periods because crises could not significantly reduce the personal consumption per capita of the Kingdom. Same findings are corroborated in the short run and lagged personal consumption per capita is found helpful in

Table 1: Unit root test

Variable	MZa	MZt	MSB	MPT
$LCONPC_t$	−5.4789	−1.4902	0.2720	4.9223
LOP_t	−4.5909	−1.3801	0.3006	18.8861
$d (LCONPCt)$	−21.9923*	−3.2991	0.1500	4.2461
$d (LOP_t)$	−22.4469*	−3.3451	0.1490	4.0900

*Explains that null hypothesis of unit root is rejected

Table 2: Estimated consumption per capita model

Variable	Parameters	SE	t-statistic	P value
Long run results				
LOP_t	0.5631	0.1064	5.2923	0.0000
$D2008_t$	−0.0452	0.2363	−0.1911	0.8495
$D2014_t$	0.3929	0.2734	1.4372	0.1588
$Intercep_t$	8.2378	0.3263	25.2464	0.0000
Short run results				
$dLCONPC_{t-1}$	0.5786	0.0630	9.1864	0.0000
$dLOP_t$	0.1336	0.0232	5.7507	0.0000
$D2008_t$	−0.0062	0.0328	−0.1879	0.8520
$D2014_t$	0.0536	0.0391	1.3719	0.1781
ECT_{t-1}	−0.1365	0.0260	−5.2502	0.0000
Bound test	4.9880			
Heteroscedasticity	0.8421 (0.5455)			
Serial correlation	1.8932 (0.1222)			
J-B Normality	3.4294 (0.1800)			

accelerating the current personal consumption per capita. Lastly, we find the low speed of adjustment of any short run deviation from long run equilibrium towards the steady path.

From our results, we may suggest the Saudi economy to diversify from the oil-sector as oil price movements have direct proportional effects on the consumption and welfare of the economy. The insignificant effects of oil price crises suggest that non-oil sector has a good capacity to support the personal consumption in the period of a slump. Therefore, the growth of non-oil sector as result of diversification policy would ensure the smooth personal consumption path of the economy and resultantly the welfare from consumption would also be stabilized.

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