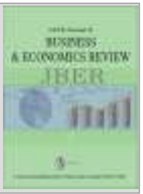
Journal of Business and Economics Review

Journal homepage: www.gatrenterprise.com/GATRJournals/index.html

J. Bus. Econ. Review 4 (2) 97 – 104 (2019)



Impact of Crude Oil Price Changes on Household Consumption Expenditure in Oman (1990-2016)

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ABSTRACT

Objective – The preceding three years (2014, 2015, and 2016) saw a drop in the price of oil which has impacted all parts of Omani macroeconomic life. This study aims to identify the association between oil price changes and aggregate household consumption expenditure in the Sultanate by analyzing the long term relationship between the variables of interest.

Methodology/Technique – The (ARDL) Autoregressive Distributed Lag bound test of co-integration is used with 27 annual observations obtained between 1990 and 2016.

Findings – The statistical results show that there is a long term, positive relationship between the two variables.

Novelty – As Oman is heavily dependent on oil, any fluctuation in the price of oil will undoubtedly cause instability in the economy (macroeconomic variables) demonstrating the presence of a robust correlation between consumption and oil prices. The bound test of the ARDL approach demonstrates this relationship. This study is therefore useful for Muscat officials to identify ways to reduce the dependency on oil.

Type of Paper: Empirical.

Keywords: Total Household Consumption Expenditure; Crude Oil Price; Autoregressive Distributed Lag (ARDL); Omani Economy.

Reference to this paper should be made as follows: Abubakar El-Sidig A.A Mahdi. (2019). Impact of Crude Oil Price Changes on Household Consumption Expenditure in Oman (1990-2016), *J. Bus. Econ. Review, 4 (2):* 97 – 104. https://doi.org/10.35609/jber.2019.4.2(4)

JEL Classification: D1, D13, D19, E30.

1. Introduction

As stated by (Kilani, Al-Hazzaa, Waly & Musaiger, 2013), the Sultanate of Oman, situated in the south-eastern angle of the Arabian Peninsula, is one of the Arabian Gulf's developing nations. As at 27 May 2015, the Sultanate's total population was approximately 4,187,516, of which 44.2% are expatriates.

* Paper Info: Revised: March 20, 2019
Accepted: June 19, 2019

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A survey by NCSI-Muscat\2012 found that the average size of an Omani household is around 8.1 persons at the Sultanate level, with 7.9 persons located in urban localities compared to 8.6 persons in rural localities. Meanwhile, the average household (Omani and foreign households combined) has reached 6.1 persons at the Omani level, 5.8 persons in urban localities and 7.0 persons in rural localities. Household final consumption expenditure (current USD) in the Sultanate of Oman was estimated at USD23,032,352,146 in 2015 (Factfish, 2018; TradingEconomics, 2018; Indexmundi, 2018). Household final consumption expenditure (formerly private consumption) represents the market value of all goods and services, comprising of durable goods (cars, washing machines, home computers) purchased by households. This excludes purchases for dwellings but includes rent for owner-occupied houses. It also comprises payments and fees to the government for certificates and licenses. Here, household consumption expenditure includes expenditure of non-profit institutions serving households, even when it is reported separately by the nation state.

'The Results of The Household Expenditure and Income Survey' (2010 - 2011) performed by NCSI-Muscat\2012 show that the average periodic spending of Omani households has reached RO.605, RO.631 for urban households and RO.513 for rural households. Sultanate households typically spend 38% of their total household income on food, equaling approximately RO.240. The average expenditure of a male lead household is RO.745, whereas the average expenditure of households controlled by females is RO.581. On the other hand, the average monthly expenditure of a Sultanate household for housing and consumer loans (together with 4-9% interest) is RO.30. In addition, the average monthly expenditure on social insurance is roughly 3.4%, or RO.28. Transportation and communications account for a little more than one-fifth of the total Omani household budget. The average monthly cost of medical care and education in a Sultanate household is as low as RO.8 and RO.19 respectively.

A number of influences have been surfaced to determine the dietetic behavior of Arab people particularly GCC's people. Some Arabian pattern of food consumption has radically changed because of sudden growth in oil revenues (Musaiger, 1993). This study aims to examine the relationship between oil price changes and total household consumption in Oman between 1990 and 2016 with a view to answering the following question: "what impact does oil price volatility have on Omani total consumption?" The importance of this study lies in its’ novelty and exploration of a relatively untouched area of study. This study aims to provide information to government officials and provide recommendations that may be helpful to the Omani economy.

2. Literature Review

Oil price shocks are normally perceived as a main determinant of the nation's macroeconomic state, mostly oil exporting nations (Hajiyev & Rustamov, 2019). Since the 1970s, a great quantity of studies have examined the relationship between oil price shocks and macroeconomic variables (Ekong & Effiong, 2015; Du, Yanan & Wei, 2010). Hypothetically, shocks in crude oil prices can have an impact on macroeconomic activities through two transmission channels (supply and demand). On the supply side, shocks in crude oil price cause the marginal cost of production to grow up resulting in decline in capacity utilization and production. The increased production cost diminishes investment spending by means of the uncertainty channel and demand for consumption goes down succeeding a rise in the product prices. (Ekong & Effiong, 2015)

Between July 2014 and February 2016, oil prices declined from $104 to $30 per barrel. This sharp decline has reignited concerns regarding the macroeconomic impacts of oil prices changes. The conservative wisdom of academics, policymakers and market practitioners is that a decline in oil prices tends to increase universal economic activity, as growths in consumption, particularly for oil importing countries, is able to offset the negative impact on oil producers. This wisdom has most recently been expressed by (Arezki & Blanchard, 2014; Bernanke, 2016) and even Warren Buffett, among others. However, there is an abundance of research on the international impact of oil price fluctuations, albeit only in the context of smaller economies (Jim´enez-Rodr´ıguez & S´anchez, 2005; Kilian, 2008), or using a limited set of indicators, such as industrial production or current accounts, etc., which may not reflect true GDP and consumption (Aastveit, Bjrnland & Thorsrud, 2015; Kilian, Rebucci & Spatafora, 2009).

(Al-Tai, 2015) has concluded, using a (VAR) model, that the price of oil has a direct impact on household consumption in Sweden. That study shows that a growth in global oil prices is linked to a fall in household consumption. Further, the impact of oil prices on consumption was greater prior to the mid-1990s compared to today. Household final consumption expenditure is typically the biggest element of GDP. Roughly 50% of all GDP in Sweden for the last five decades has been connected to consumption (World Bank, 2014). (Hamiliton, 2009) states that shocks in oil price might be considered principally as shocks in demand. Given real income, households (consumers) dealing with greater energy prices may find it necessary to cut their expenditure on products and services rather than energy (Gao, Kim & Saba, 2014). Through compressing oil shocks into a standard macroeconomic model of consumption theory, the response of consumption to the alterations in the global oil price is identified. Empirical findings show that oil shocks do have an effect on consumption and asymmetrical impacts appear (Zhang & Broadstock, 2014).

(Baumeister & Kilian, 2016) identified the impact of sharp drops in the international crude oil price since June 2014 on U.S. real GDP growth. Their investigation proposes that this drop created a cumulative stimulus of around 0.9% of real GDP by increasing private real consumption and non-oil-related business investment, and a further stimulus of 0.04%, reproducing a reduction in petroleum trade deficit. This impact, though, has been essentially offset by a large fall in real investment by the oil sector. Therefore, the net stimulus since June 2014 has been close to zero. That study demonstrates that the U.S. economy’s reaction was not dissimilar from the reaction in 1986. In contrast, research by (Mehra & Petersen, 2005) examines the extent of the adverse impact increased oil prices on real GDP growth, particularly through the consumption channel. A number of analysts have identified that large spikes in oil prices impact real growth by encouraging consumers to delay purchasing large ticket or high energy use goods.

3. Research Methodology

3.1 Data

This research relies entirely on secondary data, (an annual time series data) with 27 observations between 1990 and 2016 vis-à-vis two variables: oil price changes (OPRICE) and total household consumption expenditure (CONS) in Oman. The sources of data include IMF, World Bank and World Data Atlas (https://knoema.com/atlas/Oman/topics/Economy/National-Accounts-GDP-by-Expenditure-at-constant-2010-prices-US-Dollars/Real-gross-capital-formation).

3.2 Autoregressive Distributed Lag (RDL) Model

The impact of crude oil price volatility on total household consumption expenditure in the Sultanate of Oman (1990-2016) has been examined using a Autoregressive Distributed Lag (ARDL) model, which succeeded the methodology suggested by Pesaran and Shin (1999). Pesaran, Shin and Smith (2001) have developed a version of the ARDL model as a substitute co-integration method called the error correction version. This method can be used to test the presence of long-term connections between variables of interest (Alqattan & Alhayky, 2016). (Chen, Kuo & Chen, 2010) believe that the ARDL method is an ideal combination of dynamics and interdependence with different explanations grounded on linear equations. A large number of previous studies have used the Johansen co-integration method to test the long-term relationships between variables of interest (Pahlavani, Wilson & Worthington, 2005; Halicioglu, 2008; Achsani, 2010; Chittedi, 2012; Hasan & Nasir, 2008; Nkoro & Uko, 2016; Oskenbayev, Yilmaz & Chagirov, 2011; Ahmed, 2018a; Ahmed, 2018b; Mahdi, 2019a; Mahdi, 2019b). However, compared to the Johansen co-integration method and other approaches, the ARDL co-integration method does not require pre-tests for unit roots. Hence, the ARDL co-integration approach is useful when working with variables that are integrated in a dissimilar order, I(0), I(1) or a combination of the both. The method is also useful where there is a single long-term association among the central variables in a small sample scope. The long-term association between the central variables is examined using F-statistic (Wald test). In this method, the long-term association of the series is considered to be set whenever the F-statistic overtakes the critical value band. The ARDL equation is shown below:

$$d(Yt) = c + \lambda Y\text{t} - 1 \ + \beta X\text{t} - 1 + \sum_{i=1}^{m} a1, i * d(Yt - i) + \sum_{i=0}^{k} a2, i * d(Xt - 1) + \varepsilon\text{t}$$

$c + \lambda Y\text{t} - 1 \ + \beta X\text{t} - 1$: represents the long term relationship

$\sum_{i=1}^{m} a1, i * d(Yt - i) + \sum_{i=0}^{k} a2, i * d(Xt - 1) + \varepsilon\text{t}$: represents the short term relationship

3.4 Empirical Estimation

3.4.1 Unit Roots Tests

VAR Lag Order Selection Criteria has been used to determine the number of chosen lags for the dependent and independent variables to assure non-residual autocorrelation. Then, the Augmented Dickey Fuller (ADF) unit-roots test has been conducted for the two variables independently to determine the order of integration among the variables and to ensure that the variables are not integrated in order two I(2) and to circumvent the need for spurious regression before proceeding to the ARDL estimation analysis. The outcomes over the period after the first difference I(1) for both the dependent variable and independent variables (both variables are I(1)) are shown in (Table 1)). For the dependent variable (CONS), Table 1 shows that the ADF t-statistic (4.417469) is greater than the Test critical values (1% level, 5% level and 10% level which are 3.724070, 2.986225 and 2.632604 respectively) and the P-value is statistically significant (0.0020. This confirms that the variable (CONS) is stationary at first difference and integrated of order one I(1). On the other hand, the independent variable (OPRICE) has an ADF t-statistic (absolute value) of 4.298452 which is higher than the Test critical values (1% level, 5% level and 10% level which are 3.724070, 2.986225 and 2.632604 respectively) and a P-value which is statistically significant (0.0026. This confirms that the variable (OPRICE) is stationary at first difference and integrated of order one I(1).

Table 1. Results of Unit Roots Tests at First Difference

Null Hypothesis: D(**CONS**) has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on SIC, maxlag=1)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		**-4.417469**	**0.0020**
Test critical values:	1% level	-3.724070	
	5% level	**-2.986225**	
	10% level	-2.632604	
Null Hypothesis: D(**OPRICE**) has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on SIC, maxlag=1)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		**-4.298452**	**0.0026**

Test critical values:	1% level	-3.724070
	5% level	-2.986225
	10% level	-2.632604

Table 1 shows that both variables are jointly integrated of order one I(1) and no variable is integrated of order two I(2). These results facilitate the ARDL estimation.

3.4.2 ARDL Estimation Analysis

Diagnostic tests were conducted to determine the serial correlation. This is followed by the ARDL equation which selects the optimal lag length on the basis of the standard criteria such as the Akaike Information (AIC) or Schwartz Bayesian (SIC). Furthermore, a restricted version of the equation is resolved for the long-term solution. The results shown in Table 2 suggest that there is no spurious regression as the R-squared value (0.987057) appears to be less than the value of the Durbin-Watson statistic (1.965040). The estimation equation and its substituted coefficients are shown below:

Estimation Equation

CONS = C(1)*CONS(-1) + C(2)*OPRICE + C(3)*OPRICE(-1) + C(4)

Substituted Coefficients

CONS = 0.978663025656*CONS(-1) - 3338303.62776*OPRICE + 6968893.17316*OPRICE(-1) + 199067665.517

Table 2. Estimation using ARDL model

Dependent Variable: CONS			
Method: ARDL			
Variable	**Coefficient**	**Prob.***	
CONS(-1)	0.978663	0.0000	
OPRICE	-3338304.	0.3291	
OPRICE(-1)	6968893.	0.1076	
C	1.99E+08	0.2098	
R-squared	0.987057	Mean dependent var	5.07E+09
Adjusted R-squared	0.985292	S.D. dependent var	2.06E+09
S.E. of regression	2.49E+08	Akaike info criterion	41.64704
Sum squared resid	1.37E+18	Schwarz criterion	41.84060
Log likelihood	-537.4115	Hannan-Quinn criter	41.70278
F-statistic	559.2613	**Durbin-Watson stat**	**1.965040**
Prob(F-statistic)	0.000000		

3.4.3 Bounds Test (Long term relationship between the variables)

The ARDL Bound testing examines whether there is a long-term relationship between the variables under investigation. The results show that there is a long-term relationship between (CONS) and (OPRICE). Since the F-statistic (10.70710) outstrips the I1 Bound, the researcher cannot accept the null hypothesis and instead the alternative hypothesis has been held (There is a long-term relationship between the variables: see Table 3). These results prove that total household consumption is subject to unstable oil prices and provides support for the diversification of the economy to uphold steady and workable economic evolution and development.

Table 3. Bounds Test (ARDL approach) – Long term relationship

F-Bounds Test:		**Null Hypothesis: No levels Relationship**		
Test Statistic	**Value**	**Signif**	**1(0)**	**1(1)**
		Asymptotic: n=1000		
F-statistic	**10.70710**	10%	3.02	**3.51**
K	1	5%	3.62	**4.16**
		2.5%	4.18	**4.79**
		1%	4.94	**5.58**
Finite Sample: n=35		Actual Sample Size		33
		10%	3.223	3.757
		5%	3.957	4.53
		1%	5.763	6.48
		Finite Sample: n=30		
		10%	3.303	3.797
		5%	4.09	4.663
		1%	6.027	6.76

3.4.4 Error Correction Representation for the selected ARDL

Ultimately, the error correction representation for oil prices is conducted to measure the speed of adjustment in order to restore equilibrium in the dynamic model. The co-integrating equation is shown below:

D(CONS) = 199067665.517216470000 -0.021336974344*CONS(-1) + 3630589.545403407900*(CONS - (170154844.20709813*OPRICE(-1) + 9329704498.16849330) -3338303.627760326000*D(OPRICE))

According to Table 4, the (CointEq(-1) – (λ)) represents the Error Correction Representation for the OPRICE. The CointEq (-1), which measures the speed of adjustment to restore equilibrium in the dynamic model, appears with a negative sign (-0.021337) and is statistically significant (0.0000) with a 5% level. This confirms that there is a long-term equilibrium can be reached. The coefficient of CointEq(-1) is equal to -0.021337 for the short-term model which indicates that the deviation from the long-term inequality is corrected by 2.1% each year.

Table 4. ARDL Error Correction Regression

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OPRICE)	-3338304.	3089719.	0.000000	0.0000
CointEq(-1)*	-0.021337	0.003604	-5.919579	0.0000

4. Conclusion

According to (CBO, 2017), it has been more than two years since the severe drop in oil prices. However, uncertainty surrounding the future of the oil prices remains. Nonetheless, oil prices have remained comparatively unchanged since December 2016. This study relies entirely on secondary data, involving an annual time series, including 27 observations between 1990 and 2016 regarding two variables: crude oil price changes (explanatory variable) and total household consumption expenditure (explained variable). The employment of the (ARDL) model has been conducted and its statistical results confirm the presence of a long-term association between the variables. This enriches our knowledge of the positive connection between the selected economic variables. To alleviate the burden of oil dependency, non-oil sectors such as agriculture, fishing and services should be paid more attention to improve and strengthen the economy.

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