Natural resources volatility and economic growth: evidence from the resource-rich region

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Abstract

This research paper investigates the impact of natural resources' volatility on economic growth. The paper focused on three resources rich economies namely; UAE, Saudi Arabia, and Oman. Using data from 1970 to 2016 and employing the autoregressive distributed lag (ARDL) cointegration approach developed by Pesaran, Shin, and Smith (2001), we found that both natural resources and their volatility matters from the growth perspective. The study found strong evidence in favor of a positive and statistically significant relationship between the natural resource and economic growth for the economy of UAE and Saudi Arabia. Similarly, for the economy of Oman, a positive but insignificant relationship is observed between natural resources and economic growth. However, we found that the volatility of natural resources has a statistically significant negative impact on the economic growth of all three economies. This study contradicts the traditional concept of resources curse and provides evidence of resources curse in the form of a negative impact of volatility on economic growth.

Keywords: Natural Resources, Volatility, Economic Growth, ARDL Modeling, GCC

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1. Introduction

Looking at the UN human development report (2015), we can see that major oil and gas producing nations like Norway, Australia, and Canada are at the top of the list, while other major natural resources producing countries like Argentina, Brunei, Saudi Arabia, Qatar, UAE, and Kuwait also make a very high ranking in the UN human development report. However, there are other resource-rich countries that remain at the bottom of the ranking, e.g. Chad, Angola, Nigeria, Yemen, etc.

The impact of natural resource abundance on the economic performance of countries has been widely discussed in the research literature. Studies like Gelb (1988), Auty (1990), Sachs and Warner (1995, 1999) and Gylfason, T. (2001) concluded that concluded that natural resources abundant countries tend to grow slower compared to resources scarce countries. This phenomenon was named as the natural resource curse.

However, the debate on the natural resource curse is far from over and many studies found that the presence of a natural resource curse is dependent on contingent factors. For instance, in a cross countries study of the natural resource curse, Iimi (2007) found that the quality of governance determines the negative effect of natural resource curse on economic growth of the country. Manzano and RIgobon (2001) found that natural resource curse is dependent on debt overhang and the omitted generally omitted factors that are correlated with the primary exports and they conclude that the natural resource curse disappeared once they controlled for these two factors. However, again in a later study, Sachs & Warner (2001) reaffirmed their earlier natural resource curse finding controlling for endogeneity and omitted geographical and climate variables.
Gylfason and Zoega (2001) found that when the share of natural resource in the output rises, demand for capital decreases in the economy and that results in growth. The study further notes that improving the quality of institutions can remedy the capital market imperfections arising from natural resource and can mitigate the natural resource curse. Sala-i-Martin and Subramanian (2003) concluded that the natural resource abundance in Nigeria lowers the quality of institutions in Nigeria and that in turn causes poor economic growth. They suggest institutional quality improvements and redistribution of wealth to the public would mitigate the presence of natural resource curse.

On the other hand, there are other studies that dispute the validity of the concept of a resource curse and found no significant growth slowing impact of natural resource abundance. Alexeev and Conrad (2009), contrary to the popular view on the presence of a resource curse found that large endowments of natural resources on balance have a positive impact on long term economic growth of the country. A similar conclusion is reached by Birdsall and Subramanian (2004) who argue that resource-rich middle east has not experienced the natural resource curse largely due to their relatively small population and larger quantities of oil. Carmignani and Chowdhury (2010) concluded that the natural resource curse phenomenon is true only for the Sub Saharan African

(SSA) countries. However, no significant resource curse was found for countries other than the SSA.

The impact of natural resources especially oil on economic growth in the middle east is vastly researched and as mentioned above, Birdsall and Subramanian (2004) found that the countries have largely escaped the natural resource curse. However, other studies do point towards a relatively slow growth in the resource-rich middle eastern countries (see, Auty (2004) Aoun (2009), Arezki and Nabli, (2012) and Ben Ali et. Al (2016)). However, most of these studies are cross country studies and considered natural resource quantity rather than resource volatility. In cross country studies, one of the problems that arise is the assumption of a monotonic relationship between resources and growth across countries. We carry out time series study for the three GCC countries use volatility in natural resources and prices of natural resources and investigate its impact on economic growth. The remaining three countries of GCC are ignored owing to their unavailability of data.

In this paper, we attempt to revisit the phenomenon of natural resource curse in the 03-member countries of the Gulf Cooperation Council (GCC) namely; namely; United Arab Emirates, Saudi Arabia, and Oman. These countries are very resource rich and are relatively stable, have similar institutions and governance, language and culture and history and geography.

The paper makes a contribution to the literature in two ways. Firstly, rather than studying cross country analysis with an assumption of a monotonic relationship between resources and growth across countries, we conduct time series for each country. Secondly, in this paper, we model natural resource volatility in prices and quantity and investigate the impact of resource volatility on economic growth in the three GCC countries. We further explore the spillover effect of the resource volatility across the three GCC countries.

The rest of the paper is organized as follows: Section 2 describes the data and discusses descriptive statistics. The third section presents the model, data and estimating methodology. The penultimate section of the paper discusses the main results while the final section concludes the paper.

2. Data and Descriptive Statistics

In the first instance, we report descriptive statistics for the selected variables. Data is averaged for the entire period (1970 to 2016) for the selected 03 countries. The motivation behind this exercise is to understand the dependence of these countries on their natural resources export. Statistics are provided in the following Table 1.

The statistics reported in Table 1 demonstrates that in terms of total natural resources rents, Oman and Saudi Arabia dominate the Gulf region. The share of total natural resources rent in GDP is 32.826 and 32.337 percent for Oman and Saudi Arabia respectively. Saudi Arabia and Oman received the highest natural resources rents of 77.367 and 71.772 percent respectively. Similarly, the UAE economy received relatively lower rents as compared to Oman and Saudi Arabia.

Table 1. Descriptive Statistics

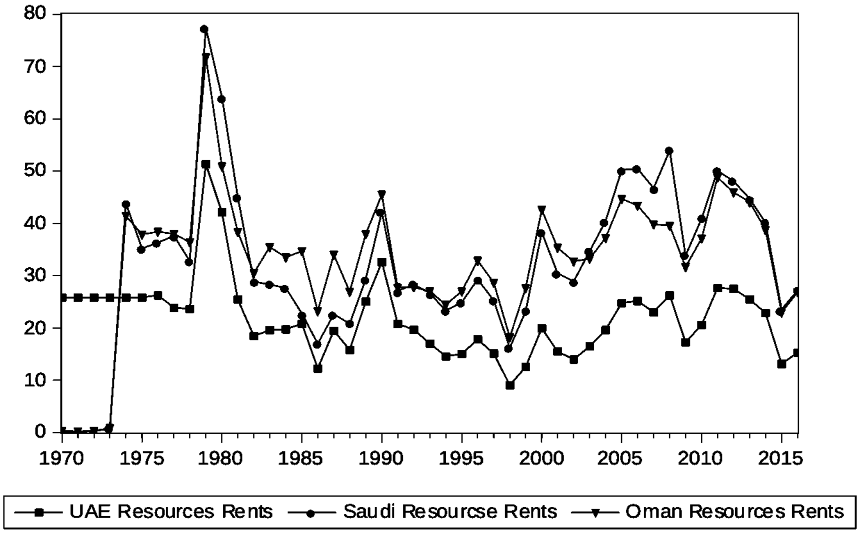
Country	**UAE**		**SAUDI ARABIA**		**OMAN**	
Variable	RENTS	GDP	RENTS	GDP	RENTS	GDP
Mean	21.85405	-1.971764	32.33789	1.454754	32.82663	1.712713
Median	20.79035	-2.263865	29.36857	0.849572	34.67548	1.502876
Std. Dev	7.433605	6.964441	15.61331	11.79136	13.38247	6.342968
Max	51.33957	13.13848	77.36759	52.21159	71.77281	18.777
Mini	9.043109	-19.64665	0.151509	-25.61908	0.207803	-17.50435
Skewness	1.551788	-0.245641	0.115481	1.369426	-0.568732	0.008727
Kurtosis	7.344244	3.060557	3.832843	9.023157	4.91273	4.262344
No. Obs	47	47	47	47	47	47

The contribution of total rents in GDP is 21.854 percent for the economy of UAE. The economy of UAE received the highest total rents of 51.339 percent during the study period.

In Terms of economic growth, again Oman and Saudi Arabia have achieved average economic growth of 1.712 and 1.454 percent respectively during the study period. Saudi Arabia achieved the highest and lowest of economic growth of 52.211 and -25.619 percent. Similarly, the economy of Oman experienced the highest economic growth of 18.777 and lowest economic growth of -17.504 percent during the study period. Surprisingly, the economic growth of UAE remained on the average negative from 1970 to 2016. Based on statistics reported in Table 1, the economic growth of UAE on average was -1.971 percent with a standard deviation of 6.964. The minimum and maximum values of economic growth are observed to be 13.138 and -19.646 percent respectively.

In the next step, we have also plotted natural resource rents for all three economies in a graph for the study period 1970 to 2016. The purpose of drawing a graph is to observe the behavior of natural resources for sampled countries over the years. It could be seen from the graph that there are considerable variations in natural resources rents specifically during the 1990s. Similarly, since then there are just usual ups and downs in natural resources rents for all three countries.

Figure 1. Natural Resources Rents over time (1970-2016)



Note: Figure 1 shows Natural resources rents received by UAE, Saudi Arabia and Oman during the period 1970-2016. Natural Resources rents are computed as a percentage of GDP of the country. Data Source: World Bank databank

3. Methodology

Time series variables are mostly non-stationary by nature and hence the techniques such as running the simple regression model would yield spurious inferences. Therefore, it is very important for a time series to be checked for stationarity properties. Therefore, for each time series, we constructed tests for both the levels and the first difference of the series. We applied both augmented dicky fuller (ADF) by Dickey-Fuller (1979) and Philips Perron (PP) test by Philips-Perron (1988) to test for stationarity of each series. For the ADF test, the lag length is automatically selected by the system based on minimum values of Schwartz information criteria (SIC), while for the PP test the lag length is automatically selected according to Newey-West Bartlett Kernel. Both the tests are conducted with including intercept only, and intercept and trend.

3.1 Conditional volatility of Natural Resources Rents

The volatility measure used in this paper is the conditional variance derived from the exponential generalized autoregressive conditional heteroscedasticity (EGARCH) model. The EGARCH model is an extended form of the GARCH model that efficiently captures the asymmetric affects and volatility clustering as shown by Nelson (1991). The generic model for volatility is described below. Specific models appropriate for each time series is estimated and results are presented in table 3.

$$\Delta Rents_t = \alpha + \beta \Delta Rents_{t-1} + \varepsilon_t \quad (3.1.1)$$

$$\log(\sigma_t^2) = \theta + \alpha \left(\frac{|\varepsilon_{t-1}|}{\sqrt{\sigma_{t-1}^2}} \right) + \beta \left(\frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} \right) + \gamma \log(\sigma_{t-1}^2) \quad (3.1.2)$$

In the above model equation 3.1.1 is the mean equation where $\Delta Rents_t$ is the first difference of natural resources rents as a percentage of GDP and $\Delta Rents_{t-1}$ is the one year lagged value of the natural resources' rents. Whereas α and β are coefficients to be estimated and ε_t is the idiosyncratic error term with standard white noise properties. Similarly, equation 3.1.2 is the variance equation where the term ε_{t-1} is the lagged value of the prediction error, the σ_{t-1}^2 is the lag of fitted variance from the mean equation 3.1.1. The log transformation of the conditional variance ensures positive variance. Therefore, any further restrictions are not required in the GARCH model. In the equation 3.1.2 above, θ, α, β, and γ are the coefficients to be estimated where θ is the intercept, α shows the ARCH effect, which represent the impact of conditional shock on conditional variance, β shows the estimated leverage effect which indicates the symmetric effect of past errors. $\beta=0$ would indicate an asymmetric shock effect while $\beta<0$ would show the presence of leverage effect. Lastly, γ shows the estimated GARCH effect in the model.

3.2 Effect of conditional volatility of Resources Rents on economic Growth

In this section, we describe the methods used for investigating the impact of natural resources rents and natural resources rents volatility on economic growth of the country. Adopting the EGARCH framework from Nelson (1991), we used the log of conditional variance of the conditional mean equation to measure the conditional volatility of natural resources rents. The following model is estimated using ordinary least squares (OLS) method.

$$GDPG_t = \alpha + \beta \Delta Rents_{t-1} + \gamma \Delta \log(\sigma_{t-1}^2) + \varepsilon_t \quad (3.2.1)$$

Where the dependent variable $GDPG_t$ is GDP growth per capita at time t and the independent variables $\Delta Rents_{t-1}$ is the one year lagged value of natural resources rents which is I(1), and $\Delta \log(\sigma_{t-1}^2)$ is the log of one year lagged conditional variance of natural resources rents that is obtained from the mean equation of the EGARCH (model 3.1.1) and ε_t is the white noise error term with the standard properties. The parameters to be estimated are α, β, and γ. The estimation results are presented in table 4.

3.3 Testing LONG RUN relationship between volatility of Resources Rents and economic Growth (ARDL bounds tests approach for cointegration)

Testing for cointegration relationship in times series analysis has become an essential part. It shows the presence of a systematic co-movement among variables over a period. The presence of cointegration helps us to rule out the possibility of spurious regression. In this paper, we use the autoregressive distributed lag (ARDL) approach developed by Pesaran, Shin, and Smith (2001), to find cointegrating relationship between GDP growth rate and natural resources rents. The model enables us to estimate the short run and long run effect of natural resources rents on economic growth. The reason behind using ARDL bound test is that it can be applied to variables regardless of the degree of integration of those variables. Especially, in our case where most GDP growth rate is I(0) and resources rents are I(1). The ARDL test can also be performed in our case as none of the variables in our study are I(2).

The ARDL method involves two stages. In the first stage, we test for a long-run relationship among variables. To test for that, we estimate the following model.

$$\Delta GDPG_t = \beta_0 + \sum \beta_i \, \Delta GDPG_{t-i} + \sum \gamma_j \, \Delta log\sigma_{t-j}^2 + \theta_0 GDPG_{t-1} + \theta_1 log\sigma_{t-1}^2 + \varepsilon_t \tag{3.3.1}$$

Once the model is estimated, we perform the F-test for the following hypothesis
H_0: $\theta_0 = \theta_1 = 0$ indicating no long-term relationship against the alternative hypothesis of the presence of a long-term relationship between the variables.
H_1: $\theta_0 \neq \theta_1 \neq 0$

Error correction model

Once we establish the presence of a cointegrating relationship between the conditional volatility of natural resources' rents and economic growth of the countries in question, we estimate the long-run equilibrium relationship between the variables with the following model.

$$GDPG_t = \alpha_0 + \alpha_1 log\sigma_t^2 + \nu_t \tag{3.3.2}$$

And the error correction model

$$\Delta GDPG_t = \beta_0 + \sum \beta_i \Delta GDPG_{t-i} + \sum \gamma_j \Delta log\sigma_{t-j}^2 + \varphi Z_{t-1} + \varepsilon_t \tag{3.3.3}$$

where $Z_{t-1} = GDPG_{t-1} - \alpha_0 - \alpha_1 log\sigma_{t-1}^2$ and the α_0 and α_1 are the OLS estimates from equation (3.3.2).

We have used Schwarz–Bayesian criterion (SBC) for selection of lags and we use the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of the recursive residuals (CUSUMS) tests to test for the stability of the model.

4. Results and Discussion

4.1 Unit Root and Stationarity

In the first instance, we have conducted the unit root testing to identify the order of integration of variables. Both the ADF and PP test are employed, and results are provided in the following Table 2.

Table 2. Unit root tests

Country	Variable	ADF		PP		ADF	PP
		Level				1st difference	
		Intercept	Intercept and Trend	Intercept	Intercept and Trend	Intercept and Trend	Intercept and Trend
UAE	*GDP Growth*	-4.672***	-4.619***	-4.672***	-4.619***		
	Rents	-3.333**	-3.562**	-3.280**	-3.470*	-5.603***	-15.035***
Saudi Arabia	*GDP Growth*	-6.611***	-6.374***	-6.748***	-6.496***		
	Rents	-3.345**	-3.216*	-3.210**	-3.113	-5.773***	-7.868***
Oman	*GDP Growth*	-5.526***	-5.648***	-5.453***	-9.099***		
	Rents	-3.715***	-3.517**	-3.534**	-3.188*	-5.009***	-9.016***

Note: GDP Growth is the per capita real GDP growth rate and Rents is the natural resources rents computed as a percentage of GDP of the country. and GDPG is the annual growth of the gross domestic product. ADF is Augmented dicky fuller test and PP is Philips Perron test both conducted with intercept, and intercept and trend. *indicate significance at 10% level, **indicate significance at 5% level, and ***indicate significance at 1% level.

The results of unit root testing have confirmed that there is no variable having the order of integration greater than 1 which is required to carry out the further analysis. According to the results, all variables for all three countries are either stationary at level or at first difference.

4.2 Conditional Volatility of Natural Resources Rents

The conditional mean and conditional volatility equations (3.1.1, 3.1.2) of natural resources are estimated using EGARCH model to capture volatility clustering. The estimation results are presented in table 3 which shows a positive and significant constant term for the mean equation in case of each country. This indicates an increasing trend over time in the natural resources' receipts by each of the countries over the period 1970-2016.

Table 3. Results of Conditional Volatility of Natural resources rents derived from EGARCH model

	Saudi Arabia	UAE	Oman
Mean Equation	**ARMA (2,1)**	**AR (1)**	**AR (1)**
α	31.953***	18.392***	35.115***
	(4.517)	(0.208)	(2.092)
β	0.409***	0.554***	0.447***
	(0.130)	(0.038)	(0.069)
β_2	0.776***		
	(0.082)		
Variance Equation			
ϕ	2.982**	2.816***	1.667**
	(1.230)	(0.000)	(0.773)
α*(ARCH)*	-0.679**	-1.713***	-0.572**
	(0.301)	(0.000)	(0.251)
β*(Leverage)*	-0.138	0.667***	-0.418**
	(0.222)	(0.000)	(0.171)
γ*(GARCH)*	0.453*	0.512***	0.689***
	(0.270)	(0.000)	(0.172)
Diagnostics			
Adjusted R-squared	0.398	0.294	0.367
Durbin-Watson	2.127	1.650	1.694

Note: The most appropriate model is estimated for each series based on the SC criteria. Standard errors are presented in parenthesis. Standard errors are given in parenthesis. ***, ** and * denote rejection of the null hypothesis at the 1%, 5%, and 10% level, respectively.

The coefficient of one year lagged natural resources (NR) is positive and significant for each of the country which indicate that current natural resources rents are influenced by the recent past natural resources' rents. The ARCH term is negative and statistically significant for each of the three countries which suggest that the conditional natural resources rents shock/innovation in each of the country negatively affect the conditional volatility. However, in case of Saudi Arabia, the leverage effect is insignificant which shows a symmetric effect of shock on conditional volatility of natural resources. On the other hand, the leverage effect is statistically significant for the UAE and Oman, indicating an asymmetric effect of shock on conditional volatility of natural resources.

The coefficient of asymmetric shock is negative and insignificant for Saudi Arabia, negative and insignificant for Oman and positive and significant in case of UAE. Which indicate an asymmetric effect of the conditional shock of natural resources in the UAE on the conditional volatility of natural resources rents. More specifically, a one-unit increase in the natural resources rents in the preceding year causes conditional volatility to decrease by 1.05 (-1.71+0.66), while a one-unit decrease in shock is going to cause the conditional volatility to decrease by 2.43 (–1.71–0.66).

The coefficient of GARCH estimates are positive and statistically significant both for the UAE and Oman while it is insignificant at 5% in case of Saudi Arabia. The GARCH estimate is smaller in case of UAE than in case of Oman indicating a quicker convergence to zero in case of UAE compared to Oman.

4.3 Effect of Conditional Volatility of Resources Rents on Economic Growth

The impact of conditional volatility of national resources on economic growth of the three countries is estimated based on equation 3.2.1 using OLS. The estimated results are presented in table 4. The tables present the results based on two different models. The first model (I) is without ΔNR_{t-1} and the second model (II) is with ΔNR_{t-1} as an independent variable for each of the three economies.

The results show that the effect of first difference of natural resources rents is positive and significant in case of Saudi Arabia and the United Arab Emirates. The effect of natural resources rents on economic growth in Oman is positive, however, insignificant. These results contradict the concept of Dutch disease. The findings could be justified as these countries have very large natural resources sectors and the fraction of manufacturing exports is rather small which might be the reason of no finding of Dutch disease.

The effect of lagged conditional volatility is strongly negative and statistically significant for all the countries included in the study. This indicate that while this study rejects the presence of Dutch disease in a tradition way in these countries, the study does find a negative effect of the natural resources rents conditional volatility (innovation) on economic growth of these countries.

The findings thus suggest that while the level of natural resources rents in these resources' rich countries (except in case of Oman) positively affects economic growth in these countries, the volatility or innovation of natural resources has a strong negative and significant effect on economic growth of these countries. These results are very significant in the sense that it rejects the traditional concept of natural resources curse as natural resource were found to be positively affecting economic growth in these countries. However, the study found that the volatility of natural resources has a strong and statistically significant negative impact on economic growth of all the three countries.

The model fitness and stability of the estimated model is evaluated with the standard diagnostics. The values of adjusted R-squared and Durbin-Watson (DW) are reported in the table. The DW value is greater than the adjusted R-squared in each model, which indicate that the model is not spurious.

Table 4. OLS Regression Estimates: Dependent variable: GDP Growth rate per capita

Country	*UAE*		*Saudi Arabia*		*Oman*	
Mean Equation	(I)	(II)	(I)	(II)	(I)	(II)
Constant	-1.901* (1.091)	-1.8558 (1.0189)	-0.803 (1.229)	-0.667 (1.177)	1.379* (0.769)	1.715** (0.843)
$\Delta\ Rents_{t-1}$		0.3391** (0.1435)		0.230** (0.106)		0.118 (0.075)
$\Delta \log (\sigma_{t-1}^2)$	-1.346* (0.728)	-1.0839** (0.7102)	-0.514** (0.284)	- 0.495** (0.268)	- 2.040** (0.978)	-2.460** (1.110)
diagnostics						
Adjusted R squared	0.07	0.124	0.05	0.122	0.077	0.092
Durbin Watson	1.358	1.79	1.70	1.70	1.10	0.93

Note: The values in parenthesis are the standard errors. Annual real GDP growth per capita in percentage is the dependent variable. $\Delta\ NR_{t-1}$ is the first difference of the lagged natural resources rents and $\Delta \log (\sigma_{t-1}^2)$ is the first difference of the lagged conditional volatility of the natural resources' rents. Conditional volatility is the conditional variance derived from exponential GARCH model of natural resources rents regressed on one-year lagged natural resources rents and constant. The Durbin–Watson statistics >adjusted R2 exclude the possibility of spurious regression.

The results for ARDL bounds test of cointegration based on model (3.3.1) are reported in table 5. The table presents the F-statistics value and critical values at 5% significance. The critical values reported are based on Pesaran and Shin (1998) and Pesaran et al. (2001), and by Narayan (2005). The I(0) critical values assume the ARDL model to be I(0) and the I(1) critical values assume the ARDL model to be I(1).

Table 5. ARDL Bound Cointegration test

Country	**F-Statistics**	**F Statistics**	**Critical Value at 5%**		**F Statistics**	**Critical Value at 5%**	
		Without time trend	I (0)	I (1)	With time trend	I (0)	I (1)
UAE	F_ (GDP\Rents)	12.136***	4.94	5.73	7.98***	4.05	4.49
Saudi Arabia	F_ (GDP\Rents)	20.214***	4.94	5.73	14.163***	4.68	5.15
Oman	F_ (GDP\Rents)	14.938***	4.94	5.73	10.446***	4.68	5.15

F_(GDP/Rents)-The F-statistics value are calculated based on the equation with real GDP growth rate per capita as a dependent variable and the conditional volatility of natural resources rents as independent variable.

We can see from the table that the F statistics values is bigger than the critical values in each case suggesting that the variables real GDP growth per capita and natural resources rents volatility are cointegrated in all three economies. In the next stage, we estimate the error correction model and the results are reported in table 6.

The error correction term shows the speed of convergence to the equilibrium and adjustment in the model. The coefficient of ECM term suggests how quickly a variable restores to the equilibrium after the shock. The error correction term is negative and strongly significant for all three economies indicating evidence of a stable long-term relationship as shown by Bannerjee et al (1998). The ECM term is -0.946 for Oman which is the biggest (in absolute terms) in the three economies, indicating the fastest convergence to equilibrium after experiencing an exogenous shock in Oman followed by the UAE and Saudi Arabia.

Table 6. Error correction model estimation results

Coefficients	UAE	Saudi Arabia	Oman
C	-0.210	-0.774	0.446
	(1.123)	(1.268)	(0.807)
$\Delta GDPG_{t-1}$	0.119	-0.188	0.312*
	(0.171)	(0.146)	(0.177)
$\Delta \log(\sigma_{t-1}^2)$	0.002	0.0009	-0.023
	(0.032)	(0.003)	(0.029)
$\Delta GDPG_{t-2}$			0.027
			(0.149)
$\Delta \log(\sigma_{t-2}^2)$			0.039
			(0.025)
ECM	-0.827***	-0.698***	-0.946***
	(0.202)	(0.183)	(0.224)
Diagnostics			
R-Squared	0.33	0.43	0.45
Durbin Watson	1.76	2.04	1.12

Note: The values in parenthesis are the standard errors.

Therefore, we conclude that natural resources rents have impacted the economic growth of both Saudi Arabia and United Arab Emirates positively and further this relationship is different from zero significantly. These findings are in line with the natural resource blessing hypothesis where the abundance of natural resources help economies to overcome the contending obstacles to economic growth. In a similar study for Australian regions, Fleming et.al (2015) found that while natural resources have been found to have negatively affected some parts of the country, the resources boom has largely been a blessing for most of the Australian regions. Our results confirm the findings for the three gulf countries.

The results regarding the positive impact on natural resources on economic growth for Saudi Arabia are also consistent with those of Khalid (2013). However, our analysis for the Saudi economy is more in-depth as Khalid (2013) only considered the production of oil. Likewise, Haouas and Heshmati (2014) focused on United Arab Emirates and found evidence in favor of natural resources curse for the same. However, our findings about the absence of natural resources curse hypothesis for the

United Arab Emirates could be justified claiming it attracts significant tourists from around the world. In a recent study, Kurecic and Kokotovic (2017) found that natural resources do not affect economic growth negatively in tourism-dependent economies. The results are consistent with the findings of Soto and Haouas (2012) who concluded that natural resources have played a significant role in the economic activity and development strategy over the years.

As far as the economy of Oman is concerned, the study finds that although natural resources have impacted economic growth positively, however, this relationship is not significant. This insignificant impact of natural resources on economic growth could be because policy makers of Oman have started the process of economic diversification recently. However, the process of economic diversification is not satisfactory as noted by Al Musalami (2016) who concluded that some resource curse is still present in the economy of Oman. Therefore, the economy of Oman is suggested to speed up the process of economic diversification to grow in the long run and beat the resource curse hypothesis.
However, there are multiple studies that found evidence of natural resources curve. Mahler (2010) found evidence of natural resources curse in case of Nigeria. The study found that the natural resources curse in Nigeria is channeled through ethnic division and violence. However, the countries in our study are culturally and ethnically very homogenous and politically stable.

Our results further conclude, that while natural resources abundance tend to positively affect economic growth of the country, it is the natural resources volatility that has a negative effect on economic growth of the country. Natural resources rents are quantified in the natural resources' rents inflow, therefore, volatility in exports amounts as well as price shocks of resources are expected to adversely affect the economic growth of the host country.

5. Conclusion

The prime objective of this paper was to revisit and investigate the natural resource curse for three resources-rich countries including Saudi Arabia, UAE, and Oman during the period 1970-2016.

The results obtained have revealed that indeed natural resources matter from the perspective of economic growth. According to the results, both Saudi Arabia and UAE in terms of economic growth have been benefited significantly from their rich natural resources. On the other hand, the relationship between natural resources and economic growth is although positive for the economy of Oman but remained insignificant statistically. These findings appeared to be in contradiction with the concept of Dutch disease. This apparently could be due to the fact that all these three countries have a very large fraction of their goods exports consist of natural resources and the manufacturing exports make a very small fraction of total goods exports.

Therefore, the potential for reduction in manufacturing exports due to expansion in the natural resources sector didn't happen and we didn't observe the natural resources curse in the conventional sense for these countries. However, the study found that the volatility of natural resources has a strong and statistically significant negative impact on the economic growth of all three countries.

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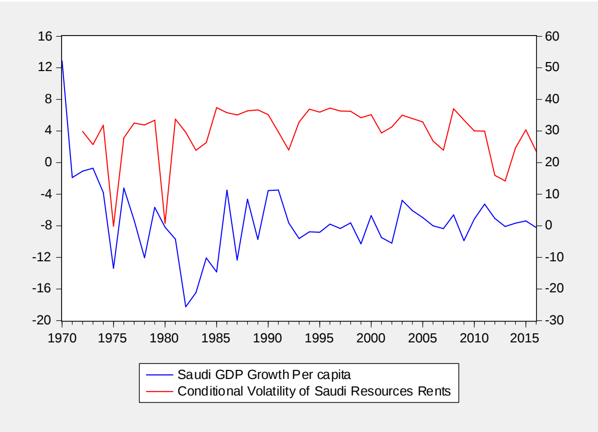
Appendix

1.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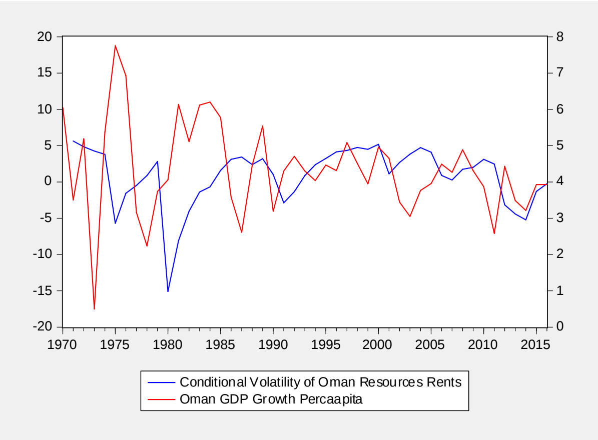
Saudi GDP Growth Per capita
Conditional Volatility of Saudi Resources Rents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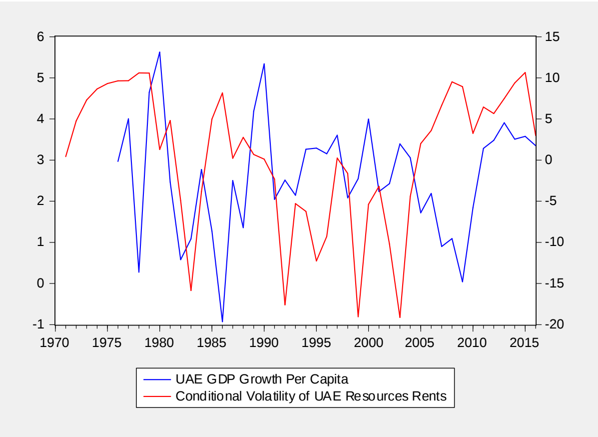
Oman GDP Growth Percaapita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1970
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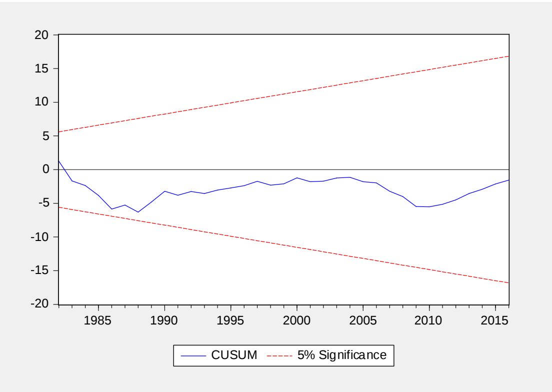
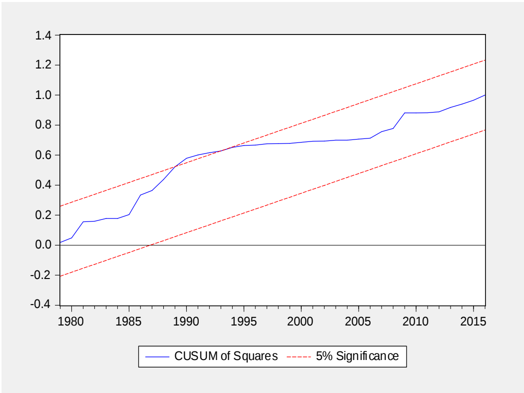
UAE GDP Growth Per Capita
Conditional Volatility of UAE Resources Rents

2. CUSUM TEST

UAE





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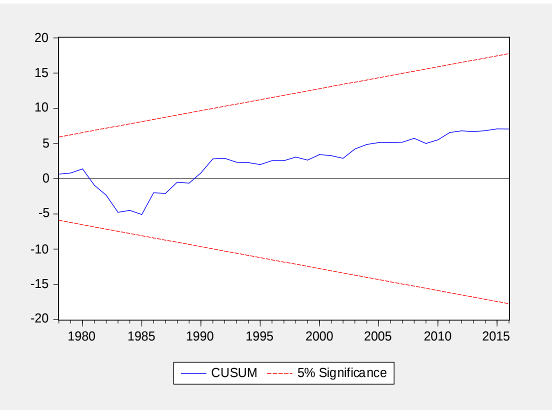
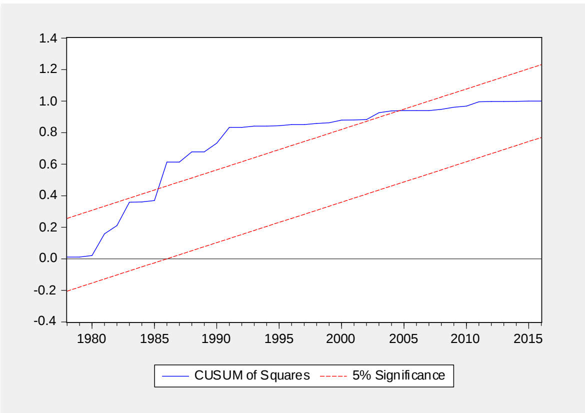
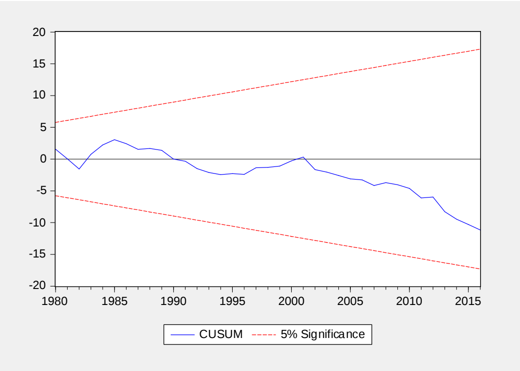
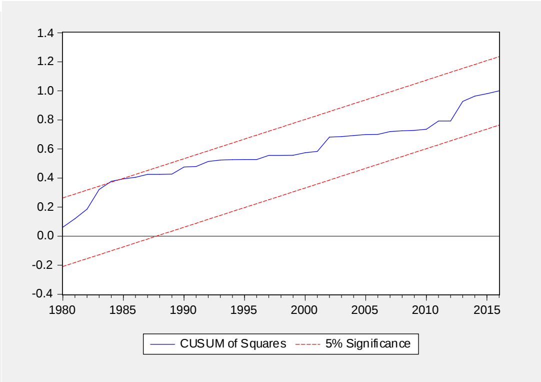




OMAN


20
15
10
5
0
-5
-10
-15
-20
1980
1985
1990
1995
2000
2005
2010
2015
CUSUM
5% Significance


1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
1980
1985
1990
1995
2000
2005
2010
2015
CUSUM of Squares
5% Significance