THE IMPACT OF OIL PRICE VOLATILITY ON ECONOMIC GROWTH WITH EMPHASIS ON REGIME CHANGES: EVIDENCE FROM OPEC AND OECD

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Abstract

In this study, effect of oil price volatility on economic growth in OECD and OPEC countries group have been investigated with emphasis on regime changes during the period 1972-2011. In this regard, the EGARCH model to modeling and calculate the oil prices volatility and the Markov-Switching models to effect of oil price volatility on economic growth in both countries group is used.

The result show that positive oil price shocks increase of oil price volatility and the negative price shocks reduce its, and this volatility have negative effect on economic growth under three different regimes of behavior. But this effect in OPEC countries group is more than of OECD countries group. With oil prices volatility, economic growth in both countries will constantly transfer from a regime to other regime. The difference is that with this regime transition, the economics of the OPEC countries group set in status of low economic growth, but the OECD countries group only don't able to keeping continuation of the high economic growth status and it more likely fixed in status of moderate economic growth.

Keywords: Oil Price Volatility, Economic Growth, Markov Switching Regression, OPEC, OECD.

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Introduction

In the world oil markets, OPEC[1] countries product 42.4 present of total crude oil in the world and OECD[2] countries have 51.5 present of total oil consumption. These two groups play the biggest role in world oil supply and demand and finally in its price (BP[3] Statistical Bulletin, 2012). So, economy of these countries is affected by shocks in oil price. According to the literatures, negative (positive) shocks have negative (positive) effect on the economy of OPEC countries, positive (negative) effect on the economy of OECD countries. Since these shocks are generated by unforeseen economic and noneconomic factors which are related to the world oil markets, they mostly have a random nature. Because of this, economic policy-makers are not aware of nature and type of futures shocks. This problem causes some difficulty in modeling, predicting and finally planning (based on these shocks). In contrast, the possibility of modeling the oil price volatility based on price shocks, allows economic planning based on oil price volatility. so, in this study, the effect of oil price volatility on economic growth in OECD and OPEC countries group have been investigated and compared. The study has tried to answer this question: does oil price volatility bring benefit to one group and loss to another? Or is the nature of these volatility damaging for the economy of both groups of countries?

In past decades, countries of the world have seen crisis and various happenings in the field of economy and energy sector. All of these happenings and crisis as a potential structural break can bring some changes to the relation between economic and energy variables, during the time, or in other words, can lead to regime changes in the relation between energy and economic variables. Hence, this study has been done with the emphasis on regime changes. The Markov Switching Regression is capable of identifying regimes and change in the relation between the variables in different regimes. Also for modeling the oil price volatility, the Conditional Heteroskedasticity Modeles are suitable. The second section of this study review the literatures, the third section is methodology. Modeling and the analysis of the results has been investigted in part four, and in the last section concluded of study.

[1] Organization of the Petroleum Exporting Countries
[2] Organization for Economic Co-operation and Development
[3.] BP Statistical Review of World Energy

Literature Review

Following the disorders of global oil markets in 1970s, and consequently the fluctuations of business cycles, theoretical explanations regarding the connection between the changes in oil price and fluctuations was presented (Phelps' 1978) and some similar studies (Pierce, J.L. & Enzler, J.J. (1974), Mork K.A & Hall, R.E. (1980), Mork, K.A. (1989), Gordon, Robert J. (1975)). After presenting these theoretical explanations, Literatures investigte the relationship between prices changes in world markets and the overall level of economic activity. In the beginning, the studies just proceeded to the effects of changes in oil price on economic activities (Darby, M.R. (1982), Hamilton, J.D. (1983), Burbidge and Harrison (1984), Geiser & Gaudin (1986)). When the asymmetrical effect of oil shocks on economy was discussed by Tatom, J. (1988), new studies emphasized on the asymmetrical effect of these shocks (Mork, K.A. (1989), Lee, K., Ni, S. & Ratti, R.A. (1995), Hooker, M.A. (1996), Hamilton, J.D. (1996), Raymond &rich (1997), Papapetrou (2001), Hamilton, J.D. (2003), Kalgani & Manra (2009), Farzanegan and Markovat (2009), Aiyto (2010 and …). During a research study regarding Uncertainty and investment, Pindyck (1991) showed that volatility and uncertainty in oil price played an important role in U.S economics Depression of 1980 & 1982. After Pindyck's study, some researches just concentrated on the discussion of the influence of uncertainty and oil price volatility (Rotemberg, J.J. & Woodford, M. (1996), Ferderer, J.P. (1996), Goa & kelison (2005), Gronwald, M. (2006), Rafiq, S., Salim, R. & Bloch, H. (2009), Elmi, Z., Jahadi, M. (2011), El Hedi Arouri, M., Lahiani. A. & Nguyen, D.K. (2011), Chen, S.S. & Hsu, K.W. (2012), Joher Ali Ahmed, H., Bashar, Omar H.M.N, H. &. Mokhtarul Wadud, I.K.M. (2012)). Some studies also considered both shocks and volatility (Lee, K., Ni, S. & Ratti, R.A. (1995), Rahman, S. & Serletis, A. (2012)).

Methodology

Autoregressive Conditional Heteroscedasticity

The first aim of this study is modeling the oil price volatility. In this line Autoregressive Conditional Heteroscedasticity (ARCH) model has been used. These models make possible the usability of the benefits of sample standard deviation and formulize the conditional variance of time series with the method of maximum likelihood and provide a systematic framework for modeling the vlatility. Different types ARCH models are used in economic modeling, among these models, the most famous one is: ARCH, Generalized ARCH (GARCH), Threshold (TGARGH), and Exponential ARCH (EGARCH). One important limitation of in ARCH and GARCH model is related to symmetry; which means they consider the absolute value of the change in predicting the volatility and ignore their sign and because of this, the effect of positive and negative shocks are considered on series volatility. While series volatility do not react the same to shocks. So, in order to solve this problem, it is needed to use an asymmetric model (Verbeek, 2005). One of the asymmetric models is TGARGH which was suggested by Zakoian (1994), Glosten & et al (1993). In this model, the effects of positive and negative shocks is separated from each other by dummy variable. In this model, for the positivity of the variance, the effect of shocks on volatility must be positive. While in practice, each shock may cause a decrease in volatility, regarding the time. So it is necessary to use a model which has no limitation on coefficients. EGARCH model (introduced by Nelson, 1991), has such characteristics. EGARCH model is shown in Equation 1:

$$(y_t|\pounds_{t-1}) = a_0 + \sum_{i=1}^{s} a_i y_{t-i} + \gamma X_t + \varepsilon_t; \quad (\varepsilon_t|\pounds_{t-1}) \sim N(0, \sigma_t^2 = h_t) \ ;$$

$$\text{EGARCH}(p,q): \log(\sigma_t^2) = \beta_0 + \sum_{i=1}^{q} \beta_i \log(\sigma_{t-i}^2) + \sum_{k=1}^{r} \theta_k \frac{\varepsilon_{t-k}}{\sigma_{t-k}} + \sum_{j=1}^{p} \varphi_j \left|\frac{\varepsilon_{t-j}}{\sigma_{t-j}}\right| + v_t \quad ;$$

$$v_t \sim IIN(0, \delta_v^2)$$

In the above equation, y_t; the dependent variable in period t, X_t : the independent variables in period t, ε_t : is the residual in period t which indicates the existence of shocks and new information of which, the economic factor was not aware (if $\varepsilon_t > 0$, the shock is positive, and if $\varepsilon_t < 0$, the shock is negative), σ_t^2 or h_t; is the conditional variance which is defined by predicting the series volatility at the period t, $\pounds_{t-1}$; includes a collection of information until the time(t-1) plus ε_{t-1}. The equation (1-1) which is conditional mean relation. In this equation, if ε_t has been normal distribution with the zero average, the conditional variance (h_t), equation (2-1) could be proposed.

Markov Switching Models

The relation of many economic variables changes over time and will be replaced with new ones. In investigate of the behavior of these variables by using linear methods; it is natural that instead of using one model for conditional mean of dependent variable, several models are used. Or if the variance of error sentences in models are identical, they could be organized in one model so that the breaks are visible. But nevertheless, in this approach the periods affected by structural breaks are specified with a limited number and exogenous, while in practice, it is possible for time series to change at any time and with any number. Moreover, in separate estimates the complete information resulted from the sample are not regarded in all models, and it is not possible to combine the models to change them to one. The reason is the difference between samples variance. On the other hand, Markov switching models as nonlinear models can model behavior and transformation pattern for data endogenously, over time. A Markov switching model is a combination of two or more separate models that have been combined according to Markov switching mechanism (Ming Kuan, 2002). It is necessary to explain that, comparing to linear models, these models are superiority: firstly in this method, the possibility of one permanent change or several temporary changes exists, and these changes can occur frequently and for a short time, yet in this model, the exact time of changes and structural break can be determined. Secondly, the difference of variances can be considered as a feature of these models, in other words, Markov model uses several equations to explain the behavior of variables in different regimes and thirdly, this model imposes fewer assumptions on the distribution of the variables and also it is simultaneously capable of estimating the changes of dependent and independent variables, of course with the condition that the economic situation is endogenous in at the any time. If in the first intended model, explaining and dependent variables take place with lags in the right side of model, according to the fact that coefficients of variables can also vary in different regimes, following Clements & Krolzig (2002) and Klony & Mantra (2009), it can be possible to define an extending status for autoregressive Markov switching model with the explaining variables (MS(K)- ARX(p,q)):

Equation 2:

$$y_t = c(s_t) + \sum_i^p a_i(s_t) y_{t-p} + \cdots + \sum_i^q \beta_j(s_t) X_{t-q} + \varepsilon_t(s_t)$$

In the above model, y_t is the dependent variable, X_t is the independent variable, c is intercept and ε_t is the component of the disturbing of the model. All of the elements in the right side of the equation 2 are function of the regime variable (s_t).

In Markov switching models, s_t variable is unseen so it is not possible to determine that in time t, we are in which status, but we can say the probability of being in regime s_t. according to Markov chain with *k* state; the discrete variable s_t is a function of its past amounts that in order for simplicity, it is assumed that it is a Markov chain with first order. By following this chain, the Data Generating Process (DGP) will be completed regarding the regime variable.

Equation 3:

$$\begin{cases} s_t \in \{1,2,\dots,K\}, P(s_t = j | s_{t-1} = i, \Omega_{t-1}) \\ P(s_t = j | s_{t-1} = i, \Omega_{t-1}) = P(s_t = j | s_{t-1} = i) = P_{ij} \\ \sum_{j=1}^{k} P_{ij} = 1 \quad \forall i,j \in \{1,2,\dots,K\} \end{cases}$$

By putting together all these probabilities in one matrix K*K, the result would be the matrix of probability of transfer (p) of which each factor P_{ij} indicates the probability of transference from status of regime *i* to *j*.

Equation 4:

$$\begin{bmatrix} P_{11} & P_{21} & \cdots & P_{k1} \\ P_{12} & P_{22} & \cdots & P_{k2} \\ \vdots & \vdots & \ddots & \vdots \\ P_{1k} & P_{2k} & \cdots & P_{kk} \end{bmatrix}, \sum_{j=1}^{K} P_{ij} = 1 \ \forall\, i,j \in \{1,2,\dots,K\}, 0 \le P_{ij} \le 1$$

Modeling and analysis of the result

The data has been used in this study is OPEC basket price and total GDP of both OPEC and OECD countries during 1972-2011.

Modeling the volatility

In this study, The EGARGH model has been used for computing the oil price volatility. For estimating the EGARCH model, first it is necessary to estimate the equation of conditional mean. The model which has been used for this is ARIMA (p,d,q). According to the correlogram of oil price, Akaike Information Criterion (AIC) & Schwarz Baysesian Criterion (SBC), and also stationary of oil price variable based on Kwiatkowski, Philips, Schmidt & Shin Unit Root Test (table 2), the equation of ARMA(1,3) has superiority over opponent states. Also according to the correlogram, related to the square of the residue of estimating ARMA(1,3) and based on Box-Jenkins criterion, EGARCH(1,1) has been chosen as the most appropriate model. The results are shown in table 1.

Equation 5:

$$\mathrm{EGARCH}(1,1)\colon \log(\sigma_t^2) = \beta_0 + \beta_1 \log(\sigma_{t-i}^2) + \theta \frac{\varepsilon_{t-k}}{\sigma_{t-k}} + \varphi \left|\frac{\varepsilon_{t-j}}{\sigma_{t-j}}\right| + v_t$$

Table 1, the results of estimation of EGARCH(1,1) model

Conditional mean equation ($OILP_t$)					
Variable	a_0	$AR(1)$	MA(1)	MA(2)	MA(3)
coefficient	40.2154	0.9619*	-0.1463	0.5116*	-0.5420**
Standard deviation	64.0415	0.1208	0.1750	0.1248	0.2145

Conditional variance equation($Log(h_t)$)				
Variable	ω	Β	θ	Φ
Factor	4.6568*	0.3535	0.7633	1.1676**
Standard deviation	0.0055	0.3443	0.2629	0.0430

Note: *, ** and *** show the significance respectively at 1%, 5% and 10%.

Source: Authors calculations

The Positive value of the parameter θ in estimation of EGARCH model, shows that the impact of positive oil price shocks on global oil markets lead to greater price volatility, whereas negative oil price shocks decreases price volatility in global oil markets. This result is consistent with the realities of the world oil markets, as positive oil shocks usually arise when the security of oil supply in the world markets faces problem or that there is a concern about it and this causes a uncertainty among Consumers of oil and finally leads to the formation of price volatility in the world oil markets. Whereas negative shocks occur when there are opposing these conditions, but lower impact of negative price shocks compared to the positive impact of price shocks is related to the limited causes of these shocks and downward stickiness of prices in oil markets.

Multibehavior pattern modeling

To evaluate the effect of oil prices volatility on economic growth of OPEC and OECD countries, the following equation is considered:

Equation 6:

$$\log(y_t) = c(s_t) + \sum_i^p a_i \log(y_{t-p}) + \cdots + \sum_i^q \beta_j \log(h_{t-q}) + \varepsilon_t(s_t)$$

In which, s_t ،$log(h_t)$و $log(y_t)$ respectively represent the state variable, the logarithm of oil prices volatility, and the logarithm of total GDD of OPEC and OECD countries in constant prices 2005 (billion U.S $). To ensure the reliability of Estimate of the time series, the variables used are examined to check the stability. In this study, to test the stationary of variables, the KPSS is used. Based on this analysis, the variables are in stationary levels (Table 2).

Table 2, Unit root test results

$\log(h_t)$	$\log(y_t)$		$OILP_t$	variable
	OECD	OPEC		
0.4873	0.1832	0.1765	0.1395	KPSS statistics
0.7390	0.2160	0.2160	0.2160	The critical values at 1%

Source: Authors calculations

Markov switching model is faced with two problems: First, it should use the number of optimal lags of p and q and the model type, AIC criterion is used for doing these.

Secondly, it must be shown that presence of the state variables is required in the model. In other words, it should be tested the null hypothesis is based on linear model against nonlinearity model, for doing this LR the test was used for this work. The results of these tests and the estimation results of the Markov model introduced in Table 3.

According to AIC in Table 3, the Markov model with state (regime) intercept was suitable for models of both group of countries. Estimation of use of AIC criterion; the model MSI(3)-ARX (4,7) is for the OPEC countries and the MSI(3)-ARX(6,6) is used for the OECD countries. Based on LR test results, in both group of countries, the switching models are preferred to the linear models.

In table 3, based on the sum of the coefficients of log of variation ($\sum_i^q \beta_j$), in both group of countries, oil price volatility have a negative impact on economic growth. Except that the negative impact of oil price volatility on economic growth of OPEC countries (-0.0208) is more than the OECD countries (-0.0164). The reason for this can be attributed to the high share of oil revenue in OPEC countries economy.

Table 3, test results and estimation of Markov switching model

Surveyed group		countries OPEC		countries OECD	
model		MSI(3)-ARX(4,7)		MSI(3)-ARX(6,6)	
Log-likelihood		126.2504		140.8967	
AIC criterion		-6.7903		-7.3060	
test		statistics χ^2	Significance	statistics χ^2	Significance
Linearity (LR)		24.6590	0.0018	34.4390	0.0002
Portman test		22.7900	0.5139	12.0210	0.2837
ARCH test		6.7028	0.1195	2.7297	0.1496
variants		coefficient	S.D	coefficient	S.D
intercept	Regime 0	-0.1914	0.0236*	0.0502	0.0057*
	Regime 1	-0.1832	0.0231*	0.0556	0.0056*
	Regime 2	-0.1759	0.0237*	0.0656	0.0057*
Standard deviation		0.0015	0.0002*	0.0011	0.0002*
$\log(y_{t-1})$		1.5140	0.0235*	1.1847	0.0395*
$\log(y_{t-2})$		-0.1802	0.0457*	-0.0539	0.0535
$\log(y_{t-3})$		-0.9526	0.0774*	-1.0625	0.0847*
$\log(y_{t-4})$		0.6981	0.0329*	0.7920	0.1002*
$\log(y_{t-5})$				-0.0369	0.0829
$\log(y_{t-6})$				0.1548	0.0471*

<table>
<tr><td colspan="2">$\log(h_{t-1})$</td><td colspan="2">-0.0137</td><td>0.0012*</td><td colspan="2">-0.0066</td><td>0.0006*</td></tr>
<tr><td colspan="2">$\log(h_{t-2})$</td><td colspan="2">-0.0070</td><td>0.0019*</td><td colspan="2">-0.0008</td><td>0.0006*</td></tr>
<tr><td colspan="2">$\log(h_{t-3})$</td><td colspan="2">0.0046</td><td>0.0024***</td><td colspan="2">-0.0004</td><td>0.0007*</td></tr>
<tr><td colspan="2">$\log(h_{t-4})$</td><td colspan="2">0.0046</td><td>0.0024**</td><td colspan="2">0.0022</td><td>0.0008**</td></tr>
<tr><td colspan="2">$\log(h_{t-5})$</td><td colspan="2">-0.0089</td><td>0.0011*</td><td colspan="2">-0.0100</td><td>0.0008*</td></tr>
<tr><td colspan="2">$\log(h_{t-6})$</td><td colspan="2">-0.0024</td><td>0.0007*</td><td colspan="2">0.0032</td><td>0.0006*</td></tr>
<tr><td colspan="2">$\log(h_{t-7})$</td><td colspan="2">0.0021</td><td>0.0011</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="2">$\sum_i^q \beta_j$</td><td colspan="2">-0.028</td><td></td><td colspan="2">-0.0164</td><td></td></tr>
<tr><td colspan="2" rowspan="2">Transition probability</td><td colspan="3">Time t-Regime</td><td colspan="3">Time t-Regime</td></tr>
<tr><td>0</td><td>1</td><td>2</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td rowspan="3">time t +1</td><td>Regime 0</td><td>0.3808</td><td>0.4220</td><td>0.3550</td><td>0.1671</td><td>0.2139</td><td>0.1802</td></tr>
<tr><td>Regime 1</td><td>0.3547</td><td>0.0963</td><td>0.5366</td><td>0.3318</td><td>0.3581</td><td>0.6380</td></tr>
<tr><td>Regime 2</td><td>0.02645</td><td>0.4817</td><td>0.1084</td><td>0.5011</td><td>0.4280</td><td>0.1818</td></tr>
<tr><td rowspan="2">Regimes features</td><td>Durability (year)</td><td>1.50</td><td>1.11</td><td>1.13</td><td>1.20</td><td>1.50</td><td>1.22</td></tr>
<tr><td>cumulative probability</td><td>0.3871</td><td>0.3226</td><td>0.2903</td><td>0.1875</td><td>0.4688</td><td>0.3438</td></tr>
</table>

Note: *, ** and *** show the significance respectively at 1%, 5% and 10%.

Source: Authors calculations

According to the values of intercept in different regimes and sameness of volatility coefficients and autoregressive of estimation of both groups of countries, it can be said that the regimes zero, one and two, respectively show low, average and high Economic growth, because the values of the intercept at the regime zero are smaller than the regime one, and regime one is smaller than regime two. In this base, transition probability matrix and regime features are analyzed.

According to the transition probabilities of estimation model of OPEC countries, despite the volatility of oil prices in the current period, if the economy of OPEC countries is placed in the regime of zero (low economic growth), 0.3808 would probably remain in the same regime in future and 0.3547 would probably turn into regime of one (average economic growth) and 0.2645 would probably turn into regime of two (high economic growth) and if in the current period, the economy of these countries places in the regime of one, 0.4220 the economy would turn into regime of zero and 0.4817 it would turn into regime of two and 0.0963 it would remain in regime of one.

If the economy of these countries places in regime of two, despite oil price volatility, 0.1084 would probably remain in the same position and respectively 0.3550 and 0.5366 would probably turn into regime of zero and one. Based on the stability period of each regime, it can be said that despite oil price volatilities, zero, one and two regimes in OPEC countries would respectively last 1.50, 1.11 and 1.13 years and also based on cumulative probability of the regimes it can be said that despite the state of economy in the current period and despite the oil price volatilities, respectively 0.3871, 0.3226 and 0.2903 would probably place in regime of zero (low economic growth), regime of one (average economic growth) and regime of two (high economic growth).Comparison of elements of transition probability matrix of OPEC countries shows that despite the switching of the regimes of one and two, the tendency for transition of economy to other regimes is more that the tendency for remaining in a special regime, but in regime of zero (low economic growth) the tendency for economic stability is more than the tendency for transition probability. In fact, oil price volatility, keeps the economy of OPEC countries in fluctuation state and only when the regime of zero is the dominant regime, the economy would have a stable state.

Based on the transition probability of economy model of OECD countries, if the economy of OECD countries, in the current period places in regime of zero, despite volatility in oil prices, the economy in the coming period 0.1671 would probably remain in the same regime and 0.3318 is likely to turn into regime of one (the average economic growth) and 0.5011 is likely to turn into regime of two (high economic growth) so, it can be said that even with volatility in oil prices, this group of countries can improve their economic growth. But if in the current period, the economy of these countries places in regime of one (average economic growth), 0.3581 probably the economy would remain in regime of one in the future and respectively 0.2139 and 0.4280 the economy would probably turn into regime of zero (low economic growth) and regime of two (high economic growth). Based on the high probability of the stability of regime of one compared to probability of transition to regime of zero and based on the high probability of transition from regime of one to regime of two, it can be said that despite the oil price volatility, these groups of countries not only can remain their economic growth but also they can improve it. But if the economy of these countries places in the regime of two (high economic growth), the probability of stability and maintenance of this regime in the coming period would be 0.1818, and the probability of transition to regime of one (average economic growth) and regime of zero (low economic growth) would be respectively 0.1802 and 0.6380. it can be claimed that in spite of oil price volatility, maintaining regime of two is difficult for these countries and probably the economy would transit to regime of one (average economic growth). Also, based on the cumulative probability, the take place of regime of zero, one and two respectively is 0.1875, 0.4688 and 0.3438, and their stability period is 1.20, 1.50 and 1.22 years. So as a sum up to the probability transition matrix, cumulative probabilities and stability of regimes period, it can be said that OECD countries despite oil price volatility, are able to transfer their economic growth from low (regime of zero) and average (regime of one) to the high (regime of two), but their economy is likely to change between regime of one and regime of two. However, in the meantime, the period of stability and probability of average economic growth (regime of one) would be higher.

Conclusion

In this study, tried to the effect of oil price volatility on the economic growth of OPEC and OECD countries, with the emphasis on regime changes during the period 1972 and 2011 investigeted. For this job to be done, firstly the EGARCH model was used for modeling and counting the volatility and then the economy of OPEC and OECD countries was considered as a unit economy. After that the effect of oil price volatility on the economic growth of both groups, was perused by using Markov Switching model.

The modeling of oil price volatility showed that the shocks in oil price asymmetrically lead to creation of price volatility in world oil markets. So, positive price shocks in oil markets, strongly lead to volatility and uncertainty, while the negative shocks lead to a decrease in volatility, but with less strength. The reason could be the source of the shocks, as the positive price shocks are in direct connection with all unpredicted factors that could put the continuous flow of oil trade into trouble in world oil markets and show themselves through unpredicted increase of prices.

This unpredicted amount, as positive shocks, leads to uncertainty in world oil markets. The result of this uncertainty would be the volatility of oil price. The reverse status is true about negative shocks, but the difference is that these factors are limited and meanwhile, downward stickiness of price in oil markets withholds large price shocks.

According to Markov Switching model and based on the effect of a three-regime pattern, oil price volatility have negative effect on the economic growth of both groups of countries, but the OPEC countries are more influenced. Also, based on different intercepts of Markov model estimated for both groups, there could be three regimes. Zero, one and two which in order stands for low, average and high economic growth. Based on this and transition probability matrix, the cumulative probabilities and the durability period of each regime; it could be said that the economy of both groups continually switching between three regimes. In other words, price volatility in world oil markets confronts the economy of both groups of countries with economic instability. The difference is that in the group of OPEC members, because they are more influenced by volatility and more dependent on the oil revenues, these volatility keep the economy in the status of low growth (zero regime), but in the group of OECD countries, these volatility are not capable of keeping the economy in the situation of low economic growth, but they could prevent the economy from continuing the high growth (regime2). They could lead the economy of this group to regime 1 (the situation of average economy).

These results are compatible with the realities of the economy of both studied groups. So the Monoculture economy of OPEC countries and their dependence of economy and government budget on oil revenues, provide the condition for the more influence of price volatility on economic growth. Another factor which leads to this issue is the largeness of the governments and their incompliance to intended policies to prevent the transmission of oil price volatility in world markets to the internal economy. But in the group of OECD countries, some policies have been used in order for the effect of volatility to be less than the other group. Some of these plans are:

A) Supporting renewable energy and let the oil to be replaced by them.
B) Take some decisions for raising taxes of importing more oil.
C) Using capacities of group decisions by establishing the International Energy Agency.

According to the results of this study, besides adherence to the mechanisms of alteration the oil expense to working capital, reducing the size of government and increasing the tax revenues in budget finance, can be the best suggested policy for OPEC countries. Finally since price shocks lead to (regardless of their type) oil price volatility, and these volatility cause a loss to the economy of both groups of countries, and on the other hand, according to the manner of OPEC countries in supplying oil and OECD countries in demanding, it is suggested that both groups form a joint union between themselves to assign stable prices for oil in global markets. Undoubtedly, by doing so, volatility in oil price will be decreased significantly.

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