Open Access

The Leverage Effect of Oil Price Shocks on Economic Growth of Iran

Mohammadreza Nahidi[a]**, Arash Ketabforoush Badri**[b*]

[a]Department of Economics, College of Management, Economics and Accounting, Tabriz Branch, Islamic Azad University, Tabriz, Iran
[b*]Department of Economics, Faculty of Management and Accounting, Qazvin Branch, Islamic Azad University, Qazvin, Iran

Abstract: Oil prices shocks are one of the main factors affecting economic variables especially economic growth. With this approach, the present study is about studying negative and positive price shocks of oil and the official exchange rate with perspective of leverage effect of shocks on economic growth of Iran. This study tends to consider the leverage effect of oil price on economic growth of Iran using EGARCH method in period 1980 to 2014. The results show that the leverage effect is confirmed and has different effects for each unit of positive and negative shock on economic growth. Also the official exchange rate and light oil price shock has positive and meaningful effect and the shock of heavy oil price has negative and meaningful effect on economic growth.

Keywords: Oil Price Shocks, Economic Growth, EGARCH Pattern, Hedrick-Prescott Filter.

1. Introduction

Economic growth is the representative of development and advancement in any country and has special importance in economy literature; therefore, studying the factors affecting it is one of the primary phenomena for economy of any country (Yahyaabadi *et al.*, 2013). In this way achieving the direction to stable optimum growth is one of important economic purposes. Since economic growth represents economic dynamism and evolution, theorists and policymakers have sought to understand and formulate the nature of its causes and obstacles (Jalili, 2013).

For oil-exporting countries, income from oil sales forms a significant source of financial and foreign exchange earnings by governments. The dependence of these revenues on the price of oil on the global market and its extraneousness can be a reason for the uncertainty and instability in economic policies. Therefore, we can say that any volatility and instability in the global oil market will lead to an imbalance and even a crisis, unless the correct policies are adopted by governments, in the face of these fluctuations (Jahadi and Elmi, 2011). So one of the important issues in the oil sector is the issue of oil prices and fluctuations in oil prices. So that any unexpected increase or decrease in oil prices will lead to changes in oil revenues this in turn, directly affects the economies of the oil countries and if the correct policies of the economy are not applied, it will lead to a crisis and economic imbalances (Fotros and Houshidari, 2016).

More than enough dependence of oil exporter countries on oil incomes and being single-based of the economy is an unwanted phenomenon according to economists and the unwontedness of this phenomenon is basically caused by exogenous oil price for these countries and deep effects of sudden increase or decrease of oil price in international markets (Altajani and Arbabfazli, 2014).

Considering the fact that changes of oil price results changes of oil income, studying these fluctuations on economic growth is essential because economic growth is one of the fundamental axis of development of any country and this dependence has massively been created during long years in foundations of this economy. So studying the effects and results of fluctuations of oil price on different economic sectors is important (Ghaffari and Mozaffari, 2010).

Over the past three decades, oil prices have seen major changes. For example, oil prices fell by about 76 percent between June and October 2008. Also, the price of crude oil in 2011, recorded an average of less than $ 100 per barrel and recently rose to $ 125, and today it has reached about $ 62

(Fotros and Houshidari, 2016). The economy of Iran is dependent on oil and in fact it is a single-product economy based on oil incomes; and because a major part of the incomes of the country are through oil, price changes and fluctuations of oil extremely affect the incomes of the country. Considering the fact that the approach of the country is towards an economy not depending on oil, the government is always concerned about the price of oil and its income estimation and the schedule are based on oil price predictions. If the predicted income is more than the gained income, it will result a part of the development plan to shut down and it will stop the process of achieving the planned growth rate. Also if the increase of oil income is more than the predicted incomes, on one side it will result increase of economic capability but on the other side, it will cause the country to get trapped in ambitious plans. Therefore, studying the effects and price fluctuations on different economic sectors is important (Ghaffari and Mozaffari, 2010).

Therefore, the exact study of oil shocks and fluctuations and its effects on the economies of oil exporting countries such as Iran is necessary. For this purpose, the present study tends to study the leverage effect of oil price shocks on economic growth of Iran in period of 1980 to 2014 using EGARCH method.

2. Theoretical Basis and Previous Studies
2.1. An Overview of the History of Oil Shocks

The first oil shock occurred in October 1973 following the Syrian-Egyptian invasion of Israel, which led to a shortage of oil and a rise in prices over a year from $ 4 to $ 12. Industrial economies were severely affected as oil importers that led to the emergence of stagflation. This has led policymakers in these countries to begin a long-term and comprehensive planning to deal with these crises. The Iranian revolution in 1979 and the crisis in the relations between Iran and Iraq and the war between the two countries led to an increase in oil prices. The sharp decline in oil supply and the problems that arose during this period led to an increase in oil prices to $ 40 per barrel. The result of this shock, like the previous shock, was nothing but a stagnant inflation for industrial economies (Jahadi and Elmi, 2011). But in late 1985 and 1986, due to the sharp drop in oil demand, the average oil price dropped in global markets. This decline in demand appears to be due to the relative success of a developed country's plan to reduce oil dependency. Oil-exporting countries to prevent a more severe fall in oil prices and because of the severe need for foreign currency, increased their supply of oil. The competition between oil producers continued to go up as prices went down. In other words, OPEC's price-control policy, which was implemented through the establishment of quotas for its members, failed. In 1990, due to the Persian Gulf War and the Iraq invasion of Kuwait and after that, Kuwait's oil cut off, the rise in oil prices still had a staggering effect on the world economy (Arshadi and Mousavi, 2014).

Since 2002, the price of oil has risen sharply due to problems in Venezuela and a sharp drop in oil production in the country, followed by a US-led invasion of Iraq in March 2003. Nigeria unrest and the escalation of tensions over Iran's nuclear case has once again raised oil prices, and in 2006 it reached $ 68 per barrel. Although the oil market was fluctuating in 2007, it still kept its upside, and for the first time, oil prices reached $ 100. Due to the turmoil in Nigeria and Pakistan, this trend continued in 2008, with oil prices reaching $ 147 per barrel. But the intensification of the global financial crisis, followed by the decline in oil demand that arose due to the recession, led to a drop in oil prices (Cologni and Manera, 2008). Table 1 shows the change in global production due to oil price shocks.

Table 1. The change in global production due to oil price shocks

Year	Occurrence	%change in world production
1956	Suez Crisis	-10/1
1973	Arab-Israel War	-7/8
1979	Iran's revolution	-8/9
1980	Iran - Iraq War	-7/2
1990	Persian Gulf War	-8/8
2003	US-Iraq War	0/03
2007	100 dollar oil experience	0/05
2008	Financial crisis	0/02
2009	Financial crisis	-0/006

Reference: (Hamilton, 2003) and (Jahadi and Elmi, 2011).

2.2. How to Influence the Oil Market Fluctuations on the Economy

Although oil revenues are expected to have a positive impact on the economic growth of oil exporting countries, Empirical studies have shown that countries rich in natural resources have lower economic growth than those that are deprived of this. According to what is said, it can be said that the increase in oil revenues in the countries that owns natural resources can have a positive or negative effect on economic growth. In this section, we discuss the channels for influencing the volatility of oil revenues on the economy. Oil is considered one of the most important sources of funding for OPEC member countries, hence, the most important channel for the effects of oil fluctuations on the economy is governments budget. On the other hand, the government's budget forms a significant portion of the total economy's demand. Therefore, it is expected that oil market fluctuations affected total demand for the economy through the government's budget. Alotaibi (2006) says that for a one percent increase in oil prices, The Gulf Cooperation Organization (GCC) member countries budget in next year influenced more than this year. On the other hand, governments that consider themselves to be owners of macro-oil revenues, in fact, they benefit from huge oil rents. Rents in these countries, not only does it postpone economic growth, but also leads to the strengthening of the public sector and the weakening of the private sector. This is most evident in developing economies, because part of their total production is provided through imports, it is natural that during the abundance of oil revenues, the amount of imports will increase, which would mean hitting domestic production and an obstacle to economic growth. By comparing these countries with Norway, the country that invests oil revenues only abroad, it can be said that perhaps the main problem of most oil economies is the existence of widespread rents and the lack of proper management of oil revenues (Jahadi and Elmi, 2011).

2.3. Exchange Rate and Oil Prices

On the other side, since fluctuations of the exchange rate affects both the demander and the provider of an economy, exchange rate can also be considered as one of the most important variables affecting macroeconomic variables of a country and the exchange rates including the United States dollar as the common cash internationally being traded like oil, it has important effects on the world's economy. Many international economic analysts agree that epidemics of floating exchange system, after the Bretton Woods system, has created noticeable distrust in economy of developing and developed countries especially the economy of countries whose economy is dependent on petroleum. Exchange system changes and revolutions of the recent decades, has resulted the exchange rate phenomenon to be revealed as a key factor in policies and decisions of developing countries. Not only are the countries affected by domestic economic policies, but also any kind of international economic and political incidents will affect domestic exchange rate and as a result it will affect economy. Gross domestic production in one of the most important economic variables which is sensitive to revolutions of true exchange rate. If the exchange rate is not decently coordinate with domestic and foreign world in a stable environment, it will result slowness of economic growth (Yahyaabadi *et al.*, 2013).

2.4. Previous Studies

Aloui *et al.* (2018) studied the dynamic nexus between oil prices, the Saudi/US dollar exchange rate, inflation and output growth rate in Saudi Arabia' economy, using novel Morlet' wavelet methods in period 1969–2014. The wavelet analysis shows that Saudi economy is still exposed to several global risk factors, which are mainly related to the oil market volatility, and the pegging of the local currency to the US dollar. Such risk factors strongly and negatively affect the real economic growth, exert more pressure on inflation and substantially limit the freedom to pursue an independent monetary policy.

Park and Shin (2018) explored the effects of oil price on the Korean economy using a Global VAR model. The results show that Korean economy is affected mostly by overseas financial conditions in the short-term but it becomes more susceptible to oil price fluctuations in the long-run, suggesting that Korea's reliance on energy imports leaves the economy exposed to volatility in energy prices.

Balcilar *et al.* (2018) studied dynamic relationship between oil price and inflation in South Africa using time series data from January, 1922 to July, 2013. The study has a policy relevance on monetary policy reaction to oil shocks as South Africa is a small open economy with higher dependency on oil import and a floating exchange rate system. They fit both symmetric and asymmetric dynamic conditional correlation GARCH (DCC-GARCH) to the data. The results reveal the oil price to have a positive relationship with inflation, however the correlation is low and ranges between 0.07-0.08. The time-series patterns show a tendency of temporary upward shift in the pair-wise conditional correlations during predominant oil crisis.

Jawad and Khan (2017) in study analyzed the effect of oil price volatility and macroeconomic variables (Trade balance, private sector investment and public sector investment) on economic growth of Pakistan. Linear regression describes the Public sector investment and Trade Balance has significant and oil price volatility and private sector investment has insignificant effect on gross domestic production of Pakistan. Johnson co integration test described the long run relation among the variables. VAR impulse response function and variance decomposition conclude that effect of variables was stable within 10 years and the major part on the variable is due to itself rather than other variables.

Zhu *et al.* (2017) studied the asymmetric effects of oil price shocks on stock returns using two-stage Markov regime-switching approach. Their results indicate that oil supply and demand shocks have a null or minimal impact on stock returns in a low-volatility regime and a statistically significant impact in a high-volatility regime. They observe that oil demand shocks affect stock returns significantly more than oil supply shocks.

Arezki *et al.* (2017) explore the effect of news shocks in open economies using worldwide giant oil and gas discoveries as a directly observable measure of news shocks about future output the delay between a discovery and production is on average four to six years. Their empirical estimates are consistent with the predictions of the model. After an oil or gas discovery, the current account and saving rate decline for the first five years and then rise sharply during the ensuing years. Investment rises robustly soon after the news arrives, whereas GDP does not increase until after five years. Employment rates fall slightly and remain low for a sustained period.

Sarwar *et al.* (2017) in study examined the empirical relationship between economic growth, electricity consumption, oil price, gross fixed capital formation and population using panel data method in 210 countries over the period 1960–2014. He results of full panel confirm a bidirectional relationship between electricity consumption and GDP, oil price and GDP, fixed capital formation, population and GDP. Moreover, the results confirm that countries using non-renewable sources for electricity generating, such as through coal and oil, the electricity consumption of these countries exhibit a negative relationship with the economic growth. Furthermore, the finding varies across income, OECD and regional, renewable energy consumption level.

Fotros and Houshidari (2016) examined the effect of crude oil price fluctuations on Tehran Stock Exchange volatility fluctuations using the GARCH method in the period 2001 to 2016. Based on the results, there is a negative and significant relationship between fluctuations in crude oil prices and stock returns fluctuations in Tehran Stock Exchange Index.

Boheman and Maxen (2015) studied the effects of oil price shocks on economic growth in 11 OPEC and 8 non-OPEC countries in the period 1980 to 2008 using VAR method. The results show that a 1% increase in the change of the oil price will increase the GDP growth rate the following year with 0.145% (OPEC) versus 0.141% (non-OPEC), consequently a positive relationship was found. Moreover, 2.82% of the variation in the OPEC countries' growth rate is explained by oil price shocks, while the responding ratio for the non-OPEC countries is 2.81%.

Jahadi and Elmi (2011) studied the effect of oil price shocks on economic growth in countries selected member of OPEC using VAR method in the period 1970 to 2008. The results show that UAE and Iran have the most dependence on oil, while Indonesia and Ecuador have the least dependence. Indonesian experience shows that reducing the dependence of the economy on oil shocks is impossible with the adoption of proper policies.

3. Estimation Model and Introduction of the Variables
3.1. Data and Estimation Model

For the estimation of the following model, serial data of the Central Bank of Iran in period of 1980 to 2014 have been used. The present study is based on Balcilar *et al.* (2018) and Aliyu (2009) bases model like the following:

$$EGR_{t=} \propto_0 + \propto_1 lEXR_t + \propto_2 SPS_t + \propto_3 WPS_t + U_t \qquad (1)$$

EGR_t : represents economic growth rate in t period
EXR_t : represents exchange rate in t period
SPS_t : represents light oil price shock in t period
WPS_t: represents heavy oil price shock in t period

3.2. EGARCH Model

One of the limitations of the GARCH pattern is symmetry of this. In other words, in the above-mentioned model, the absolute magnitude of the changes is important, and because of the squares of the sentences themselves the regression and the moving average, their sign is not important. The consequence of a negative shock in future changes is the same as the impact of the same positive shock if the impact of the shock on the conditional variance may be different. In this situation, in terms of a leverage effect can be seen. As a result, different patterns have been proposed to observe the difference between negative and positive shocks, among which the most widely used can be EGARCH and TGARCH. The EGARCH pattern can be represented by following relation (Nelson, 1991):

$$\log(\sigma_t^2) = \omega + \beta \log(\sigma_{t-1}^2) + \propto \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \gamma + \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \tag{2}$$

The left side of the equation is logarithmically indicating that the conditional variance is positive. In fact, it solves the need to apply any constraint on the coefficients. The asymmetric effect is detectable by the coefficient γ. So that its significance indicates the difference between the effect of positive and negative shocks on oscillation. The EGARCH model, while differentiating between positive and negative shocks, it also prevents the impact of pertinent observations on the results of the estimates. Therefore, the estimates obtained from this pattern will not be susceptible to pertinent observations (Heydari *et al.*, 2010).

4. Data Analysis
4.1. Stationary of the Variables

For studying the stationary of the variables, Augmented Dickey-Fuller test has been used. This test is one of the most important single-root tests. In this test, the zero hypothesis is based on existence of a single root. The summary of this test is represented in table 2 below:

Table 2. Results of the single-root test of the variables

Variable	ADF test	
	Statistic	**p-value**
EGR	-3.873200	0.0003
LEXR	1.210151	0.9387
D(LEXR)	-5.621642	0.0000
SPS	-5.159274	0.0000
WPS	-5.159779	0.0000

Reference: Research findings

According to the results of table 2, all the studied variables except LEXR are stable in I (0) level. This variable also after one time of differentiation has become stable. To make sure about the failure of affection of the possible structural break in the variables of this research, Philips-Perron test has been used.

Table 3. Tthe results of Philips-Perron test

Variable	PP test	
	Statistic	**P-Value**
EGR	2.859455	0.9984
LEXR	1.313832	0.9490
SPS	-5.901191	0.0000
WPS	-6.239558	0.0000
D(LEXR)	-5.433841	0.0006

Reference: Research findings

According to the results of table 3, All of the studied variables except LEXR are stable in I (0) and D(LEXR) and I (1).

4.2. Heterogeneity of Variance

According to the results of table 4, the White test has determined heterogeneity of variance of the model. Because P-Value- 0.9952 is not meaningful and the model has heterogeneity of variance.

Table 4. White test

Heteroscedasticity Test: White			
F-statistic	62.78282	Prob.f(6.25)	0.0000
ObswR-squared	30.00845	Prob. Chi-Square(6)	0.0000
Scaled explained SS	0.666158	Prob. Chi-Square(6)	0.9952

Reference: Research findings

4.3. Model Estimation Through the Average

The results of the estimated model by EGARCH method are shown in table 5:

Table 5. The results of estimation by EGARCH

LOG(GRACH)=C(4) +C(5)*ABS(RESID(-1)/@SQRT(-1))+C(6) *RESID(-1)/@SQRT(GARCH(-1))+ C(7)*LOG(GARCH(-1))				
Variable	**Coefficient**	**Std.Error**	**z-Statistic**	**Prob.**
DLEXR	0.013743	0.008148	1.686704	0.0917
SPS	0.038662	0.010243	3.774329	0.0002
WPS	-0.041560	0.010911	-3.809071	0.0001
Variance Equation				
C(4)	-10.75657	0.299014	-35.97346	0.0000
C(5)	1.297679	0.311662	4.163732	0.0000
C(6)	0.269759	0.108230	2.492463	0.0127
C(7)	-0.704156	0.080975	-8.695919	0.0000

Reference: Research findings

As can be seen from Table 5 the estimated results of the model under consideration are as follows:

$$EGR_t = 0.013\ LEXR_t + 0.038\ SPS_t - 0.041WPS_t +\ U_t \qquad (3)$$

In which the logarithm of exchange rate has been estimated with one time differentiation, positive and meaningful effects of the official exchange rate and shocks of light oil price and the negative and meaningful effect of shocks of heavy oil price on economic growth is noticeable; in other words, with one percent change of official exchange rate, economic growth has directly changed in 0.013 units, also if the shock of light oil price changes one unit, economic growth will change 0.038 units in the same way, for this purpose, if the shocks of heavy oil price increases 1 percent, economic growth decreases 0.041 units.

4.4. Model Estimation Through Variance

For studying the manner of leverage effect of positive and negative shocks of descriptive variables of the model on economic growth the equation about the output variance of EGARCH is used. According to the result and meaningfulness of inequality of GARCH variance ratio of $C_{(7)}$, asymmetry and leverage effect are confirmable, and this effect can be evaluated as the following calculations are made from the coefficients of the model around the variance of how the positive and negative impacts of the descriptive variables.

The effect of positive shock: $\propto +\gamma$ =1/297+0/269=1/556   (4)
The effect of negative shock: $-\propto +\gamma$ =-1/297+0/269=-1/028   (5)

According to the mentioned results, one unit of positive shock of explanative variables, increases economic growth 1.556 units and one unit of negative shock of explanative variables, decreases economic growth for 1.028 units. These results show the leverage effect of the explanative variables of the model on economic growth in the studied period.

5. Conclusions

According to the features of our country which has single product economy and incomes of the government extremely depend on incomes of selling oil and the progress of oil price has always coped with fluctuation and has experienced different kinds of shocks during past years and sometimes in direction of quick increase of the price and sometimes in direction of price reduction. So the study of oil price fluctuations and the effects of its shocks on economic growth of the country has special importance. On the other side, according to the fact that exchange rate is considered as one of the most important variables affecting macroeconomic variables of a country, the true exchange rate is the standard of value of equality of the national currency of a country against the currency of other countries and it's the reflector of economic situation of that country compared to the economic situation of other countries. In the open economy, the true exchange rate is crucial because of its mutual relation with the other economic variables which is affected by domestic and foreign economic policies and economic revolutions. So it makes us research about exchange rate and its fluctuations on economic growth of a country. For the same purpose, the present study tried to consider the leverage effect of oil price shocks on economic growth of Iran in period of 1980 to 2014 using EGARCH method. According to the results, in case of estimation through the average, a positive and meaningful relation between the differentiation of the first level of logarithm of exchange rate and economic growth, a positive and meaningful relation between shock of light oil and economic growth and a negative and meaningful relation between shock of heavy oil and economic growth were confirmed. Also in case of estimation through variance, leverage effect and asymmetry of the model were confirmed, the effect of one unit of positive shock resulted 1.556-unit increase of economic growth and the result of one unit of negative shock was 1.028 units decrease of economic growth. Based on the conclusions, the following suggestions are given:

1- Recognition of leverage reflections of economic growth compared to shocks of oil price, motivates the politicians to apply decent and right economic policies and solutions in order to decrease dependence on oil and oil incomes as much as possible.
2- Since negative shocks are more effective than a unit of positive shocks, it is suggested that the chosen exchange system of Central bank and the applied exchange policies be in a way that the fluctuations of the exchange rate which creates negative shocks, be less.

References

Aliyu, S. (2009). Impact of oil price shock and exchange rate volatility on economic growth in nigeria: An empirical investigation. *Research Journal of International Studies, 11(11): 4-15*.

Alotaibi, B. (2006). Oil price fluctuations and the gulf cooperation council (GCC) Countries, 1960-2004, Southern Illinois University Carbondale.

Aloui, C., Hkiri, B., Hammoudeh, S. and Shahbaz, M. (2018). A multiple and partial wavelet analysis of the oil price, inflation, exchange rate, and economic growth Nexus in Saudi Arabia. *Journal Emerging Markets Finance and Trade, 54(4): 935-56*. Available: https://doi.org/10.1080/1540496X.2017.1423469

Altajani, E. and Arbabfazli, M. (2014). Investigating the asymmetric effects of oil price shocks on macroeconomic variables. *Journal of Comparative Economics, 1(1): 1-26*.

Arezki, R., Ramey, V. A. and Sheng, L. (2017). News shocks in open economies: Evidence from giant oil discoveries. *The Quarterly Journal of Economics, 132(1): 103-55*. Available: https://doi.org/10.1093/qje/qjw030

Arshadi, A. and Mousavi, H. (2014). Investigating the impact of oil shocks, emphasizing its asymmetric effects on Iran's economic growth during (1969-2008). *Journal of Economic Research, 14(3): 179-200*.

Balcilar, M., Uwilingiye, J. and Gupta, R. (2018). Dynamic relationship between oil price and inflation in South Africa. *The Journal of Developing Areas, 52(2): 73-93*.

Boheman, H. and Maxen, J. (2015). *Oil price shocks effect on economic growth OPEC versus non-OPEC economies.* Lund University.

Cologni, A. and Manera, M. (2008). Oil prices, inflation and interest rates in a structural cointegrated VAR model for G7 countries. *Energy Policy, 30(3): 856-88*.

Fotros, M. H. and Houshidari, M. (2016). Investigating the effect of crude oil price fluctuations on Tehran Stock Exchange volatility fluctuations using the GARCH method. *Iranian Energy Economics Journal, 5(18): 147-77.*

Ghaffari, F. and Mozaffari, S. (2010). Asymmetric effects of oil shocks on economic growth in Iran. *Journal of Applied Economics, 1(3): 49-69.*

Hamilton, J. (2003). What is oil shock? *Journal of Econometrics, 113(2): 363-98.*

Heydari, H., Parvin, S. and Fazeli, M. (2010). Relationship between government size and economic growth: A Case Study of the Persian Gulf OPEC countries. *Journal of Quantitative Economics, 7(3): 43-66.*

Jahadi, M. and Elmi, Z. (2011). Oil price shock and economic growth (evidence from OPEC member countries). *Journal of Economic Growth and Development Research, 1(2): 11-40.*

Jalili, M. (2013). The Effect of Budget Structure on Economic Growth, Master's Thesis, Faculty of Economics Management and Accounting, Islamic Azad University, Tabriz Branch.

Jawad, M. and Khan, N. G. S. (2017). Impact of oil price volatility and macroeconomic variables on economic growth. *Review of Innovation and Competitiveness, 3(1): 49-74.*

Nelson, D. B. (1991). Conditional heteroscedasticity in asset returns: A new approach. *Econometrica, 59(2): 347-70.*

Park, H. and Shin, Y. (2018). The effects of oil price on the Korean economy: A global VAR approach. *Journal Emerging Markets Finance and Trade, 54(1)*: Available: https://doi.org/10.1080/1540496X.2017.1410473

Sarwar, S., Chen, W. and Waheed, R. (2017). Electricity consumption, oil price and economic growth: Global perspective. *Renewable and Sustainable Energy Reviews, 76(9): 9-18.* Available: https://doi.org/10.1016/j.rser.2017.03.063

Yahyaabadi, A., Samadi, S. and Jahantigh, M. (2013).*Analysis of oil price variability, exchange rate and economic sanctions on economic growth*. The First National Electronic Conference on the Perspective of the Iranian Economy with the Approach to Supporting National Production. Islamic Azad University Khorasgan Branch, Iran.

Zhu, H., Su, X., You, W. and Ren, Y. (2017). Asymmetric effects of oil price shocks on stock returns: Evidence from a two-stage Markov regime-switching approach. *Journal Applied Economics, 49(25): 2491-507.* Available: https://doi.org/10.1080/00036846.2016.1240351