Trends in Life Sciences
An International Peer-reviewed Journal
www.sciencejournal.in

THE ASYMMETRIC EFFECTS OF OIL EXPORT INCOME SHOCKS ON GOVERNMENT CONSTRUCTION COSTS IN IRAN

Abolfazl Ghiasvand*, Ali Alikhani and Marjan damankeshideh*****
*Assistant professor in Economics, Economics and Accounting Faculty, Islamic Azad University, Central Tehran Branch
a_Ghiasvand@iauctb.ac.ir

** Master of Science in Economic Sciences, Islamic Azad University, Central Tehran Branch
ali_ah201010@yahoo.com
***Assistant professor in Economics, Economics and Accounting Faculty, Islamic Azad University, Central Tehran Branch
mar.daman_keshideh@ iaucrb.ac.ir

ABSTRACT
The proceeds from oil and gas exports shocks have major effects on Iran's economy because of too much dependence of government budget on oil income. Since the major part of oil income is controlled by government and it constitutes the current and construction costs of government, recognition of the way these shocks affect government costs, has a great importance for economic policy. In this paper by using VAR techniques and time series data from 1973 to 2012, the asymmetric effects of Oil export income shocks on government construction costs in Iran have been investigated. According to the results, it can be concluded that the fluctuations of oil export income has asymmetric effects on government construction costs and there is a positive and asymmetric relationship between oil export income and government construction costs and hypothesis of the study is confirmed.

KEYWORDS: Asymmetric effect, oil and gas resources, the government construction costs

INTRODUCTION

Oil export income shocks have major effects on Iran's economy because of too much dependence of government budget on oil income. Since the major part of oil income is controlled by government and it constitutes the current and construction costs of government, recognition of the way these shocks affect government costs, has a great importance for economic policy. Generally one of the great problems of developing and third world countries is their economic dependence on raw materials export and being single product which has negative effects on economic policy, social and even cultural structure. Since the major income of these countries is achieved by just one or a few products export, they are very vulnerable against external pressures (at least in long term). It is obvious that in such condition any unusual fluctuations being created in product or products which constitute the major income of these countries, it has widespread effects on economic policy, social and even cultural structure. The present paper aims to investigate the asymmetric effects of the oil export income shocks on construction costs of the government.

The government construction costs:

The government activities generally have social effects and goals. Since the government activities influence the private part of the society, the study of major economic aspects of these activities has great importance. The construction costs are the most effective budget tools. By increasing the government investment the uprising system of income in short time has been started and the income and purchasing power of some people in the society have been increased and as a result demand for products and services increase, therefore the investment increases.

The asymmetric effects of oil income:

Including the world's oil commodity and, as one of the main inputs is so sharp fluctuations in oil prices which it is called oil shock (positive and negative) impact on the economy of the country, in developing and What is developed. In other words, the main source of economic turbulence fluctuations in oil prices on oil-producing countries such as Iran.
The sudden rise in oil prices after 1973, Iran's economy was experiencing a fundamental transformation, so that the share of oil in oil income in the national income than non-oil sectors, is significantly increased. During this period, the increase in oil revenues led to an increase in the value of the national currency, followed by the commercial sector was contracting. This phenomenon is known as Dutch disease. Iran's economy is based on the principles of Irene's economy

is based on principles of economic monoculture that shows the price of oil and the revenues from it, as an exogenous factor driving the boom and recession are in Iran, so that the fluctuation of outside the operating control, the more economic variables fluctuate. (Arshadi and Mousavi 2013)

LITERATURE REVIEW

One of the first studies is Hamilton (1983). He conclude the economy of the USA oil price shocks (in a linear definition) is an important factor in outbreak of depression during 1949 to 1973. He also argued the change in oil price leads to unemployment and GDP changes. Mork (1989) defined asymmetric changes of oil price and distinguished the positive and negative shocks to each other. He defines the oil price changes as follows:

$$ROIL_t^+ = MAX\{0, (roilp_t - roilp_{t-1})\}$$
$$ROIL_t^- = MIN\{0, (roilp_t - roilp_{t-1})\}$$

Where $ROIL_t^+$ is the difference logarithm of real oil price in time t. Mork showed that there is an asymmetry in response of macroeconomic variables to the oil price increases and decreases. He concluded that positive oil price changes have a significant negative relationship with the real GNP changes. While the negative oil price changes did not show significant effects. Also Mork in another study argues that this event is because of high important role of oil as a production factor. In fact changes in its price result in reallocation of resources in economy which this can make the GNP slower. In a study which was kind of criticizing Hamilton's work, Hoker (1996) could show that there are not evidences that oil price in interaction with macroeconomic variables of the USA's economy be exogenous. Then Hamilton (1996) showed another nonlinear oil price form. He believed since 1986, immediately after increase in oil price, there will be a decrease in its price. In such conditions if somebody wants to program her/his use based on oil price fluctuations, it is better she/he compares the current oil price with previous period price, not only one period. With this explanation, Hamilton's definition about oil price shock is as follow:

$$NOPI_t = \mathrm{MAX}\{0, P_t - \mathrm{MAX}\{P_{t-1}, P_{t-2}, P_{t-3}, P_{t-4}\}$$

Where P_t is the oil price logarithm in season t and $NOPI_t$ is the positive oil price change in the season compared to four previous periods. In his study Hamilton estimated the positive shocks of oil price on the USA's economy and by this hypothesis that positive shocks have greater roles on the USA's economy but negative shocks have little roles, he just used increasing oil price shocks in his model. Mohammad Reza Farzanegan and Gunther Markwardt (2009) used a VAR model analyzed the dynamic relationship between oil price shock and some of macroeconomic variables of Iran's economy. In this paper they showed that oil price effects on macroeconomic variables are asymmetric. Their periods of study include two periods before the war (1973-1988) and two periods after the war (1988-2007) which it is tried to compare the findings of these two periods with each other. According to the findings of this study which is conducted based on VAR model and existing variables such as inflation, production and the real effective exchange rate, a positive oil shock in medium-term causes increase in the real effective exchange rate and enforcement of the currency value which is one of the Dutch disease signs. This make the importing prices go down and exporting goods prices go high. The real import and production increases significantly, therefore we will see the initial inflation effects from positive shocks. Moreover the real expenditures of government increase in this process. Also these researchers showed that vulnerability of Iran's economy facing negative oil shocks is greater. Such that with a negative shock, the real effective exchange rate will decrease significantly which it can be considered as a warning for a crisis after each negative shock. Olomola and Adejumo (2006) investigated the oil shock effects on inflation, production, exchange rate, money supply of the Nigeria using seasonal data in 1970 to 2003 and concluded that these shocks had no effect on production and inflation and only influenced the exchange rate and money supply. Jacquinot , Mestre , Kuismamen and Spitzer (2009) consider the oil price increase from oil shocks as the influencing factor on inflations of the European countries since 1970. Collier and Goderis (2007) showed that natural resources price increase in short time has positive effect on economic growth; however, in long term this effect is negative in countries which have practical institutions and firms. Mohammad Reza Farzanegan And Gunther Markwardt (2007) using the data from 1988 to 2004 concluded any kind of oil shock influences inflation positively and significantly. Kavand (2009) using Impulse-Response Function in VAR model concluded that positive and negative oil shocks effect is positive on inflation in Iran.

MATERIALS AND METHODS

Model and the data

In this study we used the scale specification model which is introduced in Lee et al. (2001). First to analyze the positive and negative shocks it is necessary to model the optimized oil income series model based on ARMA (p,q) process and after the initial estimation using OLS technique, search for existence or non-existence of GARCH and ARCH models in this series by using ARCH-LM test variance test. After that, based on this model we can create the two positive oil shock ($SOPI_t$) and negative oil shock ($SOPD_t$) series:

$$SOPI_t = MAX(0, \widehat{e_t} \Big/ \sqrt{\widehat{h_t}})$$

$$SOPD_t = MIN(0, \widehat{e_t} \Big/ \sqrt{\widehat{h_t}})$$

$SOPI_t$ shows oil export income increase and $SOPD_t$ shows from oil export income decrease. To analyze the macroeconomic variables behavior and positive/negative shocks of oil income simultaneously, a VAR model is used which Lutkepohl (2004) introduces as follows:

$$y_t = A_1 y_{t-1} + \cdots + A_p y_{t-p} + B_0 x_t + \cdots + B_q x_{t-q} + CC_t + u_t$$

The dependent variable, yt the lag VAR model, Bt government expenditure is positive and negative effects of asymmetric shocks of oil exports, which in this model is CCt, the estimate is made. Information on oil exports from OPEC and information related to the construction costs have been extracted from the Central Bank of Iran.

In this study the time series data from 1973 to 2014 has been used which covers the social and economic atmosphere of Iran appropriately. The related data was obtained from the website of the central bank of Islamic Republic of Iran. As it was said the dependent variable was government construction costs (Cons). To investigate the stationary status of variables we applied Augmented Dickey Fuller Test. The results are as below diagram:

Result	t-statistics	Probability	Variable
Non-stationary	0.405542	0.7953	OILS*
Stationary	-2.632292	0.0100	DOILS**
Stationary	-3.075806	0.0375	CC***

*OILS oil exports is that they are not static and need to subtracting from it. **DOILS's oil exports to a level differencing. **CC construction costs of the state.

Extracting the positive and negative oil export income shocks:

Heterogeneous variance test of ARCH type:

First to assure whether using the present data we can create uncertain series or not, we used the ARCH variance test. If the probability of F statistics be lower than 0.05, we conclude that the data has ARCH heterogeneous variance.

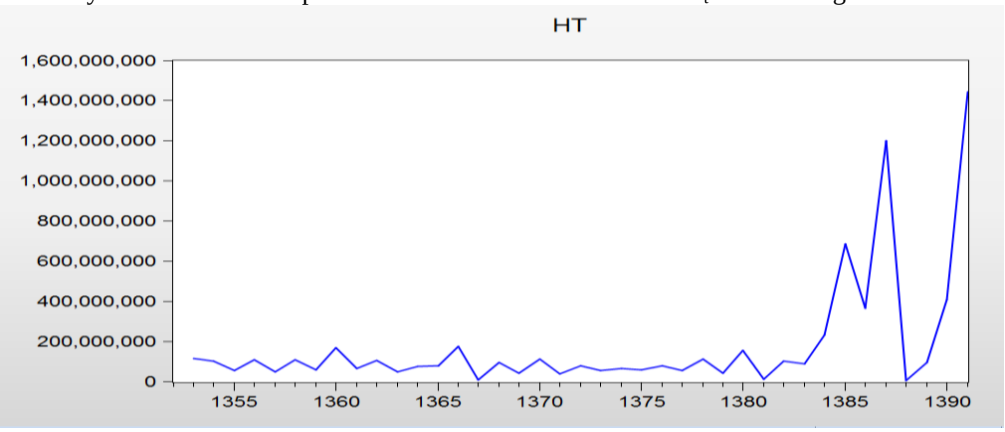
Heteroskedasticity Test: ARCH			
F-statistic	44.45916	Prob. F(2,29)	0.0000
Obs*R-squared	20.99759	Prob. Chi-Square(2)	0.0000

Therefore because the H_0 hypothesis is rejected and there is heterogeneous variance we should estimate the model using ARCH category models.

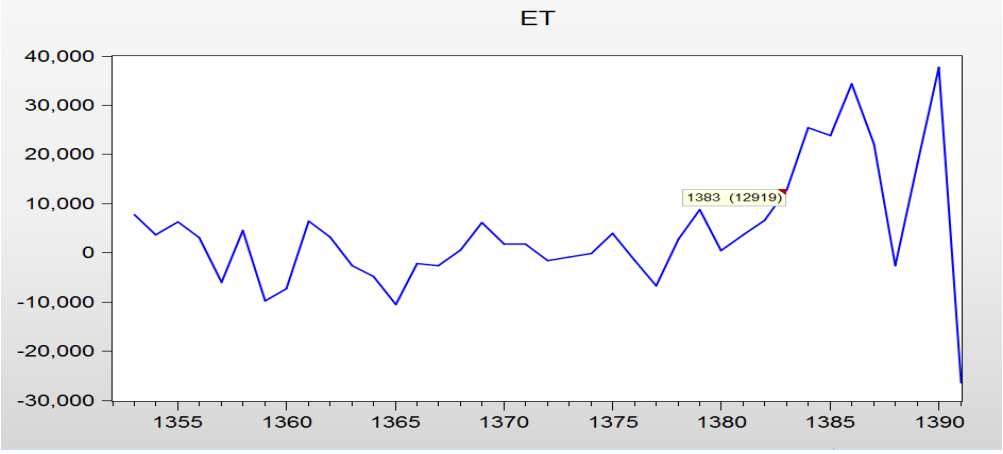
The estimation of uncertainty of oil export income:

Variable	Coefficient	Standard deviation	Z-statistics	Probability
C	145.3187	580.3698	0.250390	0.8023
MA(1)	-0.623604	0.047172	-13.21971	0.0000
	Variance equation			
C	92807724	49369699	1.879852	0.0601
RESID(-1)^2	0.480172	0.611240	1.805328	0.0070
GARCH(-1)	0.519828	0.152884	-3.400152	0.0007
R^2	-0.129829	Durbin-Watson Stat.		1.131924

Considering the significance values of ARCH and GARCH models, this estimation is acceptable. Therefore we can extract the uncertainty series of the oil export income shocks which is named h_t and the diagram is as follow:



Residual series (e_t) from ARCH estimation will be obtained in order to achieve the positive and negative shocks of the oil export income:



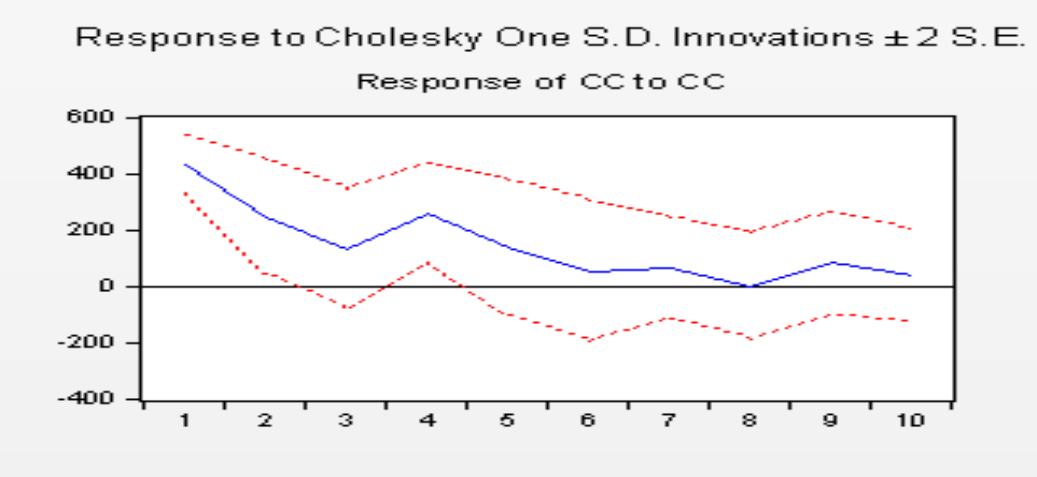
Now we can create two positive shock series of the oil export income ($SOPI_t$) and negative shock of oil export income ($SOPD_t$). These two new variables are used in main model. Now we estimate VAR model.

Determining the optimal order of VAR model using optimal lags criteria:
The number of lags for each explanatory variable can be determined with the help of one of the Akaike Criteria (AIC), Schwarz Criteria (SBC), Hannan-Quinn Criteria (HQC) or R-Bar Squared criteria.

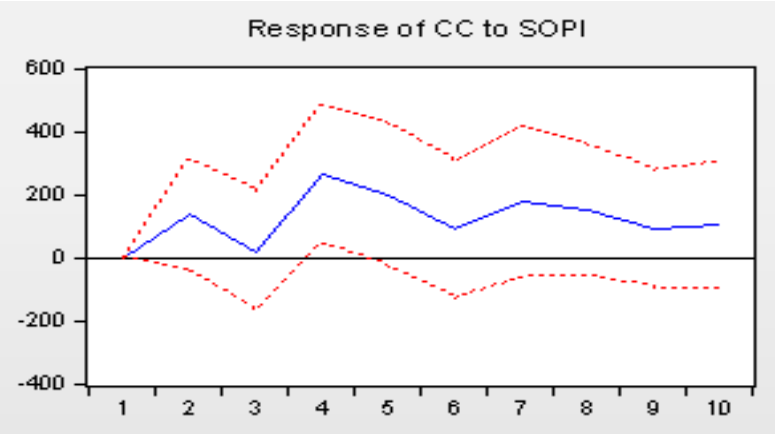
Lag	LogL	LR	FPE	AIC	SC	HQ
0	11.44700	NA	1.04e-05	-0.122082	-0.030147	-0.084741
1	379.8988	706.7027	3.22e-08	-6.791302*	-5.784986*	-6.276331*
2	439.3565	110.1429	1.58e-08	-6.612402	-5.440305	-5.713275
3	462.4736	41.30765	1.41e-08	-6.729076	-5.533919	-6.243640
4	468.8654	11.00216	1.66e-08	-6.571563	-5.008666	-5.936763
5	483.8095	24.74357	1.70e-08	-6.554254	-4.623617	-5.770089
6	513.3486	46.97199*	1.37e-08	-6.776206	-4.477828	-5.842676
7	530.2694	25.79737	1.37e-08*	-5.899981	-4.125184	-5.708407
8	535.5920	7.765756	1.66e-08	-6.616263	-3.582404	-5.384003

Considering above table, the AIC and SC refer to one lag.

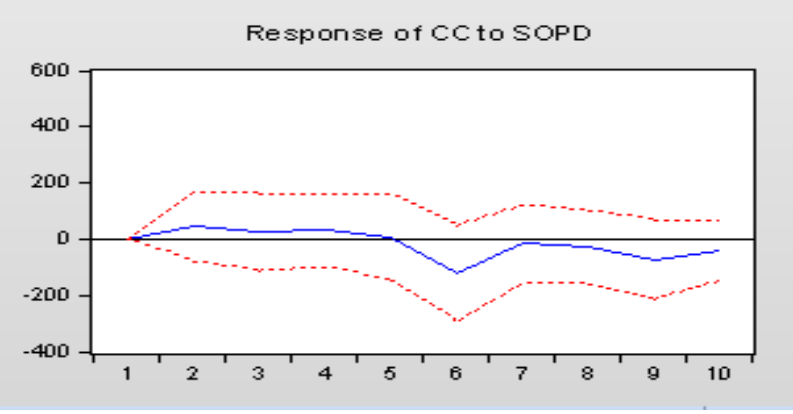
Impulse response functions:
To study the effects of the shocks to the model, it is necessary to apply the shock to the variables after obtaining response functions. In order to analyze the other variables' reaction and the time duration which the shock influences on the system. In fact, using these functions, we can investigate these effects of a standard deviation change of a variable on other variables. The following diagrams show the reactions of the positive shocks of the variable of oil export income and the negative shock of the oil export income.



When a shock or sudden change happens in construction costs of the government, its effect would be decreasing and after ten periods would be vanished.



When a shock or a sudden change is created about one standard deviation in positive shock of the oil export income, its effect would be four times increasing and from the fifth period the shock effect will decrease but it will be effective up to 10 periods.



When a shock or a sudden change is created about one standard deviation in negative shock of the oil export income, its effect would be increasing in one period and after stability in four periods, the effect of the shock would be removed.

Variance decomposition analysis:
The following table shows the variance decomposition analysis for the variables of the model:

Period	S.E.	CC	SOPI	SOPD
1	432.2109	100.0000	0.000000	0.000000
2	516.4703	92.54582	6.674695	0.779487
3	533.8239	92.69473	6.365856	0.939415
4	648.7500	78.73074	20.42319	0.846078
5	692.0638	73.02746	26.22232	0.750224
6	710.1560	69.88381	26.42782	3.688367
7	734.8636	66.01821	30.48516	3.496626
8	750.3716	63.31761	33.17957	3.502827
9	763.8339	62.24273	33.39452	4.362749
10	772.8731	60.99795	34.43093	4.571118

The column CC of the table shows the changes of real construction payments of the government from this variable itself. The real construction payments of the government from 100% in the first period became 92% in the later periods which was because of the variable shocks. This process decreased in later periods and its effect became 60%. Therefore in future years, the effect of the real construction payments of the government will be decreased on this variable. The SOPI column is the real construction cost changes of government created because of positive shock changes of the oil export income which shows the applied shocks from positive uncertainty of the oil export income in the second period explains 0% of the real construction cost changes of the government. This effect from the second period has been increased and reaches 6%, and in the 10^{th} period, 34% of changes is explained by this variable. The SOPD column is the real construction payment changes of the government from the negative shock changes of oil export income which shows the applied shocks from oil export income in the second period explains the 0.77% of the real construction payment changes of the government. This effect increases from the third period, and in the 10^{th} period 4.5% of the changes is explained by the negative shock changes of the oil export income. As it is clear in the results of variance analysis, the most effective influence of the real construction payments of the government is from the positive shock of the oil export income, therefore we conclude that in the later periods the most effective influence is from the positive shock of the oil export income.

CONCLUSION

In this study by using VAR techniques and time series data from 1973 to 2012, the asymmetric effects of Oil export income shocks on government construction costs in Iran have been investigated. According to the results it can be concluded that shocks of the oil export income have asymmetric effects on the construction costs of the government. Moreover the positive and asymmetrical relationship between the oil export income and the construction costs of the government is confirmed.

REFERENCES

Abrishami Hamid *et al.*, (1988). Relationship between economic growth momentum, oil and OPEC: Is this relationship asymmetric / Energy Economics Studies / sixth / 21 / summer 1388 / pages 112-93.

Azimi, H. (1987), the prospects for the oil market and the future of the economy, the political-economic monthly data.

3. Arshadi Ali, Habib Mousavi, 2013, the effect of oil shocks with an emphasis on asymmetric effects on economic growth during 2009-1972, Journal of Economic Research (sustainable development) - Chhardhm- number of third-Fall 2014- pages 200-179

Ebrahimi, Mohsen and Salarian, Mohammad and Haji Mirzaee, Mohammad Ali (1988). reviews the mechanisms of influence of oil revenues on economic growth in oil-exporting countries from the perspective of the natural resource curse, / Energy Economics Studies / fifth year / number 16 / 156-131.

Fallahi, Mohammad Ali and the Peyghambari, saeed (2005). To assess the interaction between OPEC oil basket price growth rate and economic growth in the major countries of the OECD, / Journal of Humanities and Social Sciences" economic science "/ seventh year / number twenty and fourth / Spring 86.

Farzanegan M. R. and Markwardt G. (2009). The effects of oil price shocks on the Iranian economy. *Energy Economics*. 31(1): 134-151.

Garkaz, Mansour, Azma, Fereydoon (2012): Relationship between oil revenues and government expenditure using wavelet analysis method: Evidence from Iran / Economics and Finance Review 2(5):52 – 61. Available online at http://www.businessjournalz.org/efr

Ghafari, Farhad., Mozaffari, Sahar. (1990). the asymmetric effects of oil on economic growth in Iran. *J. Applied Economics.* first / third number / Winter, p 13

Helali A. (1989). Investigation of the asymmetry effect of oil revenues on production levels and prices in Iran", MA thesis, Faculty of Economics and Politics at the Shahid Beheshti University

Iwayemi A. and Fowowe B. (2011). Impact of oil price shocks on selected macroeconomic variables in Nigeria. *Energy Policy*. 39(2): 603-612.

Jones D. W. *et al.* (2004). Oil Price Shocks and Macroeconomy: What has been learned since 1996. *The Energy J.* 25(2).

Komijani Akbar Asadi Mehmandust (1987). The impact of oil shocks and monetary policy on economic growth, humanities and cultural studies institution.

Lardic, Sandrine., Mignon Valerie (2006). Oil prices and economic activity: An asymmetric cointegration approach. *Energy economics*. 5(30):847- 855.

Lee, K., Ni, S., and Ratti R. (1995). Oil shocks and the macroeconomy: the role of price variability. *The Energy J.* 16 (4):39-56.
Lutkepohl H. (2004). *Applied Time Series Econometrics*, Cambridge University Press.
Mork K. A. (1994). Oil and Macro economy when Price goes up and down: An extension of Hamilton results. J. Political Economic. 9:
Mork, Knut Anton (1989). Oil and the macroeconomy when prices go up and down: An extension of Hamilton's result. *The J. Political Economy.* 5(97): 740-745.
Raymond Jennie E., Rich, Robert W. (1997), Oil and the macroeconomy: a Markov State-Switching approach. *J. Money. Credit and banking.* 5(29): 193-213.
Romer David. Translation, Taghavi M. (2005), the theory of business cycles, the first volume, Islamic Azad University, Science and Research.
Sarzaim Ali (1986). The effects of oil price shocks on economic variables in a VAR model, Energy Economics Studies, Issue 12, Spring 27.

