The Impact of Oil Price and Inflation Rate on Iran Economic Growth (Johansen-Jusilius co Integration)

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ABSTRACT

According to this fact that achieving high and stable economic growth rate is one of the main issues in every country and fluctuations of oil price and its impact on inflation rate and its harmful effects on economic growth cause to difficulties, so this article tries to study and analyze the impact of the oil price and inflation rate on the macro economic variables and especially Iran economic growth. For doing so, Johansen-Jusilius co integration method was employed for investigation the long term relationship among model variables for period of 1971-2007. The results show a co integration relationship among variables of inflation rate, oil world price and economic growth. In addition the results of this research show that increase of oil price in the world markets has had significant and positive effect on Iran economic growth in the studied period and there is a reverse relationship between inflation rate and Iran economic variables.

Classification of JEL: C22:F14:F43

KEYWORDS: oil price, inflation rate, economic growth, Johansen-Jusilius co integration, Iran.

INTRODUCTION

Crude oil as an important production factor has had a significant position in the world economic. Especially after oil crises in 70th decade that led to economic regression in the west, oil and oil products were considered as important factor in production and in 80th decade, the relationship between oil and economic growth gained attention of the analysts. Fluctuations of the oil price and its considerable effect on the macro economic variables were considered by the most of the economists. From experimental viewpoints, there are many reasons for the impact of oil price fluctuations on the macroeconomic variables. The fluctuations of oil price lead to irreversible reduction of investment, total demand and supply, changes in energy price and as a consequence change in consumption of energy, decreasing productivity of the work force, capital and potential production. According to this fact that achieving high and stable economic growth is important for countries in one hand and fluctuations of oil price and its impact on inflation rate especially on economic growth cause to fundamental problems in other hand, so this article aims to study and analyze the impact of the oil price and inflation rate on macro economic variables especially Iran economic growth. For doing so, Johansen-Jusilius co integration method was employed for investigation of the long term relationship among the model variables for years of 1971-2007. This research is based on theoretical principles and research methodology and finally conclusion and practical solutions are proposed.

REVIEW OF LITERATURE

Theoretical Principles

According to the international commerce theories, developing countries have been employed economic primary specialists due to incorporating relative advantages and frequencies of the production inputs. Also foreign investment has been justified by abundance of the inputs in these countries. Some economists criticize international specialism because of dependency of economic on the primary products export. This group believes that international specialism production causes to dependency on the export incomes. The export incomes become instable and influence negatively on economic because of unpredictability and exogenous prices of the crude export products and fluctuations of the prices (Feder, 1982).

Some economists believe that instability of the prices is sometimes good and in case of correct planning the markets could transact for prevention of price risks. But fluctuations of price for the consumers that are not under pressure of instable markets of the primary products but they share in oil products are painful. Energy products are important for oil and consuming products importers since they are the main inputs of the economic activities.

Some theories support this view point that instability of prices influences not only on price upper levels but also it affects negatively on the macroeconomic variable in all price levels. The documents show that there is a

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relationship between oil price fluctuations and variables like GDP, stock return and interest rate (Hamilton, 1983). In some cases, the effects of oil price instability have been shown asymmetrically, it means that increase of oil price has been led to economic regression, but reduction of oil price does not lead to its development in an appropriate way (Sadorsky, 1999).

Macbean (Macbean, 1999) inferences that price fixation polices are usually justified based on the harmful effects of export products price instability on the developing countries economics especially with one product economic.

Ferderer (Ferderer, 1996) points to two mechanisms in his theories of oil price fluctuations consequences generalized to other products. He suggests that instability of the input product price has negative effect on economic. The first mechanism influences by impulses:

Some production factors like work force and capital are used in the specialist production process by costly transfer to other industries. Thus price fluctuations in each input and probably the product that affects on work force optimal specialism and capital of industries lead to significant cost in macroeconomic. The second mechanism is value of selection of capital return pause, when price future levels for inputs and products cause to unreliability. Instability in price of inputs and product (not only oil) creates non negative selection value for irreversible investment. In case of instability, the price will be fluctuated and the common price pause will be balanced, so there is no obvious reason for prove of investment general reduction.

According to the importance of the economic growth, the effective factors are investigated. The review of literature shows that different factors affect on economic growth, it can be referred to capital, work force and latest technology. In other hand, inflation rate is one of the main problems in developing countries by unpleasant impact on the economic growth. Thus in study of the economic growth, investigation of inflation effects seems necessary. According to the economic growth models (by emphasize on inflation rate), different viewpoints have been proposed by the economic schools and the relationship between inflation rate and growth is expressed as consistently or inconstantly. According to Kinzy theory, due to inflexibility of the wages in short term the monetary policies could change production level. Indeed, since nominal salaries are less flexible, increase of liquidity enhances prices and reduces real salaries or wages and as a consequence promotes employment and production. Thus application of expanded monetary policies in short term causes to increase in employment and production (Sidrauski, Miguel, 1967). In Neo- Kinzy model, expansion of the monetary policies in long term do not affect on production and they only lead to increase in prices. According to Kinzy and slow adjustment of real wages, inflation rate leads to increase of prices by redistribution of the income from workers (by fewer attitudes toward saving) toward employers (by high attitude toward savings) that it causes to economic growth. According to the traditional advocates of the monetary system, enhancement of money supply or application of the monetary expanding polices in short term could increase production level, but in long term economic returns to primary balanced and the impact of the money supply is only reflected in increase of prices. In school of the advocates of the monetary system (Freedman and et al) confirmative expectancies in short term cause to a relationship between inflation rate and growth, but there is no relationship between these variables in long term (Keynes, 1930). New classics by proposing logical expectancies suggest that there is no relationship between these variables in long term. According to the new classics, application of the expanding monetary policies is not compromising even in short term and it could not change production level even if they are predicted by economic decision makers. Thus unexpected monetary policies in short term influence on economic real sector. By expanding the economic characteristics of developing countries like inflexibility, the structuralisms believe in a positive relationship between inflation and minimum growth to defined rate of inflation (Bernheim, 1989).

EXPERIMENTAL STUDIES
A) Foreign Studies

By economic factors behavior optimization method and consideration of money real remainder in an optimal function, Sidrauski, Miguel (1967) showed that money is a neutral cloud and so, there is no relationship between inflation and growth. Tobin (Tobin, 1965) by assumption of replacement of capital by money proved the positive impact of inflation on growth that it is famous for "Tobin effect". (Eltony and Awadi, 2001) in a study in Kuwait concluded that oil symmetrical shocks are effective factors on macroeconomic variables like GDP and price general levels. (Ayadi, 2001) in his study by using self regression investigated the effect of oil price fluctuations on macro economic variables like GDP and unemployment rate in Nigeria during 1980-2004. The results showed that the impact of oil price fluctuations is insignificant on economic growth. (Raguindin and Reyes, 2005) investigated the impact of oil price shocks on macro economic variables in Philippine during 1981-2003. The results showed that the oil price shocks have a significant and and negative effect on this country gross production. (Rebecca, 2005) in a study by using VAR regression analysis investigated the effects of oil price shocks on GDP in some countries

member in OECD. The results showed that there is a nonlinear relationship between oil price and GDP in these countries and increase of oil price has a significant and positive effect on economic growth in oil exporter countries economic growth. In other hand, in importer countries of oil increase of oil price has led to reduction of economic growth. (Olomla and Adejumo, 2006) by using self regression analysis investigated the impact of oil price shocks on macroeconomic variables like GDP, inflation rate and money supply during 1970-2003 in Nigeria. The results showed that oil price shocks do not have a significant effect on economic growth of this country. (Anashasy, 2005) investigated the relationship between oil price shocks and economic growth in Venezuela during 1950-2001. They concluded that oil price long term and short term shocks influence on macro economic variables of government expenditure, income and GDP. Lescaroux and Mignon (2008) studied the relationship between oil price and macro economic variables by Granjer causative test in the oil exporter and importer countries. The results showed that there is a causative relationship between GDP and price general level affected by oil price. Farzanegan and Gunther (2009) investigated the oil price shock effect on Iran economic during 1975-2006.

B-Domestic Studies

(Feriudon Huseini, 1996) showed that increase of oil price has influenced negatively on economic growth of OECD selected countries. According to his results, oil positive fluctuations coefficient was high and significant and coefficient of trivial changes was insignificant from statistics view point. In other words, increase of oil price influences negatively on GDP while reduction of oil price does not affect significantly on GDP. (Hadiyan and Parsa, 2006) investigated the impact of oil price fluctuations on some macroeconomic variables of GDP, price general levels and employment during 1961-2005 in Iran by using VECM and instantaneous reactions functions and analysis of variance. They concluded that one of the reasons for fluctuations of macroeconomic variables is oil price shock and about %20 of the GDP fluctuations and %60 of price general level fluctuations are resulted from oil price fluctuations. (Dadgar and et al, 2006) investigated the relationship between inflation and economic growth in Iran during 1959- 2004 by CLS and concluded that at first there is a one way relationship between inflation and economic growth in Iran and secondly, there is a positive relationship between inflation and economic growth in one range and there is a neutral and then negative relationship between inflation and economic growth in other range (to some inflation rate). (Abrishami and et al, 2008) studied the asymmetrical effect of oil price on economic growth of countries member in OECD during 1960-2002 and concluded that the effect of increase and decrease of oil price was not the same and oil price fluctuations have asymmetrical effect on GDP of these countries. Different studies have been done on the impact of oil price on macroeconomic variables especially investment and economic growth by using regression analyses in order to investigate the effect of oil price shock on macroeconomic variables, so this study is important since co integration analysis has been used for investigation of macroeconomic growth variables of inflation rate and oil price effect on Iran economic growth.

GOALS

The aim of this study is to determine the effects of inflation rate and oil world price variables on Iran economic growth during 1971-2007.

HYPOTHESES

1-oil world price influences significantly on Iran economic growth.
2-inflation rate influences significantly on Iran economic growth.

METHODOLOGY

This research is a descriptive and applied research. The results could be used for improvement of decision making in the monetary and financial policies. The statistics and information used for variables of GDP and products price indicator and CPI have been prepared by statistics and information site of central bank and the statistics of OPECK crude oil price has been extracted by OPECK statistics information in 2007. This research was conducted during 1971-2007.

Model of research

According to the experimental studies and theories of Economics, the relationship between economic growth and variables of oil price and inflation rate were extracted from (Lescaroux and Mignon ,2008) and (Farzanegan and Gunther ,2009) studies.

$$GGPD_t = \alpha_1 + \alpha_2 OP_t + \alpha_3 INF_t + \alpha_4 DU + U_t$$

Where
GGDP: economic growth rate (percentage of GDP relative changes)
OP: OPECK crude oil price
INF: inflation rate or items and consuming services indicator rate
DU: virtual variable for consideration of wartime structural changes (1980-1988).

FINDINGS

In this research Johansen-Jusilius co integration method was used for estimation of long term relationship between model variables because of consideration of convergence vector between variables and the estimators have asymptote efficacy. It should be pointed that before Johansen-Jusilius co integration method test, test of root of unity of time series reliability is necessary, then optimal step of VAR is identified, so in this study, at first the reliability of time series variables is examined by Philips and Perron test and augmented Dicky-Fuller statistics. The results are shown in following table:

Table I: model variables reliability test

Variables	ADF test		PP test	
	Level by consideration of width from source and trend	One step subtraction	Level by consideration of width from source and trend	One step subtraction
GGDP	-2.25	-3.46	-1.73	-3.38
INF	-3.38		-3.35	
OP	-2.16	-5.14	-2.13	-5.16

*Mack Kinon critical value in significant level of %5 for test PP (-3.55) and Mack Kinon critical value in significant level of %5 for test ADF (-2.95)

According to the results of the model variables reliability test it can be said that all variables of economic growth rate and oil price is validated with one step subtraction and inflation rate variable is in reliability level. In other hand variables are economic growth rate and oil price I (I) and inflation rate I (0). In next step, pause in model variables optimal is estimated by using SBC when the model is in state that economic growth variable is dependent. The results are shown in table 2.

Table II: results of determination of model optimal pause

Number of pause	SBC of test statistics value
1	**26.38
2	27.09
3	27.81

**indicate number of model optimal pause

According to the results, the number of model optimal pause is one when economic growth variable is considered as a dependent variable in model (1). In next step according to this fact that all variables were validated by one step subtraction, convergence has been used. This method involves two maximum Eigen value and trace matrix and based on theoretical principles for selection of convergence vectors maximum Eigen value is referred since this statistics possesses strong and exact function.

Following table summarizes the results of determination of model variables convergence vectors number based on maximum Eigen value and trace matrix:

Table III: results of convergence vectors number

H0 and function	maximum Eigen value	trace matrix	Critical value in significant level of %5 for maximum Eigen value	Critical value in significant level of %5 for trace matrix
$H_0: r=0$ $H_1=r=1$	56.96	131.88	37.86	97.17
$H_0=r\leq1$ $H_1=r=2$	28.95	55.93	31.79	63.16

Resource: research estimation

According to the results of table 3, it can be said that maximum Eigen value and trace matrix confirm convergence vector between model variables. The vector proportionate with economic theories is as follows:

Table IV: normalized convergence vector relative to GGDP

Variable	Coefficient
GGDP*	-1
INF	-1.59
OP	0.04
DU	-0.12

*convergence vector relative to normalized economic growth variable

According to the results of table IV, by increase of inflation rate the economic growth is reduced and oil price variable influences positively on Iran economic growth. In addition, virtual variable has impacted negatively on Iran economic growth by consideration of wartime. In other words, by increase of one unit in oil price, economic growth has increased 0.04, while by one percent increase in inflation rate, economic growth is reduced averagely -1.59. In next step, according to this fact that the model variables convergence vector has been confirmed, it is necessary to impose confinement in order to have recognition capability. The results are shown in table 5.

Table V: estimation of normalized convergence vector relative to GGDP after applying confinement

Variable	Coefficient	T student statistics
GGDP*	-1	
INF	-0.46	-2.76
OP	0.13	3.34
DU	-0.14	-4.23

**indicates that by applying confinement on coefficients the t student is not calculated.

According to the results of table 5, it can be said that by increase of inflation rate, economic growth is reduced and coefficient of inflation rate in the estimated model equals to -0.46 .In addition oil prices has a positive and significant impact on Iran economic growth in the studied period. The results show that by increase of oil price and income the level of production and economic growth are increased. Virtual variable of wartime has influenced negatively and significantly on Iran economic growth. The results showed that during wartime and reduction of demand, production and economic growth have reduced in this period. VECM is used for adjustment of short term error toward balanced and long term economic growth.

Table VI: the results of estimation of VECM

Variable	Coefficient	Student t
C	0/055	3.18
Ecm$_{t-1}$	-0/17	-3.13
R^2=0.46, R^2=0.35,F=4.06,SBC=-2.35		
Diagnostic Tests Test Statistics * LM Version A:Serial Correlation * CHSQ(1)= .54670[.460] B:Functional Form * CHSQ (1)= .18988[.663] C:Normality * CHSQ(2)= 3.9957[.136] D:Heteroscedasticity * CHSQ (1)= .078926[.7797]		

Resource: research estimations

According to table 6, it can be said that error correction coefficient of the first vector equals to -0.17 and it is significant statistically. The significant error correction coefficient of the first vector shows that there is a long term balanced relationship between model variables and long term adjustment is done. In addition, self correlation, heterogeneity of variance, dependent form and normalization of the confusion phrase depict fitness of the estimated model in all significant level

DISCUSSION AND CONCLUSION

In this research the long term relationship among economic growth, inflation rate and oil price have been investigated in Iran economic during 1971-2007. Johansen-Jusilius co integration method method was used for estimation of balanced and long term relationship. The results show that inflation rate and virtual variable of wartime have had significant and negative and OPECK oil price variable has had a positive and significant effect on Iran economic growth during studied years. Thus according to the results followings are recommended for economic policy makers:

1-since inflation rate has a significant and negative impact on Iran economic growth, so it is recommended the economic policy makers to control inflation rate in order to empower production and economic growth by observing regulations in execution of financial and monetary policies.

2-According to the positive effect of oil price on Iran economic growth, it is recommended that the policy makers use appropriate polices in order to empower non oil and industrial exports and accelerate domestic production level and economic growth while consideration oil price and oil incomes in increase of production and economic growth.

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