



Oil income shocks and economic growth in Iran

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ABSTRACT

The aim of this paper is to study the relationship between oil revenue shocks and output growth in Iran by Adopting an SVAR model over the period 1959–2008. The results indicate that positive and negative oil revenue shocks significantly affect output growth positively and negatively respectively and these effects are asymmetric. While negative oil revenue shocks adversely affect the economic growth, the resource curse impedes the expected positive effects of positive oil shocks. In order to overcome the harmful effects of oil booms and busts, the establishment of oil stabilization and saving funds, diversifying economy, delinking government expenditure from oil revenues and introducing fiscal rules into the budget seems crucial for Iran economy.

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1. Introduction

Oil revenue in some developing oil exporting countries such as Iran, is the main source of financing physical and social infrastructures. This dependence on oil has caused oil shocks to be the main source of macroeconomic fluctuations which, in turn, have important effects on both macroeconomic policy and economic activities in most oil exporting countries. In such countries oil income accrues to the governments; it will have significant effects on the economic performance with regards to its impacts on government expenditure, money supply, inflation, real exchange rate and imports (Strum et al., 2009). Therefore, oil shocks have important effects on both monetary and fiscal policies, but the effects of such shocks on the output resulted from fiscal and monetary policies have not been given enough consideration in different studies. Most studies about the impacts of oil shocks on the economy have been carried out for oil importing countries. Hamilton (1983), considering a linear specification for oil shocks, concluded that during 1949–1973, oil shock has been an important factor in all recessions happened in the US. Burbridge and Harrison (1984) showed in their study that oil shocks have had significant negative effects on the industrial production of Canada, Germany, Japan, UK and the United States. Following these studies, other researchers assessed the effects of oil shocks on the economy (e.g., Balke et al., 1999; Cologni and Manera, 2008; Cunado and De Gracia, 2003; Davis and Haltiwanger, 2001; Hamilton, 1996, 2003; Hooker, 1996; Huang et al., 2005; Lardic and Mignon, 2006; Lee et al., 1995; Mork, 1989; Mork et al., 1994).

Despite considerable attention to oil importing countries, oil exporters have not been sufficiently attended to by researchers; however recently few studies have been done for these countries. Eltony and Al-Awadi (2001), in their study for Kuwait, found that oil price shocks are major determinants in economic activities. Olomola and Adejumo (2006) showed that oil price shocks do not have any substantial effects on output and inflation, but they are significant determinants of real exchange rate and money supply in Nigeria. Berument and Ceylan (2007), in their study using a structural vector autoregressive model, examined the effects of oil price shocks on the economies of some selected MENA countries. The results indicated that the effect of a positive oil price shock on the output of most oil producing countries is positive and significant, but for some of them there are no significant effects. Mehara (2008), in his study about oil exporting countries, found that oil revenue shocks tend to affect the output in asymmetric ways. While oil booms or positive oil shocks have a limited role in the economic growth, negative shocks decrease it significantly. Farzanega and Markwardt (2009), in their study on the Iranian economy, indicated that oil price fluctuations have significant effects on industrial production, inflation and effective exchange rate and the effects of oil price shocks on output are asymmetric. Mehrara (2009), in his study regarding some oil exporting countries, examined the relationship between the oil revenue and the output growth. His results suggested the existence of a threshold beyond which the oil revenue growth imposed a negative effect on the output. The assessed threshold for oil exporting countries was around 18–19% above which the oil revenue growth rate significantly slowed the economic growth. Iwayemi and Fowowe (2011) showed that oil price shocks do not have a major impact on most macroeconomic variables in Nigeria. Their results indicated that different measures of linear and positive oil shocks do not cause output, government expenditure, inflation, and the real exchange rate. The tests support the existence of

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asymmetric effects of oil price shocks because negative oil shocks can cause significant output and the real exchange rate. [Cognigni and Manera \(2011\)](#) studied the effects of oil shocks and the expansionary fiscal policy on the business cycle of some major oil exporting countries using the Real Business Cycle (RBC) model. Results revealed that the expansion of government size can explain a considerable part of the negative effects of oil revenue shocks on the private sector. However, since the public sector growth is more than the private sector reduction, an increase in oil revenues will boost the total output. Nevertheless, the transmission mechanism of oil shocks in such countries has been less in focus of different studies.

The aim of this study is to assess the impact of oil revenue shocks on the output by considering several channels through which the oil revenue shocks affect the economy of an oil exporting country. For this purpose, the effects of structural shocks on the output have been assessed using a Structural Vector Auto Regressive (SVAR) Model and impulse response functions.

This paper has been structured as follows: [Section 2](#) discusses some theoretical background, [Section 3](#) presents the data and methodology, [Section 4](#) provides some empirical results and, finally, [Section 5](#) concludes the whole work.

2. Theoretical background

Several studies have documented various transmission channels through which oil price shocks affect economic activities in developed oil importing countries. [Brown and Yucel \(2002\)](#) have surveyed theory and evidence linking fluctuations in energy prices to those in aggregate economic activities. But, regarding oil exporting countries, there are few such studies. Oil revenue shocks can affect macroeconomy of developing oil exporting countries from different aspects. An oil boom, for oil exporting countries, stimulates economic activities from both the supply and the demand sides. The first impact originates from governments use of petro dollars for financing their expenditure; therefore, with increasing oil revenues, fiscal policy will be expansionary. In these circumstances, if public expenditure is considered as an input to private production, then government spending on public goods and infrastructure can stimulate investment and output ([Barro and Sala-i-Martin, 1992](#)). On the other hand, [Dar and Amirhalkhali \(2002\)](#) have mentioned another way that government expenditure influences investment. According to them, government expenditure has the effects of diminishing returns; and, over-expanding by crowding out of private investment will decrease economic growth. Moreover, inefficiency, distortion in allocation of resources and corruption are other channels that have negative effects on output. On the other hand, when oil revenues fall, with limitations on the access to capital and intermediary imports, economy will suffer from under-capacity, particularly in the presence of capital market imperfections ([Hausmann and Ribogon, 2003](#)).

Second transmission channel through which oil revenue shocks affect output is money supply. With increasing oil revenues and government expenditure, petro dollars have to be exchanged for local currency; therefore, the central bank should sell them at the domestic exchange rate market; selling all of them will cause depreciation of foreign exchange rate and the price of imported goods will be cheaper for domestic consumers and import will increase causing bankruptcy of domestic firms—hence an increase in unemployment. To prevent this phenomenon, some of these petro dollars will not be sold in the domestic exchange rate market. This way, the central bank increases its foreign reserve and money base the overall outcome of which is an increase in the money supply. According to the transmission mechanism of the monetary policy, an increase in money supply will lead to an increase in output via asset price and credit channels. For example, by increasing bank reserves and deposits, the expansionary monetary policy will increase loans paid to firms which will cause investment and output to rise. Surveys of the credit view can be found in

[Bernanke and Gertler \(1995\)](#). On the contrary, with oil revenue bust, expansion in money supply will be lower¹ and contraction in money supply decreases the output deeply.

Another transmission channel of oil shocks is the Dutch disease which is a combination of two effects. The first is the appreciation of real exchange rate caused by the rise in oil export and the second is the draw of resources such as labor and capital from industry and agriculture sectors which, by rising production costs, will lead to a decline in the output and export of these sectors ([Auty and Gelb \(1986\)](#), [Benjamin et al. \(1989\)](#)). Therefore, rise of production costs, increase in imports (which is an outcome of the appreciation of real exchange rate) and inflation caused by aggregate demand pressures due to the implementation of expansionary fiscal and monetary policies, will decrease domestic production and economic growth.

Aside from Dutch disease, on the basis of several empirical studies, economic growth in some resource abundant countries tends to be slower than that in countries without natural resources ([Auty, 2001](#); [Gelb, 1988](#); [Sachs and Warner, 1995, 1999](#)). This phenomenon is known as the "resource curse". [Strum et al. \(2009\)](#) point out to four main explanations of the resource curse. The first is the Dutch disease mentioned above and the second is reduced incentive to develop non resource sectors; resource abundance may reduce the incentives to use accumulated skills and human resources ([Auty, 2001](#)). The third is high volatility of resource revenues with which (as an example of resource abundance economies) public sector and external balance will face higher volatility which increases uncertainty and reduces investment and, with impeded implementation of a balance fiscal policy, retards economic growth. The fourth explanation is political economy effects; rents related to natural resources can be a source of conflict, political instability, corruption, weak institution ([Boschini et al., 2007](#)) and inequality. The overall outcome of these phenomena has affected GDP growth of oil exporting countries and it has been below the expected levels compared to emerging market economies.

3. Data and Methodology

In this section, the objective is to examine the dynamic relationship between output, government expenditure, liquidity and oil revenue shocks in Iran using the annual data over the period 1959–2008. To assess the relationship between the series, we adopt the K variable SVAR and start with VAR Model as follows:

$$y_t = A_0 + A_1 y_{t-1} + \dots + A_p y_{t-p} + u_t \quad (1)$$

Where $y_t = (y_{1t}, \dots, y_{kt})'$ is a $(K \times 1)$ vector of endogenous variables, A_0 is a $(K \times 1)$ vector of intercepts, $A_i (i = 1, \dots, p)$ are $(K \times K)$ coefficient matrices and u_t is a $(K \times 1)$ white noise error vector with zero mean and non-singular covariance matrix $\sum u_t$. To identify the structural innovations that induce the effects of structural shocks in the system variables y_t , we can write the following structural specification for Eq. (1):

$$A y_t = A_0^* + A_1^* y_{t-1} + \dots + A_p^* y_{t-p} + \varepsilon_t \quad (2)$$

where ε_t is a $(K \times 1)$ vector of structural disturbances with zero mean and covariance matrix $\sum \varepsilon_t$. Premultiplying system (2) by A^{-1} gives the reduced form of Eq. (1) where $A_j = A^{-1} A_j^* (j = 1, \dots, p)$ and:

$$u_t = A^{-1} \varepsilon_t = B \varepsilon_t \quad (3)$$

¹ Because of rigidity in government expenditure when oil revenues fall, increase in government debt to central bank will increase monetary base and money supply, but in general, increase in money supply is lower than those of oil booms periods.

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