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The sources of Iran's Business Cycles

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Abstract

A business cycle is, in fact, fluctuations of macroeconomic variables and gross domestic product. These fluctuations play a substantial role in any country. Prosperity and depression have been the most impressive problem in Iranian economy during the last decades so government and politicians have always sought a remedy for alleviating its negative effects like inflation and unemployment. This study analyses the underlying causes of Iranian business cycles using structural auto regression (SVAR) in the period between 1965-2009. The findings of this research show that business cycle in oil exporting countries is affected by changes in oil revenues. To identifying how oil shocks spread through different variables we use Bernanke and Sims (1997) technique, imposing a set of long-run economic restrictions that are added to purely statistical restrictions of VAR. In the end, the hypothesis of the thesis verifies that the effect of fiscal policy in generating business cycles is much more than monetary policy and technological shock. But, bear in mind that the effect of technology shock in Iranian economy, in general, could not be ignored.

JEL Classification: E32·E52·E62·O39.

Keywords: Business Cycle, Fiscal Policy, Monetary Policy, Technology Shock.

1. Introduction

Modern economies usually experience many ups and downs known as business cycles. Business cycles reflect the volatilities of production and macroeconomic variables in a country (Satyajit, 2000). These volatilities play an important role in the performance of economies. It is expected that production and employment would increase in prosperity period and would decline in the period of depression (Valentino and Dauten, 1987). During recession, however, unemployment and decline of production would lead to the spread of poverty and welfare decline as well as drop in people's living standards. Besides, as controlling unemployment and inflation is among the most important economic goals of governments and central banks in any country, understanding the economic factors affecting this phenomenon is imperative. Therefore, economic planning without a proper knowledge about the sources and roots of volatilities of GDP will be useless.

Six categories of theories including those Pre-Keynesian Theories of the Business Cycle, Keynes, and Keynesian business cycle theories, Freidman's business cycle, political business cycle theories, new classic theory of cycles, and new Keynesian business cycle theories can be mentioned with regard to the causes of the development of business cycles in economies (Hansen, 1951). Many of ideas about business cycle theories have been put forward before Keynes. Based on the classical economics, general condition is full employment equilibrium and, therefore, any distraction from it will be eliminated by the spontaneous performance of twin pillars in an economic system. Overall, theories proposed before Keynes can be examined under three categories including non-monetary cycle theories, monetary cycle theories, and supply theories of cycles. Non-monetary demand theories of business cycle focus on the non-monetary factors affecting the business cycle in terms of demand and can be divided into two subcategories of capital shortage theories proposed by Cassel (1918), Baranowsky (1913) and Aftalion (1913), and theories of innovation and investment opportunities by Robertson (1915) and Schumpeter (1927). Monetary demand theories of business cycle, on the other hand, are concerned with the role of monetary variables and interest rate as the main cause of the development of business cycles. From Hayek's perspective, and other followers of the Austrian School, during recession due to the decrease of the interest rate to lower than its natural rate, production will be beneficial; this will be the beginning of prosperity. Lauderdale is the first to pay attention to the role of fiscal policy as an influential factor in increasing the overall demand. Maltus (similar to Keynes) differentiates between the savings built up by an increase in profits and the savings as the result of decrease in expenditure cuts. According to Hobson's view, the cause of development of business cycles is unequal distribution of incomes which causes saving to be more than its ideal rate. Then in supply theories of business cycle, that's to say, Pigou's theory is the most important theory of psychological

cycle. According to him, the main reason for the creation of these waves or production more or less than needed, is incorrect estimation of the profits by firms (optimism or pessimism) (Gordon,1974). In general theory, Keynes' concern is to confirm that product equilibrium is less than full employment equilibrium and from his perspective the cause of business cycle are the changes in the marginal efficiency of capital. Overall, Keynes' theories about business cycle can be classified under two categories: multiplier-accelerator theories (Hansen, 1964; Samuelson, 1939 and Metzler, 1941) and Keynesian endogenous theories (such as those proposed by Kalecki, 1935 and Goodwin, 1951) Keynesian endogenous cycle theories. Freidman believes that business cycles pay attention to the effect of lags and have a monetary root (Dore, 1993). Finally, another branch of the theories proposed by economists such as Frey (1987) and Tullock (1967) focus on the interdependence between economy and politics. Governments and ruling groups take measures to improve their popularity by decreasing inflation and unemployment temporarily. New classic theories in the framework of continuous market clearing, rational expectations, and vertical aggregate supply, present two theories: Lucas theory and the real business cycle theory. Lucas examines the role of imperfect information of economic agents in existence of a business cycle. Real business cycle theory, on the other hand, focuses on the role of real factors such as technology shock, oil supply disruption, change of tastes, etc. in development of business cycle (Walsh, 1986). New Keynesian theories of business cycle pay attention to the factors related to demand side by emphasizing the existence of imperfectly competitive market (Dore, 1993).

All the factors influencing development of business cycles which can be extracted from these theories include factors stimulating demand, predicted and unpredicted monetary policies, political factors, etc. In line with this, and relying on the mentioned theoretical basis, Baldini (2005) in his study of business cycles of Venezuela attributed economic stability of this country to volatilities related to oil to a large extent. Examining the role of fiscal policies in business cycles of Portugal, Afsono and Ricardo (2009) also concluded that the positive shock of government spending has a negative effect on real GDP leading to substitution effect via a decrease in consumption and private sector investment. Franken and Parrado (2004) analyzed the reaction of Chilean business cycle to shocks using a VAR model. The results of this study indicated that real external shocks are the main source of volatilities of domestic economic activities especially the shocks related to foreign capital and demands of the external world. These shocks are followed by the monetary policy shocks. In their examination of the Chile's economy, Medina and Soto (2006) considered productivity shock as the main cause of business cycle. Fernandez and Hernandez (2006) estimated the economic effects of fiscal policies in Spain using a SVAR model. The results of their study showed that fiscal policies through increasing government expenditures are able to stimulate economic activities in the short term at the expense of increasing

inflation, more massive budget deficit and lower production in the medium term. Accordingly, considering the single product Iran's economy and its high susceptibility to oil revenues, it can be stated that the most important factor in making economy cyclic is oil price volatilities and, ultimately, oil revenues. It exerts its influence via monetary, financial, and technological mechanisms.

Therefore, the present paper is an attempt to examine the existence of business cycles in Iran's economy and analyze the causes and roots of its development in the framework of three classes of theories including Keynesian business cycles theories, Freidman's business cycle theory, and real business cycle theories. For this purpose, Structural Vector Auto Regressive (SVAR) model, which has become very popular in analyzing the sources of volatilities of business cycles and monetary movement mechanisms among the existing instruments, is used.

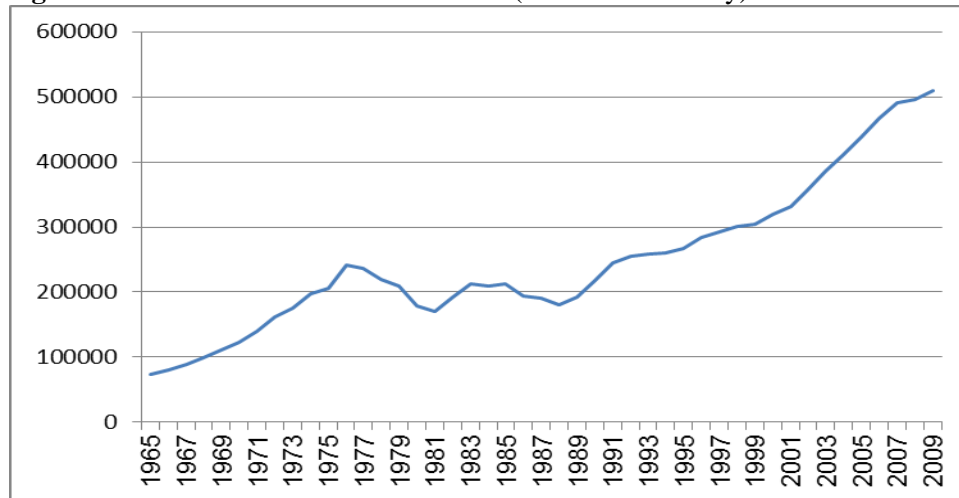
2- Historical Analysis

I. The Process of Changes in GDP during 1965-2009

One of the indexes reflecting the amount of economic activity in any country is Gross Domestic Product which is the total value of final goods and services produced domestically during a period (in a single year). As it can be seen, up to 1974 the GDP has been picking up and after that when Islamic revolution happened its rate of growth has decreased to -7.3. By 1979, the negative rate of growth continues due to intensified political problems and issues such as the import and export markets being closed. In 1980 and 1981, the positive rate of growth up to 12.5 and 11.06 is clear respectively due to reopening of the factories and the government being put in its right position.

From 1984 till the end of 1988, because import and export market was closed and also due to the sanctions on Iran by other countries, decrease in the oil price in the world market, GDP declined severely by negative rates of growth during 1986, 1987, and 1988. Later on, by the government's change of policies for export and import and being incorporated in the first development plan (1989-1993), the production market flourishes again and GDP experiences a high level of growth. The increase in the growth rate of GDP to 12.12 in 1991 was because of the Iraq-Kuwait crisis and a consequent increase in oil price in the world market. Following that, from 1993 to 1995 the rate of growth decreased again in a way that in 1994 it became 0.49 percent. After that period, the rate of growth reached 8.1 in 2002. This rate declined to 3.4 due to the sanctions imposed on Iran and an increase in the imports from China and a decrease in domestic production.

Fig. 1. GDP at Fixed Price in Billion Rials (National Currency) from 1965 to 2009



Source: Central Bank of Iran (www.cbi.ir)

II. The Trend of Changes in Oil Revenues from 1965 to 2009

Iran's economy has been living on oil revenues for a long time and in this way, oil sector has a vital role in economy and has always maintained its dominance over national economy in terms of commercial activities, production, investment, consumption, providing budgetary revenues, etc. and based on this any volatility in the amount of oil export or in its price has had dual effects: economic prosperity or recession.

The first oil shock happened when Arab oil-producing countries in OPEC decided to use oil as a political tool for putting pressure on the United States and the western countries during Arab-Israel war in 1973. Therefore, OPEC decreased its oil production to five million barrels. This decrease displayed itself in the form of a seven percent decrease in free production in the world. In this year, for several months oil price increase about 400 times. The prices resulting from measures taken by OPEC led to a decrease in demand for oil. These factors along with global recession led to a decrease in demand for oil and consequently a decrease in its price.

The second oil shock was provoked by Iran's oil export in 1978 with the outbreak of the Islamic revolution and following that by Iran-Iraq war. Iran's oil export in October of 1978 was about five million barrels a day. At the peak of the revolution, oil export decreased severely and it was completely stopped in December of 1978. Oil supply shortage along with concerns about impossibility of getting oil in the future led to a fast increase in its price from 13.5 dollars in January of 1979 to 35 dollars in January of 1980. This considerable increase in oil price gave rise to an increase in its supply, on the one hand, and the other countries reduced the volume of their oil purchases, on the other.

In 1980, economic sanctions and outbreak of war between Iran and Iraq resulted in a severe decrease in oil exports (from 1219.7 Billion Rials in 1979 to 888.8 Billion Rials in 1380) and

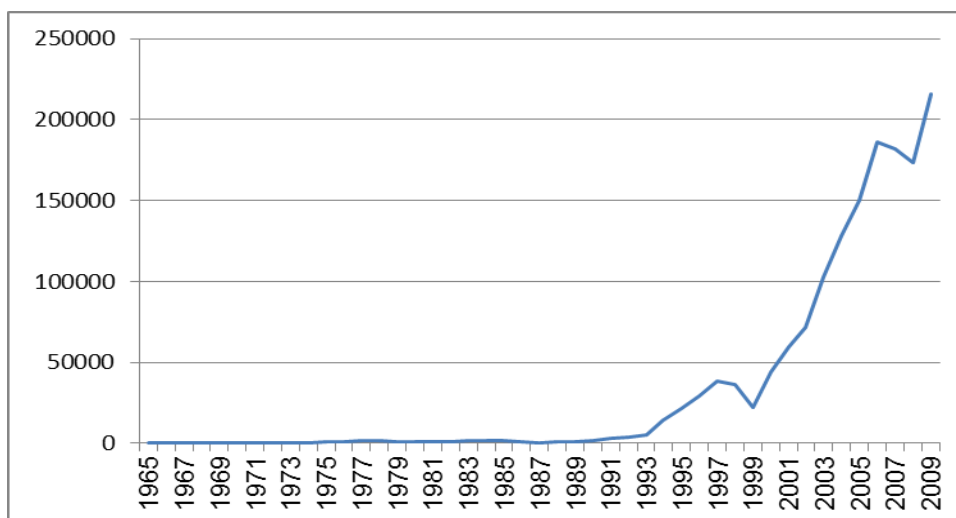
consequently sources of foreign exchange became really limited. In 1982, owing to a relative mitigation of the problems related to oil export, foreign exchange earnings improved to a certain extent. In this year, these earnings rose from 12.5 Billion Rials to 20 Billion Rials in 1981. However, in 1984, with the falling trend of oil price, Iranian oil revenues started to decrease and reached its lowest level (less of 12 Billion Rials) in 1986. During the Persian Gulf War in 1989 and occupying of Kuwait by Iraqi army, the level of oil supply and export decreased quickly in the world markets. At the end of this year, world crude oil price rose from 16 dollars to 36 dollars a barrel.

Asian financial crisis in 1996 also had an influence on OPEC's oil production. Low demand and OPEC's unwillingness to decrease its production quotas once more exacerbate the decrease in oil prices in 1997. While world demand for oil was not in an appropriate condition and there had recently been only a small increase in demand, attack on World Trade Center towers in New York in September of 2001 exerted another shock to the oil market leading oil price to fall to 30 dollars thus decreasing foreign exchange earnings to 59448 Billion Rials.

Statistics show that increase in demand was about 100000 barrels a day in 2000. But, on the other hand, OPEC's increased production and, on the other hand, prediction of the continuation of this trend up to 2002 resulted in a lower pressure and concern about raising the prices. But concerns about outbreak of war in Iraq kept prices high until in 2002 oil revenues had a 43 percent increase compared to the previous year reaching 102626 Billion Rials. Oil for Food Program arranged by the United Nations for Iraq continued until 2002 creating limitations in oil supply.

2005 was a turning point in the history of world oil. In this year, oil price exceeded 50 dollars a barrel. Norway oil industry workers and sabotage in the pipeline and oil production stop warning in Nigeria can be mentioned as some of the causes of this high increase. In late August of 2004, Katrina Hurricane swept through the Mexican Gulf and oil price exceeded 70 dollars a barrel. Therefore, Iran's oil revenues exceeded 150400 Billion Rials. In 12th of September in 2007, the sharp decline in America's oil reserves led oil price to become 80 dollars a barrel following the decreased interest rate in this country which caused oil price to rise to 95 dollars per barrel. In January of 2008, violations in Nigeria and the likely decrease in America's oil reserves, oil price became 100 dollars. At the end of this year, with a decrease in American oil reserves, OPEC's decision to maintain its oil production ceiling, positive economic growth in China, depreciation of the dollar, and also disruption in Nigeria's oil production increased oil price to 135 dollars. Therefore, oil revenues reached 173519 and 215650 Billion Rials in 2007 and 2008 respectively.

Fig. 2. Oil Income in Rials during 1965-2009



Source: Central Bank of Iran (www.cbi.ir)

3- Empirical Results

During the last four decades, Iran's GDP has experienced many ups and downs in a way that internal and external factors have had an important role in its direction. Oil revenues are in fact the major cause of the development of business cycles. Oil is the most important export good in Iran and the major part of foreign exchange earnings and a major part of the country's budget is provided by revenues from oil export. Therefore, oil revenues practically influence fiscal policies and along with it fiscal policies are also influenced. Besides, enhancing efficiency of total production factors can be affected by importing intermediate and capital goods from advanced countries or by foreign investment. Therefore, in this study it is hypothesized that business cycles in Iran are influenced by fiscal and monetary policies and technology shock. Structural Vector Auto Regressive (SVAR) model has five variables including GDP, government expenditures (TGC), as an index of fiscal policies, money supply (M1), as an index of monetary policy, importing intermediate and capital goods (IM), and oil revenues (OIL) as an exogenous factor. The time range of this study was from 1965 to 2009 in an annual basis. In analyzing VAR, an important issue is the identification of the shocks of every equation from the residuals of reduced forms. For this purpose, in experimental literature on VAR models, different solutions have been suggested. For example, Sims (1997) suggested using a form of a lower triangular matrix. The problem with this method is that results are sensitive to the order of variables. Another approach for identification structural shocks is to use structural restrictions or the well-known model of Structural Vector Auto Regressive used in the present study. The main feature of SVAR models is their focus on the role of shocks in dynamicity of a model for the purpose of identification.

In the structural VAR approach, no restrictions are imposed on the structure of lags. These patterns clearly have an economic logic for taking these restrictions into account. With regard to GDP, it can be stated that based on the previous studies on Iranian economy, this variable is almost influenced by all the variables of the model but the money supply (M1) due to neutrality of money. On the other hand, considering the mechanisms of the government and the central bank for spending the oil revenues, the government provides the central bank with the foreign exchange earnings and following that central bank injects national currency into the economy in the form of capital and current budgets. Furthermore, due to the prominent role of the government in Iran's economic environment, the relationship between technology imports and government expenditures seems to be logical. Considering the restrictions mentioned above, structural equations between shocks of the VAR model and structural shocks will be as follows:

$$C(1)U_{GDP} + C(2)U_{TGC} + C(7)U_{IM} = \varepsilon_{GDP} \quad (1)$$

$$C(3)U_{TGC} + C(5)U_{M1} = \varepsilon_{M1} \quad (2)$$

$$C(4)U_{TGC} + C(6)U_{M1} = \varepsilon_{IM} \quad (3)$$

The results of estimation of SVAR matrix coefficients have been presented in Table 1. Based on the table, the mark of all the coefficients is as predicted and all the coefficients are meaningful in the long term at 0.5 level of significance.

Table 1. The Results of SVAR Model

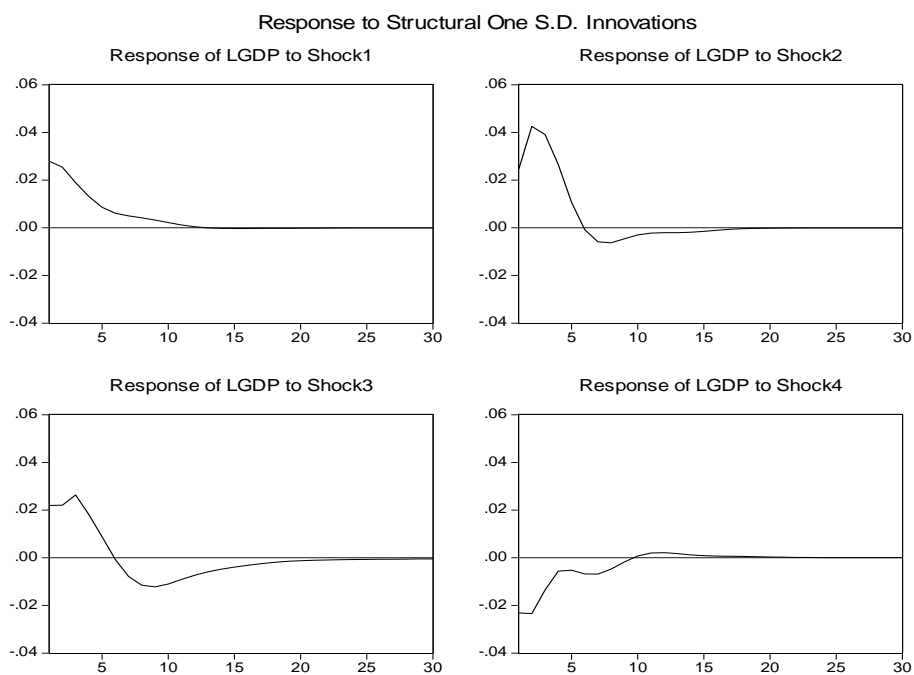
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.113322	0.017268	6.562411	0.0000
C(2)	0.329356	0.035936	9.165151	0.0000
C(3)	0.109455	0.016969	6.450372	0.0000
C(4)	0.645039	0.070380	9.165151	0.0000
C(5)	1.189190	0.129751	9.165151	0.0000
C(6)	0.821446	0.106661	7.701486	0.0000
C(7)	0.078123	0.008524	9.165151	0.0000
Log likelihood 161.3932				
LR test for over-identification:				
Chi-square(3)	1.877938		Probability	0.5981

Source: Research Findings

Based on the χ^2 statistics, the hypothesis related to testing over-identified-level restrictions is not rejected at 0.5 level of significance. Therefore, it can be accepted that the identified restrictions for the system are all valid and are not extra restrictions which are limiting for the system. Considering the fact that the SVAR system has appropriate statistical characteristics and that the mark of all the

coefficients are consistent with theoretical expectations, the shocks resulting from the system can be interpreted as the structural shocks of each equation and response-impulse functions of the system can be stipulated based on them. According to the research hypothesis, the main source of the shocks is oil revenues, but the main direction of transfer of these shocks is via the government's budget, money supply (M1) and technology imports. Therefore, response functions will be stipulated by including shocks of government expenditures, money and technology. The shocks of the above graphs are indicative of the reaction of GDP to the shocks resulting from variables of the system. It can be observed that monetary shocks act as anti-production due to the inflation-producing effects they have. Besides, the main cause of the negative effects of technology on GDP can be the low efficiency of capital in Iran and unprincipled maintenance inconsistent with the standards.

Fig. 1. Response Stimulus Functions



Furthermore, analysis of variance decomposition determines the relative importance of any of the shocks affecting the product fluctuations.

Table 2. Analysis of variance of GDP

Period	S.E.	Shock1	Shock2	Shock3	Shock4
1	0.049025	32.40660	25.19224	20.05322	22.34794
2	0.076776	24.15667	40.98091	16.44545	18.41697
3	0.093049	20.58537	45.56956	19.20795	14.63712
4	0.099457	19.75989	46.97608	20.13511	13.12892
5	0.100922	19.91694	46.75026	20.31363	13.01917

6	0.101342	20.11875	46.36899	20.15043	13.36183
7	0.102168	20.03077	45.95800	20.41419	13.59705
8	0.103201	19.79488	45.41000	21.25766	13.53745
9	0.104085	19.55746	44.83567	22.27117	13.33569
10	0.104732	19.36029	44.36506	23.09804	13.17661
11	0.105177	19.20957	44.03493	23.65410	13.10140
12	0.105474	19.10288	43.82463	24.00373	13.06877
13	0.105673	19.03098	43.69722	24.22572	13.04608
14	0.105807	18.98356	43.61878	24.37116	13.02650
15	0.105894	18.95314	43.56732	24.46761	13.01193
16	0.105948	18.93442	43.53231	24.53026	13.00300
17	0.105981	18.92330	43.50891	24.56943	12.99836
18	0.106001	18.91678	43.49379	24.59330	12.99613
19	0.106013	18.91289	43.48413	24.60811	12.99487
20	0.106021	18.91043	43.47778	24.61792	12.99387
21	0.106027	18.90872	43.47334	24.62498	12.99296
22	0.106031	18.90740	43.46999	24.63047	12.99214
23	0.106034	18.90632	43.46731	24.63494	12.99143
24	0.106037	18.90541	43.46509	24.63868	12.99082
25	0.106039	18.90462	43.46322	24.64185	12.99031
26	0.106041	18.90394	43.46161	24.64459	12.98986
27	0.106043	18.90335	43.46022	24.64696	12.98948
28	0.106045	18.90282	43.45901	24.64903	12.98914
29	0.106046	18.90236	43.45796	24.65084	12.98884
30	0.106047	18.90196	43.45704	24.65243	12.98857

Factorization: Structural

Source: Research Findings

In the first period, 25 percent of the GDP changes were related to fiscal policies, 20 percent caused by monetary policies, 22 percent due to technology shock, and 32 percent was attributable to other factors which are latent in the structure of the GDP itself. During the time, the share of the shock caused by financial and monetary policy in the changes in GDP increased and the role of other factors became less significant. Overall, it can be stated that in this model monetary and financial variables have been collectively able to explain 70 percent of the volatilities created in Iran's GDP, but they make the largest contribution to explaining economic volatilities of government expenditures.

4- Conclusion

The findings from the model show that this model can best explain the causes of shaping of business cycles in Iran. Furthermore, the results confirm previous studies in terms of the nature of business cycles due to fiscal policy in developing countries. The overall conclusion of the model developed for Iran's economy is indicative of the fact that although both political tools, i.e., both fiscal and monetary policies have a more influential role in creation of business cycles, but the shocks to the fiscal tools (fiscal policy-making) have the largest effect on GDP changes and changes in fiscal policies have a

higher explanatory power compared than monetary policies. And importing investment and intermediate goods act as a channel for transferring technology and considering the structural problems afflicting the Iranian economy and its susceptibility to the importing these goods, they affect development of business cycles. Based on these findings, as a policy recommendation it can be stated that supervision over how to fix government's budget deficit, improving the taxation system for the purpose of decreasing government's dependence on oil revenues and overall decreasing the vulnerability of long-term economic growth to volatility of foreign exchange earnings (caused by the dominance of oil revenues over fiscal policies and government's monetary measures) can help to control the undesirable effects of oil shocks on the country's economy.

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