

opción

Revista de Antropología, Ciencias de la Comunicación y de la Información, Filosofía,
Linguística y Semiótica, Problemas del Desarrollo, la Ciencia y la Tecnología

Año 36, 2020, Especial N°

27

Revista de Ciencias Humanas y Sociales

ISSN 1012-1587/ ISSNe: 2477-9385

Depósito Legal pp 198402ZU45



Universidad del Zulia
Facultad Experimental de Ciencias
Departamento de Ciencias Humanas
Maracaibo - Venezuela

Measurement and analysis of the impact of oil shocks on fiscal policy

Esraa Said Saleh

lsraa_saeed@uomustansiriyah.edu.iq

Ali Mahdi Abbas Albairmani

dr_amaal@uomustansiriyah.edu.iq

Isam Abdul Khudhur Saud

d_r_assm18@uomustansiriyah.edu.iq

Abstract

Oil shocks directly affect fiscal policy in Iraq as a result of public budget dependence on oil revenues. Thus, Fiscal policy responds through its spending and revenue instruments in a way that is in line with or against the direction of oil shock. This research is about measurement and analyzing the response of fiscal policy towards oil shocks in Iraqi economy for period 2003-2017.

Keywords: Fiscal policy, GDP, Oil markets, Oil shocks.

Medición y análisis del impacto de los choques petroleros en la política fiscal

Resumen

Los choques petroleros afectan directamente la política fiscal en Irak como resultado de la dependencia del presupuesto público de los ingresos petroleros. Por lo tanto, la política fiscal responde a través de sus instrumentos de gastos e ingresos de una manera que está en línea con o en contra de la dirección del shock petrolero. Esta investigación trata sobre la medición y el análisis de la respuesta de la política fiscal a las crisis petroleras en la economía iraquí para el período 2003-2017.

Palabras clave: Choques petroleros, Mercados petroleros, PIB Política fiscal

1. INTRODUCTION

The Iraqi economy is often exposed to shocks as a result of fluctuations in oil prices, where exports of oil are the main source of its revenues. These shocks can be positive or negative or be temporary or continuous. Given that the fiscal policy in Iraq is one of the most important economic policies for directing economic activity and addressing the shocks and crises through mitigating the impact of oil shocks on the local economy, the fiscal policy responds in a manner consistent with the trend of oil shock, because it works away from the approach of various sources of revenues, so that the public budget has lost the flexibility to face fluctuations in financial return because oil is its main source and often constitutes a large percentage of GDP up to (70%).

The importance of research stems from the fact that the oil shocks resulting from fluctuations of oil prices are characterized by a significant impact on the fiscal policy in Iraq as a result of heavy dependence on oil revenues, neglect of public budget revenues from direct and indirect taxes, and keeping pace with fiscal policy of economic cycles caused by oil shocks.

The Iraqi economy is a rental economy depends on oil as a main source of revenues and the contribution of oil sector in GDP constitutes a large proportion compared with the contribution of other economic sectors. This makes the Iraqi economy more vulnerable to external shocks caused by fluctuations in world oil prices.

The oil shocks to the Iraqi economy caused by imbalance and fluctuations that occur in the world oil markets cause effects on fiscal policy that vary depending on the type of shock (positive or negative).

Measurement and analysis of the impact of oil shocks on fiscal policy in Iraq during the period (2003-2017).

2. METHODOLOGY

For the purpose of verifying the research hypothesis, it was divided into three sections as follows:

The First section: the theoretical and conceptual foundations of the concept of oil shocks and their impact on fiscal policy.

The Second section: Analysis of the impact of oil shocks on fiscal policy in Iraq for the period (2003-2017).

The Third section: Analysis the results of econometric model of the impact of oil shocks on fiscal policy in Iraq.

Section one

Theoretical Framework of oil shocks concept and Econometric Model Used

First Requirement: The Theoretical Framework of oil shocks concept

First: Oil shocks concept

Oil shocks are sudden imbalances in the oil market leading to a sharp rise or fall in prices that lasts for a certain period of time ,due to factors affecting supply or demand or both, These factors are the inability of oil supply to meet the need of global market, conflicts and international crises affecting the oil supply, as well as the efforts of consuming countries to search for alternative sources of oil where they have recently achieved a breakthrough in the field of shale oil that has a key role in the decline of oil prices since mid-2014, However, there is a consensus that there are other reasons behind this complex political and economic phenomenon. Also, there are countries believe that fluctuations in oil prices are not due to economic considerations but to purely political considerations. (REBECA JIMENEZ, 2004.p5).

Second: Oil shock types

Positive oil shock

A positive oil shock is a sudden increase in the prices of oil exports. The overall impact of this shock is based on the relative weight of oil exports on national income. This type of shocks would lead the economy to enter the recovery stage of economic cycle

through the positive impact on government consumption and thus increase public spending, especially if the country depends on the export sector as a main source of financing its public spending. The increase in government consumption would result in a higher aggregate demand, domestic product, incomes, and a higher level of production factors employment, provided that the economy is not at full employment level.

The oil-exporting developing countries experienced positive shocks in the 1970s when oil prices rose, reflecting positively on their balance of payments and revenues. However, development programs and production capacities in these countries were not prepared to expand the volume of investments and there was a gap between financial assets and real investments. (AL-NAJAFI, 2004:191).

Negative oil shock:

The negative oil shock is a sudden drop in the prices of oil exports globally that resulting in a negative impact on revenues, state spending plans, investment, and levels of employment.

Third: The Impact of Oil shocks on Fiscal Policy:

The importance of studying the impact of oil shocks on fiscal policy comes from the fact that fluctuations in oil prices have increased in recent years. The impact of these shocks on fiscal policy is evident through two different fiscal situations. The first fiscal

situation, the so-called neutral fiscal policy, is one in which both tax revenues and government spending remain constant during oil shocks and therefore shocks have no impact on fiscal position of government. The second fiscal situation, the so-called interventional fiscal policy, is one in which public spending and tax revenues are affected in the same direction of oil shocks. The impact of oil shock on national economy when it is positive, fiscal policy responds to the positive revenues shock (pro-cyclical fiscal policy) by increasing government spending in the areas of production, health, education, and infrastructure. This increase in government spending, through spending multiplier effect, would generate an increase in aggregate demand without increasing the amount of external debt. taking into account the productive capacity of the economy and the level of full employment (GLENN FOLLETT AND BYRON LUTZ.2010.p 9-10).

There is a consensus among most economists that a positive oil shock is adjusting disposable income, that is, a country may consume more than it could before but without increasing the amount of external debt. Instead, individuals prefer to save a certain portion of their high incomes and consume more in the future. On the other hand, in the case of a country experiencing a negative oil shock, fiscal policy may respond procyclically and, consequently, government spending will fall and tax rates will raise. A tight fiscal policy will lead to an impact on Macroeconomic variables as the levels of production, employment, and prices are determined by the level of government spending. On this basis, the low level of government spending means lower demand for goods and services, less use of resources in the

production process, layoffs, higher unemployment rates, and lower incomes. In this case, the country will spend less than it could before and the decrease in spending is postponed due to the possibility of external borrowing, but in the end, the spending of that country has to be reduced to the extent commensurate with its new low income.

Most adjustments in public spending directly affect private consumption, and the effect on public investment side are greater than they are on the public consumption side. The reason behind this is because the cuts in public consumption directly affect consumer benefit, while the cuts in public investment indirectly affect the benefit by reducing the return on private capital and marginal product of labor. Also, the effect of reducing public spending on consumer benefit is spread over multiple periods of time, such as reducing the value of capital over time (OTHMAN ALWAGDANI, 2014, p 7).

The reduction in public spending raises the fears of some economists because of its negative impact on economic activity in the short term, since most multipliers (measures of the effect of deficits on economy) indicate that spending cuts negatively affect economic activity more than the effect of the same amount of tax increases. Other economists consider cutting spending rather than increasing taxes will be more effective in stimulating economic growth or helping to avoid recession. When economists consider the recessionary effects of reducing public spending in the short term in an economy below full employment level, they believe that the budget deficit caused by increased public spending can be harmful in the long term by crowding

out the private sector, while reducing deficits will increase the confidence of consumers and investors, and thus spending cuts will have fewer impacts than tax increases.

3. RESULTS AND DISCUSSION

3.1. The Tests for Unit Root Stationary

The nonstationary of time series is most often due to the presence of unit root in the data of these series. For the purpose of knowing whether the time series is stationary or not for each variable in the model, this requires testing the unit root of that time series. There are several unit root tests, but the most important and common are Dickey Fuller test and Phillips-Peron test.

Dickey–Fuller (DF) Test

The Dickey–Fuller test is based on three elements to determine whether or not the time series is stationary, which are:

- Model formula used

- Sample size

- Level of significance

This test is based on performing an autoregressive procedure for each series using the first difference of the series variable as a dependent variable and entering the same variable as an independent variable with a lag time of one year, and also the first difference of one - year lag time of the variable can be used for one period. This test is based on three models:

1- Without a constant term and without a time trend, as in the following equation:

$$A Y_{t-1} = PY_{t-1} + U_t \tag{1}$$

2- There is only a constant term as in the following equation:

$$\Delta Y_t = a + pY_{t-1} + U_t \tag{2}$$

3- There is a constant term and time trend ,as in the following equation:

$$\Delta Y_t = a + a_1 T + PY_{t-1} + U_t \tag{3}$$

The Dickey – Fuller test verifies, through the three formulas above, the null hypothesis which states that the time series contains the unit root, as opposed to the alternative hypothesis which states that the time series is stationary. The verification process is done through (p-

values), and if its value is less than 5%, this means that the time series is stationary with no unit root, and if it is greater than 5%, this means that the time series is not stationary with a unit root and this requires taking the first or second difference of series and retest with the same mechanism for obtaining stationary.

3.2. Co-Integration

The origin of Co-Integration dates back to 1981 by Granger, while this idea was clarified, tested, and experimental examples provided in 1987 by Engle and Granger.

There is a linkage between the approach of co-integration and economic theory, as the existence of a co-integration between certain variables indicates a long term equilibrium relationship between these variables and their approach to each other in the long term. In fact, as long as the tests of co-integration depend largely on unit root tests (stationary), the co-integration represents a quantitative economic approach that helps to clarify the effect of change across the time path to equilibrium and, also, to reveal or not the existence of long-term equilibrium relationships between model variables, which considered an introductory pathway to knowing the causal relationship. It is important here to mention here that there are several methods for examining whether or not co-integration exists, but one of these methods would be indicated below:

3.3. Johansen – juselius Test

This test was developed by JUSELIUS and JOHANSEN (1990) to avoid deficiencies in the two-step Engle-Granger test, as the first test is distinguished from the later by being suitable for small and large samples as well as for relationships that contain more than two variables. According to juselius and Johansen test, determining co-integration vectors is done through the following two tests:

Trace Test (trace λ), which takes the following formula:

$$\lambda \text{ Trace} = - T \sum_{i=r+1}^n \log (\lambda_i) \tag{4}$$

Where the null hypothesis is tested against the alternative hypothesis, and the null hypothesis is accepted if the calculated maximum possible average is smaller than the critical value which means that the co-integration vector is equal to zero, while if the calculated value is greater than the critical value, then the alternative hypothesis is accepted. This means that the number of vectors is greater than zero, which means that there is a co-integration between the relationship variables.

Maximum Eigenvalues Test, which takes the following formula:

$$\text{Max} = -T \log (1-\lambda_t) \lambda \tag{5}$$

According to this test, the calculated value of the maximum probability rate if it is greater than the scheduled (critical) value then the null hypothesis is rejected ($r = 0$) and the alternative hypothesis is accepted ($r = 1$) which states that there is at least one vector for the co-integration, and the opposite is true if the null hypothesis is accepted and the alternative hypothesis is rejected.

3.4. Third - Determine the optimal Time lag

As a result of the dynamic use of error correction vector model in determining the short-term and long – term relationship between economic variables, this model is sensitive to the time lag of explanatory variables in causal relationship equations. This matter requires the adoption of certain criteria to determine the appropriate time lag of the variables under test, which must be included in the error correct vector model to ensure that it gives the best estimates about the direction of causal relationship between the variables in the short and long term. Three tests with specific criteria have been used to determine the optimum time lag period:

- Akaike Information criterion Test
- Hannan – Quinn Information criterion Test
- Schwarz Information criterion Test

All of the tests above state that the optimal time lag period is the period that gives the lowest value after the test.

3.5. Fourth – Autoregressive Distributed Lag Model

It is designed for use with unstationary time series and applied by pesaran and shin in 1999. In 2001, Pesaran et al developed this model to test co-integration and short and long – term relationships. The general formula for the mentioned model is:

$$\Delta Y_t = C + \alpha_1 (t-1) + \alpha_2 x_1 (t-1) + \alpha_3 x_2(t-1) + \dots + \alpha_{(K+1)} \quad (6)$$

Whereas:

Et: random error term

In the absence of a co-integration, that is to say, a long –term equilibrium relationship between the variables, and consequently, the null hypothesis is realized, which is represented as below:

$$H_0: \alpha_1 = \alpha_2 = \dots = \alpha_{k+1} = 0 \quad (7)$$

Against the alternative hypothesis:

$$H_0: \alpha_1 \neq \alpha_2 \neq \dots \neq \alpha_{k+1} \neq 0 \quad (8)$$

That is, existence of a co-integration and a long – term equilibrium relationship between the variables.

ARDL implementation requires the following steps:

1- Determine optimal time lags based on Akaike and Schwarz criteria.

2- Co- significance test for the variables as the ARDL model provides two values for testing and comparing the statistically estimated values (upper and lower value of F), and if the Calculated Value of F is less than the lower F then the null hypothesis is accepted and this means that there is no co-integration between the variables, While the alternative hypothesis states that there is no co-integration between the variables when the calculated value of F is greater than the upper limit.

3.6. Fifth-Impulse response functions

The impulse response functions measure the impact of the shock to which a variable is subjected within the Vector Auto Regression model (VAR). Or the Vector-Error Correction Model (VECM) on the current and future values of other variables of that model. There are two ways to measure the impact of a shock. The first one measures the shock effect by one standard deviation, while the

Second measures the shock effect by one unit. The impulse response functions are characterized by the fact that they show a single and sudden decrease of a variable on itself and on the rest of model variables at all times with the assumption that there is no correlation between errors.

3.7. The second section

Analysis of the impact of oil shock on Fiscal Policy

In Iraq for the period (2003-2017)

A review of the details of fiscal policy path in Iraq leads to the fact that it is weak in its ability to face the cyclical economic fluctuations resulting from fluctuating public revenues due to its continued dependence on oil revenues. In short, achieving the fiscal policy in Iraq for its spending programs depends on the growth of oil revenues. Since 2003, Iraq has witnessed a number of political and economic transformations so that it has managed to make significant progress towards macroeconomic stability.

Iraq has come fifth in the world in terms of proven oil reserves (143 billion barrels) after Saudi Arabia, Venezuela, Canada and Iran. After the sharp decline in oil production in 2003 due to the American occupation and its repercussions as it fell to (1.3) million barrels per day, then production increased rapidly to reach (2.95) million barrels

per day in 2012. Table (1) below shows a comparison between general revenues, oil revenues, price of a barrel of oil, and the ratio of oil revenues to general revenues for the period (2003-2017).

Table 1: Development of public Revenues in Iraq for the period (2003-2017) (billion dollars))

Year	Public Revenue	Oil Revenue	Oil Price dollar	The ratio of oil revenues to public revenues%
2003	20.328	18.12	24.4	88.58
2004	22.703	22.228	31.4	97.9
2005	27.526	26.516	45.6	97.4
2006	33.439	31.548	55.6	94.9
2007	43.769	40.415	66.7	94.7
2008	67.595	63.127	87.9	93.9
2009	45.407	40.047	59.4	88.5
2010	59.981	53.044	75.6	85.7
2011	92.997	86.562	105	97
2012	102.458	93.218	106	89.36
2013	97.478	92.902	102.3	97.46
2014	90.526	81.624	91.6	92.11
2015	59.291	58.051	44.729	97.90
2016	45.722	37.199	36.098	81.35
2017	64.988	54.682	53.75	84.13

Source: The percentages of researchers working on data from the Central Bank of Iraq, annual releases 2003-2017

Since 2011, as table (1) shows, oil revenues have witnessed a remarkable boom due the increase on oil price to more than (100) dollars a barrel. After 2003, the fiscal policy in Iraq was characterized as an expansionary policy as a result of the large increase in oil revenues due to the lifting of economic sanctions and high oil prices. In 2004, public spending at current prices increased to reach (32117491) million dinars, and at constant prices (59598.99) million

dinars, after it was (8822.32) million dinars in 2003. This increase in government spending is due to the increase in public sector salaries and to increased security and military spending due to the deteriorating security situation in the country.

As for the period 2005-2008, expansionary fiscal policy reached its highest level in 2008, as public revenues increased as a result of the rise in world oil prices. (Kirabaeva & others, 2013, p5) However, this increase in public revenues was accompanied by an increase in the amount of operating spending due to the large size of public sector and the huge dependence of the Iraqi economy on oil revenues in financing government programs and plans. In addition, the political and social conditions have formed a pressure on the Iraqi government to expand employment in the public sector which has been offset by the declining role of the private sector in providing employment opportunities due to security and political conditions as well as a result of the absence of the legal and institutional necessary for developing the private sector. All of these factors have led to a deepening of the imbalance in the structure of public spending in favor of operational expenditures and at the expense of investment expenditures, as shown in the table (2) below.

DURING that period (2005-2008), the expansionary direction of public spending policy was justified by the fact that Iraq has started the process of reconstruction and achieving sustainable development in all economic sectors with the aim of restructuring the economy and reforming structural imbalances, but by following up the development

of operating and investment spending ratios to public spending-table (2) – we come to the fact that spending policy has failed to reform the structure of the Iraqi economy. (JONATHAN E. SANFORD, 2003: P5)

In 2009, public revenues declined due to lower oil prices (which is the channel that plays a fundamental role in transferring the effects of economic crises to the Iraqi economy) and the repercussions of global financial crisis. As a result, the annual growth rate of public spending decreased to (9.25%) after it was (34.29%) in 2008, and this forced the policy makers to resort to the accumulated reserves achieved from pervious booms in oil prices to finance the budget for the year 2009.

4. CONCLUSION

The model's impulse functions indicate that a shock of one standard deviation in oil prices leads to a response to public spending since the first period, thus reflecting the spending policy alignment with the economic cycle by high oil prices.

The model's impulse functions also indicate that a shock of one standard deviation in oil prices will have a significant and positive impact on the size of public revenues as a result of the domination of oil revenues over public revenues, which are closely related to oil prices and their fluctuations. Therefore, the fluctuations in oil prices

must leave a clear impact on public revenues, while a shock in public revenues will not have an impact on oil prices because oil prices are external variable while public revenues are an internal variable.

RECOMMENDATIONS

Diversification of the public revenues base in preparation for removing the Iraqi economy from the renter pattern in order to protect the economy and the public budget from large or sudden fluctuations in oil revenues to achieve stability in government spending levels and enhance its efficiency.

This can be done by expanding dependence on tax revenues as an indispensable financing tool, which requires reforming the tax system by reviewing current tax laws and legislation, in addition to enhance tax awareness among the public.

Diversification of the structure of economy in Iraq through a gradual increase in rates of contribution of other economic sectors (agriculture, industry, tourism, etc) in the formation of the gross domestic product in order to form various sources of financing for the public budget.

Reducing the flow of the economic surplus abroad as a result of the increasing import of goods and services that the local market was unable to provide due to the weak non – oil real output low levels of its

growth. This can be achieved through establishing and qualifying an advanced production system that is consistent with the material and human resources of the Iraqi economy, in addition to providing ways to finance strategic productive.

Projects capable of advancing the productive sectors of the country, as well as developing pivotal structures achieve externalities for these projects.

All of this has to be done in conjunction with making serious efforts by political decision – makers to provide security and political stability for the environment that embraces these projects and keeping the economy away from political tensions.

REFERENCES

- AL-NAJAFI, SALEM TAWFIQ. 2004. **the legacies of the twentieth century economic approaches, i 1**, Amman, Dar Al-Hamid Publishing.
- GLENN FOLLETTE AND BYRON LUTZ. 2010. **Fiscal Policy in the United States: Automatic Stabilizers, Discretionary Fiscal Policy Actions, and the Economy**. Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C.
- JONATHAN E. SANFORD. 2003. **Iraq's Economy: Past, Present, Future, Coordinator Foreign Affairs Defense, and Trade Division, Congressional Research Service, and the Library of Congress**. Report for Congress Received Through the CRS Web.

- OTHMAN ALWAGDANI. 2014. "The asymmetric effects of fiscal policy shocks on private consumption in saudi arabia", **European Scientific Journal February** edition vol 10.
- REBECA JIMÉNEZ-RODRÍGUEZ. 2004. **oil price shocks and real gdp growth empirical evidence for some oecd countries**, working paper series, NO. 362.



**UNIVERSIDAD
DEL ZULIA**

opción

Revista de Ciencias Humanas y Sociales

Año 36, Especial N° 27 (2020)

Esta revista fue editada en formato digital por el personal de la Oficina de Publicaciones Científicas de la Facultad Experimental de Ciencias, Universidad del Zulia.

Maracaibo - Venezuela

www.luz.edu.ve

www.serbi.luz.edu.ve

produccioncientifica.luz.edu.ve