Crisis Management: monetary policy compatible with the oil economy

Gestión de crisis: política monetaria compatible con la economía petrolera

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ABSTRACT

The purpose of this research is to explain monetary policy consistent with the country's economic conditions. Hence, in this paper, we tried to evaluate the two states of the central bank's reaction to the dynamic general equilibrium model adapted to the characteristics of the Oil-rich countries economy. In the first instance, the policy maker, with regard to the level of production, diverts inflation from target inflation and exchange rate policy. In the latter case, the basis for deciding the production deviation from potential production, the deviation of future inflation from target inflation and exchange rate, and in both cases, the use of policy experiences is also considered as a variable for policy.

Keywords: foreign financial resources, central bank's, policy maker, DSGE-BVAR, financial service

RESUMEN

El propósito de esta investigación es explicar la política monetaria de acuerdo con las condiciones económicas del país. Por lo tanto, en este documento, intentamos evaluar los dos estados de la reacción del banco central al modelo dinámico de equilibrio general adaptado a las características de la economía de los países ricos en petróleo. En primera instancia, el creador de políticas, con respecto al nivel de producción, desvía la inflación de la inflación objetivo y la política de tipo de cambio. En este último caso, la base para decidir la desviación de la producción de la producción potencial, la desviación de la inflación futura de la inflación objetivo y el tipo de cambio, y en ambos casos, el uso de experiencias políticas también se considera una variable para la política.

Palabras clave: recursos financieros extranjeros, banco central, creador de políticas, DSGE-BVAR, servicio financiero

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Introduction

Another noteworthy point is that most of the studies conducted in recent years have been in the form of DSGE models. However, these models are highly criticized by some economists due to the use of informal calibration methods for evaluation and estimation. Therefore, a method for estimating this model should be used that can, along with the modeling of the realities of the Oil-rich countries economy; provide a better fit for the effect of oil shocks on the true economic variables. One of the disadvantages of DSGE models is the integration of these models with a modeling model such as BVAR (Algozhin, 2015), since these results in more compatibility between the DSGE and the VAR, which is more consistent with the data. The DSGE-BVAR hybrid model, in addition to reducing the prediction error of DSGE models, results in more coordination between theoretical foundations and data, which results in better data fitting (Algozhin, 2015). Hence, in this paper, the impact of oil shocks on economic variables has been tried to examine in the framework of a DSGE-BVAR model proportional to the characteristics of the economies of oil-rich countries. Accordingly, the structure of this paper is as follows:

> After introducing and reviewing the background of the research, the dynamic random equilibrium model is compatible with the open economy of Oil-rich countries. The third part of the research methodology is presented and the results of model estimation and effects of various impacts on macro variables are investigated (Bostani, 2012).

Finally, a summons and recommendations for monetary policy makers are presented.

Given the changes that began in monetary policy since the 1960´s, countries use instruments such as interest rates, inflation rates, exchange rates, or a combination of these tools to manage their money according to their economic circumstances (Lubik, 2007). Experts extracted using the optimal control methods of the optimal monetary policy for the Oil-rich countries economy, assuming that the policy maker uses interest rates as policy tools. For this purpose, a randomized dynamic model including rational expectations for the country's economy was presented, whose parameters were adjusted according to the coefficients obtained in previous studies (Rabee Hamedani, 2014). The results showed that optimal policymaker's behavior is to reduce interest rates in response to technological impacts (Romero, 2008). Policymakers also need to respond aggressively to increasing the amount of money. Experts used a dynamic equilibrium model to analyze Oil-rich countries' monetary policy (Olayeni Olaolu, 2009). In this template, the central bank's policy tool involves controlling grants and intervening in currencies. The results of the projected model estimate indicate that, if inflation targeting policies follow, and with the occurrence of oil shocks, less volatility occurs in large variables. Based on the optimization of the wisdom and internal price indices, experts have focused on evaluating various monetary policies in Oil-rich countries (Tajikani, Akbar and Hossein Tavakoliyan, 1931).

The research findings show that the implementation of the policy of targeting internal inflation ineffectiveness of inflation and unemployment. Among the monetary rules, the domestic inflation targeting rule provides a complete overview of the results of optimal monetary policy. Also, the fixed-exchange rate policy, the worst performance and monetary rule, targets inflation as the best practice among monetary rules. Experts used a dynamic equilibrium model to determine the optimal monetary and financial policies of the Oil-rich countries economy. In this model, in order to adapt to Oil-rich countries' oil-related conditions, the financial sector is considered as the government sector, the impetus of expenditures and the effects of changes in government revenue sources, including taxes and oil revenues (Walsh, 2003). To simplify the model, given the small size of the country in the oil market, oil prices for the domestic economy are exogenous. Due to the conversion of crude oil sales to domestic currency, oil price fluctuations and the exchange rate are based on changes in the volume of domestic currency. Policy function results indicate that rising inflation, the production gap and the volume of liquidity, raising interest rates is one of the best ways to reduce instability. Based on the results of model uncertainty, policy performance and policy makers' response have been accompanied by improvements.

The model's uncertainty has been to make policy terms consistent with accruals. Also, in the presence of persistent inflationary periods in Oil-rich countries' economy, more weighty responses in the first period were optimal responses to the state of the parameters. The experts also sought to stabilize production, inflation and distribution of income simultaneously with the implementation of the energy price reform plan, the monetary policy rules and the optimal financial. In this regard, using the optimal control theory, a loss function of monetary and financial policymakers includes the second power of inflation variables, the growth gap of production, the Gini coefficient, and the deviation of the growth of liquidity and the growth of government expenditures from the previous periods according to the three curves of the total demand , The Philips curve and the income distribution equation were mined and the rules of optimal monetary and financial policy were extracted in terms of energy price modification (Tavakkilian, 2012). Experts used the method of random dynamic general equilibrium to extract the optimal monetary rule for the Central Bank of the oil-rich countries. In this research, the monetary transfer mechanism of the model consists of four equations of total demand, total supply, oil price and Taylor's relation. In this study, the dynamic form of the relationship between total demand, given the monetary nature of inflation in oil-rich countries, is a function of the growth rate of the volume of money. With the assumption that the central bank's goal is to simultaneously pursue the inflation target and production gap, and given the mechanism of monetary transfer, the optimal monetary policy rule for oil-rich countries has been extracted as a function of the inflation gap, the production gap and the growth rate of oil revenues (Zarra, 2012).

Methodology

DSGE-BVAR Methodology

Random dynamic general equilibrium models provide a consistent description of the macroeconomic theories and provide a clear economic interpretation of impacts affecting the economy, while the vector auto regression models tend to provide better fitting data based on their past trends and are not based on theoretical foundations. Therefore, due to the characteristics of these two models, it is possible to combine them with each other to provide closer coordination and closer interfaces between theoretical foundations and the data process, and secondly, better fitting of data. The DSGE-BVAR (λ) model was first introduced by (Del Negro, 2004), and in another article from the two writers, this model was developed, which is now used by a number of authors. As stated, this method the combination of DSGE and VAR is based on the Busy estimation method. Unlike BVAR, which uses Minnesota's former distributions for sloping forward estimates of random steps in parameter space, the DSGE-BVAR (λ) model uses artificial data generated by the DSGE model to slope downward estimates of a region of parameter space. This method brings a balance between the VAR statistics and the DSGE's economic needs. The hyper parameter λ determines how this trail would be done. The goal of DSGE-BVAR (λ) is to build identical synthetic distributions with the previous Minnesota-style distribution in BVAR. These previously viewed distributions are used to simulate the likelihood function. The steps are as follows:

Estimated DSGE Model

The DSGE model is estimated using the Bayesian method. A fundamental result used in the bottom-line analysis is that the Posterior distribution is proportional to the multiplicity function of the previous distribution.

$$p(\theta|y) \propto p(y|\theta)p(\theta) \quad (1)$$

y represents the observed data, θ is the known parameters and p (.) is the density function.

Determine the approximate VAR for the DSGE model

The DSGE model can be written as a VAR in the form below:

$$y_t = \emptyset_0 + \emptyset_1 y_{t-1} + \cdots + \emptyset_p y_{t-p} + u_t \quad (2)$$

The maximum VAR likelihood function is:

(3)

$$p(y|\emptyset,\Sigma) \propto |\Sigma|^{\frac{-T}{2}} \exp(-\frac{1}{2} tr[\Sigma^{-1}(y'y - \emptyset'x'y - y'x\emptyset + \emptyset'x'x\emptyset)])$$

Optimal combination model

(3,4) factorized the distribution in the conditional density for VAR parameters, so that p_λ (φ, Σ | Y, γ) represents the DSGE parameters and the final density of DSGE parameters, which is represented by p_λ (γ | Y). DSGE fit assessment; they studied the later distribution of the λ-superconductor. They checked a limited number of grids $\Lambda = [\lambda_1, \ldots, \lambda_q]$ with $\lambda_1 = \frac{n+k}{T}$ and $\lambda_q = \infty$. The distribution of this hyper parameter is as follows:

(4)

$$p_\lambda(Y) = \int p_\lambda(\emptyset,\Sigma,\gamma|Y) d(\emptyset,\Sigma,\gamma)$$

That;

(5)

$$p_\lambda(\emptyset, \Sigma, \gamma|Y) = p(\emptyset, \Sigma|Y, \gamma)p_\lambda(\gamma|Y)$$

And then it is as follows:

(6)

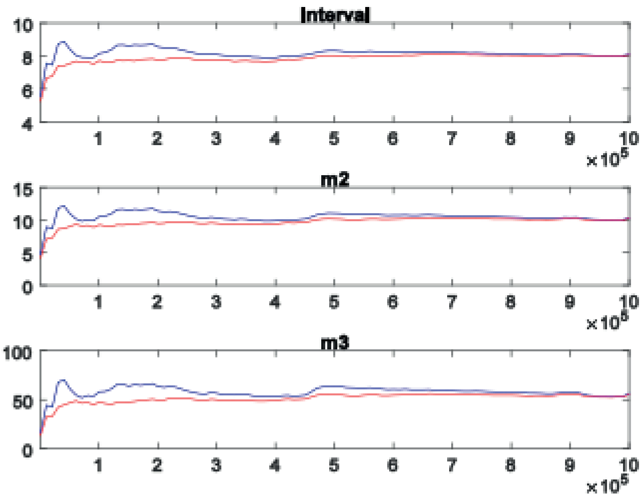
$$\hat{\lambda} = \arg max_{\lambda\in\Lambda}\, p_\lambda(Y)$$

The minimum value of λ is zero. In this case, the best representation of the data is VAR, and the maximum value of λ is infinite, in which case data will fit better than the DSGE model. If $\hat{\lambda}$ is large, the theory model will fit the data well, and if $\hat{\lambda}$ approaches zero, the theory model does not explain well the data.

Results

Before simulating the model, it is necessary to calculate the structural parameters and stable values of the model variables. To determine the structural parameters of the model, initialization methods, Bayesian estimates, or a combination of both are used. To estimate other parameters of this pattern, we use Bayesian method and Metropolis – Hestings Ondings algorithm. Using the metropolis algorithm, ten parallel chunks with a volume of one million sample impressions were extracted to obtain the lateral density of the parameters. Data used in this paper are seasonal adjusted data of consumer price index, GDP, government investment (development expenditures), currency volume and foreign exchange earnings from oil exports during the 23 years period. All data is seasoned using X-12 method. The Consumer Price Indicator data for inflation and the amount of money used for the growth rate of monetary base have been used. Using the Hedrick-Prescott filter, the process component was separated from the data and analyzed on a cyclic component. The Bayesian estimate is based on the maximal truth function of the dynamic random-equilibrium system. The advantage of this method is that you can add additional information to the template through previous distributions for parameters. In fact, Bayesian estimation is a general dynamic dynamic equilibrium pattern based on a likelihood function obtained from logarithmic-linear solving. For estimation, the type of distribution, mean, and standard deviation of the previous parameters 1 must be determined. The previous distribution paper for each parameter is selected based on its characteristics and the distribution characteristics. As an example, the beta distribution is used to estimate parameters that are in the range of [0-1], so the distribution is used to estimate parameters such as the discount rate or part of the government's oil revenues sold to the central bank. Also, the gamma reverse distribution is used to estimate the parameters that are non-negative and have infinite standard deviations. With this description, the gamma reverse distribution is appropriate for estimating parameters such as the standard deviation of the shocks.

First state reaction function



Second state reaction function

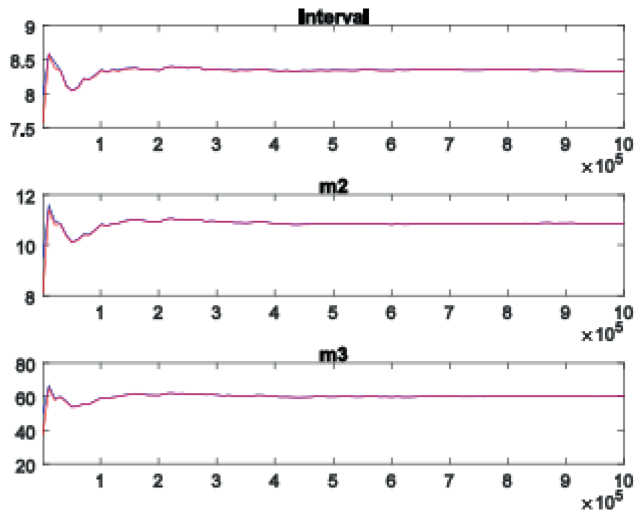


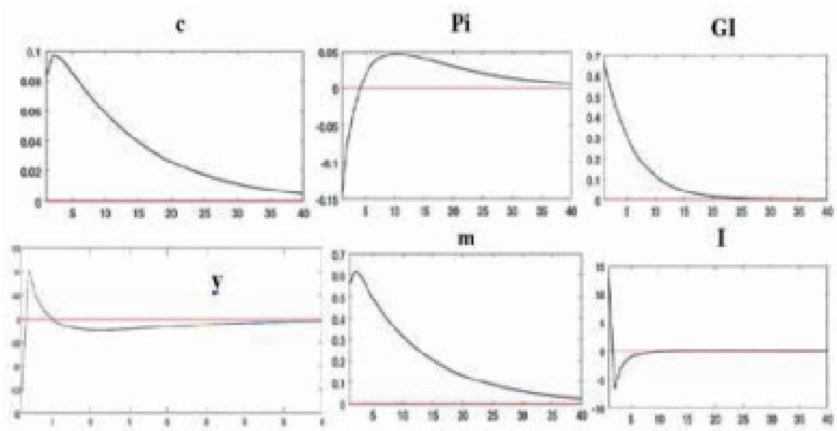
Fig 1. Multiple diagnostic tests

Another Diner outlet is the comparison of the past and the past parameters based on the Metropolis -Ondings algorithm. As you can see, distributions have their own conventional shape and their fashion is well-defined. In some of the reported graphs, the previous and previous densities coincided, indicating that either the previous information about these parameters was perfectly correct or that the data used could not be used to estimate these parameters (for example, For the parameter, if the correctness of each of these states, the result indicates the calibration of that parameter. In the Bayesian approach, if the previous information is accurate and accurate, Bayesian method becomes calibrated, that is, in this case, the late density of the parameter is equivalent to its former density and the information likelihood function does not exceed the information available. But if this information is completely false, the Bayesian approach will be converted into a likelihood function, in which case the later density of the parameter will be equivalent to the likelihood function derived from the data. In the interstitial state, the Bayesian approach will be a method between calibration and maximum likelihood in that lateral density, the weighted average is from the previous density and the likelihood function.

A. The first mode of the central bank reaction function.

B. The second is the central bank reaction function.

Fig 2. An Instant Response Functions A snap of oil revenues in the size of a standard deviation.



A. The first mode of the central bank reaction function

A. The second mode of the central bank reaction function

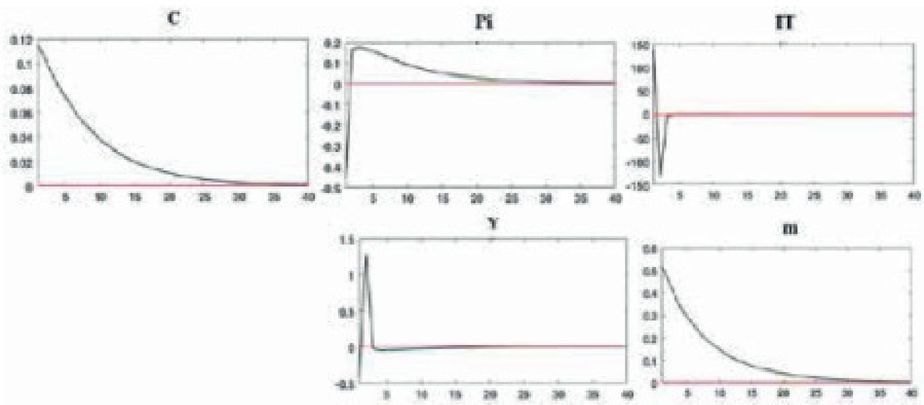


Fig 3. An instant response function is a currency swirling as much as a standard deviation

According to the new Keynesian doctrines, a dynamic random variable equilibrium model is appropriate for the characteristics of the economies of the oil-rich countries, including the high dependence on the state budget on oil revenues, how the government allocates current and construction expenditures, the share of oil revenues from exports, and thus exports Oil was designed as the only trade-off between the country and the outside world and the central bank's lack of independence. Since the economies of oil-rich countries have always experienced the effects of oil shocks during the recession period in different periods, in this paper two monetary policy modes were examined. In the first case, the central bank, in view of the diversion of inflation from the target inflation and the level of production, and in the latter case, policy on the basis of future inflationary fluctuations of target inflation and the diversion of production from potential production. In both cases, the policy tools of the Bank's Center for Growth of Money and Policy Utility have been taken into account from previous policy experiences. The model estimation using the DSGE-BVAR method, based on seasonal data, shows that in the latter case, the policymaker takes decision and policy making more attention to previous policy experiences than the current situation, while in the first case the picture is the same. Also, the analysis of the results of the functions of the instantaneous reaction of oil, currency and monetary impacts shows that if the policy, based on past experience, aims to reduce the production diversion from potential production and reduce the future inflationary divergence from the target inflation, then if a fast economic momentum is brought to a state of equilibrium will return.

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