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The Impact of International Oil Price Fluctuation on China's Economy

Zhang Qianqian*

School of Economics and Management, Wuhan University, Wuhan 430072, China

Abstract

Oil is an important lifeline in our national economic development, and its price fluctuations also affect every field of the economy. With the rapid economic development, China's demand for oil has increased and the dependence on imported oil also on the increase. Therefore, the negative effect of high oil price on China's economy is growing up. In this paper, we apply the cointegration and error correction model to specifically measure the impact of oil price on the economy. The results show that there exist long-run equilibrium relationship between the oil price and the China's output, the consumer price index, the total amount of net exports and the monetary policy. Rising international oil price would cause the total amount of net exports and the real output to decline and the prices to ascend. Meanwhile, it would have a negative impact on the actual money supply.

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1. Introduction

Energy is an important pillar of national economic development. Oil, as an important strategic material and special product, goes throughout all the aspects of production and daily life, being an important indispensable component in our modern economic life, it's price fluctuation also affect every field of the economy. Therefore, a number of theoretical and empirical researches have examined the relationship between oil price shocks and economic growth. These researches conducted from a variety of perspectives and methods, but mainly focused on the developed countries, only a few refer to Asian countries. With China's continuous economic growth and opening up, oil price fluctuations will have greater impact on China's economic growth and stability, in this paper we take the international oil price as the research object to specifically measure the impact of oil price on China's economic growth.

* E-mail address: angel443@163.com.

The remainder of the paper is organized as follows. Section 2 is the literature review. Section 3 considers the influence of oil price fluctuation on the economy. Section 4 describes the model selection and introduction. Section 5 reports the econometric analysis and the estimation results. Section 6 summarizes the main findings.

2. Literature Review

So far, a large literature have investigated the macroeconomic impact of oil price shocks, focusing in particular on the real economic growth. Hamilton (1983) observed that all but one of the US recessions since World War II have been precede by a dramatic increase in the price of crude petroleum. Thus there showed a strong negative correlation between the rising oil price and the American economic activity. Brown and Yücel (1999) used the vector auto-regressive (VAR) model to study the impact of oil price on economy, he found that the oil price shock may cause the real GDP decline, consumer prices increase, short and long term rates increase. Burbidge and Harrison (1984), Rotemberg and Woodford (1996), Finn (2000) and other studies also agree that the oil price shocks (mainly refers to the rising oil price) may led to the output falling and inflation.

Another strand of research related to the present papers deal with the possible policy reaction of the monetary authorities. Many economists such as Bohi(1989), Bernanke, Gertler and Watson(1997) have investigated the monetary polity response to the oil price shocks.

3. The Influence of Oil Price Fluctuation on Economic Growth

Many economists agree that oil price is an important factor which would cause the depression of the economy, it may increase the domestic cost of factor inputs, then push up the overall inflation; it would also cause the net exports decline in the oil-importing countries, lead to the deterioration of the trade balance; meanwhile the consumer spending and investment may decrease, lead to the decline of economic growth. (see Fig.1)

3.1. CPI

The rise of oil price would directly push up the cost of factor inputs, lead to the production cost of the enterprise increase, then the enterprise would increase the selling price to keep profit, which could push the price of the production materials increase, then transfer to the overall price. Then high price will aggravate the rise of the production cost in the enterprise, push price continually ascend, then lead to inflation.

3.2. International Balance of Payment

Oil price rise would increase the import costs, cause the importing expenditure rise. Meanwhile as the high oil price may increase the cost of production, the competitiveness of the export industries would fall. Besides, the slowdown of world economic growth caused by the high oil price may result in the worldwide demand decrease. All of these would lead to the overall exports reduce. On the one hand the imports increase, on the other hand the exports decrease, thus the net exports decline.

3.3. Real Output

Oil price may influence every aspect of the national economy, production and consumption, cost and price, trade and investment, all of these would be affected by the oil price fluctuation, so the high oil price would also reduce the national output. First, high oil price would lead the domestic refined oil prices increase, then the oil expenditure rising, under the same income, consumer spending would decrease correspondingly. In addition the price ascend means the real income decrease, which would also reduce the consumption. Second, the imported oil price increase would rise the production cost of the enterprise, the expected return decline, result in the decrease in investment and production. Furthermore, the uncertainty expectation of the future would also accelerate the decrease in consumption and investment. Third, the exports may also be influenced by the high oil price. On the whole, the oil price increase would reduce the output, slow down the economic growth.

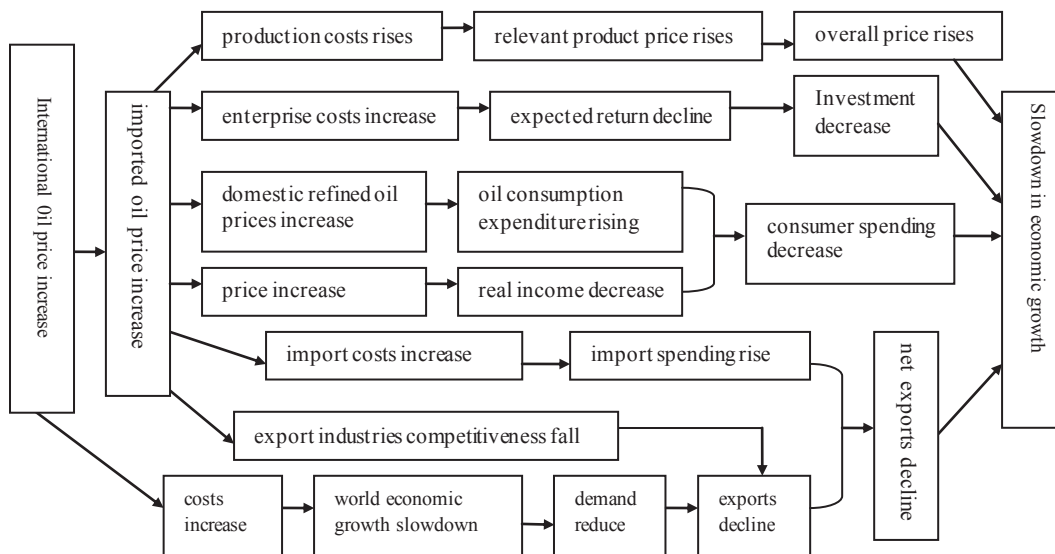


Fig. 1. the functional mechanism of oil price increase on china's economy

4. Model

In this paper we choose Vector Error Correction Model (VECM) to analyze the influence of the international oil price fluctuations on China's macroeconomy and the corresponding monetary policy response. Error correction model is an important representation of cointegration relationship, it overcomes the Spurious Regression, and describes the long-term performance and the short-term characteristics of the economic variables effectively.

The most general mathematical expression of VAR model is

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad t = 1, 2, \dots, T \tag{1}$$

where y_t is the k-dimensional vector of endogenous variables, x_t is a d-dimensional vector of exogenous variables, p is the lag order number, T is the sample number. $k \times k$ -dimensional matrix A_1, \dots, A_p and $k \times d$ -dimensional matrix B is the coefficient matrix to be estimated. ε_t is a k-dimensional disturbance vector.

If there exist cointegrations among \mathcal{Y}_t , then the previous equation without exogenous variables can be written as follow:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \quad (2)$$

where $\Pi = \alpha\beta'$ ($0 < \text{rank} < k$), Δ is the differencing operator.

It can also write in the form:

$$\Delta y_t = \alpha ecm_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \quad (3)$$

Where $ecm_{t-1} = \beta' y_{t-1}$ is the error correction term, reflecting the long-term equilibrium relations among the variables, the coefficient α reflecting the adjustment speed to the equilibrium state, when the balanced relationship between variables deviate from the long-term equilibrium.

As the main objective of the macroeconomy are price stability, economic growth, full employment and the balance of payments. By Okun's law we can extrapolate the unemployment rate, and take monetary policy into account, so we analyze the VECM with the real gross domestic product, net exports, monetary supply and consumer price index.

5. Econometric Analysis

5.1. Data Description

Given the characteristic of China's macroeconomic data and the availability, this paper selects 1999.10-2008.10 as the analysis period. All data are actual monthly data, adjusted by CPI index, excluding price changes.

In the empirical analysis we consider international oil price as the world average oil price, data come from the U.S. Energy Information Administration; as the monthly GDP data is difficult to obtain, we adopt domestic industrial output instead of real GDP; the domestic industrial output, monetary supply M2, Import and export volume, CPI index and exchange rate can be acquire from website EIU and other websites.

Since the natural logarithms of the variables can better reflect the long-term trends, and the natural logarithms transformation don't change the cointegration relationship among variables, so we transfer all variables into natural logarithm form.

5.2. VECM Analysis

Take P(oil price), CPI, Y(domestic industrial output), M2(monetary supply), NEX(net exports) as test variables, make ADF test with EViews 6.0, the results show that all variables are I(1). After the unit root test, we can choosing the optimal lag order based on LR, FPE, AIC, SC, HQ and other test criteria. The results show that under the 5% significance level the optimal lag order is 2.

On determined the optimal lag order, we carried out Johansen cointegration test, the test results show that there are two cointegration equations, indicating that there exist long-term equilibrium relations between the oil price, monetary supply and the output, net exports, inflation.

Then based on the cointegration relationship of the variables, we use vector error correction model, consistent with cointegration, select L=2, to investigate the influence degree of oil price on china's economy. The regression results show that the International oil price increase by one percentage point, China's economic growth will slow down about 0.104 percentage points; net exports will reduce 2.815 percentage points; CPI will increase 0.017 percentage points. Meanwhile one percentage increase in oil price will brought down 0.016 percentage points in monetary supply.

6. Conclusion

It can be seen from the above results that the increase of the international oil price has a negative effect on China's real output, net exports and the actual monetary supply, and has positive correlation with CPI. It means higher oil price could slow down the economic growth in China, reduce the total exports and push up prices. Meanwhile it showed that facing the high oil price, authorities are more inclined to adopt tight monetary policy to curb inflation.

In addition, there exist lag-effect of the oil price on the macroeconomy, the current oil price fluctuation will affect the economic situation in the next few years. Therefore, when investigate the influence of the oil price and formulate corresponding measures, we should not only consider the current situations, but also take the past, the future possibility into consideration.

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