ATLANTIS PRESS
Advances in Economics, Business and Management Research, volume 94

4th International Conference on Economy, Judicature, Administration and Humanitarian Projects (JAHP 2019)

The Impact of Oil Price Shocks on Stock Markets

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***Abstract*—This paper investigates the impact of oil price shocks on stock returns in China and the U.S. Oil price shock is decomposed into three different structural shocks using SVAR model. The effects of oil price shock on stock returns are analyzed employing impulse response function and variance decomposition. The results show that the direction, magnitude and duration of the impact of oil price shock on stock returns are related to the driving factors behind it. Oil price shock has a significant impact on U.S. stock returns, while the impact on China's stock market is insignificant except for the impact of oil-market specific shock. The results of variance decomposition indicate that the contribution of oil price shocks on stock returns is greater than that of interest rate shocks and inflation rate shocks.**

Keywords—oil prices; stock markets; SVAR

I. INTRODUCTION

Numerous studies have pointed out that the soaring oil prices in the 1970s are closely related to the ensuing economic depression. Although there was controversy over whether oil price shock is the main cause, oil price increases after 1999 were once again widely concerned by economists. Hamilton (1983) indicates that almost every recession in the United States after World War II is accompanied by sharp rises in oil price. A large number of studies have shown that oil price shocks have significant effects on some macroeconomic variables, such as real GDP growth rate, exchange rate, employment rate and inflation rate.

Since crude oil prices have an important impact on a country's economic activities such as real output and inflation, it is natural to imagine that there is a possibility of a relationship between oil price changes and stock prices. In theory, this relationship between crude oil prices and stock prices can be well explained by the asset pricing model. The theory of asset pricing models shows that the current price of all assets can be obtained by calculating the present value of all future cash flows discounted. Based on the stock pricing model obtained by the discounted cash flow method, the change in crude oil price mainly affects the stock price through two channels: First, oil is the direct or indirect production factor of most companies and lacks substitutes. Assuming the company will not transfer the rising costs to consumers or investors, the rise in oil prices will inevitably lead to higher production costs, lower expected returns, and then lower cash flow. The stock pricing model calculated according to the discounted cash flow method shows that future decline of cash flow will eventually lead to a decline in stock prices. Second, crude oil is an input to many products and the rise in oil prices is likely to cause “input-type inflation”, which may cause the central bank to adopt corresponding tightening monetary policies such as raising interest rates to control prices. Both inflation and interest rate increases will result in a larger discount rate used in the discounted cash flow method, eventually leading to a fall in stock prices.

Since the influential research conducted by Hamilton (1983), more and more foreign scholars have begun to study the impact of oil price shocks on the macro economy and the stock market. In the study of the impact of changes in crude oil prices on stock prices, some researchers have conducted research on the stock markets of developed countries, such as Kling (1985), the first scholar to study the impact of changes in oil prices on stock price fluctuations. He finds that the US stock index often falls when the oil price rises during the period of 1973 to 1982. Sadorsky (1999) employs the VAR model to study the relationship between oil price changes and U.S. stock returns and finds that the rise in oil prices has a significant negative impact on stock market real return, and the impact of oil price shock on stock returns is greater than the impact of interest rates after 1986. He also finds that the impact is asymmetric. After that, the results of similar empirical studies in developed countries are mostly similar to those of Sadorsky (1999). For example, Park & Ratti (2008) construct a VAR model to study the impact of oil price shocks on the stock markets in the United States and 13 European countries during the period of 1986 to 2005. They conclude that crude oil price changes have a significant impact on stock market returns over the same period and with a one-month lag, which is greater than the impact of interest rate changes on the stock market.

However, there are also a few scholars who have different views on the correlation between the two, and believe that the impact of crude oil price shocks on stock prices is not significant or small. For example, Huang et al. (1996) construct a VAR model and find that crude oil futures return is not related to the US stock market return, except for oil company stocks. Apergis & Miller (2009) study the relationship between oil price and stock prices of eight developed countries and find that the impact of crude oil prices on the international stock market is significant but small.

Different from the above researches, other scholars study the dynamic relationship between the changes of crude oil prices and the stock prices of developing countries. Unlike the study targeting stock markets in developed countries, the empirical research concerning the impact of crude oil price

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shocks on the stock markets in developing countries starts late, and there are controversies in conclusions. Some scholars such as Maghyereh (2004) believe that the impact is not significant. Similarly, Hammoudeh & Choi (2006) construct a VEC model to study the relationship between the stock indices of five countries in the Gulf Arab States (GCC) and three global factors including crude oil spot price index. It is found that changes in crude oil prices have no direct impact on the stock markets of the five GCC countries. Cong et al. (2008) find no significant impact of oil price shocks on stock market returns in empirical analysis of 22 emerging-market countries and China. Ghosh & Kanjilal (2016) conduct a research on the relationship between international crude oil prices and the Indian stock market through a non-linear cointegration test. The results of the full sample show that there is no long-term equilibrium relationship. Sub-sample studies aiming at the pre- and post-crisis periods find that the international oil price and the Indian stock price have a cointegration relationship during the global financial crisis only. Other scholars believe that the impact is significant. For example, Masih et al. (2011) employ the VEC model and find that oil prices have a significant impact on the Korean stock market. Basher & Sadorsky (2006) use multi-factor models and find that oil price risk has significant effects on the stock market returns in 21 emerging markets, and the direction of the response of stock markets to oil price risk depends on whether the frequency of data used are daily, weekly or monthly. Basher et al. (2012) use a model of structural vector autoregression to study the dynamic relationship between oil prices, exchange rates and stock prices in emerging market countries, and find that positive oil price shocks negatively affect stock prices and US dollar exchange rates in emerging markets in the short term. Unlike Basher et al. (2012), other scholars believe that the impact is significant and positive. For example, Dagher & Hariri (2013) find that oil price shocks have a significant positive impact on Lebanese stock prices. You et al. (2017) use the quantile regression method to study the impact of crude oil price shocks and the uncertainty of China's economic policies on stock market returns. It is found that oil price shocks have an asymmetric effect on the stock market, and this effect is correlated with state of the stock market (bear market, normal market or the bull market).

This paper compares the impact of oil price shocks on the stock markets of China and the US. First, the United States is the most important developed country in the world, and China is the largest developing country in the world; second, both China and the United States are important importers of crude oil in the world. Third, the US stock market is the most developed stock market in the world. As of market capacity, the varieties of stock issuance and the degree of market development, China's stock market is much behind the US stock market. The differences and commonalities between the above-mentioned Chinese and American samples make the comparative analysis of the Chinese and the US stock markets important. Although there have been some studies that have contributed to the relationship between oil price shocks and the US stock market or China's stock market, there are not many comparative studies on Chinese and US stock markets.

This paper mainly studies the impact of oil price shock on the stock price of China and the US from the following aspects: First, using the SVAR model proposed by Kilian & Park (2009), this paper decomposes oil price shocks into oil supply shock, aggregate demand shock and oil-market specific demand shock. Then, this paper studies the impact of different types of oil price shocks on the stock markets. In addition, based on the research of Kilian & Park (2009), this paper also introduces the short-term interest rate and inflation rate that may affect the relationship between oil price shocks and stock markets into the SVAR model. Second, this paper replaces the international oil price with domestic oil prices to examine the robustness of the empirical results of the impact of oil price shocks on China's stock market. To ensure the robustness, this paper also considers the spillover effect from the US stock market. Third, through predicting variance decomposition, the contribution of different shocks to the variation in stock market return is obtained.

The remainder of this paper is organized as follows. Section 2 contains the data description, the introduction of the empirical methodology and some tests of the time series data. Section 3 focuses on the impact of oil price shocks on the stock market returns of China and the U.S. Section 4 concludes.

II. DATA AND METHODOLOGY

A. *Data Description*

This paper investigates the impact of oil price shocks on the stock returns of China and the US. China officially became a net importer of crude oil in 1996. Considering that some studies (e.g. Park & Ratti, 2008; Wang et al., 2013) indicate that the impact of oil price shocks on a country's stock market is related to the country’s status in the international crude oil market (that is, oil importing country or oil exporting country), this paper selects the monthly data from January 1996 to December 2017 for empirical analysis.

Our measure of international oil price is based on Europe Brent spot price and the nominal price is deflated by the U.S. CPI. In addition, international oil price is converted into domestic price using exchange rate and then deflated with China's CPI to obtain real domestic oil price. Regarding the stock price, we use the Shanghai Composite Index and the Shenzhen Composite Index to represent the stock price in China, and use the S&P 500 index to represent the US stock price. Each stock index is adjusted by the U.S. and China CPI to obtain the real stock price. The short-term interest rates in China and the United States are represented by a one-month interbank lending weighted average interest rate and a three-month Treasury bill rate. In addition, in order to examine the impact of different types of oil price shocks on the stock returns of China and the U.S., we use the world crude oil output as the representative of oil supply, and use the global index of dry cargo single voyage freight rates (Kilian, 2009) to measure global economic activities as the proxy of global oil demand. This index can be found on Kilian's personal website (http://www-personal.umich.edu/~lkilian/). Both Brent oil prices and world crude oil output are sourced from the U.S. Energy Information Administration. The interbank borrowing weighted average interest rate and China CPI data are all derived from the CEInet statistics database. The U.S. CPI data and Treasury bill rates are derived from the Federal Reserve website (https://fred.stlouisfed.org). The price of China's two major composite indices comes from the Ruisi statistics database, while the US S&P500 index price data comes from the Yahoo Finance website.

For the convenience of analysis, the following variable symbols will be employed. (See "Table I")

TABLE I. VARIABLE SYMBOL AND DEFINITION

Variable symbol	Definition
cop	the logarithm of world oil production
cod	the global index of dry cargo single voyage freight rates
op(opc)	the logarithm of world (domestic) real oil price
cpi(ucpi)	China (or the U.S.) CPI index
rr(urr)	the logarithm of short-term interest rate in China (or the U.S.)
sz(szz、sp)	the logarithm of the real price of the Shanghai Composite Index (Shenzhen Composite Index or S&P500 index)
lcop	the first log difference of world oil production
lcod	the first difference of the global index of dry cargo single voyage freight rates
lop (lopc)	the first log difference of world (domestic) real oil price
lcpi(lucpi)	inflation rate of China (or the U.S.)
lrr(lurr)	the first log difference of short-term interest rate in China (or the U.S.)
lsz(lszz、lsp)	the first log difference of the real price of the Shanghai Composite Index (Shenzhen Composite Index or S&P500 index)

B. Unit Root Test and Co-integration Test

In order to avoid the occurrence of false regression in the subsequent analysis of time series, the KPSS test is used to test the stability of variables. The outcomes are presented in "Table II". The null hypothesis of the KPSS unit root test is that "the variable is stationary". At the 5% significance level, the KPSS test results of the variables all reject the null hypothesis that "the variable is stationary", while the test results of the first-order difference sequence cannot reject the null hypothesis. Therefore, all of the variables are I (1) processes and the first order difference of them are I (0) processes.

TABLE II. KPSS UNIT ROOT TEST RESULTS

Variables	**KPSS test statistics**		**First order difference of the variables**	**KPSS test statistics**	
	Constant & Trend	***Constant***		***Constant & Trend***	***Constant***
cop	0.115	2.014***	lcop	0.022	0.032
cod	0.397***	0.419*	lcod	0.056	0.053
op	0.317***	1.297***	lop	0.052	0.091
opc	0.369***	1.002***	lopc	0.045	0.099
cpi	0.412***	2.051***	lcpi	0.096	0.212
ucpi	0.407***	2.126***	lucpi	0.056	0.251
rr	0.336***	0.433*	lrr	0.045	0.212
urr	0.148**	1.468***	lurr	0.101	0.164
sz	0.123*	0.821***	lsz	0.051	0.119
szz	0.095	1.490***	lszz	0.070	0.107
sp	0.227***	0.504**	lsp	0.127*	0.132

a. *, ** and *** denote rejection of the null hypothesis at the 10%, 5%, and 1%, level of significance, respectively.

Considering that all variables have unit roots, co-integration tests were performed for common stochastic trend (Johansen & Juselius, 1990). The co-integration test results in "Table III" show that null hypothesis of no co-integration cannot be rejected.

TABLE III. CO-INTEGRATION TEST RESULTS

	Hypothesis	**r=0**	**r≤1**	**r≤2**
(cop, cod, op, cpi, rr, sz)	Trace test	75.762	45.722	29.454
	λ max test	30.040	16.267	12.849
(cop, cod, op, cpi, rr, szz)	Trace test	81.054	44.392	28.225
	λ max test	36.662	16.167	12.815
(cop, cod, op, ucpi, urr, sp)	Trace test	100.789*	66.111	36.938
	λ max test	34.679	29.173	18.739
(cop, cod, opc, cpi, rr, sz)	Trace test	76.341	45.632	29.859
	λ max test	30.708	15.773	12.731
(cop, cod, opc, cpi, rr, szz)	Trace test	81.330	44.138	28.348
	λ max test	37.192	15.790	12.613

a. * denotes rejection of the null hypothesis at the 5% level of significance.

C. Structural VAR Model

A structural VAR model can be expressed as:

$$C_0 y_t = \alpha + \sum_{i=1}^{p} C_i y_{t-i} + u_t, \qquad t = 1,2,...,T$$

Where yt is a column vector of observation on the current values of all variables in the model, p represents the number of lags, T is the size of the sample, and ut denotes the vector of serially and mutually uncorrelated structural innovations. Let ε_t denotes the reduced-form VAR innovations such that $\varepsilon_t = C_0^{-1}u_t$.

In this paper, $y_t = (lcop, lcod, lco, lcp, lr, ls)$, where *lcop* is the first log difference of world oil production, *lcod* is the first difference of the global index of dry cargo single voyage freight rates, *lco* is the first log difference of real oil price, *lcp* is the inflation rate, *lr* is the first log difference of short-term interest rate, and *ls* is the first log difference of the real price of stock index. This paper imposes the following identifying assumptions:

$$\varepsilon_t = \begin{pmatrix} \varepsilon_{1t}^{lcop} \\ \varepsilon_{2t}^{lcod} \\ \varepsilon_{3t}^{lco} \\ \varepsilon_{4t}^{lcp} \\ \varepsilon_{5t}^{lr} \\ \varepsilon_{6t}^{ls} \end{pmatrix} = \begin{pmatrix} a_{11} & 0 & 0 & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & a_{55} & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & a_{66} \end{pmatrix} \begin{pmatrix} u_{1t}^{oil\ supply\ shock} \\ u_{2t}^{aggregate\ demand\ shock} \\ u_{3t}^{oil-market\ specific\ demand\ shock} \\ u_{4t}^{\text{inflation rate}\ shock} \\ u_{5t}^{\text{interest rate}\ shock} \\ u_{6t}^{other\ shocks\ to\ stock\ returns} \end{pmatrix}$$

The above short-term constraints are based on these assumptions:

- Oil supply will not be affected by crude oil demand shocks, inflation rate, interest rates or stock price fluctuations within one month. The change of world crude oil production will lead to the movement of crude oil supply curve;
- Taking into account the slow response of global economic activity, oil price increases brought by oil-specific demand shock and other shocks will not have a significant effect on global economic activity within one month;
- Both oil supply shock and oil demand shocks cause significant changes in crude oil prices. Part of the changes in crude oil prices that cannot be explained by the impact of crude oil supply shock and aggregate demand shock can be attributed to the impact of oil-market specific demand shock. Kilian (2009) points out that there are good reasons to believe that other specific demand shocks in the crude oil market can effectively represent changes in precautionary demand for crude oil, which comes from increased uncertainty of future oil supply shortfalls;
- The inflation rate will respond to the shifts in oil price rather than interest rate or stock price in the short term;
- Innovations in world crude oil production, aggregate demand, oil price and inflation rate will have an impact on interest rates in the short term.

III. IMPACT OF OIL PRICE SHOCKS ON STOCK MARKET

A. World Real Oil Price Shock

In this section, we analyze the impact of world oil price shocks on stock markets in China and the U.S. through impulse response. We construct a six-variable SVAR (lcop, lcod, lop, lcp, lr, ls) model, where lcp, lr and ls denotes inflation rates (of China or the U.S), short-term interest rates (of China or the U.S) and stock returns (of Shanghai Composite index, Shenzhen Composite Index or S&P 500) respectively. The order of the above variables means that interest rate shocks, oil supply shocks, oil demand shocks, and other specific oil demand shocks may have simultaneous impacts on real stock returns.

The first column of "Fig. 1" is the cumulative impulse response of stock returns to oil supply shock. For China's stock market, whether it is the Shanghai Composite Index or the Shenzhen Composite Index, the impact of oil supply shock on stock returns is not significant. The response of U.S. stock returns is insignificant in the initial period, but becomes significant two months after the shock. The above conclusions are consistent with part of the findings of Wang et al. (2013) concerning China and the U.S. In fact, their research results show that most of the stock markets in major oil-importing and oil-exporting countries do not significantly respond to oil supply shock, except for three developed oil-importing countries (Italy, U.K., and the U.S.).

The second column of "Fig. 1" shows the cumulative impulse response of stock indices returns to aggregate demand shock. Unexpected disruptions of aggregate demand will cause an increase in stock returns of China and the United States. In fact, although the rise in oil prices brought about by aggregate demand shock will increase the cost of enterprises and may lower the stock prices of oil-importing countries like China and the United States, it is not surprising that the response of stock prices is positive considering increased global economic activity will promote stock prices. The response of S&P 500 index return is significant three months after the shock and lasts for two months. The results of Kilian and Park (2009) also indicate that aggregate demand shock has a significant impact on U.S. stock returns.

Regarding the impact of oil-market specific demand shock, the third column of “Fig. 1” gives the corresponding cumulative impulse response results. The response of China's stock returns to oil-market specific demand shock gradually turns from positive in the initial period to negative, and is significant in the second month. Although the response of the U.S. stock returns is also positive, the response is smaller and not significant at all. Considering that the U.S. and China are major oil-importing countries, it's not difficult to imagine that increases in oil price will lower the stock returns of these two countries.

The above impulse response results indicate that the magnitude, direction and significance of the impact of oil price shock on stock price are related to the driving forces of oil price shock, that is, the change of oil price is caused by crude oil supply shock, aggregate demand shock or oil-specific demand shock. As a whole, the response of China's stock market to oil price shocks is not as sensitive as the U.S. stock market.

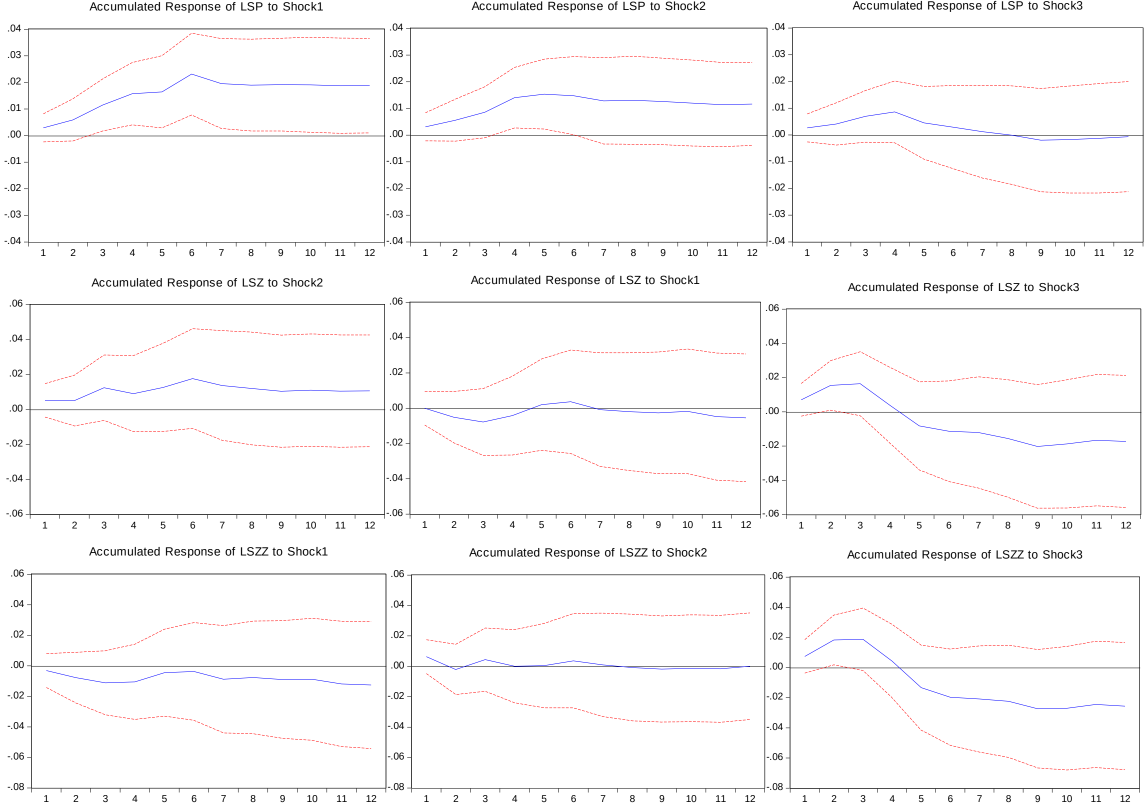

Fig. 1. Cumulative response of stock returns to world real oil price shocks.

B. *Domestic Real Oil Price Shock*

Considering the possible impact of the dynamic changes in the exchange rate of RMB against the US dollar, we study the impact of domestic oil price on China's stock returns. We establish the similar five-variable SVAR (lcop, lcod, lopc, lcpi, lrr, ls). The impulse response results using domestic real oil price is very similar to that using world real oil price. Considering the limited layout, the results of this part are no longer displayed and can be provided on request. In fact, Park & Ratti (2008) believes that oil price shocks will have an impact on global stock markets, and world oil prices capture this effect better than domestic oil prices because exchange rate changes may offset this effect. Therefore, this paper uses only world oil prices in the next sections.

C. *Variance Decomposition*

"Table IV", "Table V", and "Table VI" respectively present the forecast error variance decomposition of real stock returns of S&P500 index, Shanghai Composite Index and Shenzhen Composite Index. It can be seen that in the short term, whether it is the Chinese stock market or the US stock market, the impact of three different types of oil price shocks is small. However, over time, the impact of crude oil price shocks on the returns of the Chinese and US stock markets has gradually expanded. Finally, in the long run, the three structural shocks driving the international crude oil market account for 10.6%, 10.5%, and 11.2% of the return variability in S&P 500 index, Shanghai Composite Index, and Shenzhen Composite Index, respectively. The contribution of inflation rate to the change in the three indices returns is only 3.4%, 3.6% and 5.9% respectively. For interest rate shock, it only account for 4.1%, 2.7% and 3.0% respectively. The results indicate that the impact of the international crude oil market is an important factor in the change of stock returns, which is greater than the impact of inflation shock and interest rate shock. Among the three types of oil price shocks, the precautionary demand shock has the greatest impact on China's stock market, followed by aggregate demand shock and oil supply shock. This is mainly because during the sample period studied in this paper, China does not have a crude oil futures market. Investors lack the appropriate tools to manage the risk of oil price changes that may be faced in the future. In contrast, the contribution of oil-market specific demand shock to US stock returns is much smaller, accounting for only 2%, which is the least of the three oil price shocks.

TABLE IV. PERCENT CONTRIBUTION OF DIFFERENT SHOCKS TO THE VARIABILITY OF S&P 500 INDEX RETURN

Horizon	**Three types of oil price shocks**			**Interest rate shock**	**Inflation rate shock**	**Other Shocks**
	Oil Supply Shock	***Aggregate Demand Shock***	***Oil-market specific Demand Shock***			
1	0.469	0.538	0.386	0.076	1.189	97.342
2	0.940	0.851	0.492	1.517	1.665	94.534
3	2.552	1.287	0.897	1.525	2.227	91.512
12	5.664	2.773	2.174	4.068	3.409	81.912
∞	5.677	2.781	2.186	4.079	3.444	81.833

TABLE V. PERCENT CONTRIBUTION OF DIFFERENT SHOCKS TO THE VARIABILITY OF SHANGHAI COMPOSITE INDEX RETURN

Horizon	**Three types of oil price shocks**			**Interest rate shock**	**Inflation rate shock**	**Other Shocks**
	Oil Supply Shock	***Aggregate Demand Shock***	***Oil-market specific Demand Shock***			
1	0.000	0.461	0.836	0.600	1.396	96.707
2	0.435	0.451	2.004	0.661	1.438	95.010
3	0.542	1.307	1.955	1.655	1.395	93.145
12	1.658	2.104	6.563	2.691	3.555	83.429
∞	1.777	2.107	6.571	2.736	3.626	83.183

TABLE VI. PERCENT CONTRIBUTION OF DIFFERENT SHOCKS TO THE VARIABILITY OF SHENZHEN COMPOSITE INDEX RETURN

Horizon	**Three types of oil price shocks**			**Interest rate shock**	**Inflation rate shock**	**Other Shocks**
	Oil Supply Shock	***Aggregate Demand Shock***	***Oil-market specific Demand Shock***			
1	0.123	0.508	0.688	0.833	3.305	94.543
2	0.378	1.356	2.120	1.154	3.206	91.785
3	0.508	1.821	2.075	2.450	3.169	89.977
12	1.214	2.005	7.873	2.948	5.756	80.204
∞	1.285	2.003	7.872	3.019	5.854	79.967

IV. CONCLUSION

This paper investigates the impact of oil price shocks on the stock returns in China and the U.S. by constructing a multivariate SVAR model. The main conclusions are as follows:

First, a SVAR model with six variables is conducted, and decompose oil price shock is decomposed into three structural shocks. The results of impulse response function analysis indicate that the direction, magnitude and duration of the response of stock returns to oil price shocks vary depending on the drivers behind oil price shock. Although the impact of oil-market specific demand shock is significant, neither oil supply shock nor aggregate demand shock have significant impacts on China's stock market. The response of U.S. stock returns is much more significant. Both oil supply shock and aggregate demand shock have significant impacts on U.S. stock returns and the impacts have lasted for two to three months. This may be related to the low degree of marketization of China's refined oil pricing mechanism and the high speculative nature of the stock market. This paper also replaces world oil price with domestic oil price, analyzes the impulse response of China's stock market and finally obtains similar results.

Second, the contributions of different shocks are analyzed to the variations stock returns through variance decomposition. It is found that the impact of oil price shocks has been expanding over time, and the three structural shocks that drive the global crude oil market jointly account for about 11% of the variation in stock returns, while the impact of interest rate shocks only accounts for 3%-4% and 3%-6% for inflation rate shock. This means that oil price shock have greater impacts on stock returns than interest rate shock and inflation rate shock. In addition, the largest contributor of the three structural shocks to the variability of stock returns in China is oil-market specific demand shocks. While for the US stock market, the impact of oil-market specific demand shocks is much smaller. This is related to the long-term lack of tools for domestic investors to manage oil price risks, which adds to the uncertainty of future.

The results of this paper are of great significance for understanding and preventing the impact of oil price shocks on stock market returns. First, the results of this paper show that oil price shocks have an important impact on stock returns in China and the U.S., far exceeding the impact of interest rates and inflation rates. Considering that China's demand for crude oil is increasing in recent years, the impact of oil price shocks on China's stock returns will inevitably increase. We need to pay attention to the possible impact of oil price shocks on China's economic development, and rationally formulate relevant energy policies to adjust the impact of oil price shocks. Second, compared with the U.S., China's stock market is more vulnerable to the impact of precautionary demand for crude oil. This empirical result reminds us that enhancing energy security awareness and improving China's oil reserve system and oil futures market is of great significance.

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