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Response pattern of stock returns to international oil price shocks: From the perspective of China's oil industrial chain

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HIGHLIGHTS

- The stock return of oil sales sector responds to all shocks most significantly.
- Before and after 2012, the impacts of oil price shocks change structurally.
- The stock returns are mostly affected by oil supply and precautionary demand shocks.
- The contribution of China's oil stock returns to oil price shocks is increasing.

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ABSTRACT

Based on a Structural Vector Autoregression (SVAR) model, this paper decomposes oil price changes into four components: oil supply shocks, global demand shocks, domestic demand shocks and precautionary demand shocks. Then, this paper investigates the impacts of these oil price shocks on the stock returns of China's listed companies in the oil industrial chain using data from 2009 to 2014. The empirical results show that the returns of the listed companies in the whole oil industrial chain benefit from appreciation in the oil price, the impacts of oil supply shocks and precautionary demand shocks are the most significant, and there is a structural change in the impacts of oil price shocks in 2012. Among the four oil price shocks, the impacts of oil supply shocks and precautionary demand shocks are the most significant. Moreover, there is a gradual increase in the aggregate contributions of oil price shocks to the changes in stock returns. A robustness check with different global crude oil prices and a different industry classification standard confirms that the above empirical results are robust. The empirical results of the paper imply that stock investors, oil-related companies and the government need pay close attention to sudden changes that may affect current and future oil availability and pay greater attention to the stocks at the two ends of the oil industrial chain.

1. Introduction

Oil stocks are a major force in China's stock market. CNPC and Sinopec are blue-chip stocks, and a change in the oil industrial index could significantly affect China's stock market. The stock market is the most sensitive market. The stocks of listed companies in the oil industry respond most rapidly to global oil price shocks. Therefore, changes in the global oil price not only affect the stock returns of oil-related listed companies and the stock market directly but also indirectly affect China's oil sector and stock market.

Although China is an important global oil producer, it also experiences considerable demand for oil products. China's oil import dependency exceeds 50%, and China's oil sector is greatly affected by global oil price changes. After the 2008 international financial crisis, the global crude oil price (e.g., the Europe Brent Spot Price FOB) decreased to 40 US dollars per barrel in 2009 because of the global economic recession, which was a drastic change. Thereafter, the global oil price reached more than 120 US dollars per barrel in 2011 and 2012 and then decreased dramatically to less than 50 US dollars per barrel in 2014 and 2015. The changes in the crude oil price wrought significant impacts on the global economy and affected the stability of financial markets. In China, the oil sector

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is suffering serious losses because of these price fluctuations. In particular, China's domestic oil sector spans the entire oil industrial chain, including the oil exploitation sector, the oil refinery sector and the oil sales sector. Because of differences among these lines of business, the impacts of oil price changes on the oil sectors may be very different. Therefore, the response of the stock returns of oil-related companies might differ. It is interesting to investigate the response pattern of the listed companies in the different oil sectors.

However, changes in the oil price are due to different sources [1]. Market concerns transmitted through the Internet can strengthen the linkage between oil price changes and external events by influencing the expectations of market traders, and to some extent, it can exaggerate the impact of nonfundamental information shocks [2]. Generally, changes in the oil price can be decomposed into four components: oil supply shock, global demand shock, domestic demand shock and precautionary demand shock. The impacts of the different shocks on the stock returns may also be differ [1,3]. The aim of this paper is to present the response pattern of the stock returns of the different oil sectors to different oil price shocks. This study is helpful for understanding the way in which the global oil price affects China's oil sectors through the financial market and hence provides knowledge for investors, oil companies and the government to make rational decisions, which is helpful for the stable development of China's oil sectors.

Relevant studies on the impacts of oil price changes focus primarily on macroeconomic aspects. Many studies show that oil price shocks often cause economic recessions and inflation [4–8]. The short- and long-term impacts of oil price shocks on economic output differ [9,10]. Moreover, some scholars report different impacts of oil price changes on different economies [11,12]. In addition, the impacts of oil price changes on a specific economy may be asymmetric [13,14]. Thus, many studies focus on the channels by which oil price changes have an impact, such as inflation [15], wealth transfer [16], employment [17] and currency exchange [18–20]. Furthermore, governments implement various monetary and energy policies to alleviate the economic recessions caused by oil price shocks. However, few scholars have obtained consistent conclusions because they examine different national situations and periods [21–25].

The research on the relationship between oil prices and the financial markets focuses on two main aspects: (1) the relationship between the oil price and the overall stock market (refer to Panel A in Table 1) and (2) the relationship between oil price changes and industry index returns (refer to Panel B in Table 1). The former focuses on the regularity of the relationship, while the latter aims to investigate the differences.

Jones and Kaul show that oil price changes influence stock prices by affecting current and future cash flows [26]. In addition, many other studies have confirmed a significant relationship between the oil price and stock markets [27–30]. However, the impacts of the oil price on stock markets may be different in different countries. For instance, the impacts could be in opposite directions for oil-exporting and oil-importing countries [31,32]. Some scholars argue that the different stock price responses to increases in oil prices are caused by different factors [32,33]. Moreover, the oil price is not the only factor that affects stock markets. Thus, due to the impacts of other factors, the relationship between the oil price and stock markets may be contrary to expectations [34]. In some instances, there may not be a linear relationship between the oil price and stock markets [35]. Moreover, due to economic cycles, there may be a cyclical relationship between oil price changes and stock prices [36]. Stock returns may respond differently to oil price shocks pre-crisis, during a financial crisis, and post-crisis [37].

Although they have little effect on the total market, the oil futures returns have a significant ability to explain oil companies' stock returns. The stock returns of different industries generally respond to oil price shocks differently [38]. Considering an economy as a whole, a positive oil price shock may increase the stock returns of the energy-supply industries and decrease the stock returns of energy-intensive industries [39–41]. However, stock returns may also respond differently to oil price shocks even within an industry. Such differences may be not recorded in studies that examine a specific industry as a whole. More important, these differences can provide valuable empirical support for investors' arbitrage strategies, oil firms' operational adjustments and government policy-making. At present, other than one study that considers the differences in major businesses [42] (refer to Panel C in Table 1), no relevant studies analyze the differences in the response patterns of oil company stock returns to oil price shocks with respect to the oil industrial chain.

The impacts of oil price shocks on China's financial markets may be different from those in the rest of the world due to differences in market regulations, the special characteristics of oil companies and the financial markets themselves. Furthermore, the degree of market openness varies across business sectors within the oil industry, and hence there are heterogeneous impacts on the different oil sub-sectors. Thus, it is interesting to examine the impacts of oil price shocks on the stock returns of China's oil companies from the perspective of the oil industrial chain.

This paper focuses on the impacts of oil price shocks on the stock returns of oil sub-sectors from the perspective of China's oil industrial chain. Previous studies examine primarily the relationships among oil prices, the macroeconomy, financial markets and the returns of industry indices. Thus, many scholars have neglected the impacts of different positions in the oil industrial chain on such relationships, not to mention the effects of different oil price shocks. In particular, China's domestic markets have particular characteristics. In China's domestic oil markets, there are strict access restrictions, price controls and regulations on crude oil import rights. Regarding China's domestic financial markets, there are considerable differences in market efficiency and in investors' responses to external information between China and most developed countries. Thus, we expect to observe some interesting features of the relationship between oil price shocks and stock returns in the oil industrial chain.

The remainder of this paper is organized as follows. Section 2 offers a brief introduction of the relevant model and the data. Section 3 describes the empirical results. Section 4 presents the robustness check. Section 5 contains the main conclusions and directions for future research.

2. Methodology

2.1. Analytical framework

This paper's objective is to examine the impacts of oil price shocks on the stock returns of different oil sectors in China. First, this paper adopts the SW and CITIC Industry Classification Standards[1]: the empirical analysis adopts the former classification standard, and the latter is used in a robustness check. Second, the study uses the SVAR model to decompose oil price changes into four components: oil supply shock, global demand shock, domestic demand shock and precautionary demand shock. Third, using the impulse response function and variance decomposition analysis, the aim of this paper is to investigate the impacts of different oil price shocks

[1] SW and CITIC Industry Classification Standards are developed by Shenwan Hongyuan Securities and CITCI Securities.

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