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Impacts of oil price shocks on Chinese stock market liquidity☆

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ABSTRACT

In this paper we investigate whether and how different oil price shocks affect the stock market liquidity in China. Our empirical results show that stock market liquidity only increases when the positive oil price shocks come from oil-specific demand side. When the oil price shocks are from oil supply side or the aggregate demand side, stock market liquidity negatively comoves with oil price.

1. Introduction

The dynamics of international oil prices have strong impacts on both the real economy and the financial markets. Since the seminal work of Hamilton (1983), a growing number of literature has attempted to discover how oil prices shocks affect different countries.[1] This branch of literature covers a wide range of topics, including the relationship between oil prices and the economic growth rate (Narayan, Sharma, Poon, & Westerlund, 2014), inflation (Cologni and Manera, 2008), interest rate (Akram, 2009), unemployment rate (Herrera, Karaki, & Rangaraju, 2016), exchange rate movement (Balcilar, Hammoudeh, & Asaba, 2015), and also stock market return (Park & Ratti, 2008).

The objective we attempt to test in this paper is that oil price shocks are common determinants of stock market liquidity, and the specific source of oil variations really matters a lot. In particular, we discover this relation between structural oil price shocks and Chinese stock market liquidity by adopting the empirical framework of Kilian (2009). In this way, we classify oil prices shocks into three different types, i.e. oil supply shock, aggregate demand shock and oil-specific demand shock. Our results show that stock market liquidity only increases when the oil price shocks come from oil-specific demand side. When the source is due to changes in oil supply side or the aggregate demand side, stock market liquidity is negatively related to oil price movement. In addition to the benchmark results, we also test the robustness of our conclusion by running a variety of sensitivity checks, including using alternative measures of liquidity, introducing sign restrictions, subsample analysis and so on. In the last section, we also discuss a bunch of related issues. First, we prove the validity of our empirical specification in the benchmark model. Second, we provide the evidence by focusing on energy-related sectors. Third, we use panel regression to provide the micro-level evidence on the relationship between individual stock liquidity and oil price shocks. Our empirical findings in this paper not only help understand liquidity risk in the financial

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[1] To name a few, literature that works on the linkage between oil prices and macroeconomic variables includes Hamilton (2003), Cunado and de Gracia (2005), Kilian (2008b), Alvarez, Hurtado, Sanchez, and Thomas (2011) and Cologni and Manera (2008). As for works that investigate the responses of stock market to global oil price shocks, examples include Jones and Kaul (1996), Gupta and Modise (2013) and Park and Ratti (2008). Interested readers can refer to the excellent reviews of Hamilton (2008) and Kilian (2008a).

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markets, but also point out that different oil prices shocks may lead to different consequences to the financial markets.

Stock market liquidity is regarded as the ease of trading (Amihud, Mendelson, & Pedersen, 2006). Since the global financial crisis, an enormous number of literature has turned to studying the liquidity in financial markets, with a focus on its determinants and impacts. Theoretically speaking, liquidity risk should be partly determined by the aggregate discount factor that relies on a certain group of state variables. However, there are fewer papers that address the link between oil prices and stock market liquidity. Therefore, our paper fills the gap in this type of literature. Our hypothesis is that shocks from international oil market could be one of the key state variables, and we empirically prove the existence of such relation by using Chinese stock market as a case study. The reason we choose Chinese stock market as our case is due to its role as a major player in the global oil market. Given China's size and persistently high economic growth in the past three decades, it has now become the world's second largest oil consumer, surpassing Japan in 2003. Therefore, this large emerging country provides us an excellent basis for the study of liquidity and energy issues. In fact, China's rapid growth and consequent extraordinary demand for energy have already significantly influenced world energy and financial markets, thus making it under considerable international attention.[2]

Our paper contributes to two different branches of literature. The contribution for the first type of literature is that we extend the discussion of the relation between oil prices and stock market. Current studies are mainly focused on the effects of oil price changes to stock market return. Generally speaking, there is still no consensus on the precise impacts of oil price shocks. Effects could be positive (Ono, 2011), negative (Park and Ratti, 2008; ONeill et al., 2008), or even insignificant (Jones & Kaul, 1996; Chen, Roll, & Ross, 1986).[3] Our paper here is concerned with the impacts of oil prices on stock market liquidity. Since the great financial crisis in 2007, an enormous volume of literature has been focused on this critical concept (Chordia, Roll, & Subrahmanyam, 2001, 2005; Acharya & Pedersen, 2005; Martinez, Nietob, Rubio, & Tapia, 2005; Levine & Schmukler, 2006). The reason why stock liquidity is important can be explained as follows. First, theoretically speaking, by taking into consideration the variations in liquidity, we can go beyond the traditional asset pricing approach that assumes constant trading frictions. After the global financial crisis, people have realized that the importance of including the liquidity risk because of its one unique characteristic: liquidity is not only risky but also has commonality Acharya and Pedersen (2005). Such quality could lead to large impacts to the whole financial system. Second, liquidity risk is a major source of financial crisis, especially to developing countries. Conversely, an improved condition in liquidity can contribute a lot to the financial development and economic growth in developing countries (Bekaert, Harvey, & Lundblad, 2007; Bekaert & Harvey, 2000). For example, Deng and Oren (2006) argue that liquidity of the energy markets is a precondition for increasing efficiency. Besides, Bekaert et al. (2007) discover that improved liquidity can contribute to the decline in the capital cost, which is of great importance to emerging countries. However, there are few papers that address the link between oil prices and stock market liquidity. To the best of our knowledge, the relationship between market liquidity and oil price was first tested by Sklavos, Dam, and Scholtens (2013). Based upon 130 US firms in the period 2006–2011, they find that an increase in oil returns will tend to reduce the traded value and the price spread set by market makers. Essentially, rising oil prices directly lowers the cost of trading, reduces market depth and is likely to discourage subsequent trade. Ratti and Vespignani (2013) also focus on the interplay between liquidity and crude oil prices in China. However, they use M2 as proxy for market liquidly, and highlight that compared with shocks to real M2 in the some advanced economies, the impacts of China's M2 on the real price of crude oil is larger and much more important to the global oil market. In contrast, our proposed indicator of liquidity reflects the microstructure condition of the stock market, and we are more interested in the question of how different types of shocks in global oil market will change the liquidity condition in Chinese stock market.

The second contribution of this paper is that we apply the novel and effective method of impulse responses function analysis proposed by Inoue and Kilian (2013) to study the determinants of Chinese stock market liquidity. VAR has been commonly used in previous studies of market liquidity and macroeconomic factors (Fujimoto, 2004; Chordia, Sarkar, & Subrahmanyam, 2005; Gao & Kling, 2006; Fern¢ndez-Amador, Gachter, Larch, & Peter, 2013). The conventional application of VAR models to the analysis of impulse response functions is based on the quantiles derived from the resultant point-wise posterior distribution of responses. The measure of central tendency of the impulse response functions, together with their point-wise 68% posterior error bands, is represented as a vector of point-wise posterior medians. However, this approach lacks clear economic outcomes as it fails to reflect the degree of uncertainty pertaining to the structural response functions. Against this backdrop, Inoue and Kilian (2013) proposed an alternative approach based on selecting from a set of admissible structural models. The advantage of this approach is that it provides for an integrated treatment of both the exactly identified and the sign-identified VAR models with regard to estimation and inference. Our paper is closely related to several recent works. Another paper that is pertinent to ours is Fern¢ndez-Amador et al. (2013), which also adopts both the structural VAR model and panel regression study the determinants of liquidity. However, their mainly interested variable is monetary policy interventions of central banks. By using the European data, they highlight that an expansionary (contractionary) monetary policy will lead to a(n) increase (decrease) of aggregate market liquidity. Besides, by using South Africa's

[2] Many papers hold the view that with China's increasing energy dependence, it is probable that Chinese financial markets have become more susceptible to variations in global energy prices (Broadstock, Cao, & Zhang, 2012).

[3] There are a few possible reasons why conclusions vary. First, the oil price shocks may indeed have different impacts to different countries. In a recent work, by using data of 11 OCED countries, Talukdar and Sunyaeva (2011) find that oil price shocks have negative impacts on all the countries except for Norway and Canada. Second, the different empirical methodologies in various studies contribute a lot to this debate. For example, Shanken and Weinstein (2006) challenges the empirical findings in Chen et al. (1986). They find that a small change in the estimation procedure leads to strikingly different conclusions. Third, many recent studies have gone beyond the conventional approach that investigates this relationship at the aggregate level, thus finding more interesting results. For instance, Ciner (2013) finds oil price shocks with less than 12-month persistency are likely to have a negative impact on stock returns. Meanwhile, shocks with persistency between 12 and 36 months are shown to be associated with positive stock returns. In a different aspect, Degiannakis, Filis, and Floros (2013) find the positive and negative relationships vary among different sectors.