



The high-frequency asymmetric response of stock returns to monetary policy for high oil price events

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ABSTRACT

This paper investigates whether a high oil price event that worsens the quality of a firm's balance sheet in turn provides an additional transmission channel to the stock market, which then affects stock returns. We examine the asymmetric impacts of monetary shocks on stock returns across high oil price events and non-high oil price events over the period from 1995 to 2008. We ask how these impacts respond to the relative ability of firms to obtain external finance. Our findings suggest that more energy-intensive industries and durable-goods industries react more significantly to monetary shocks based on high oil price events than on those based on non-high oil price events. By controlling for the capacity for external finance, the intraday windows reveal that a monetary surprise for the high oil price events has a bigger impact on stock returns than for the non-high oil price events. Firms with financing constraints find that the adverse impact of a surprise monetary policy action on high oil price events is amplified in the medium profitability category, while the impact of a surprise monetary policy action on non-high oil price events is amplified in the lowest profitability category.

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1. Introduction

Higher oil prices cause the costs of production of goods and services to increase, and most of the previous literature therefore finds that oil price shocks have a negative impact on real GDP growth rates, and also cause higher inflation (Bachmeier, 2008; Cunado and Perez de Garcia, 2005; Gisser and Goodwin, 1986; Hamilton, 1983; Hamilton, 2003). Some studies have even concluded that oil price shocks are the main cause of economic recession (Blanchard and Gali, 2008; Bohi, 1989). On the other hand, an increase in the oil price affects production activity and corporate earnings, and therefore has some implications for asset prices in financial markets. Many studies, therefore, investigate how oil price shocks influence the stock market. Most of these studies find the relationship between oil price shocks and stock returns to be significantly negative (Bachmeier, 2008; Ciner, 2001; Hammoudeh and Choi, 2007; Miller and Ratti, 2009; Sadorsky, 1999). Chen (2010) even concludes that a higher oil price can push the stock market into a bear state. However, certain other studies find evidence of oil price changes having no effect on asset returns (Al Janabi et al., 2010; Apergis and Miller, 2009; Chen et al., 1986; Henriques and Sadorsky, 2008). Huang et

al. (1996) find no negative relationship between stock returns and changes in the prices of oil futures. Wei (2003) concluded that the decrease in U.S. stock prices in 1974 could not be explained by the 1973–1974 oil price increase. While these previous studies mainly focus on how oil price shocks directly affect stock returns, their findings show that there is no consensus on the relationship between oil price shocks and stock returns.

On the other hand, as to the relationship between monetary policy and stock returns, a number of studies have empirically investigated the effects of monetary policy on stock returns and have found that monetary policy has an immediate impact on asset prices and stock returns. Most articles show that stock returns respond strongly to surprise changes in the federal funds rate (Ammer et al., 2010; Basistha and Kurov, 2008; Bernanke and Kuttner, 2005; Chulia et al., 2010; Ehrmann and Fratzscher, 2004; Farka, 2009; Guo, 2004; Hausman and Wongswan, 2011; Jansen and Tsai, 2010; Kurov, 2010). The above studies even find that both oil price shocks and monetary policy shocks affect the stock market. However, until now, few papers have investigated the role that monetary policy plays in oil price shocks to the stock market. Bachmeier (2008) has attempted to address the question as to whether monetary policy can explain the reaction of stock prices to oil shocks, and finds that many individual stocks exhibit no response to monetary policy shocks. This leads him to conclude that monetary policy plays no role in the transmission of oil price shocks to the stock market.

However, Bachmeier's findings (2008), in which monetary policy has no effect on the transmission of oil shocks to the stock market,

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does not seem to be consistent with [Hamilton's implications \(2008\)](#) for the channels of the oil price shock. As noted in [Hamilton \(2008\)](#), there are two main channels of transmission when an oil price shock occurs. The first channel has to do with the increase in the marginal production cost, and the second is concerned with the reduction in household demand for the firm's output. The first channel means that a rise in the oil price leads to a higher cost of production of goods and services, and results in a weakening in the earnings of firms and their market valuations. On the other hand, higher energy costs decrease the usage of oil which in turn lowers the productivity of capital and labor, and therefore it decreases the output, particularly for the firms which belong to an energy-intensive industry. This will occur through higher production costs, which is particularly severe in the traditional manufacturing, mining and transportation industries. The second channel of transmission may be amplified by an increase in precautionary savings and by the increased operating cost of energy-using durable goods. That is, the higher energy cost reduces the disposable income of US households, and in particular restricts the households' purchases of durable goods. Thus, the reduced consumption adversely affects the corporate profits of the energy-using durable goods industries. The wholesale trade durable goods industry is expected to be more responsive than the non-durable goods industry to the high oil price shocks.

The above two channels (as suggested by [Hamilton, 2008](#)) evidently worsen the credit worthiness of firms as reflected by the quality of firms' balance sheets, since high oil price shocks lead to a decrease in corporate profits. Agency costs result in information asymmetry between firms and financial intermediaries and, therefore, the resulting external finance premium is larger. It is implied that a high oil price shock will through these two channels cause firms to face higher costs of external finance which will result in lower levels of investment. More explicitly, when a high oil price shock occurs, the reduction in investment reinforces a decline in stock returns through the credit channel. That is, the reaction of the stock return should be affected by the monetary policy mechanism of a high oil price shock. However, [Bachmeier's findings \(2008\)](#) are not consistent with [Hamilton's implications \(2008\)](#).

Thus, our paper revisits the topic of how stock returns respond in different ways to monetary policy shocks as the result of a high oil price shock. We intend to examine whether a high oil price event that worsens the quality of a firm's balance sheet in turn provides an additional transmission channel to the stock market, which then affects the stock returns. We wish to use different perspectives to investigate how stock returns react differently to a monetary shock based on a high oil price event. Even though there is a large body of literature on the asymmetric responses of stock returns to surprise monetary shocks,² however, the way in which monetary policy has asymmetric impacts on stock returns with the asymmetries being linked to a high oil price event has not been seriously examined. Thus, the first goal of this paper is to examine the asymmetric impacts of a monetary shock on stock returns across both high oil price events and non-high oil price events.

[Hamilton \(2011\)](#) refers to three important high oil price events associated with significant changes in the price of oil between the 1990s and 2008. [Hamilton \(2011\)](#) concludes that the key post-World-War-II

high oil price events between 1995 and 2008 include: 1) the resumed growth event,³ which occurred between December 1999 and November 2000; 2) Venezuelan unrest and the second Persian Gulf War event,⁴ which took place between November 2002 and March 2003; and 3) the growing demand and stagnant supply event,⁵ which occurred between February 2007 and June 2008.

We find that the WTI (West Texas Intermediate) oil price movements in history show persistency between year 1995 and 1999. During the period of the resumed growth event, WTI oil price is a result of a continuing increase and climb by 38%. One peak of WTI oil price is observed in September 2000. In the Venezuelan unrest and the second Persian Gulf War event, the price of WTI increased by 28%. The WTI oil price reaches another peak in February 2003. Between 2003 and July 2008, WTI oil prices steadily rise, reaching \$100/bbl in February 2008. The growing demand and stagnant supply event cause the WTI oil price increased by as much as 145%. WTI oil prices are also volatile in this period and the volatility is characterized by sharp increases in the WTI oil price. These three oil events all caused the WTI price to significantly increase. Thus, we follow [Hamilton's suggestions \(2011\)](#) and refer to these 3 important events as high oil price events. Our paper tests whether monetary shocks are amplified through their effects on stock returns as a result of these high oil price events.

Due to the heterogeneity of oil-intensity across industries, some studies have investigated the specific-industry effect of oil price shocks on stock returns. Such studies provide evidence of the impact of oil price changes on stock returns varying across industries ([Faff and Brailsford, 1999](#); [Nandha and Faff, 2008](#)). [Nandha and Faff \(2008\)](#) investigate the impact of oil price changes on 35 industry groups and find that oil price changes do have a negative impact on stock returns for all industries with the exception of mining, and oil and gas. [Hammoudeh and Li \(2004\)](#) find the reaction of an oil price shock on stock returns in the transportation industry to be significantly negative and the most significant. On the other hand, [El-Sharif et al. \(2005\)](#), [Sadorsky \(2001\)](#), [Faff and Brailsford \(1999\)](#) find evidence of the oil price being positively related to the stock returns of the oil and gas industries. The above studies appear to tell us that the magnitudes of the impact on stock returns are highly associated with the oil-intensity of the input for various products.

Oil price shocks weaken firms' balance sheets as the expected future earnings are lowered further, particularly in the case of oil-intensive firms. This implies that it is harder for more oil-intensive firms to access funds in the capital market, while facing high oil price events. If a credit channel of monetary policy is at work, one would expect a tightening of monetary policy to have a particularly strong impact during high oil price events for firms that are in highly oil-intensive industries. Therefore, we would expect the response to a monetary policy shock to be significantly heterogeneous since each industry differs in its usage of oil and in its sensitivity to high oil price events. Even the previous literature provides evidence that changes in the price of crude oil are often important factors affecting stock returns. However, so far, few papers have examined asymmetries in terms of the impact of monetary shocks on stock returns across oil-intensive industries. Thus, the second goal of this paper is to use individual firm data to investigate the industry-effect of monetary policy due to a high oil price shock. We investigate whether the asymmetric effect of monetary policy surprises on stock

² Some studies examine how monetary policy has asymmetric impacts on stock returns with asymmetries linked to firm characteristics such as firm size, capital intensity, and financial constraints. These asymmetries particularly suggest that monetary policy may have asymmetric impacts on firms and firm values depending on firm financial characteristics even for firms in the same industry. Another set of papers finds asymmetric responses of stock returns to surprise changes in monetary policy at different stages of the business cycle. There is also a set of papers that look at asymmetries in the impact of monetary policy that are related to the aggregate status of the stock market itself. [Jansen and Tsai \(2010\)](#), [Kurov \(2010\)](#), [Chen \(2007\)](#) and [Perez-Quiros and Timmermann \(2000\)](#) all provide evidence that monetary policy does have a stronger effect on stock returns in a bear market.

³ After the Asian Event (1997–1998), the Asian regions steadily returned to growth. Global petroleum consumption returned to strong growth in 1999.

⁴ A Venezuelan strike eliminated 2.1 mb/d (millions barrels per day) between December 2002 and January 2003. This strike was followed after by the U.S. attack on Iraq, which removed an additional 2.2 mb/d over April 2003 to July 2003. These two geopolitical events caused the price of West Texas Intermediate to significantly increase.

⁵ Global economic growth in 2004 and 2005 steadily increased, and the IMF estimated that real gross world product was growing at an average annual rate of 4.7%. These strong demand pressures were the key reasons for the steady increase in the price of oil over this period.

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