

The Effects of Oil Price Shocks on Stock Market Volatility: Evidence from European Data

Dr. Stavros Degiannakis

Bank of Greece, Economic Research Department, 21 E. Venizelos Avenue, GR10250, Athens, Greece

Dr. George Filis

Bournemouth University, Department of Accounting, Finance and Economics, Executive Business Centre, 89
Holdenhurst Road, BH8 8EB, Bournemouth, UK

Dr. Renatas Kizys

University of Portsmouth, Portsmouth Business School, Subject Group of Economics and Finance, Richmond
Building, Portland Street, Portsmouth, PO1 3DE, Hampshire, United Kingdom

Research into energy markets has gained momentum in recent years as politicians and policy makers have become concerned about the sustainability of energy resources, and portfolio managers and investors became increasingly aware of the energy futures markets as a vehicle to store value and hedge against unexpected outcomes in the energy spot markets.

Macroeconomics focuses on oil prices as an important input in the production process, and as principal source of business cycle fluctuations in the medium term and economic growth in long-term. Energy-efficient companies are less constrained with the current and future availability of energy resources and, thus, they can more accurately plan their future energy consumption. Financial

economics then argues that energy-efficient firms can more accurately predict their future cash flows which are then used by the stock market to determine the market value of a firm. By contrast, firms with more energy-intensive production processes are constrained by greater uncertainty of energy consumption and energy prices, and hence their future cash flows are less certain. As a result, the market value of a firm is contaminated with greater uncertainty.

The effects of oil price fluctuations on stock market returns and volatility have become subject of heated debate in the academic literature. Whether oil price fluctuations make the market value more or less uncertain depends on the source of oil price fluctuations. Therefore, understanding the sources of oil price fluctuations is of utmost importance for stock market investors. Our research draws on the idea that oil price fluctuations are driven by three different types of structural shocks. The first structural shock is the supply-side oil-price shock that measures an unexpected change in the current supply of oil. The second structural shock is the aggregate demand oil price shock that reflects an unexpected change in the global oil consumption. The third structural shock refers to an unanticipated oil specific demand event (or precautionary demand shock) which is triggered by the uncertainty about the future availability of oil.

The main objective of our research is to study the effects of the three structural oil price shocks on stock market volatility. To this end, our research uses European data compiled or computed at monthly frequency from January 1999 to May 2010. Changes in world oil production, global economic activity and changes in oil prices are used to identify the structural oil price shocks. Three different measures of stock market volatility are used, namely, the conditional volatility, the realised volatility and the implied volatility measures. The two former measures are current market volatility measures, whereas the latter matter is a forward-looking measure of stock market volatility. Our research builds upon a structural multi-equation model that signs and quantifies the effects of the three structural

shocks on stock market volatility. Our findings are broadly in agreement with the existing literature. First, the supply-side oil price shocks do not appear to exert a significant influence on stock market volatility, irrespective of whether a current or a forward-looking volatility measures are relied upon. In line with our results, the literature on this theme reports that changes in world oil production do not affect stock price returns. Second, the three measures of stock market volatility do not respond to the oil-specific demand shocks. This result can be explained by the fact that nowadays firms use effective hedging strategies against variations in the precautionary demand of oil. This view has also been broadly supported by the existing literature. However, we do find that an aggregate demand oil price shock significantly influences the three measures of stock market volatility. More specifically, a positive shock has a negative effect on stock market volatility. A positive shock implies that global economic activity increases and, hence, is considered as good news by stock market participants. This is associated with a more stable business environment and, thus, with a lower uncertainty surrounding the stock market. Conversely, a negative shock feeds into a less stable business environment, more uncertain future cash flows of firms and a more volatile stock market. An important episode illustrating the negative effect of aggregate demand oil price shocks on stock market volatility was marked by the recent global financial crisis. The global financial crisis that began in September 2008 with the collapse of Lehman Brothers saw a depressed global economic activity and oil prices and a remarkable increase in the three measures of stock market volatility.

It is worth noting that the results for the three volatility measures at aggregate stock market level also hold for the current measure of volatility of European industrial sectors. As with the aggregate measures of stock market volatility, the supply-side oil price shocks and the oil-specific demand shocks do not exert a significant effect on stock volatility of European industrial sectors, whereas the aggregate demand oil price shock has a significant negative effect. The exception is the

European Gas and Oil sector, whereby the oil specific demand shock has a negative effect on the current measures of stock market volatility, as well. This result implies that all positive demand side oil price shocks are perceived as good news for energy companies.

The findings of the study are essential in pricing financial derivatives, selecting portfolios, measuring and managing investment risk. Investors, risk managers, policymakers and regulators may find the outcomes of the study useful in handling market's uncertainty in relation with the state of the oil price shocks. For example, supervisors of financial institutions must hold capital based on its internal model's estimates of Value-at-Risk (VaR). Our research suggests that the VaR internal model can take into consideration the relation between oil price shocks and stock market volatility. The Basel Committee, in order to strengthen bank capital requirements and introduce enhanced regulatory requirements on bank liquidity, may take into consideration the relation between aggregate demand oil price shocks and volatility of European stock markets.