THE EFFECT OF SUPPLY AND DEMAND SHOCKS ON THE U.K. NATURAL GAS PRICE VOLATILITY

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Overview

The aim of this study is to examine the impact of shocks in supply and demand on the U.K. natural gas spot price volatility. Prior studies tend to focus on the impact of aggregate demand and supply shocks on energy or stock market volatility (Diakannakis et al., 2014; van Goor and Scholtens, 2014). Our ambition, however, is to specifically examine the impact of different demand and supply sub-element shocks on spot price volatility. There are several sources of gas to the UK market, including imports from interconnecting pipelines to Ireland, Belgium and the Netherlands, withdrawals from underground storage, gas from offshore oil and gas fields on both the U.K. and Norwegian contintental shelves and importations of liquefied natural gas (LNG). On the demand side, gas is used in the residential, power and industrial sectors, as well as exports via interconnecting pipelines and injection into underground storage facilities. We address how shocks in each of these supply and demand components can affect the volatility in the wholesale gas market during 2007 to 2014.

Methods

Following prior studies (e.g. Diakannakis et al., 2014; van Goor and Scholtens, 2014), we model volatility using conditional volatility models, in particular an autoregressive moving average generalized autoregressive conditional heteroskedasticity (ARMA-GARCH) model. We examine the effects of demand and supply shocks on volatility by examining the impulse response functions from a ten-dimensional vector autoregressive (VAR) model. Moreover we also examine the forecast error variance decomposition to collect information on the contribution of each type of shock to the forecast variance.

Results

We have uncovered two supply or demand elements that seem to affect volatility. First, volatility is negatively associated with increased flows from underground storage facilities, indicating that these facilities have a primary role in regulating U.K. natural gas price volatility. Furthermore, volatility is positively associated with shocks in the demand for gas from the power sector, suggesting that there might be a spillover effect from the power market.

Conclusions

This study seeks to examine the impact disaggregated demand and supply shocks on the U.K. natural gas spot price volatility. Our results show that shocks in several of the sources of supply and demand subcomponents dynamically influences U.K. gas price volatility. We find that withdrawals from underground natural gas storages act to mitigate increases in volatility. Furthermore, shocks in demand from the power sector leads to increased volatility suggesting that there is a spillover effect from the power markets into the gas markets.

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