

VOLATILITY SPILLOVERS IN THE UK NATURAL GAS MARKET

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Overview

The UK energy market is a substantial and important energy market, comprising one of Europe's largest and most liquid natural gas markets. Compared to oil and electricity markets, little research has been carried out on UK natural gas markets price behaviour. In particular, very few studies examine the dynamic nature of gas volatility (see e.g. van Goor and Scholtens, 2014 and Misund and Oglend, 2016). This paper examines the volatility spillovers in the short-term forward and futures markets in the United Kingdom, concentrating on the direction and magnitude of volatility spillovers. We investigate the dynamic transmission of price volatility between the short-term and the longer-term gas forward markets. Moreover, the relationship with crude oil price and power price volatilities are also examined to place the findings in a larger energy perspective.

Methods

We apply the Diebold and Yilmaz (2012) method for examining the volatility dynamics among the short-term and long-term forwards, crude oil and power markets in one of Europe's largest energy markets.

Daily price data from 2008-2018 is collected from Reuters. We use the following forward contracts from the UK National Balancing Point market; within day (intraday price), day ahead (next day), weekend (coming weekend), working day next week (Monday to Tuesday after the coming weekend), front month (coming month), front quarter (next quarter) and front season (next season). Both dated Brent and the Brent front month contracts are used, as well as the day ahead UK power price. Price returns from the rollover of contracts are excluded from the analysis. The number of daily logreturn observations is 2071.

From the daily logreturns, daily volatilities are calculated using an autoregressive-general autoregressive conditional heteroscedasticity model, AR(1,1)-GARCH (1,1). The volatility transmission is examined using the Diebold and Yilmaz (2012) framework, which is based on a vector autoregressive model (VAR). This methodology allows for examination of the direction of volatility, from one market to another, as well as to provide information on the magnitude of volatility spillovers between markets.

Results

The results show that prompt contracts (i.e. short-term) such as within day, day ahead and working day next week (i.e. the contracts with maturity of 1-2 weeks) transmit volatility to the longer dated natural gas forward contracts (i.e. front month, quarter and season). Of these, the day ahead volatility is the most important transmitter of volatility. This result suggest that information is transmitted from the short-term market to the longer-term gas markets, typical of a 'physical market'. Moreover, the results also show that volatility is transmitted from crude oil to natural gas. This result is consistent with findings that natural gas prices are cointegrated with crude oil prices in the UK, and that crude oil prices lead gas prices (Asche et al., 2013), suggesting that information is transferred from oil to gas markets. However, in our study we uncover that this relationship is only evident in the longer-term gas markets (front month, quarter and season), and not in the short-term market. There is little volatility transmission between crude oil and natural gas in the short-term market. Furthermore, the results also show that volatility is transmitted from the natural gas market to the power market. This transmission is most evident in the short-term market. This result can be

explained by the importance of natural gas in the power sector (i.e. gas-fired power plants). During the ‘dash for gas’ in the 1990s, a large number of gas-fired power plants were built in the UK.

Conclusions

This study seeks to shed some light on the volatility dynamics in one of Europe’s largest natural gas markets. We examine the magnitude and direction of volatility connectedness both for different maturities of natural gas forward contracts, as well as the relationship with related energy markets such as crude oil and electricity. Our results suggest that volatility is transmitted from the short-term gas market and to the long-term market, as well as to the power market. Furthermore, we also find that crude oil also serves an important role in the UK energy nexus. Volatility is found to spill over from the crude oil market to the long-term gas market.

Our results should be of interest to a wide audience, including energy companies operating in the UK markets, traders pricing options on gas forward contracts, as well as researchers on price and uncertainty in the UK energy markets.

References

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