Effects of Oil and Gas Price Shocks to Stock Markets and Volatility Spillover from Oil and Gas Prices to Stock Markets.

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1.Introduction

In this study, the implications of oil and gas price shocks on stock markets are investigated for Norway, UK and US. The impact on both broad market based index and an energy index is examined.

2.Methodology

i) Analysis of Impact on stock market returns to shocks in energy prices:

- Vector Autoregressive Models (Eviews)

→ Granger Causality Tests

→ Impulse Response Functions

$$\begin{pmatrix} r_{1t} \\ r_{2t} \end{pmatrix} = \begin{pmatrix} c_{10} \\ c_{20} \end{pmatrix} + \begin{pmatrix} \beta_{11} & \alpha_{11} \\ \beta_{21} & \alpha_{21} \end{pmatrix} \begin{pmatrix} r_{1t-1} \\ r_{2t-1} \end{pmatrix} + \begin{pmatrix} u_{1t} \\ u_{2t} \end{pmatrix}$$

ii) Analysis of volatility spillover between oil and gas prices and stock markets.

- Full bivariate GARCH BEKK model (Eviews)

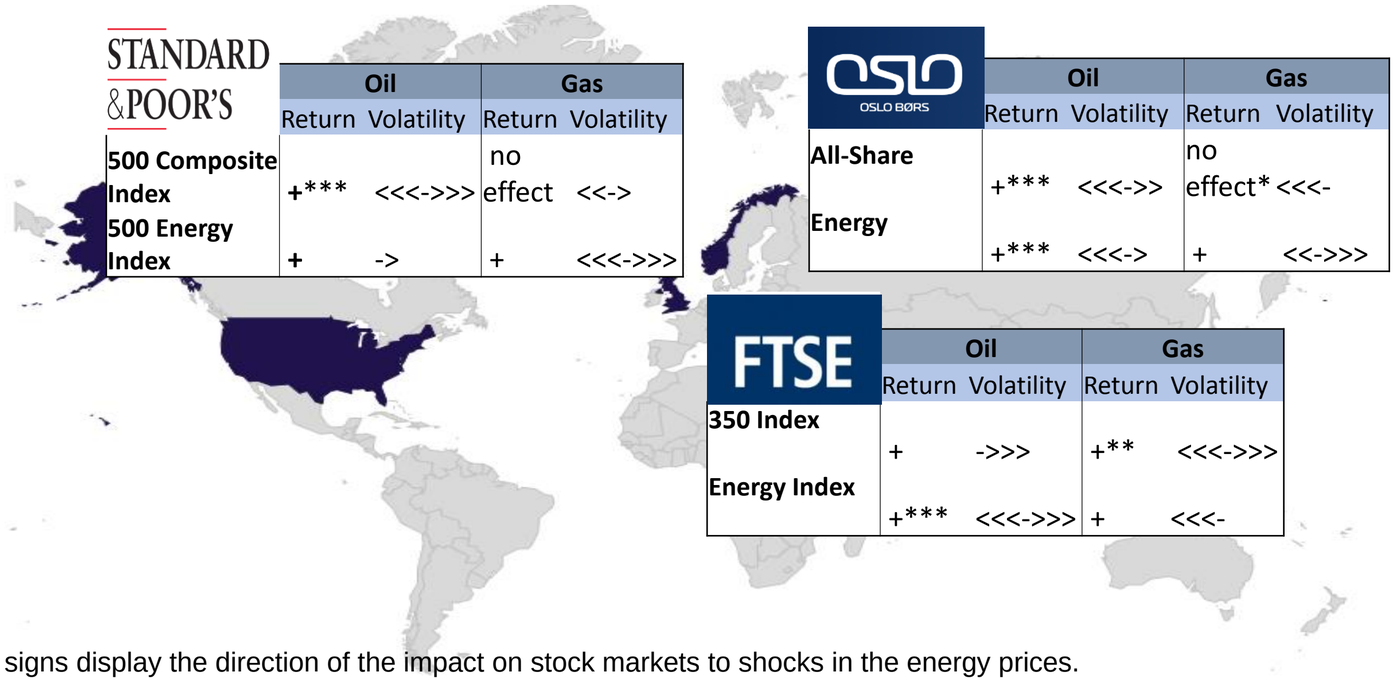
→ The full model allows for investigation of the off-diagonal elements. If found significant, there is evidence for volatility spillover.

→ GARCH BEKK estimated by Maximum log likelihood.

$$H_t = C'C + \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}' \begin{pmatrix} \varepsilon^2_{1,t-1} & \varepsilon_{1,t-1}\varepsilon_{2.t-1} \\ \varepsilon_{1,t-1}\varepsilon_{2.t-1} & \varepsilon^2_{2,t-1} \end{pmatrix} \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} + \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix}' \begin{pmatrix} \sigma^2_{1,t-1} & \sigma_{12.t-1} \\ \sigma_{12.t-1} & \sigma^2_{2,t-1} \end{pmatrix} \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix}$$

3.Results

- Results from the impulse response functions are summarised in the return columns.
- Direction of volatility spillover is displayed in the volatility columns.



STANDARD &POOR'S

	Oil		Gas	
	Return	Volatility	Return	Volatility
500 Composite Index	+***	<<<->>>	no effect	<<->
500 Energy Index	+	->	+	<<<->>>

OSLO BØRS

	Oil		Gas	
	Return	Volatility	Return	Volatility
All-Share	+***	<<<->>	no effect*	<<<-
Energy	+***	<<<->	+	<<->>>

FTSE

	Oil		Gas	
	Return	Volatility	Return	Volatility
350 Index	+	->>>	+**	<<<->>>
Energy Index	+***	<<<->>>	+	<<<-

The signs display the direction of the impact on stock markets to shocks in the energy prices.

Arrows show volatility spillover from energy prices to stock market indices >>>, .>>, > and from stock markets to energy prices <<<, <<, < of 99%, 95%, 90% confidence respectively. Arrows pointing both ways show bidirectional volatility spillover.

4.Conclusion

- In Norway, which is an oil-exporting country, the oil and gas sector is heavy weighted. As expected, the stock market is positively affected by energy price shocks, and there is also evidence for bidirectional volatility spillover.
- In the UK, the FTSE Energy index is found to be positively affected by energy shocks. However, there is not enough evidence to claim that energy shocks affect the FTSE350 index.
- The evidence suggests bidirectional volatility spillover from the Henry Hub gas price to the S&P 500 Composite Index.

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VAR-Vector autoregressive models are estimated and **Granger Causality** tests are performed on the VAR(1) models. **Impulse Response Functions** are used to analyse the impact on the returns of the aggregated stock prices of a shock to the energy prices.

GARCH- Full bivariate General autoregressive conditional heteroscedasticity models with BEKK specification allows for investigation of the of diagonal elements in the conditional covariance equation, if significant there is evidence of volatility spillover.