Volatility Spillovers in North American Energy Markets

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Overview

The interconnectedness of global oil and natural gas markets has received much attention. The global pool hypothesis [Adelman (1992), Gulen (1999), Ewing and Harter, 2000 and Wilmot (2013)] would suggest that volatility should spillover from one market to another. A vast literature of econometric studies examining the dynamic and distributional properties of price and/or returns exist for crude oil markets. The natural next step is an examination of the second moment of the distribution, i.e. volatility. Volatility transmission among the bench market crude oil series is the focus of Jin et al, 2012. Yet little appears to have been done on either 'regional' oil blends or natural gas markets. Thus, the focus herein is on the relationship between Canadian and US energy commodities, both Crude oil and natural gas. The US is home to the benchmark series of WTI and Henery Hub, yet both commodities play an important role north of the boreder as well. Canada is the worlds top five energy producers (EIA, 2014) and is the principle supplier of energy imports to the United States (EIA, 2014). Canada is the worlds fifth-largest oil producer, with much of that production derving from the oil sands located in Alberta. Canada also ranks fifth in dry natural gas production, with all of Canada's current natural gas exports shiped to the US market via pipelines. Canada is heavily reliant on the US for its exports, It seems that these two countries are highly interconnected. Such a relationship suggests that understanding volatility flows would be important for assessing, hedging and undertaking capital investment.

Methods

Using daily data on crude oil and natural gas (spot) prices, from both the United states and Canada, (pd 2000 – 2014), a VAR-BEKK model is employed. The multivariate conditional volatility model, by Engle and Kroner (1995) allows for an examination of volatility transmissions within commodity markets, between countries, as well as across commodity markets within a country.

Results

Preliminary analysis suggests that volatility does spillover from the US benchmark series to the Canadian series. Some off-diagonal coefficients are statistically significant, indicating that volatility is transmitted through the cross product of innovations as well as squared innovations.

Conclusions

This paper presents an empirical study of multivariate GARCH models to daily crude oil and natural gas price data from the beginning of 2000 through the end of 2014. The multivariate GARCH results reinforce the hypothesis of a a Noth American 'pool' for energy commodities, given the volatility spill overs that are observed.

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