

FINANCIALIZATION IN THE US GAS MARKET AND ITS INFLUENCE ON THE PRICE DYNAMICS

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Overview

Natural gas futures appeared on the New York Mercantile Exchange (NYMEX) in 1990-1993 (EIA, 2015). However, significant increase in energy futures from financial investor demand has been started after the US Commodity Futures Modernization Act in 2000. This Act introduced “more flexibility, allowing financial agents such as commodity index funds to enter them”. (Lubnau and Todorova, 2015) It can be one of the reasons why since then there has been a significant increase in both the volatility of the spot market and the volumes of natural gas futures traded which is not consistent with previously observed trends. Fig. 1 demonstrates the rise in positions of traders for natural gas (NG) in NYMEX. As seen, the position of the noncommercial traders is just part of the total open interest.

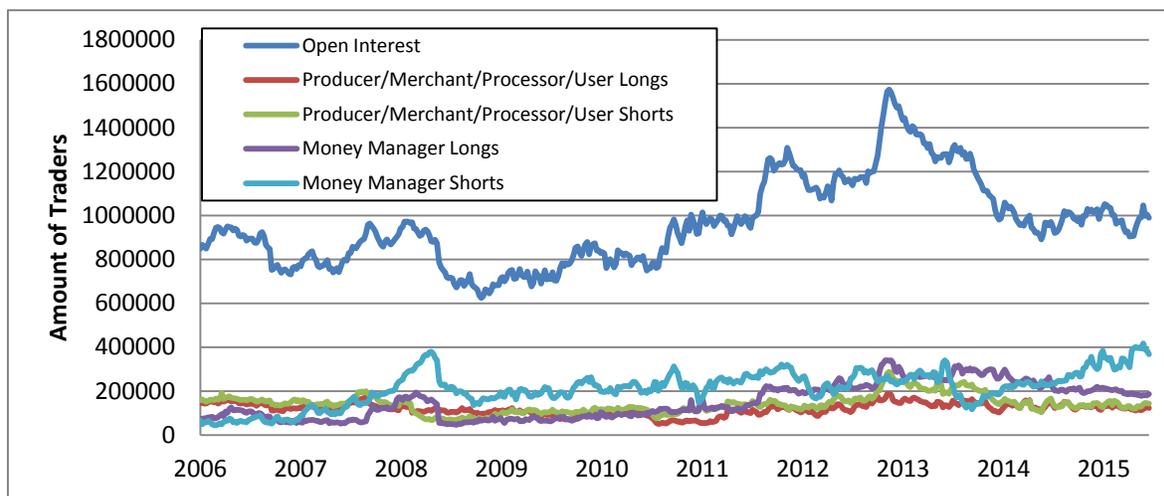


Fig.1 Amount of traders for NG futures on the NYMEX (Quandle, 2015).

This dynamic have led me to question whether this increase in trading or “financialization” has had a significant influence on the price dynamics in the US natural gas market. As natural gas becomes an important energy source in the lower carbon economy, a greater understating of its price dynamics will be beneficial for regulators, commercial traders and non-commercial traders. I have been unable to find any existing research pertaining to the financialization and specifically its impact the dynamic of NG spot prices. The future-spot spread model and 2-regime Markov-switching model are applied to test out hypothesis: *Financialization had an impact on the dynamic of US natural gas spot prices.*

Methods

To identify the influence of financialization on the natural gas market we apply econometric techniques to analyze the interaction between the NG spot price and the NG futures price in the periods between 1997 and 2003 and between 2004 and 2015. Monthly data for the natural gas spot price and futures prices for contracts with 1, 2, 3 and 4 months of maturity have been utilized in the analysis.

Firstly, the forecasted performance over 1-4 months horizons of natural gas futures in these periods were tested on the short- and long-run relationships with the NG spot prices. The forecasting models of the NG spot price based on the NG futures and the basis defined by the NG spot and futures prices were constructed and tested by the

application of Augmented-Dickey Fuller test and the cointegration analysis. The Error Correction Model (ECM) is applied for modeling the short-term relationship between the cointegrating variables.

Further 2-regime Markov-switching model with constant transition probabilities were applied. It is used to detect the breaks and jumps in the cointegration between the NG spot and futures prices or the NG spot and the basis defined by the NG spot and futures prices. As there are some events (business cycles, financial crisis, changes in government policies, impact of macroeconomic and financial variables) causing structural breaks in the cointegrated relationship, 2-regime Markov-switching model can be useful to model these switches between the regimes.

Results

The descriptive statistics and the cointegration analyses demonstrated higher volatility of the NG prices and the bases (defined by the NG spot and futures prices), and change in the short- and long-term relationships between the NG spot and futures prices in the period between 2004 and 2015 compare with the period between 1997 and 2003. The test for the short-term relationship between the spot NG prices and futures NG prices show that it exists only in the period between 1997 and 2003 for contracts in 2 and 3 months of maturities. In the period between 2004 and 2015 the adjustment coefficients for current differences in NG spot prices becomes insignificantly different from zero, meaning it takes a long time for the spot price of NG to adjust back to its long-term equilibrium with its futures price after a shock. In addition the variables and their bases were also tested for seasonality, however procedures indicated that seasonality was not significant in data sets analyzed.

The forecasting models of the NG spot prices based on the NG futures prices for contracts in 1, 2, 3 and 4 months to maturity demonstrated poor forecasting performance in both periods. However, it was detected significantly higher bias for the real and fitted paths in the forecasting models in the period after 2004.

Further the dynamics of the NG prices were analyzed by using 2-regime Markov-switching model with constant transition probabilities. The results show a lot of structural breaks between the NG spot price and NG bases in the period between 2003 and 2012. This period can be characterised by high volatility and loss of cointegration relationship between the NG spot price and bases defined by the NG spot and futures prices. The cointegration of the NG spot price and the NG futures price for contracts in 1, 2, 3 and 4 months to maturity exists in both regimes, however, the period between 2003 and 2013 demonstrates high volatility and a lot of structural breaks or switches between 2 regimes.

All these results demonstrate some changes in the fundamental patterns of the natural gas prices after 2003. The reasons can be caused by an increase in trade volumes, market liquidity and thereby financialization.

Conclusions

The executed tests in this work demonstrate the evidence of higher volatility in the spot and futures NG prices and the fact of the change in the relationships between them in the long- and short-terms in the period after 2003 compare with the earlier period and the period after 2012. It signals in favour of my hypothesis, as the volatility increased and the NG prices have moved out from their fundamentals after 2003. However, more analysis is required to test the hypothesis of the financialization in the NG market of the US. The 2-regime Markov-switching model with time-varying transition probabilities could be applied further to demonstrate the probabilities in what regime the gas price is – in the commercial trader regime or in non-commercial trader regime in the period between 2003 and 2015.

References

- EIA, 2015. Available at: http://www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm
- Lubnau, T. and Todorova, N. 2015. Trading on mean-reversion in energy futures markets. *Energy Economics*, 51, 312-319.
- Quandl, 2015. Available from: https://www.quandl.com/data/CFTC/NG_F_L_ALL-Commitment-of-Traders-Natural-Gas-Futures-Only-Legacy-Format