

VALUING THE RISKS AND RETURNS TO THE SPOT LNG TRADING

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Overview

Two major changes in the world natural gas markets have been emphasized in the last decade: (1) an increase in the level and volatility of regional natural gas prices, and (2) a continuous reduction in costs for liquefaction, shipping, and regasification of LNG. These observations have followed an extensive discussion on potential returns from short-term trading of LNG in the spot market, and potentially fostering integration of geographically sparse regional gas markets. Naturally, returns and risks to such short-term trading, as opposed to conventional models of LNG trading through a long-term supply/purchase arrangement, depend on the stochastic properties of regional gas prices and crude oil prices to which the LNG prices are often linked under long-term supply arrangements. While the literature on the stochastic properties of energy commodities has been growing, their implications for returns and risks to short-term LNG trading have rarely been drawn. This paper examines the stochastic properties of US natural gas and crude oil prices and considers their implications for the returns and risks to spot LNG trading in the Asia-pacific region.

Methods

I estimate the models of commodity price dynamics using the daily spot price data from the Henry Hub (HH) natural gas and Brent crude oil. The model decomposes daily price changes into the two components: (i) deterministic or seasonal price movement and (ii) stochastic movement, and specify each of these two components by flexible, non-parametric functions. The depicted portrait of natural gas and crude oil prices are then used to quantify the expected returns to a flexible LNG supply for spot trading and its variance through Monte Carlo simulations.

Results

The estimated models of price dynamics of the two commodities indicate that the HH natural gas price exhibits strong seasonal patterns, with both mean and variance peaking in winter high-demand season (seven times higher than early summer). In contrast, mean and variance of the spot crude oil price is relative flat throughout the year. Crude oil price volatility exhibits a similar seasonal pattern but by a magnitude much smaller than that of the HH natural gas price. After controlling for such seasonality in mean and variance, the two prices exhibit only moderate correlation. The difference in the seasonality of two mean prices and high winter volatility of natural gas price implies positive expected returns from arbitraging spatial price differences between Asia and the US. Although these returns are highly volatile, a volatility increment, from the case where the producer supplies under long-term forward contract with the price linked to the spot price of crude oil, is only moderate, as shown through the simulation. Besides, while option to choose from multiple regional markets increases the volatility of revenue from short-term trading overall, it reduces the downside risk substantially, with the revenue exceeding the revenue from forward sales in more than 90% of time.

Conclusions

A positive return from the short-term LNG trading with reasonably low incremental price risk will provide an incentive to LNG producers in Asia-Pacific region to shift from conventional long-term supply arrangement to short-term trading.

References

Bartsch, U. 1998. Financial risks and rewards in LNG projects: Qatar, Oman, and Yemen. Oxford Institute for Energy Studies Working Paper NG3.

Bollerslev, T. 1990. "Modeling the coherence in short-run nominal exchange rates: A multivariate generalized ARCH model, *Review of Economics and Statistics*, 72: 498-505.

Chabrelie, M. F. 2003. "A new trading model for the fast-changing LNG industry," Presented at the First Asia Gas Buyers' Summit, Mumbai, India.

EIA. 2003. *The global liquefied natural gas market: Status & Outlook*. Energy Information Administration, Washington D.C.

EIA. 2007. "Short-term energy outlook supplement: U.S. LNG imports - The next wave," EIA, Short-Term Energy Outlook Supplement. Energy Information Administration, Washington D.C., January, 2007.

Fujime, K. 2002. *LNG Market and Price Formation in East Asia*. Institute of Energy Economics, Japan. (<http://eneken.ieej.or.jp/en/data/pdf/127.pdf>).

Hayes, M. H. 2006. "Flexible LNG supply and gas market integration: A simulation approach for valuing the market arbitrage option," *Proceedings to the 23rd World Gas Conference*, Amsterdam.

IEA. 2005. "LNG cost reductions and flexibility in LNG trade add to security of gas supply," *Energy Prices and Taxes*, 1st Quarter, 2005, International Energy Agency.

Suenaga, H. 2007. "Optimal forward contracting in LNG supply capacity investment," to be presented at the 1st IAEE Asian conference, Taipei, November.