

# Asian Spot Prices for LNG and other Energy Commodities

Abdullahi Alim<sup>†</sup>, Peter R. Hartley<sup>\*</sup> and Yihui Lan<sup>†</sup>

## Executive Summary

One of the more dramatic changes in LNG markets in recent years has been the growth in spot trading. The large amount of liquefaction capacity coming on stream in the US in the next few years should further increase spot market LNG supply into Asia and encourage lower and more flexible prices. US exports are being marketed under arrangements that tie the price of the natural gas to the Henry Hub (HH) price. US exports that can be shipped to Europe, South America or Asia should also increase the linkages between natural gas prices around the world and improve the liquidity of natural gas markets. These developments have increased interest in establishing an Asian LNG pricing hub with associated derivatives markets. They have also stimulated proposals to use alternatives to oil prices to index long-term LNG contracts. The main goal of our study is to investigate whether Japan-Korea Marker (JKM) price is sufficiently stable and informative of Asian energy market developments to serve these purposes.

The core of our paper is an econometric analysis of the relationship between the JKM, the prices of the main competing energy commodities, thermal coal and fuel oil, and the price of Brent oil. We find that the largest cross-price effect on spot LNG prices arises from shocks to the Brent oil price. We also find evidence of substitution between natural gas and coal in the short run, but in the long run the JKM price is linked to oil and fuel oil prices, but not to the coal price.

These findings can be explained by noting that the JKM price is for spot trades. Spot LNG cargoes are likely to be used for less predictable demands such as peak load power generation and space heating during unexpected cold weather. By contrast, LNG purchased under long-term contracts is likely to be used for more stable and predictable demand such as fuelling combined cycle power plants or for industrial purposes. Peaking gas turbines may substitute for coal in the short run by changing the number of hours each type of plant is used, but they will be more substitutable with peaking plants fired by oil and oil products. In the long run, combined cycle plants will be more substitutable for coal-fired plants, but under the current structure of long-term contracts there is little scope for coal prices to affect long-term LNG contract prices. LNG used for industrial purposes or for space heating will also be more substitutable for oil products than for coal.

---

<sup>\*\*</sup> Corresponding author: Department of Economics, MS22, 6100 Main Street, Houston, TX 77005-1892, and Department of Economics, University of Western Australia. Email: hartley@rice.edu.

<sup>††</sup> UWA Business School. The University of Western Australia.

A second critical factor that may explain our results is that while long-term LNG contracts often specify a volume of trade over each year or number of years, there is some flexibility in when those cargoes are taken. This means that contract LNG effectively provides an opportunity cost for many, if not most, spot LNG purchases. The linkage between contract prices and oil prices as a result of indexation clauses in the contracts should therefore also tie spot LNG prices to oil prices in the long run.

In summary, while we find strong linkages between the JKM price and Brent oil price, we also find that some of the fluctuations in JKM reflect inter-fuel competition in Asian markets, particularly with coal. This could make JKM more suitable than Brent or a market gas price from another region, such as the HH price, as an indexation variable for long-term LNG contracts in Asia.

We also examine the variability of the JKM price, the Brent oil price and the HH price. We find that HH prices have been much more volatile than both Brent and JKM in our sample period. The mean of the log HH price 28-day standard deviations is about 0.054 compared to about 0.033 for log Brent and 0.032 for log JKM. The corresponding maximums are 0.217 for log HH, 0.150 for log JKM and 0.125 for log Brent. The higher volatility of HH than either JKM or Brent would make it more risky as an indexing variable for long-term LNG contracts in Asia.

In summary, our paper provides evidence that the JKM price could indeed be suitable as the basis for an Asian LNG pricing hub with associated derivatives markets, and as an alternative, and perhaps more informative, index for long-term LNG contracts. The premise underlying such a proposal is that utilities in Asia would value energy market prices that are more informative to both buyers and sellers. In many countries this may require improved pipeline infrastructure, reduced price regulation and increased competition. While electricity prices remain regulated with costs passed on to consumers, utilities may value the greater stability of oil-linked contracts. In a more competitive electricity market, however, there may be more benefit in allowing natural gas prices to reflect information about the changing balance of supply and demand in the markets for different fuels.

**Keywords:** Spot energy prices, LNG, Asia, inter-fuel competition, LNG contract trades, cointegration, vector error correction models