GAS TRANSPORT: PIPELINE VERSUS LNG

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Overview

We will address the main question in the Norwegian discussion on gas transport from the Barents Sea – whether to lay pipelines or liquefy gas for export as LNG. If sufficient volumes of gas can be attained, the pipeline solution offers economies of scale and a lower transport cost, at least for the parts of the Barents Sea that is closest to existing pipelines. Transport will also be available for all companies at a regulated tariff. But this option locks the natural gas into the European market, while shipment as LNG has the potential to reach other regional markets. This flexibility has an option value if price differences occur periodically. That option value must be traded off against the incremental cost of liquefaction, transport and regasification relative to the pipeline alternative

Methods

One fundamental issue is the extent to which future price differences for natural gas are likely to exceed incremental transport costs. This is a crucial input in determining the value of the LNG option. This line of research will represent an extension of our work on market integration for natural gas, see Asche et al (2002, 2006). A full understanding of the global gas markets requires major exogenous market changes, such as the recent shale-gas boom, to be taken into account in gas market models. This will lead to a more qualified assessment of the profitability of gas projects, such as new Norwegian pipeline or LNG developments. Failing to take account of the US gas market when assessing future European gas prices might seriously overstate the profitability of new pipelines to Europe. Accounting for structural changes in time-series data has long been a focus of research in economics. Several parametric tests exist for testing for structural changes (Nyblom, 1989; Hansen, 1992, Andrews, 1993; Bai & Perron, 1998, 2003). In general, research on energy market integration has assumed structurally constant relationships across markets. In light of recent changes, it is clear that such methods are not appropriate for a full understanding of energy markets.

Our work aims to extend empirical research on energy markets by utilising promising new methods which can fully incorporate and account for structural market changes. One such method is the generalised co-integration model of Hansen (2003), which allows for market relationships to change in light of significant exogenous structural changes. In addition, with the advent of Bayesian econometrics in recent years, we can account for time-varying relationships by means of fully flexible state space models where key parameters of vector error correction models are allowed to change over time (Koop, Gonzales & Strachen, 2009, 2010; Koop & Jochmann, 2011; Strachan & Inder, 2004). Such models allow cointegration spaces to vary over time, consistent with possible changes in market structures. These methods promise a more flexible and precise representation of energy markets. The benefit is greater understanding of these markets, in addition to greater academic competence of economic market analysis.

Results

Current research on international gas markets establishes three main gas regions: the European, North American and Pacific-Asian markets. The degree of price divergence between these markets relies heavily on the availability and economics of pipeline and LNG transport. The heavily oil-indexed European and Pacific-Asian markets ensure common pricing through an indexation to the global oil price (Asche et al, 2002; Asche et al, 2006; Siliverstovs et al, 2005). US gas is traded to a much smaller degree on oil-indexed contracts, and significant price divergence is often observed between US and European/Asian gas prices. This has been especially evident in recent years, with the unexpected shale-gas boom leading to heavily depressed domestic US gas prices relative to prices for both oil and international gas (Oglend et al, 2013; Erdős, 2012). Prior to the shale-gas expansion, US gas prices were integrated with those in Europe through intercontinental gas-to-gas competition and inter-fuel substitution (Bachmeier and Griffin, 2006; Villar and Joutz, 2006; Neumann, 2009; Erdős, 2012).

Conclusions

The future development of both European and Pacific-Asian gas markets is critically dependant on the US market. If sufficient US gas liquefaction capacity is developed, it will affect the European market and lead to lower gas prices there. Whether or not this occurs in the foreseeable future depends on both US political decisions and the economics of natural gas production in the USA. The economics of gas operations also depend on the market for other petroleum products, such as LPG, which are an important source of revenue for shale gas operations (Oglend et al, 2013).

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