

# **Transatlantic Natural Gas Price Convergence: Is LNG Doing its Job?**

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## **1. Overview**

This paper analyzes the dynamic integration of international markets using econometric analysis, applied to the natural gas markets. We test the hypotheses of an emerging global natural gas market leading to price convergence, in particular in the Atlantic basin. For a couple of years now one observes indeed structural changes affecting the formerly regionally segmented natural gas markets of Europe, North America and Asia-Pacific: an unprecedented growth of trading in liquefied natural gas (LNG), an increasing role of spot trading on both sides of the Atlantic, and a diminishing role of long-term contracts in total procurement. Theory predicts that in an integrated market, prices on homogenous products from different suppliers should move in the same direction, and price differentials should only represent differences in transportation costs or quality. We test this hypothesis for the price dynamics between major North American and European natural gas hubs. Furthermore, we analyze the interaction of oil and natural gas prices.

## **2. Literature and Methods**

The recent literature on energy price convergence focuses on regional markets. Substantial work showing the integration of North American natural gas markets has been carried out, amongst others, by King and Cuc (1996), Cuddington and Wang (2004), and Serletis and Rangle-Ruiz (2005). Asche, Osmundsen, and Tveteras (2001, 2002) focus on monthly European prices; Panagiotidis and Rutledge (2004) show that there exists a long-run equilibrium of monthly spot wholesale natural gas and oil prices in the UK between 1996 and 2003 which has become more volatile over time. Neumann, Siliverstovs and Hirschhausen (forthcoming) have shown some price convergence of European spot prices.

In this paper, we assume that growing international trade with LNG serves as a device to force price convergence across the Atlantic. We place ourselves in the approach of Siliverstovs et al. (2005), but expect to contradict their argument of regionally segmented natural gas markets.

The empirical analysis relies on an econometric time-series analysis of the dynamics of natural gas spot prices (Henry Hub, NBP) and crude oil spot prices relevant to the Atlantic basin (Brent and West Texas Intermediate). We have monthly, weekly, and daily data for the gas years 1999 until 2005 (1570 observations). In a first step we apply standard cointegration approaches to identify the current level of integration of spot market prices. In a second step,

we include time-varying coefficients in order to measure the dynamics of bilateral price relationships for both, natural gas and oil prices.

### **3. Results**

First estimations from weekly data show that with increasing trade of LNG and growing liquidity of continental European spot markets for natural gas, prices at either side of the Atlantic Basin are increasingly converging. This is in particular true for the second half of our sample, i.e. the years 2003-2005. Although the natural gas markets in North America and Europe are not perfectly integrated, the Kalman filter analysis of daily data, and sub samples thereof, confirms that convergence of natural gas prices on either side of the Atlantic increases over time.

### **4. Conclusions**

LNG seems to be playing its role as a “physical” interconnection between natural gas markets in North America and in Europe. Arbitraging possibilities particularly frequently arise during summer months, mainly due to use of natural gas in power generation. The increasing share of LNG supplies to Europe and to the U.S. combined with an increase in demand for natural gas, declining indigenous production, and the changing nature of long-term contracts are driving elements towards market integration. An important issue for further research is the role of LNG as an integrator of the Asian and Pacific markets.

**Keywords:** market integration, international trade, spot markets, natural gas

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