GAS AND LNG MARKETS : ARE WE FACING A GLOBALLY INTEGRATED MARKET?

Olivier Massol, Center for Economics and Management, IFP School, Phone +33 1 47 52 68 26, olivier.massol@ifpen.fr
Ekaterina Dukhanina, MINES ParisTech, Phone +33 1 40 51 91 26, ekaterina.dukhanina@mines-paristech.fr

Overview

After liberalization reforms, spatially localized spot markets for wholesale natural gas emerge in different regions worldwide. In addition to the pipeline transportation, the development of the LNG industry, which enables the transoceanic arbitrage, enforces the link between different gas trading regions.

The literature on spatial integration suggests that the intermarket arbitrage is playing a crucial role in the price formation. According to the spatial equilibrium theory, the arbitrage activities reduce the spatial price spread to the level of transportation (arbitrage) costs, a threshold below which the trade becomes not profitable. Thus, on an integrated gas market the observed prices on geographically dispersed hubs should differ on the value of arbitrage costs, whatever the nature of the arbitrage, by pipeline or via LNG.

The spot markets worldwide are not homogeneous, some of them are supplied and interconnected by pipelines, some of them via LNG or mixed. The costs, the liquidity and the timing are neither equal for pipeline and LNG transportation. This should impact the arbitrage activities and the relative prices. Thus, numerous questions are emerging. Do these spot markets stay in spatial equilibrium? Are the closer located to each other markets more integrated? How do the pipeline and the LNG trade interact in terms of formation of an integrated global gas market?

The goal of this paper is to examine whether we observe the same degree of integration between the spot markets in different regions (Europe, North America and Asia) provided their heterogeneity in terms of gas supply. Taking into account that having an integrated gas market impacts the strategic decisions for industrials and policy makers, we analyse at which extent we can consider the global gas and LNG market integrated.

This study differs from other works on gas market integration by several features: the scope of analysis and the methodology. Numerous contributions examine separately the degree of integration of regional gas markets and the LNG links between the regions. However, the question about the links between the spot markets worldwide benefitting from different types of supply with emphasis on spatial arbitrage has not been covered by the literature. Moreover, most of existing works use standard time-series econometric tools in order to infer about interrelation between the prices on different markets. Only a handful of studies pay attention to the transportation costs and even less to the intermarket arbitrage opportunities. The chosen methodology enables explicit estimation of the arbitrage costs, which are appropriate for each pair of markets. Thus, we can compare the estimated values with the real ones. This sheds light on the unobservable part of arbitrage costs and allows us to study in depth arbitrage opportunities and conclude about the periods of equilibrium and detect inefficient trade on the market.

The analysis of the gas market integration using the spatial equilibrium approach is a new and promising field of research. Applied to this case it allows us to estimate and compare the degree of integration between different spot markets worldwide. It tells us how spatially efficient the intermarket pipeline and LNG arbitrage is and how close we are to a globally integrated gas market.

Methods

We examine the arbitrage performed between different gas markets and focus on the role played by the arbitrage costs using a switching regime approach derived from the seminal work of Spiller and Huang (1986) and extended by Sexton et al. (1991), Barrett and Li (2002) and Massol and Banal-Estañol (2016). This approach suggests that integration may not be a time invariant: there can exist "autarky" periods during which the price spread is lower than the arbitrage costs, "barriers to trade" when the price spread is higher and "equilibrium" periods when the price

spread equals the arbitrage costs. In addition, we correct for serial correlation in order to deal with inter-period linkages according to the methodology described in Kleit (2001).

Results

The model shows that the probabilities for considered markets to be in equilibrium vary between market pairs. Thus, we can conclude that the markets worldwide do not have the same degrees of integration. This result means that it is too early to speak about a globally integrated gas market. Moreover, comparing the degrees of integration between the spot markets, we find some distanced markets more integrated than neighbouring ones, observing a higher integration between the European and the Asian markets than between the markets within the Europe. This result questions the common hypothesis that closer located to each other markets are more integrated. On the one hand it can be explained by some inefficiencies present on European markets. On the other hand this raises a question whether the gas and the LNG markets lie in the same economic market.

Conclusions

The study allowed us to estimate the degree of integration between different gas trading regions and infer about the efficiency of arbitrage activities between them by using a new method based on the spatial equilibrium theory. We discover that the regional gas markets do not have the same degrees of integration. This indicates that it is too early to speak about a globally integrated gas market. Moreover, we observe a higher degree of integration and, by consequence, a tighter connection between some distanced markets than between neighbouring ones. A possible explanation is that the pipeline gas and LNG are not considered as a homogeneous commodity, as they have different trade conditions, prices and different market liquidity. Another way to explain this is the presence of obstacles for integration between some markets, for example, capacity or congestion problems.

The analysis of the gas market integration using the spatial equilibrium approach is a new and promising field of research. It enables explicit estimation of the arbitrage costs and comparison of the estimated values with real transportation costs in order to shed light on the unobservable part of arbitrage costs. This methodology, which is well suited for in depth analysis of arbitrage opportunities and helps to conclude about the periods of equilibrium and detect inefficient trade on the market, could be useful for industrials and policy makers in strategic decision making.

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