

CROSS-BORDER CONSTRAINTS, INSTITUTIONAL CHANGES AND INTEGRATION OF THE DUTCH-GERMAN GAS MARKET

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(1) Overview

We estimate the contribution of institutional changes in the Dutch and German gas markets to the integration of these markets. We measure this contribution through the impact of bottlenecks in the cross-border infrastructure on cross-border price differences. In the period 2007-2011, the differences in both price levels and price volatility between these two markets decreased. We find evidence that institutional changes in the Dutch market, in particular regarding quality conversion, have reduced the impact of cross-border infrastructure bottlenecks on regional price differences. The integration of German regional networks into larger systems, however, appear to have had a negative effect on the integration with the Dutch market.

(2) Methods

Our paper is related to papers like Siliverstovs, L'Hégaret, Neumann and von Hirschhausen (2005), Cuddington and Wang (2006), Marmer, Shapiro and MacAvoy (2007) and Growitsch, Stronzik and Nepal (2012) who also analyse the integration of regional gas markets. The contribution of our paper is that we not only use data on prices, but also data on the utilisation of cross-border infrastructure. In addition, we focus on the impact of changes in the national markets.

We apply GARCH (1,1) models to the differences in daily gas prices on the TTF and NCG over the period June 2007 – December 2011. We use a mean equation in which the key explanatory variables are the daily utilization rates of the L- and H-gas export infrastructure and dummies for the institutional changes with interaction terms. We control for the influence of time patterns, outside temperature and the Ukraine gas crisis.

Price differences are measured in two ways. The difference in the highest daily day-ahead prices between TTF and NCG is our measure of integration of price levels. In addition, we look at the differences in the range between the highest and the lowest day-ahead prices at TTF and NCG as an indicator of volatility in both markets. In an integrated market, not only the price levels converge, but also the price volatility as in integrated markets all prices show similar movements (Stigler and Sherwin, 1985). Note that we use day-ahead prices as daily changes in cross-border utilisation in particular affect short term prices.

The utilisation rates are used as a measure of the cross-border constraints, using daily data on transport flows and capacity (GTS, 2012). We measure the constraint as a continuous variable because traders can be expected to face more difficulties in acquiring additional capacity if the level of transport flows approaches the capacity levels. This general relationship holds even more in the gas industry where most of the capacity is booked in advance through long-term contracts, leading to situations in which some traders face capacity restrictions where others still have unused capacity (CEER, 2011). This means that utilisation rates (far) below 100% may indicate constraints for international price arbitrage.

(3) Results

We find that the Dutch market (TTF) and the German market (NCG) have become more integrated over the past years. At the end of 2011, the difference in price levels is -0.159 euro/MWh which is lower than it was in the period from mid-2008 to mid-2009. Comparing the difference in the price range (high-low prices), we observe a steady drop from 0.778 euro/MWh to 0.091 euro/MWh in 2011.

In particular the abolition of the obligation to book quality-conversion capacity in the Dutch market in 2009 has reduced cross-border differences in both price levels and price volatility. Also the introduction of a market-based balancing regime and the change in the policy of the incumbent Dutch gas supplier to deliver all gas on the TTF had a positive effect on market integration between the Dutch and the German market. The pooling of network areas in Germany into larger networks in 2008 and 2009, however, seem to have reduced the integration with the Dutch market.

We do not find an effect of the introduction of an exit-entry system in Germany in 2007 and the acquisition of the GUD network by the Dutch Gasunie. Regarding the implementation of backhaul on the connection with the UK (BBL) we do find a significant effect on differences in price levels, but the sign of this effect is not clear as the coefficients for the L-gas network and the H-gas network are of an equal size but with the opposite sign.

(4) Conclusions

We conclude that the degree of utilization of the cross-border infrastructure is positively related to price differences, but that this relationship weakens during the period of analysis. We find evidence that the several institutional changes within the Dutch market have contributed to this. These measures appear to have raised the ability of market players to respond more quickly to price differences between the Dutch and German market.

The pooling on network areas in Germany in 2008 and 2009, however, seems to have reduced the integration with the Dutch market. This result might be related to the fact that the NCG market is still not a very liquid market, while the TTF market has become one of the most liquid gas markets in Europe.

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