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THE LAW OF ONE PRICE IN GLOBAL NATURAL GAS MARKETS – A THRESHOLD COINTEGRATION ANALYSIS

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Overview

In the last decade, trade volumes of liquefied natural gas have increased strongly and are thought to promote the integration of global markets for natural gas. According to the Law of one Price we expect prices of a homogenous good such as natural gas to converge under such circumstances by arbitrage activity. In contrast, important benchmark prices of natural gas around the globe seem to have decoupled, at the latest since the end of the financial crisis. Hence, in this study, we empirically investigate whether the Law of one Price holds against the background of persistently differing prices. In specific, we focus on the long- and short-run dynamics between the Henry Hub in the US and the National Balancing Point in the UK.

Method

Previous research on spatial arbitrage in international natural gas markets mostly used linear cointegration approaches to study the subject matter. However, linear approaches ignore that there should be no arbitrage activity i.e. no error correction when the price difference is smaller than the transaction costs of arbitrage. First, we improve on existing literature by developing a threshold cointegration framework that is more adequately capturing the dynamics of spatial arbitrage in gas markets in the presence of transaction costs. Second, we use our model to both test for cointegration and estimate a measure for impediments to arbitrage (such as transaction costs). The measure can be compared to typical transport cost differentials across the Atlantic to get an indication for other less obvious impediments to arbitrage. Third, we investigate the adjustment of individual prices by using a threshold vector error correction model.

Results

First, our empirical analysis reveals that standard and threshold cointegration test results differ. Accordingly, using standard cointegration tests a stable long-run relationship with threshold error-correction dynamics can be found for our full sample period 2000-2012 and the pre-crisis period 2000-2008, but not in the 2009-2012 period. In contrast, the threshold cointegration approach finds cointegration not only in the full sample and in the pre-crisis sample, but also in the post-crisis period 2009-2012 when gas prices seem decoupled. Second, in the period 2000-2008 our estimates show that there were only minor impediments to arbitrage on top of transport costs. However, in the latter period we find evidence for substantial impediments to arbitrage that by far exceed typical Atlantic transport costs differentials. Further, for 2000-2008 we find that price convergence occurred by adjustment in both the US and UK market. Since 2009 price convergence was mainly achieved by downward pressure on the high UK prices.

Conclusions

Taken together, we improved on the existing empirical literature on spatial arbitrage in international gas markets by employing a threshold cointegration approach. Further, we provide evidence for the law of one price to hold - even in the period 2009 to 2012 when US and UK gas prices seemed to have decoupled. Moreover, our results indicate the presence of high non-transport transaction costs and other impediments to arbitrage in recent years that substantially decrease the speed of price convergence compared to the period 2000 to 2008.

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