

# ***THE CONVERGENCE BETWEEN THE NATURAL GAS PRICES: HENRY HUB AND NATIONAL BALANCING POINT***

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## **Overview**

Using the theoretical approach of The Law of One Price (LOP), this paper analyzes the long-term convergence between international natural gas prices: Henry Hub and National Balancing Point (NBP) using econometric analysis. It is also calculated the volatility of relative prices between the Henry Hub prices and the NBP prices, natural gas prices and fuel oil prices and the Brent and the WTI to study the process of globalization across energy markets.

The LOP assumes that the same good should have the same price across countries when measured in the same currency. The LOP argument should be applied among tradable and homogeneous goods. The main reasons to explain the violation of the LOP are transportations costs, tariffs and non-tariffs barriers, nontradable goods and “pricing to market”.

When the LOP argument is applied to the natural gas market, it is not expected to have the same natural gas prices across countries, but convergence between prices. The reasons to explain that convergence are, first, the huge investments on the liquefied natural gas supply chain (liquefaction, shipping and regasification) making possible the interconnectedness of different markets, second, the signature of contracts more flexible, based on the spot market.

## **Methods**

The methodology to study the convergence between Henry Hub and NBP is based on the unit root test (ADF test and DF-GLS test). The unit root test is applied to the Henry Hub price over the NBP price to analyse the stationary of the relative price:  $\ln$  of the Henry Hub prices minus the  $\ln$  of the NBP prices measured in the same currency. Evidence against the unit root behavior emerges when the relative price fluctuates around a constant mean, with a tendency to return to it. In this work, the unit root test is calculated with weekly data from 2002 to 2007.

The simplest measure of volatility of relative prices, i.e., the standard deviation of the  $\ln$  of relative prices, measures the standard deviation of absolute deviations from LOP. The volatility is calculated with weekly data from 2002 to 2006, for all weeks of the year to solve the seasonality problem.

## **Results**

The results for natural gas suggest that there is convergence in the long term between the Henry Hub prices and the NBP prices. The relative prices of natural gas are stationary meaning that the effects of shocks on the prices will dissipate and the relative prices of natural gas will revert to its long run mean level.

The volatility between natural gas prices is high in compare with the Brent and the WTI. The high volatility between the Henry Hub prices and the NBP prices are explained by the limited quantity of natural gas trade in these hubs and the sales contracts based on fuel oil and petroleum prices.

The results also indicate that there is more market arbitrage between the fuel oil prices and the natural gas prices than between the Henry Hub prices and the NBP prices. With more investments on the liquefied natural gas supply chain and more trade on natural gas spot market, the trend is to decrease the volatility between natural gas prices.

## **Conclusions**

The econometric tests suggest that there is a long-term convergence between international natural gas prices: the Henry Hub prices and the NBP prices. In spite of the process of globalization of the natural gas market, the volatility between natural gas prices is still high in compare with the volatility between petroleum prices.

## **References**

Rogoff, Kenneth, Kenneth A. Froot and Michael Kim, 2001, The Law of One Price Over 700 Years, IMF Working Paper, No. 174.

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