

THE STABILITY OF ENERGY PRICES IN THE NEW DECADE: THE CASE OF EUROPE AND US OIL AND NATURAL GAS PRICES

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Overview

This paper investigates changes in stability of energy prices, and the consequences of instability on hedging energy price risk exposure. A period of economic recession and expanding energy supply from the shale oil and natural gas revolution has transformed energy markets. We provide evidence that in the current regime, oil and natural gas prices in Europe and the US has become unstable. Short run volatility in price spreads is lower, but the persistence in deviations from mean spreads has increased. This is consistent with previous findings on increased energy market segmentation, especially between the US and rest of the world. We show that the reduced stability has important consequences for energy risk exposure and price hedging opportunities, with reduced ability to hedge long-run energy price risk within the energy markets.

Methods

For our analysis, we use Brent (North Sea) and WTI (US) oil price indices, and UK (National Balancing Point, NBP) and US (Henry Hub) natural gas prices. These prices reflect liquid energy markets, and contain important information on supply/demand conditions for energy. Our data set consists of daily observations of spot prices from 01.01.1997 to 31.12.2015, in total 4957 observations for each price series. First, we assess the data on oil and natural gas in the US and European market, by transforming prices to an energy equivalence basis (\$/MMBtu). The transformed series is presented in Figure 1 and is further used to calculate the relative prices (log of price ratios) for the price stability analysis. Stability is tested using cointegration and we define partially stable ($H_0: \beta = 0$), perfectly stable ($H_{10}: \beta = 1$) and unstable relationships using a hypothesis test.

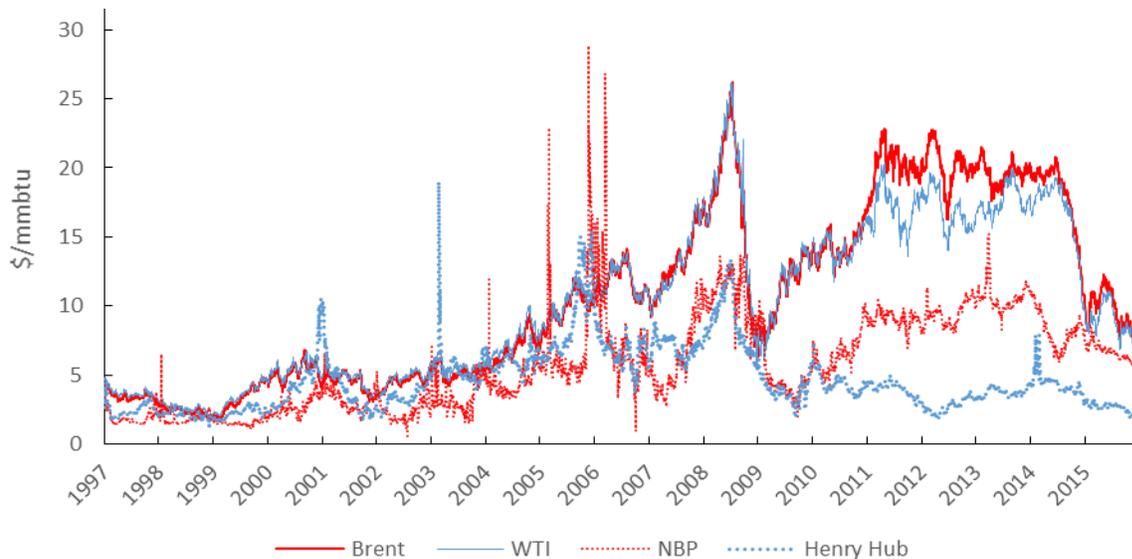


Figure 1. Price of Energy, Oil and Natural Gas in US and Europe

Results

Our data analysis shows that there is a change in price relationship between 2009 and 2010, and consequently we split the sample at the end of 2009 to compare characteristics over the two periods of interest. The results show that all price spreads are stable for the 1997-2009 period, with the EU market being perfectly stable, and the natural gas (NBP/HH) being perfectly stable (although with less certainty). Energy prices in the current decade show very little evidence of any stability. In this period, the EU market (Brent/NBP) display strongest evidence for stability.

Table 1. Stability tests (p-values)

	1997-2009			2010-2015		
	$H_0: \beta = 0$	$H_{1 0}: \beta = 1$		$H_0: \beta = 0$	$H_{1 0}: \beta = 1$	
Brent/WTI	0.000	0.001	Part. stable	0.257	-	Unstable
Brent/NBP	0.001	0.520	Perf. stable	0.096	0.084	Part. stable
WTI/HH.	0.024	0.056	Part. stable	0.291	-	Unstable
NBP/HH.	0.000	0.122	Perf. stable	0.104	-	Unstable

Further, we do a cointegration test in the full system over the two periods. Our results indicates that in the first sample period, exposure to any one of the prices requires only one of the other prices to eliminate the long-run price risk exposure (assuming short exposure is possible). In the second sample, one would need exposure to all other prices to eliminate the long-run risk.

Conclusions

Energy markets are now substantially different from what we observed in the period leading up to the financial crisis. Prior to the 2009 financial crisis, energy prices shared the same stochastic trends that resulted from the strong demand for commodities. As a result, energy prices were stable and the risk factor was the aggregate demand. However, the recession and the surge in available oil and natural gas in the wake of the US shale revolution has led to more segmented energy markets. Using daily prices of two oil indices (Brent and WTI) and two natural gas prices (NBP in the UK, and Henry Hub in the US), we find that energy prices are less stable now than before the financial crisis.

This increased instability has consequences for dealing with exposure to energy price risk. Before 2010, exposure to any of the energy prices required hedging in one of the other prices in order to hedge the long run risk. In essence, there was one market for energy. Following 2009, more segmented energy markets means this is no longer the case.

References

- Asche, F., P. Osmundsen, and R. Tveterås. 2002. "European market integration for gas? Volume flexibility and political risk." *Energy Economics* no. 24 (3):249-265.
- Asche, F., P. Osmundsen, and M. Sandsmark. 2006. "The UK market for natural gas, oil and electricity: are the prices decoupled?" *The Energy Journal* no. 27(2):27-40.
- Asche, F., A. Oglend, and P. Osmundsen. 2016. "Modeling UK Natural Gas Prices when Gas Prices Periodically Decouple from the Oil Price." Forthcoming *Energy Journal*.
- Elder, J. and A. Serletis. 2010. «Oil Price Uncertainty.» *Journal of Money, Credit, and Banking* 42: 1138-1159.
- Erdős, P. 2012. "Have oil and gas prices got separated?" *Energy Policy*.
- Kilian, L. 2009. Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market. *American Economic Review* 99, 1053-1069.
- Oglend, A., M.E. Lindbäck, and P. Osmundsen. 2015. "Shale Gas Boom Affecting the Relationship Between LPG and Oil Prices." *Energy Journal* no. 36 (4):507-526.
- Pinno, K. and A. Serletis. 2013. "Oil price uncertainty and industrial production." *The Energy Journal* 34(3): 191-216.
- Silverstovs, B., G. L'Hégaret, A. Neumann, and C. Von Hirschhausen. 2005. "International market integration for natural gas? A cointegration analysis of prices in Europe, North America and Japan." *Energy Economics* no. 27 (4):603-615.
- Villar, J.A., and F.L. Joutz. 2006. "The relationship between crude oil and natural gas prices." *EIA manuscript*, October.