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Abstract submission**

The effects of structural breaks on the long run level of oil and oil products. Evidence from the last two oil price crashes.

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1. Overview

This paper examines long term properties of Brent crude oil and oil products prices, i.e. gasoil, and low sulphur fuel oil from 2002 to 2015 using recent developments on unit root testing in the presence of structural breaks. Our main contribution is twofold. Firstly, to allow for structural breaks in the testing process providing new insights into the anatomy of the last two oil price crashes, i.e. the 2008-09 and the 2014-15, but also to characterize the nature of the steady path to long-term growth of those time series.

There are multiple similarities and differences among the two oil price crashes. In general it could be said that the 2008-2009 crash exhibits some unique characteristics as it was precipitated by global events, i.e. the 2008 financial crisis and prices during that crash correlated highly with equity and exchange rate movements. On the contrary the most recent crash took place as a result of stagnant demand and strong oversupply conditions, especially from unconventional sources in the United States, which could lead to a prolonged period of low oil prices.

2. Methods

We use generic unit root tests as well as more advanced techniques allowing for a potential structural break in the trend function. The unit root tests allowing for structural breaks are based on two reputed endogenous testing procedures: firstly, the one developed by Vogelsang and Perron (1992 and 1998) including the assumption that no break has occurred under the null hypothesis of unit root. Secondly, a more recent test for processes with level shift proposed by Lütkepohl et al. (2001) and Lanne et al. (2001), that extend the tests of Elliot,

Rothenberg and Stock (1996) which are based on estimating the deterministic term first by generalized least squares (GLS).

3. Results

Conventional unit root tests indicate that all variables are non-stationary in the levels. Interestingly and allowing for higher power of the one-break tests performed, all the variables considered show evidence of a unit root over the period.

In general innovational outliers suggest that both Brent oil and fuel oil are more responsive to the oil crash in 2014 than to the one in 2008 with those effects affecting both a change of slope (at the start of 2013) and in the level (in mid-2013). Neither of these breaks are regarded as significant. On the contrary the effects from the 2008 financial crisis are more relevant for gasoil prices implying a rather similar impact on level and slope on the same date. Moreover, it can be said that in general the effects from the recent 2014 oil crash differ from those resulting from the 2008 financial crisis as the former result on a change of slope and level but at different times.

4. Conclusions

The main conclusion of our research is that once trend breaks are accounted for, the unit root hypothesis cannot be rejected allowing for structural breaks in the unit root testing process. Of separate interest are the break dates themselves. Brent oil and fuel oil exhibit a break in level and slope at different times as a result of the 2014 oil crash whereas gasoil only exhibits one break, both in level and slope, as a result of the financial crisis in 2008.

The results have significant consequences for economic analysis, forecasting and policy-making decisions. In particular, the prediction of product prices by time-series methods is shown to depend critically on whether series are modelled as differenced or trend stationary. In this sense the time series analysed can be characterized as including a unit root. Moreover, the fact that events like the financial crisis in 2008 or the oil crash in 2014 will result in permanent deviations from the steady growth path means that highs and lows of these commodities would have substantial impact in the long-run.

Further to this research we suggest to expand investigation on oil and oil-products price and the relationship between long-term gas prices and other non-oil energy variables such as coal or NBP prices, consistently interconnected through competition in gas and electricity markets.