Long Memory versus Structural Changes in the Dynamics of Europe Brent-Oil Prices

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Abstract

In this paper, we examine the potential of long memory and structural breaks properties in the Brent returns and the Brent volatility series. We analyze the series over the period 20/05/1987-22/01/2016, using long memory tests, we demonstrate strong evidence of long-range dependence in the daily return and volatility of oil prices. From structural breaks tests, we find two structural breaks that appear in 1991 and 2008 which coincides, respectively, with the Gulf war and the global financial crisis. We use the Perron and Qu (2010) test in order to discriminate the long memory from the spurious long memory in presence of structural break, the results show strong evidence in favor of long memory. Long memory plays a crucial role in describing the oil price dynamics and we can also confirm that despite the persistence of shocks, the evolution of series is predetermined by a long memory process.

***Keywords**: Volatility, Fractional Integration, Long Memory Process, Spurious Long Memory, Structural Breakss.*

Introduction

Given the fact that oil prices shocks are triggered by different factors such as the market conditions, the OPEC and non-OPEC oil production, the global demand for oil and the geopolitical environment. There is a large attention in modeling the behavior of oil prices

Further, some authors pay attention to the oil returns, whereas others authors are attentive to the oil volatility. For that, several models were employed. Among these models, the authors apply the long memory models. However, Long memory properties on the oil market have been investigated in the case of the oil returns investment (Boone, 2001), the oil consumption (Mohn and Osmundsen, 2008), Lean and Smyth (2009), and energy prices (Serletis, 1992; Lien and Root, 1999; Elder and Serletis 2008; and Kang et al., 2011).

In fact, in financial time series analysis, the long-range dependence phenomenon has been the topic of a wide theoretical and empirical examination. For reviews of the literature, see Robinson (1994) and Baillie (1996). The long memory process illustrates the high-order correlation composition of financial time series. Series showing evidence of long memory, even between distant observations, indicate persistent temporal

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