



Speculative trading and oil price dynamic: A study of the WTI market[☆]

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ABSTRACT

The aim of this paper is to study the oil price dynamic in West Texas Intermediate (WTI) market in the US. By using statistical and econometric tools, we first attempt to identify the long term relationship between WTI spot prices and the prices of futures contracts on the New York Mercantile Exchange (NYMEX). Subsequently we model the short term dynamic between these two prices and this analysis points up several breaks. On this basis, a short term Markov Switching Vectorial Error Correction model (MS-VECM) with two distinct states (*standard* state and *crisis* state) has been estimated. Finally we introduce the volumes of transactions observed on the NYMEX for the WTI contracts and we estimate the influence of the non-commercial players. We conclude that the hypothesis of an influence of non-commercial players on the probability for being in the *crisis* state cannot be rejected. In addition, we show that the rise in liquidity of the first financial contracts, as measured by the volume of open interest, is a key element to understand the dynamics in market prices.

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1. Introduction

Recent events in the crude oil markets, such as the sharp rise in prices between January and July 2008 (Fig. 1) to around 145 US Dollars (USD) per barrel and the collapse a few weeks later to under 35 USD, have left many analysts and researchers puzzled by the underlying explanations for determination of crude oil prices.

More precisely, there is a strong debate in the economic literature regarding the factors affecting the oil price dynamics. The impact of the short term variation of stocks (Fattouh, 2009; Pierru and Babusiaux, 2010), the monetary policies and by extension the dynamics of exchange rates (Hamilton, 2009; Mignon, 2009) or interest rates (Hamilton, 2009), or the cyclical nature of the petroleum industry (Fattouh, 2010; Lescaroux, 2010; Smith, 2009) are commonly put forward to explain prices movements. In this paper we pay a particular attention to the speculation factor which is “by definition” difficult to measure. Some authors (Hamilton, 2009; Kesicki, 2010; Krugman, 2008; Smith, 2009) support the hypothesis that speculation has a limited role or no role to play in the markets. Nevertheless many reports and academic researchers also support that speculation can be considered as an important

factor. In 2006, Coleman and Levin in a United States Senate report wrote “Speculation has contributed to rising U.S. energy prices, but gaps in available market data currently impede analysis of the specific amount of speculation, the commodity trades involved, the markets affected, and the extent of price impacts.” (p.6). Masters (2008) and Masters and White (2008a, 2008b) in a Testimony and in different reports for the United States Senate launched the controversial debate about the role of Index commodities funds as drivers of speculation. Moreover many academic studies (Chevillon and Riffart, 2009; Cifarelli and Paladino, 2010; Fan and Xu, 2011; Kaufman and Ullman, 2009; Kaufmann, 2011) identify a possible implication of the speculation process on oil price dynamics. They also all notice the difficulty to assess the share of speculation amongst the fundamental factors. Weiner (2005, 2006a, 2006b) in different papers related to oil price instability (1990–1991 Gulf crisis...) analyses the consequences of the speculative trading on price dynamic and concluded in the same way. Tokic (2012) focus on the incomplete level of information (quantitative and qualitative ones) from oil financial market. Since this debate is largely open and since oil price dynamic and speculation process can have a huge impact on growth and on macroeconomic policies for oil exporting or importing countries (Chevalier, 2010; Hamilton, 2009) or on investment processes in the different economic sectors (Henriques and Sadorsky, 2011) and despite the lack of evidence that can be found through statistical analysis we decide to focus on crude oil market in this paper, and more especially on the WTI market. Considering the leadership of oil in the commodity markets (physical volume exchange, size of the financial markets) and despite Regnier's (2007)

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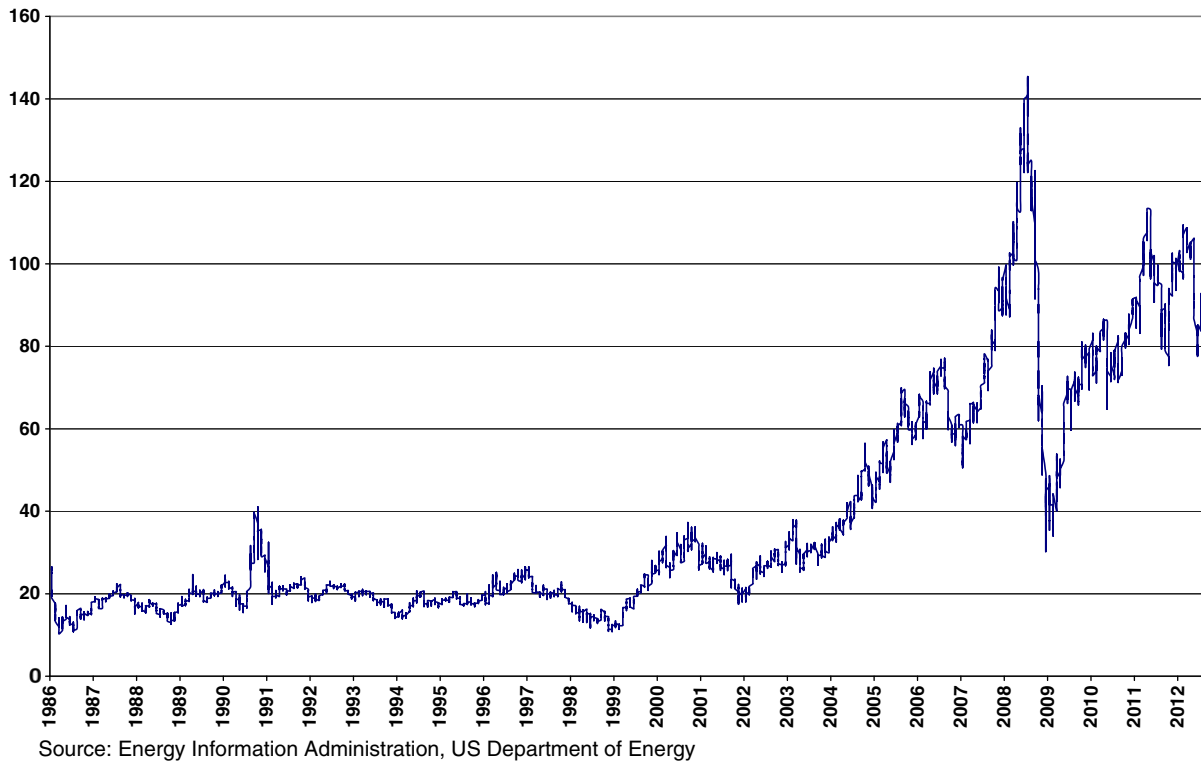


Fig. 1. Spot price for WTI crude oil (US dollars per barrel, daily data). Source: Energy Information Administration, US Department of Energy.

results on the fact that crude oil market is not significantly more volatile than other commodities over a period of 60 years (1945–2005), we will analyse the interactions that may exist between the physical crude oil price and the level of activity in financial oil markets during the 1993–2011 period and more especially during 2007–2008 “oil bubbling”. Our main assumption relates to the fact that speculative trading can help in understanding the oil price dynamic during financial instability and that speculation can exacerbate the dynamic observed in the oil market during tension periods whereas it won’t appear as a determinant factor during «normal» or bearish period. This assumption leads us to adopt a specific econometric methodology based on non-linear models, a Markov chain model which allows for changes in the short run dynamic and we estimate a short term Markov Switching Vectorial Error Correction model (MS-VECM) with two distinct states (*standard* state and *crisis* state).

In the first section, we briefly define the major changes introduced by the new regulations of the Commodity Futures Trading Commission (CFTC) in 2000 and the consequences in term of transaction volumes. In the second section, we present data and standard tests (unit root and cointegration tests) used to analyse the long term equilibrium between spot and WTI prices. In the third section we present the Markov Switching Vectorial Error Correction (MS-VEC) methodology and the probit model that will help us to analyse the trader’s behaviour on the short run. The main conclusions are summarised in the final section.

2. A new deal in the financial markets after 2000

Following the introduction at the end of December 2000 of the law modernising commodity markets, the Commodity Futures Modernisation Act¹(CFMA), two major changes have been observed. On the one hand, by studying available data from January 1993 to January 2011, we observed a marked rise in transaction volumes for each

maturity (Fig. 2). Measured in batches of 1000 barrels (a standard financial contract for WTI on the New York Mercantile Exchange (NYMEX)), these transactions have risen, for two-month term contracts, from around 52 000 in 1993 to 136 000 in 2008, i.e. multiplied by a factor of two and a half, with a peak of 165 000 in 2007.² On the other hand, the share of non-commercial³ players increased from around 20% before 2001, to over 50% on average since 2006. In addition, their share in the volume of global transactions reached almost 60% at the beginning of the third quarter of 2008, a period during which crude prices reached record levels. According to Medlock and Jaffe (2009), during the 1990s we could observe ten active contracts on NYMEX, representing in barrel equivalents (1 contract = 1000 barrels) over 150 million barrels per day, or more than twice the global demand for crude oil at that time. In recent years, this figure has changed to almost seven, with around 600 million barrels being exchanged through financial contracts. To support this observation we build a ratio comparing the world oil demand and the “virtual” physical oil included in the financial WTI contracts (Fig. 3) and we observe a sharp increase for this ratio since 2003. This ratio reached a first peak in 2008 and a second one in 2010. Derivatives are said to facilitate speculation, but it implied economic benefits for the different players in the market.

Thus during the previous two decades and especially in the initial phase of construction of the commodity markets, the main objective

² During the same period of time, consumption of petroleum products only increased by 12% in the United States, and by 20% world-wide.

³ Thanks to the obligatory declarations that must be made by the various traders on NYMEX in order to operate in the financial markets, it is possible to determine the volumes for each trader, and to make so-called “open” positions (open interest) more comprehensible. Until September 2009, the CFTC classified the various parties into three categories of traders (see the breakdown up to 2009 produced by the CFTC at http://www.cftc.gov/marketreports/commitmentsoftraders/cot_about.html#P16_3370) so-called “commercial” traders (commercial traders are those who are active in the petroleum supply chain (producers, stockholders and refiners), and who are in the market to achieve arbitrage between a physical position and a financial one. Non-commercial traders act in the market without any physical counterpart for their deals), “non-commercial” traders, and “others”, with this last category corresponding to small volumes of transactions which it is impossible to attribute to one or other of the first two.

¹ For more information, see the CFTC website at <http://www.cftc.gov/lawandregulation/index.htm>.

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