World Journal of Social Sciences
Vol. 3. No. 3. May 2013 Issue. Pp. 143 – 150

Crude Oil Pricing: From Speculative Trading to Actual Price Formation. Evaluation of Netback Calculation Model

Magsud Ibrahimov* and Jamila Muradasilova

Crude oil price volatility has been under particular attention of economists and politicians during last decades. Rapidly rising and falling prices is putting pressure on major market fundamentals and therefore it is becoming vital to define value of crude to sustain robust economic condition. This paper is investigating in depth the conception of netback calculation system and its possible application to crude oil price assessment. Despite previous failure of the model, the market condition existing today provides opportunity for adaptation netback calculation mechanism to sustain actual price of crude oil. It shall be argued that speculative trading bubble is misleading from true market perception and it might be eliminated through calculation of price of crude referring to netback calculation system. Moreover, crude oil industry in this instance shall be working on the same principle as every sector of economy where marginal profit is added to the cost of production and the industry becomes much more predictable in terms of supply, demand, price movement, etc.

Field of Research: Crude Oil Price Calculation Based on Netback Model

1. Introduction

Crude oil pricing has been under focused attention of all parties such as government, multinational companies, refineries, etc. since this industry is standing in the core of economic activity. The major question discussed among these parties is maximum efficiency of sale considering production volume, availability of alternatives and demand for petroleum products. The share of crude oil in energy sector equals to 39.3 per cent whilst gas is in the second place with 22.6 per cent market part. At the same time, it must be highlighted that primary demand for oil is derived from transportation sector since there is no viable alternative for gasoline, gasoil and jet fuel (Speight, 2011) in the market. The energy sector as crucial part of economic development programme is under constant attention and therefore parties involved in the process are struggling to manage sustainable crude oil policy ensuring high price when selling crude oil or low price when purchasing it. It is vital to ensure competent strategic policy securing physical availability of crude and low price petroleum products stimulating production and providing competitive advantage. However, the imperfect condition of the market in reference to crude oil has changed the structure of the market allowing number of unrelated to physical crude oil business parties enter into the industry. The complexity of energy market established the situation when big industrial nations as the US, the EU, China, India, Brazil, etc. are looking for opportunities to secure oil supply whereas financial market opens prospect for trading and locking profit as crude oil is primarily delivered to those countries from distant location as Middle East, West Africa and North Sea.

*Magsud Ibrahimov. University of Liverpool. State Oil Company of Azerbaijan Republic Azadliq ave 16, apt 19. AZ1010, Baku, Azerbaijan. Tel: (+994 55 711 12 54). E-mail: magsudibrahimov@gmail.com

The evolution of crude oil market has been transferring market from one stage to another whereas in each case different methodologies have been applied to estimate the price of crude. One of the initial ways in estimating price of crude was 'netback calculation' system adopted by Saudi Arabia in the mid 1980s. As major crude oil exporting country during that period and leading country in crude oil supplying organization OPEC, the methodology of price calculation adopted by Saudi Arabia became example for other countries as well. In the absence of significant alternative supplier of crude into the market and simple notion of fair price, it was proposed to calculate price considering cost of production and adding fair value of marginal profit. The basic conception of this methodology was calculation of the price from the sale point of gasoline back towards the production field assessing cost in each stage including transportation, refining and distribution of petroleum products. However, further market development with discovery of new oil fields in the North Sea, growing demand for petroleum products, rising variance of crude oil types and complexity of refining system established the necessity of application of Benchmark modeling where price of crude loading within the same geographical location refer to the price settled for one crude grade. This formula has been evolving during last thirty years and now is firmly standing in the core of price settlement mechanism. Nevertheless, there are certain externalities of this model which shall be discussed in the frame of this paper highlighting the importance of reverting back to netback formula. First of all, benchmarking of the crude is leaving all other grades in disadvantaged position since their price depends entirely on price of Brent in Mediterranean market, WTI in the US and Dubai in East Asian region. Secondly, the price of benchmark does not consider cost of production of all other grades delivered in particular region whereas sale price for all of them shall be based on final benchmark price. Finally, there is no any alternative system of pricing except benchmark model.

It is examined in this paper how price of crude is formed today whereas separate part is reviewing the conception of netback calculation and its adaptation as an alternative to benchmark model. It shall be studied the causes of failure of the system during 1980s and its necessity of application in relation to current market pricing principles. In the beginning, the literature review presented in section 2 provides some analyses from past academic works, despite the fact that this topic has been only partially covered. In the next part, in chapter 3 it is demonstrated the methodology applicable addressing the question of price settlement rules. In part 4, it is analyzed how precisely netback calculation model might be adopted and applied in existing calculation methodologies. The conclusion, part 5, based on the analyses of this article particularly highlights the importance of netback calculation in price formation due to number of advantageous provided in this instance such as valuation of crude, risk consideration of supply and demand, opportunity for long-term business projection and finally it shall lead to reduction of price from existing level of 100 US dollars per barrel paving the way from establishment of new market relationship models on the ground of vigorous fundamental market factors.

2. Literature Review

The case of netback calculation model and its importance in terms of reliable price estimation methodology might be reviewed from different perspectives. It is maintained by Moran and Russel (2009) that the case of energy security is standing in the first place whereas the price of oil for actual receiver balloons because of the risk associated with certain assumptions about crude oil supply or further demand for

petroleum products. It is also demonstrated that 'peak oil' theory is still on agenda even though it is argued by Deffeyes (2009) that the theory might be proved only from retrospective standpoint. It is impossible to define the date when the 'peak oil' moment is reached whilst it can be argued only in the future that the production volume of crude achieved its highest point sometime in the past. When Hubbert for the first time in 1956 stated that the peak production moment of crude oil shall be in the beginning of 1970s, it had led to particular shifts in the market changing the position of many companies in the market. However, after almost sixty years, when the production equals to 90 million barrel per day oppose to 45 million barrels per day produced during that period, there is only one conclusion might be drawn in this regard that production has been rising and therefore 'peak oil' moment has not been observed yet, although the market is very vulnerable to any news regarding fall in production and disruptions in supply. Taking into consideration that crude oil is depleting energy source and it is non-renewable, the fear among market players always persists. Following this notion, it is further demonstrated by Deffeyes (2009) that constant consideration of falling supply of crude oil is putting under risks future supplies whilst occasionally directing price of crude to high levels. The perspective of market development in relation to crude 'oil peak' theory model provides some understandings of the industry. The important feature, nevertheless about 'oil peak' theory to be considered in the frame of this analyses is that it is one of the fundamental aspects putting pressure on price and therefore might be considered in netback calculation.

The cost of production of crude should be standing in the first place when calculating sale price of crude. However, this commodity is derived from different locations in the world at particular cost. According to Parra (2010) the cost of production of one barrel of oil in Saudi Arabia is around 15 US dollars whereas this cost in the North Sea equals 40 US dollars per barrel. It is even higher in arctic region reaching almost 90 US dollars level. The cost of production has been rising in line with basic economic indicators. As it was pointed out by Oil Minister of Saudi Arabia, the cost of production of crude oil in the beginning of 1990s was 1,50 US dollars per barrel rising within the next decade to the level of 5 US dollars per barrel. The cost of production is major component of netback calculation system. However, the cost varies depending on the place where the commodity is derived. Therefore, in each case there are different costs of production and delivery to the market. The benchmark formula was born at the time when different costs of crude oil demonstrated to the market that price can not be so different depending on place of production. Parra (2010) notices the major and vital part forming the price of oil, but, it is not revealing the basics of crude oil price formation and its association with true cost and netback calculation.

It is noteworthy fact that simple production of crude oil, transportation and calculation of cost based only on these factors is not enough to estimate true price of energy commodity. The long term business and military cooperation between the US and Middle East crude oil exporting countries should also be considered when calculating price of crude oil. It is stipulated by Moran and Russel (2009) that the work of market mechanism in crude oil business is characterized by several factors whilst each one of them is linked to the US market. First of all, the largest economy of the world is one of the major producer of crude oil as well as the main importer of crude oil from Africa, South America and Middle East. Secondly, the dependence on foreign oil and strong political and military power the US possess open for consideration different options for securing crude oil supply into the country. The calculation of cost included

into netback calculation should also consider the price of military intervention as well as finances invested into security projects of different crude oil supplying regions as it argued by Muller and Krauner (2007). It was estimated that cost per barrel of oil should had been 100 US dollars during the second gulf war when the US army invaded to Iraq in 2003. According to estimations, only the price of oil at that level might covered expenses of the war, however, during mentioned period, it was only 25 US dollars per barrel. Considering this particular case and the extent of the US influence in crude Middle East region, it must be made separate estimation of the cost of such policy and possible inclusion this cost into netback calculation of price of crude oil. The subject might be viewed from two perspectives where on the one hand, there might be put forward an argument that cost of production should be included into price from seller's side whilst on the other side in case crude oil is exported into the country ensuring military protection for exporting country that party might receive crude oil at the price with deduction of the costs spent on military protection.

The mechanism of crude oil price calculation is based today on speculation of forward, futures contracts, swaps and options. The technological development opens opportunity for trading from every computer in the world and become part of sale and purchase of crude oil. Moreover, the rules of market provide also opportunity to hedge risks protecting investors form volatile price movement of the crude. The conception of economic rent reveals some very fundamental characteristics of price settlement mechanism in the market and price formation principles. It is argued by Noreng (2007) that crude oil price in any way depends on actual production volume, supply into the market and therefore price of this commodity is reflecting pure supply and demand notion of the market whilst it is also considering reserve oil capacities both for the short and long term future.

The literature review in the frame of analyses of price formation based on netback mode actually reveals some very outstanding issues that are conceptually not included in price formation within boundaries of existing market conditions. It must be noticed that the level of production as well as estimated volume of reserves should be considered once netback calculation model is adopted. Moreover, military policy of protection of crude oil supplying countries must also be taken into account when calculating cost of crude oil. Finally, the risks associated with energy security in terms of supply and demand in the market are also argued to be part of the netback calculation. Thus, existing views to the industry and price calculation methodology underlines those aspects that must be included into price formation whereas none of them is considered in assessment of crude oil.

3. Methodology

The oil price has been has been swinging during the entire period of its industrial production. The establishment of OPEC, organization representing interests of all major crude oil exporting nations, created market conditions where price was dependent on physical supply and demand in the market for crude oil and oil derived products. In these circumstances, oil exporting countries may bargain better prices and dictate conditions to buyer countries. It must be underlined at this stage that the factor of physical supply and demand was in the front line building the price of crude oil during early stage of market evolution. It is noticeable that Noreng (2007) argues that despite initial understanding of the market based supply and demand principle, their role has been diminished in the following decade as neither of these factors has

had any long-term impact on the market. Nevertheless, it is assumed that possible physical shortage of petroleum products in the market shall immediately give revert reaction and impact on price rise of crude oil. Due to rising risk of possible disruption of supply from exporting countries, it has become part of strategy to ensure availability of enough stocks for short term delivery. Thus, it is becoming arguable case that reduction in oil supply impacts on price even in the short term since it is information about lowering stocks actually provides ground for speculation of traders. The methodology of calculation price of crude based on supply and demand is also supported by Smil (2011) arguing that fundamental principles of economy are vital when determining price of crude oil. However, this analyses is incomplete as it does not take into account such significant factors as the role of transportation infrastructure, refining capabilities and paper trading activities since all of them are directing price of crude both in the short and long term future.

According to market fundamentals price of crude fluctuates depending primarily on supply and demand, however, the significant factor determining price of crude must be referred cost of production. The principle of 'netback calculation' was applied and developed in Saudi Arabia for the first time in the second half of 1980s. The basic conception of calculation actually refers to very simplistic estimation of cost of crude oil referring to production, transportation and refining process. There is long chain of activities beginning from the moment of production and reaching the moment of petroleum product sale at petrol station. It is stipulated by Roberts (1987) that calculation of cost during each stage of the process by appropriate companies is increasing cost whereas marginal profit added to the cost of production also inflates the cost. However, this system does not consider many factors that always persists leading to market externalities. There are number of issues such as refining capacity, transportation facility utilization efficiency, delivery point petroleum products, etc. which are changing netback calculation and cost for different relevant organizations. It is therefore presumed that cost associated with crude oil business varies subsequently putting pressure on price at different times. The methodology presented for analysis by Roberts (1987) refers to the factors that do not reveal entire market complexity.

The evolution of crude oil industry in reference to price formation has developed into the stage when not only physical suppliers and end users are taking part in trading, but, there are also big financial institutions participating in trading activities. According to Carollo (2012) the new system of benchmark modeling is linking the price of crude oil loaded at different ports to one delivered in certain location. It is worth mentioning fact that more than 60 per cent of crude oil sold around the globe refers to Brent Dtd quotation used as benchmark in European region. However, this methodology does not clearly explain how different market players are hedging their risks. It is not clear how basic principle of trading is working depending on volume production of oil and refining process. Taking into account number of participants such as producers, refiners, financial institutions, traders, etc. it must be noticed that pricing of crude is also guided by the volume of purchase and sale of different contracts (futures, options, etc). This market segment is omitted from analyses whereas 95 per cent of oil related trading activities take place apart from actual physical market.

The application of any of mentioned methodologies does not provide any plausible answer to the question what precise way might explain the notion of netback calculation. All methodologies applied in the frame of these analyses referring to supply and demand, cost calculation and benchmark modeling does not reveal the

fundamental causes of changing price of crude. It is also unclear whether qualitative or quantitative methodologies might be addressing this complicated issue. There must be made different approach to study the notion of netback calculation and its application in price determination of crude oil.

4. Netback Calculation Model

It is highlighted by Carollo (2012) that crude oil market pricing system has shifted dramatically since the adoption of netback evaluation system. Furthermore, gradual falling dependence on OPEC countries has led to establishment of new pricing system depending on location of crude oil sources, involvement of financial institutions and opportunities of trading of cargoes. It is further underlined that the link in the market between physical supply and price of the commodity was strong enough directing the entire market. However, the growing complexity of the system led to vanishing of strong connection between physical market and price of crude. It is argued by Parra (2010) that available stocks of crude oil as well as petroleum products is one of those factors that does not pressure market price. The notion of netback calculation stands in the core conception of adding marginal profit to the cost production, delivery and refining of crude oil. However, considering such factors as location of fields, volume of production, complexity of refining system simple cost plus profit mechanism does not address clearly the issue of pricing principle. The development of the fields in the North Sea and establishment of trading activities in London created for the first time so called ’15 day contract’ linked with the production in the North Sea (Fattouh et al, 2012). The system introduced into the market by Shell presumed that companies are gaining opportunity to trade cargoes that are not produced. The system of standard contracts trading evolved further leading to creation of futures market, options, swaps, etc.

The externalities and problems of such chaotic trading activity became apparent in the beginning of 1990s. In the system when every receiver of the cargo is passing it to the next party and the fact that last purchaser (in most of the cases they are traders) must lift cargo created catastrophic situation when small traders standing in the last part of the chain could not handle physical delivery of the cargoes. In the result of these events, new market regulations came into place requiring companies participating in trading activities to have enough financial back up, guarantying that physical cargo shall be lifted and delivered to the port of destination. The popularity of new system paved the way for trading of cargoes by organizations that financially strong enough. As the outcome of this process International Petroleum Exchange (IPE) was established in 1988 where market players may trade contracts backed at the end with physical market in terms of supply and delivery. The netback calculation methodology started to lose its importance and necessity whilst all trading activities moved to London whereas supply of crude became no longer dependant on OPEC members. Big oil producers such as Saudi Arabia and Iran linked its price to London Brent Dtd straightening their position in the market as the price of the commodity at trading floors is much higher than production cost of crude. The price fluctuation in the market became the result of involvement of financial institutions such as banks, hedge funds, etc. whilst parties actually participating in physical provision of cargoes are also taking part in the process to reduce exposures that occur because of time fragment between production, delivery, refining and final supply of petroleum products to petroleum stations. It is further argued by Carollo (2012) that significant link in the market between physical and paper traders remain only in the sense of

final physical presence of the cargoes in the market. The technological development as well as connection of trading to global internet network system allowed establishment of ICE platform in IPE in 2000. Despite the fact that crude oil industry is quite close business where national companies and even multinationals do not reveal information regarding production volume and sale prices, Middle East producers adopted the price settlement principle referring to the price established in ICE platform rather than calculating cost of production and delivery of crude oil. The differences of intentions of relevant parties (producers, refiners, suppliers, etc.) trying to secure profit from risks exposures has led to introduction of different derivative instruments of trading such as options, swaps, futures, etc. (Salvatore, 2012).

5. Conclusion

The price of crude oil is one of the major elements impacting on economic performance. The unique energy resource supports almost entirely transportation sector ensuring in many cases economic growth in different parts of the world. The conception of price of this commodity is standing in the core of economic policies leading to development of certain projects. The evolution of oil industry has evolved the necessity of establishing the system where crude oils produced in different part of particular region refer to the price of one benchmark. However, there are certain externalities of this pricing principle which do not reveal true price of crude oil.

This research reveals the necessity of establishing unique mechanism for price calculation. Considering the steps that crude oil passes from the stage of exploration till the moment of petroleum products retails sale, it is turning to be important point to establish the way of price indexation. The new model will be moving apart from existing benchmark methodology which actually separates actual price of crude oil from true notion of supply and demand.

In this regard, it should be reviewed the principle of ‘netback’ calculation model indicating the cost of production, delivery, refining, etc. However, there must be added other factors such as oil reserves, political risks, military protectionist measures and paper trading prices since all of these factors have direct impact on separate crude oil exporting countries. The indexation of price under one benchmark is establishing unfair market condition and therefore there is need for building new model of price calculation.

The idea itself has not been studied during the last decades. The beginning of electronic trading and establishment of virtual market backing physical market paved the way to form benchmark price indexation which actually resulted in separation of the market into three regions. Thus, price of crude oil now mirrors regional differentiation instead of accepting crude oil produced in different as one commodity the price of which should be different depending on quality of the grade, cost of production and delivery.

Nevertheless, it must be noticed that the netback calculation model does not include all those conventional perceptions that exists in the market today. It is difficult to imagine how precisely virtual market is eliminated and physical market stands in the first place. Moreover, it is worth noticing that netback calculation model is getting away from indexation mechanism and establishes more chaotic market in terms

pricing. However, this methodology allows precise valuation of the crude oil cargo produced in one part of the world and delivered to another.

References

Carollo, S, 2012, *Understanding Oil Prices.* Sussex: John Wile&Sons Ltd.

Downey, M 2009, *Oil 101*. New York: Wooden Table Press

Fattouh, B. 2009, Reinforcing Feedbacks, Time Spreads and Oil Prices (online). Available from: http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/March2009-Reinforcingfeedbacks-BassamFattouh.pdf (Accessed: 08 May 2012)

Fattouh, B 2010, Oil Market Dynamics Through the Lens of the 2002-2009 Price Cycle (online). Available from: http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM39-OilMarketDynamicsThroughTheLensofthe2002-2009PriceCycle-BassamFattouh-2010.pdf (Accessed: 08 May 2012)

Fattouh, B 2011, Uncertainty, Expectations, and Fundamentals: Whatever Happened to Long-Term Oil Prices (online). Available from: http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/03/Comment-March-2011_1.pdf (Accessed: 08 May 2012)

Leeb, S and Leeb, D 2008, *The Oil Factor*. New York: Business Plus

Maas, P 2009, Crude World: The Violent Twilight of Oil. London: Penguin Books

Moran, D and Russel, J 2009, *Energy Security and Global Politics: The Militarization of Resource Management*. London: Taylor and Francis group

Noreng, O 2007, *Crude Power: Politics and the Oil Market* London: Tauris & Co Ltd

Krugman, P 2008, *The Return of Depression Economics and the Crises of 2008* London: Penguin Group

Parra, F 2010, *Oil Politics: A Modern History of Petroleum*. London: Tauris & Co Ltd

Roberts, P 2004, *The End of Oil: The Decline of Petroleum Economy and the Rise of a New Energy Order* London: Clays Ltd

Shah, S 2004, *Crude: The Story of Oil* London: Turnaround Publishes Services Ltd

Smill, V 2005, *Energy at Crossroads: Global Perspective and Uncertainties* Massachusetts: Achorn Graphic Services

Smil, V 2008, *Oil: Beginners Guide* Oxford: Oneworld Publications

Speight, JG 2011, An Introduction to Petroleum Technology, Economics and Politics. New Jersey: Wiley&Sons, Inc.

Strahan, D 2007, *The Last Oil Shock: A Survival Guide to the Imminent Extinction of Petroleum Man* London: John Murray