



## THE VOLATILITY OF OIL PRICES ON STOCK EXCHANGES IN THE CONTEXT OF RECENT EVENTS

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### Abstract:

*Oil along with currencies and gold are the main indicators of the most important processes which take place in the world economy, quotations' volatility being always followed by economic and social events. Quiet periods of oil prices, when quotations have a constant evolution or only suffer minor fluctuations, are very rare. Most of the time, very sharp price increases or decreases are happening over night or week. This is mostly due to the fact that the oil market is extremely speculative, being influenced by political, military, social, or meteorological events. Since the major oil price shocks of the 70s, the impact of oil price changes on the economic reality of a country or region has been widely studied by academic researchers. Moreover, the stock market plays an important role in the economic welfare and development of a country. Therefore, a vast number of studies have investigated the relationship between oil prices and stock market returns, being discovered significant effects of oil price shocks on the macroeconomic activity for both developed and emerging countries. The purpose of this study is to investigate the volatility of oil prices on stock exchanges taking into consideration the recent events that have affected the oil markets around the globe. Furthermore, based on the findings of this research, some possible scenarios will be developed, taking into account various events that might take place and their potential outcome for oil prices' future.*

**Key words:** Oil prices, Stock Exchanges, Stock Market Returns, Volatility

### 1. Introduction

The energy encompass all the characteristics of an essential good, as there is a strong correlation between economic growth and energy consumption – one percentage point of economic growth can lead to a growth of 0.5% of primary energy consumption (Jancovici, 2006).

Oil is the world's dominant fuel (at 33% of current global primary energy consumption now and it is projected to fall at 28% by 2030), but it has been losing

market share since the 1970s (British Petroleum, 2015). Oil lost share rapidly in the 1970s and early 1980s when prices were high; lost share slowly from the mid-1980s to the late 1990s when prices were low; and accelerated again when prices began to go up over the past decade (British Petroleum, 2014).

Oil prices have increased in recent years, averaging about \$80 in 2010 and well above \$100 (Worth, 2010, p. xii), which would be the highest (nominal) price on record. The oil market has been prone to disruptions, with major shocks to supply and prices in the early and late 1970s, 1990s, and several times in the past decade. In response, both consuming and producing countries have adopted strategies for dealing with unexpected outages, including the maintenance of spare capacity as well as investment in strategic stockpiles.

Oil, justifiably called the black gold for the qualities and advantages it offers, has imposed in history through a continuous and remarkable diversification of its use, being present everywhere, always multiple and universal, eternal and mysterious. In the last century, it has become a highly sought product, absolutely necessary for the development of the modern economic life, an important factor in international politics and indispensable in time of war, causing frequent and lively economic and diplomatic conflicts, cold or hot battles, tensions and suspicions between states and nations. Over several decades, oil has turned into one of the fundamental elements of the international life being a decisive factor in the prosperity of the industry.

## **2. The evolution of the oil market**

There are various moments that influenced the oil history, and they have an important role in shaping the oil world that we know today. If we are to talk about pre-industry, then we have to remember that oil has long been used for cooking, lighting, medicine and warfare. Alexander the Great is said to have frightened his enemies using torches dipped in oil (Epstein, Jaco, and Neiman, 2003, pp. 33-34), the Chinese are thought to have extracted oil from the ground using bamboo in the 4th century AD (Epstein, Jaco, and Neiman, 2003, p. 33) and Marco Polo saw oil being collected from seeps during a visit to Baku, now the capital of Azerbaijan (Epstein, Jaco, and Neiman, 2003, pp. 41-43). In 1772, many people had discovered that heating coal causes it to give off gases which burn brightly. Scottish engineer William Murdoch is the first to put this to practical use, lighting his house in Cornwall, UK, with the gas (Leffler, 2014, p. 119). After this, coal gas becomes widely used for lighting, heating and cooking in the US until the 1940s and in the UK until the 1970s, when it is replaced by natural gas (Hatheway, 2012, p. 1173).

In 1807, German inventor Frederik Winsor demonstrates public street lighting with coal gas in London (Simon, 2015). In 1813, Westminster Bridge is lit by gas and the technology rapidly spreads across the UK, Europe and North America (Simon, 2015). Some decades later, Canadian geologist Abraham Gesner invents a way to refine a liquid fuel from coal. The liquid, which he calls kerosene, burns more cleanly than alternatives such as whale oil (Simon, 2015). Also, the Polish geologist Ignacy

Łukasiewicz distills kerosene from oil and invents the kerosene oil lamp. This is widely considered the beginning of the oil industry. In a prescient speech, he says: "This liquid is the future wealth of the country; it's the well-being and prosperity of its inhabitants" (Epstein, Jaco, and Neiman, 2003, p. 70). Łukasiewicz is also credited with starting the first "oil mine" near Krosno in Poland and the world's first oil refinery in Jasło, Poland (Li and Molina, 2014, pp. 184-185). In 1855, in Heidelberg, Germany, Robert Bunsen invents a gas burner capable of producing a controllable flame that maximises temperature while producing little light (Heyworth, 2008, p. 17). The Bunsen burner is still a standard piece of lab kit.

In 1859, oil pioneers George Bissell and Edwin Drake drill the first oil well at Oil Creek in Pennsylvania. Until then, oil had largely been collected by soaking blankets in liquid that had seeped to the surface and draining it into barrels. Bissell and Drake distil the oil into kerosene and become known as the fathers of the US oil industry (Maugeri, 2006, pp. 4-5). French engineer Alphonse de Rochas patents the four stroke internal combustion engine, the earliest recorded ancestor of the car engine (Epstein, Jaco, and Neiman, 2003, p. 75). In 1885, German engineer Karl Benz develops his own version which he uses to power a horseless carriage. Benz is regarded as the inventor of the petrol-powered car and is granted a patent for the automobile in 1886 (Clarke, 2006, p. 32). The invention of Thomas Edison, the modern electric light bulb, causes the rapid replacement of gas lighting (Sonneborn, 2007, p. 90). Electricity becomes a powerful competitor to gas heating. Demand for oil continues to grow thanks to the nascent car industry.

In 1903, the Wright brothers' invent the first powered flight (Anderson, 2004, p. 154). Five years later, takes place the first major oil strike made in the Middle East at Masjid-i-Sulaiman in modern-day Iran, just across the border from Basra, Iraq (Peck, 2008, p. 55). In 1914, Venezuela's first oil gusher is drilled near Lake Maracaibo (Vassiliou, 2009, p. 311).

Between 1914 and 1918, World War One is the first conflict in which the supply of oil is crucial to maintain fleets of ships, vehicles and aircraft. Control of the oil supply becomes a critical factor. In 1938, oil is discovered in Kuwait and Saudi Arabia (McElroy, 2010, p. 133).

In the Second World War, Hitler relies on oil from Romanian fields in Ploiesti but plans a broader conquest of fields in Persia (Iran) and Russia. When Romania switches sides in 1944, the German army is all but defeated. By contrast, the Allied control of oil from Baku, in modern-day Azerbaijan, and the Middle East plays an important role in the victory. In the Pacific, Japan invades Indonesia in 1942 to gain access to the country's oil reserves. The Allies later regain the territory, cutting off the supply, weakening Japan (Kahn, 2014, pp. 429-430).

Another major event, in 1960, the major oil producing countries – Saudi Arabia, Venezuela, Kuwait, Iraq and Iran – founded the Organization of Petroleum Exporting Countries in Baghdad. OPEC begins to coordinate the production of oil by its members to control the price (Epstein, Jaco, and Neiman, 2003, p. 187). In 1973, Arab oil-producing countries embargo the supply of oil to the US and other supporters of

Israel in the Yom Kippur war, triggering an “oil shock” –a major, rapid oil-price rise (McMahon and Zeiler, 2012, pp. 277-278). In 1979, the Iranian revolution disrupts the supply of oil from the country, triggering the second “oil shock” of the 1970s (McMahon and Zeiler, 2012, p. 448).

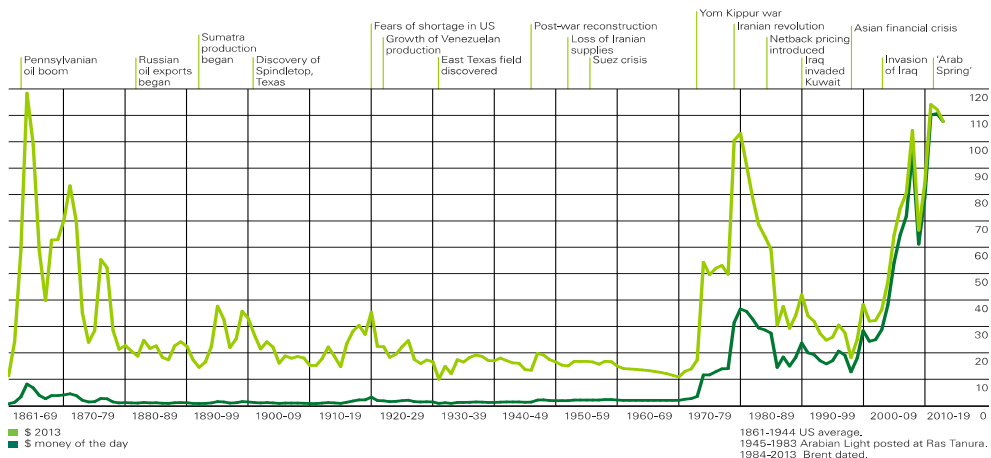
The 1984 brings the war between Iran and Iraq that goes offshore as they start a “Tanker war” in the Persian Gulf, which damages more than 500 commercial ships. The Seawise Giant, the largest ship ever built, was sunk by an Iraqi Exocet missile while carrying Iranian oil (Hiscock, 2012, p. 214).

The worst offshore oil and gas industry disaster in history takes place in 1988, when the Piper Alpha North Sea oil and gas production platform explodes in the North Sea, killing 167 men (Lindoe, Baram, and Ren, 2014, p. 139). In the same year, the Exxon Valdez tanker runs aground in Price William Sound, Alaska, spilling up to 750,000 barrels of oil (Lindoe, Baram, and Ren, 2014, p. 156). The accident is considered to be one the most environmentally damaging in history.

When Iraq invades Kuwait, triggering the first Persian Gulf War, the United Nations places an embargo on Iraq, preventing oil exports. In January 1991, Iraqi forces dump 11 million barrels of crude oil into the Persian Gulf – reportedly an attempt to stop a US invasion. During Iraq’s retreat from Kuwait, its army sets fire to some 700 oil wells. The fires burned for 10 months, consuming 6 million barrels per day and causing widespread pollution (Tucker, 2014, pp. 331-332). Thirteen years later, the second Gulf war begins with a US-led invasion of Iraq.

One of the latest events that had a major echo on the oil market was the Arab Spring that generated fears of oil-price rises (Fig. 1), particularly after civil war erupts in Libya, which has the world’s eighth largest reserves. However, disruption was largely offset by increased oil production in Iraq and the release into the market of 60 million barrels from 28 other countries in June 2011 (Rooney, 2011).

**Figure no. 1 Crude oil prices 1861-2013 (US dollars per barrel, world events)**



Source: BP Statistical Review of World Energy 2014

### 3. Oil – a good traded on the stock exchange

Energy products are essential both for satisfying basic human needs and also for supplying with the necessary electricity for the survival and development of economies. The types of energy used depend somewhat of their discovery and availability. For example, coal was a very important source of energy in the nineteenth century. In 1886, the Coal Exchange was established in Cardiff, Wales (the largest coal exporting city in the world at that time). They say big investors in this stock stood very close to each other (Breverton, 2009). Then, from early twentieth century, oil gained more importance, as it came to be an important source of energy. Although oil is today the most important energy product in the world trade and at the same time the most valuable source of energy, generating markets of alternative sources are becoming increasingly essential for global economies. Regarding the question Will oil remain the most used source of energy?, The Organization of the Petroleum Exporting Countries (OPEC) believes that there will be a further strong growth in demand for oil and thus oil will remain the most important source of energy in the near future (Organization of the Petroleum Exporting Countries, 2012). According to OPEC references, oil share in overall fuel basket will record a slight decline from 31.9% in 2010 to 29.6% in 2020 (Organization of the Petroleum Exporting Countries, 2014), which will not affect the position of leader of the world's energy sources. Reducing oil market share is largely due to strong growth in other forms of energy, especially natural gas (see Table 1).

**Table no. 1 – World supply of primary energy (Fuel shares %)**

	2010	2020*	2030*	2040*
Oil	31.9	29.6	27.2	24.3
Coal	28.2	29.1	28.4	27.1
Natural Gas	21.5	23.1	25	27
Nuclear	5.6	4.6	5	5.7
Hydro	2.3	2.5	2.5	2.4
Biomass	9.7	9.7	9.7	9.4
Other renewables	0.7	1.4	2.4	4
<b>Total</b>	100	100	100	100

Source: World Oil Outlook 2014, \* projection

Energy derivatives are contracts which are based on certain energy product (oil, natural gas, heating oil, coal, electricity etc.). These financial instruments provide an opportunity to manage the risks associated with volatile energy prices, permitting a party to secure energy prices before its actual consumption. The variety of energy derivatives includes *forward* contracts, *futures* contracts, *options* and *swaps*. The two main *futures* exchanges dealing with trading energy products are the *New York Mercantile Exchange* (oil, natural gas, heating oil, gasoline and electricity) and *London's International Petroleum Exchange*<sup>i</sup> (oil, natural gas and electricity).

Energy products are usually based on contracts traded on one of the following derivatives: call options, put options and swaps. Call and put options can be grouped as collars<sup>ii</sup>. Some collars, known as *participating collars*, have provisions that allow the manufacturer to participate in order to have a higher profit (for example, if the market price goes over the call). Or a manufacturer may choose a simple swap, which usually means he exchanges a floating price on the market for a fixed price.

Global energy markets are under continuous deep and fundamental structural changes arising from deregulation, privatization and consolidation. The key factor in all markets is the increasing risk. To meet the challenges of energy companies, financial engineering is growing exponentially that is helping at the development of new financial products for the emerging energy markets.

Worldwide energy markets are undergoing rapid deregulation, are generating competition, are being exposed to volatility in energy prices and are exposing the participants to much higher risks. Changes on these markets are affecting both consumers and producers, and have led to a greater need for risk management and use of derivatives to control exposure to energy prices. Investment banks are attracted to the energy markets because they provide new opportunities for allocation of funds. There is also a growing number of companies that are consolidating their role on the energy market. This cohesion between two different parts of the market has the potential to make the energy derivatives market on one of the derivatives markets with the fastest growing derivatives.

Given the significant increase in oil prices and natural gas in recent years, it is no wonder the reaction of energy companies, banks and hedge funds that have become very active in their attempt to cover their risks through over-the-counter (OTC) instruments and by trading on the exchanges energy derivatives. There are many contracts that allow the user to manage its exposure to energy prices, derivative contracts providing the easiest and most flexible solution for effective risk management.

The key of energy derivatives instruments is the deregulation on the energy market (Borenstein and Bushnell, 2000). By this, an energy product is not subject to any form of price regulation and thus can be developed a competitive *spot* market, where prices are liquid and reflect the real price of energy at any time. Usually, these *spot* markets are related of physical delivery points or of energy conglomerates where a large number of buyers and sellers maintain market liquidity and transparent pricing. In North America, the process of deregulation of energy markets has been successful through creating a number of energy shopping centres where prices can be indexed to the NYMEX in different locations: West Texas Intermediate for crude oil, Henry Hub for natural gas, New York Harbor for oil and gas, PJM West for electricity, and Central Appalachian for coal (Walsh, 2009).

#### **4. The volatility of oil prices on stock exchanges and their effects**

The volatility has often born debates. That is why we ask ourselves if price volatility emphasizes the need for futures contracts trading or trading futures contracts causes price volatility? The latter theory is often used by manufacturers to take better decisions. The manufacturer of any commodity traded on a futures market - corn, copper or oil - tends to have a dual view in terms of volatility. He perceives price increases caused by natural market forces, and price decreases as a direct cause of the “greed” of futures speculators (Dial, 1997).

New spot markets have often resulted as response to volatile prices. In 1971, when the Bretton Woods system of fixed exchange rates collapsed, the exchange rates began to fluctuate. This created a higher volatility of currencies and prompted the creation of a successful *futures* market for currencies. In a few years, the growth of the volatility of interest rates opened the door for a whole new variety of interest rates and other financial *futures* contracts. And we see the same process underway on the energy markets.

The successful introduction of WTI crude oil *futures* contract<sup>iii</sup> on the New York Mercantile Exchange in 1983 was possible because of a variety of structural changes on the world market of crude oil in previous years, which led to the creation of an open, competitive and volatile market. These structural changes have included (Grossman, 2013, pp. 134-138):

- increase of the market power of state oil producing companies – from the control of 6% of the production in 1970 to 55% in 1979 (Dial, 1997);
- corresponding decrease in ownership of oil sources by “The Seven Sisters”<sup>iv</sup> - from 61% to 25% over the same period as above (Dial, 1997);
- crude oil price in the United States has undergone deregulation and the system of price controls on oil was abolished in 1981<sup>v</sup>;
- the development of oil spot market, giving a greater role on the market to independent oil producers and brokers.

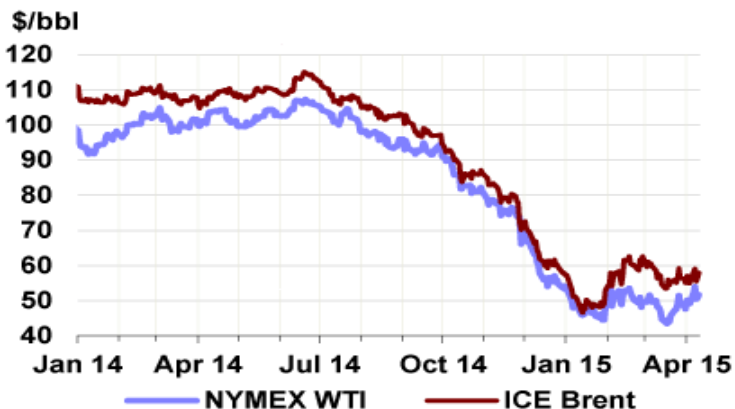
Trading crude oil *futures* contracts on NYMEX began in March 1983. According to the U.S. Commodity Futures Trading Commission (CFTC) statistics on fiscal years, the volume for the 1983 fiscal year, the first full year of sales, was of 1.4 million contracts (Dial, 1997). The explosion of trading these contracts began in 1996, when the volume of *futures* and options crude oil contracts traded on the NYMEX rose to over 28 million contracts<sup>vi</sup>. Most major oil companies, which initially opposed to *futures* transactions regarding them as a threat to their pricing power, have come to depend on the *futures* markets, both for hedging risks and also for confirmation of crude oil price.

At the latest stock exchange crash in July 2008, oil costs soar to \$147 dollars per barrel. Nonetheless, in an article from the Guardian published one month before the crash, the investment manager George Soros anticipated that the cost of oil had

turned into a bubble that could explode in any moment (Wearden, 2008). On 3rd June, Soros told the US Senate trade board that oil had been pushed to its \$135 a barrel mark by a new wave of speculators (Chung, 2008). Soros asserted that the multiplying in the cost of oil from 2006 until 2008 was mostly due to venture establishments<sup>vii</sup>. Soros continued to warn the board that there could be intense results for worldwide stock exchanges if the establishments abruptly started wagering on a fall in the oil value (Chung, 2008). Finally, he analysed the stock market crash of 1987 in comparison with the speculative pressure observed in 2008 on oil prices, which were mostly brought about by a sudden surge of cash into portfolio protection. As indicated by Soros, the 1987 crash could be relieved if institutional investors opted for a way out from that situation (Chung, 2008). In the same year, on 23 December 2008, WTI crude oil spot price fell to US\$30.28 a barrel, the lowest since the financial crisis began (Le Billon and Cervantes, 2013). The price sharply rebounded after the crisis and rose to US\$82 a barrel in 2009.

After the 2008 crash, the oil prices have started to receive more attention from every party operating on the energy market, and not only. But, even so, the price of oil has started to decline lately, and it reached 6 years historical low, plunging down after the 2009 economic crisis, being a signal for the global economy, because it supplies a third of all energy consumed. Therefore, ICE Brent *futures* relaxed in March being constrained by forcefully higher supplies from Middle East OPEC producers, while a constant supply in US crude stocks weighed on NYMEX WTI (Fig. 2). Afterwards, due to military activity from Saudi Arabia and the rising tensions from Yemen (Mahmood and Shaheen, 2015), the prices started to grow in April 2015 (International Energy Agency, 2015).

**Figure no. 2 Crude Futures (Front Month Close)**

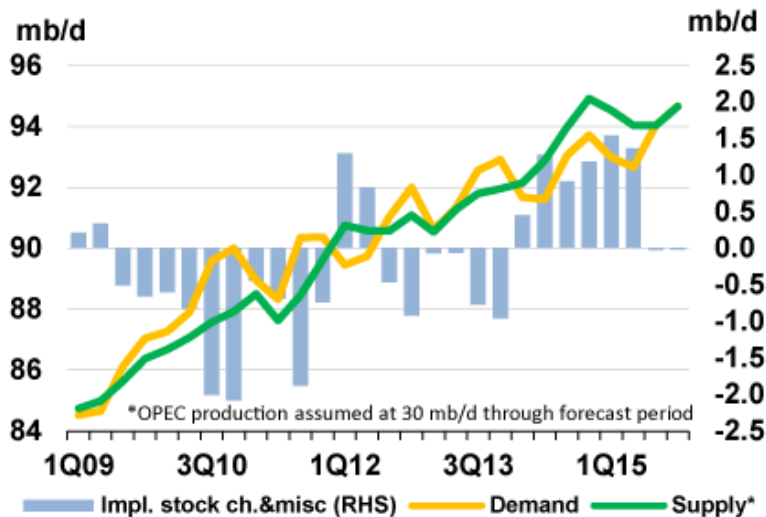


Source: IEA - Oil Market Report: 15 April 2015

Now, there is a lot more oil getting pumped out than anyone needs, and a lot is just getting stockpiled away for later. That is causing the price to drop as we can see in Fig. 3.



Figure no. 3 Demand/Supply Balance until 4Q15



Source: IEA - Oil Market Report: 15 April 2015

## 5. Conclusions

If everything will remain unchanged in the nearby future, some countries will be affected or will take advantage from this situation. Therefore, one of the biggest concerns is Russia that is a nation tremendously dependent on oil and gas production<sup>viii</sup> and the sharp fall on oil prices affected it severely. Financial experts now assess that Russia's GDP will recoil no less than 4.5 percent in 2015 if oil stayed at \$60 per barrel (The World Bank Group, 2015).

Other countries that might be affected due to their link with the oil market are Iran, Venezuela and Saudi Arabia. Iran's economy had begun to recover after a long period of subsidence. If oil costs will continue to fall, the Iranian government will have to exploit other markets for sources of income. Venezuela is heavily reliant on oil as the oil revenues account for about 95 per cent of export earnings in 2014 (Organization of the Petroleum Exporting Countries, 2015). If the oil market will crash, there are concerns among researchers that Venezuela will default (Coppola, 2015). The world's second biggest producer after Russia, Saudi Arabia, will experience financial difficulties if the oil price will stay low. Therefore, the uncertainty surrounding the medium-term outlook for the oil market could have implications for Saudi Arabia's GDP (Al-Darwish, *et al.*, 2015).

In the United States many individuals are benefiting from cheaper oil, because it means lower gas costs. But, as for the oil-producing states such as Alaska, Texas, Louisiana and North Dakota, the fall in oil prices means shortages in income and economic activity (World Bank Group, 2015).

Moreover, in the latest Shell's forecast of global energy development up to 2050 (Shell International BV, 2008), two scenarios were accepted: scramble and

blueprints. The first scenario relates, to a certain extent, to the concept of resource nationalism and suggests high crude oil prices. Their level will be determined not only by basic parameters of prevailing demand market, but also by the behaviour of OPEC which has learned quite an important lesson over the past years: World economy is able to survive at very high crude oil prices. The second scenario envisages a world of political cooperation between governments on efficiency standards and taxes, a convergence of policies on emissions trading and local initiatives to improve environmental performance of buildings. This scenario expects lower oil consumption and not very high crude oil prices.

Even as the world turns to unconventional sources, such as oil sands and oil shale, the pollution problem marches on. The issue isn't whether we run out, or even when we run out. The issue is simpler: we know it will run out and we know it will run out soon. We must begin the retreat from fossil fuels now.

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## Notes

<sup>i</sup>. Now part of Intercontinental Exchange Futures due to the expansion of the ICE in 2001, according to <https://www.theice.com/about.jhtml>

<sup>ii</sup>. It describes a strategy implemented after a period of substantial gains from an open long position on the stock market. To prevent a potential risk of depreciation to the extent of reaching the proposed level of liquidation of the contract, we must adopt a strategy of protection. The strategy provides the buying of a put option "out of the money" and simultaneously selling a call option "out of the money".

<sup>iii</sup>. On the goods market, the WTI oil type is known as slightly sweet oil, which refers to a type of oil which contains less than 0.5% sulphur, thereby rendering sweet to this type of oil rather than acid which is having higher sulphur content. This type of oil is used to produce gasoline, diesel and kerosene.

<sup>iv</sup>. The term "Seven Sisters" appeared in 1950 when the businessman Enrico Mattei, then head of the state-owned Italian oil company Eni, described the "Iran Consortium" cartel which consisted of seven oil companies that have dominated the global oil industry from mid-1940 to 1970 (Sampson, 1975). The group was formed of Anglo-Persian Oil Company (now British Petroleum); Gulf Oil; Standard Oil of California (SoCal); Texaco (now Chevron); Royal Dutch Shell; Standard Oil of New Jersey (Esso); Standard Oil Company of New York (now ExxonMobil). Before the 1973 oil crisis, members of the Seven Sisters controlled about 85% of world oil reserves, but in recent decades the dominance of these companies and their successors decreased as a result of the growing influence exercised by the OPEC cartel and by the state-owned oil companies from emerging market economies. Financial Times used in 2007, the label of "Seven New Sisters" to describe a group that includes most influential national oil and gas companies based in countries outside the Organisation for Economic Co-operation and Development (Hoyos, 2007). According to Financial Times, this group includes: China National Petroleum Corporation (China), Gazprom (Russia), National Iranian Oil Company (Iran), Petrobras (Brazil), PDVSA (Venezuela), Petronas (Malaysia) and Saudi Aramco (Saudi Arabia).

<sup>v</sup>. The U.S. system of price controls on oil was created to control the price of oil and to equalize the cost of crude oil to refineries. Companies that had easier access to cheaper oil and with a controlled price paid money to oil refineries that did not obtained oil so easy. They were dependent on more expensive internal and external oil. The government has acted as a bank for this program, collecting from some companies and providing subsidies to others. After a reclassification made in the last months of the program, the government lost more of its assets and shareholders were asked to pay the debts recorded by the bank. President Reagan lifted all regulations on oil prices, including the system of price controls, in a very short time after taking office (Hayward, 2001, pp. 267-268).

<sup>vi</sup>. According to statistics published by the CFTC on crude oil, available at [http://www.cftc.gov/oce/web/crude\\_oil.htm](http://www.cftc.gov/oce/web/crude_oil.htm).

<sup>vii</sup>. For example, pension funds that diverted cash into indexes connected to the expense of crude oil.

<sup>viii</sup>. Oil and gas revenues account for more than 50% of the federal budget revenues (U.S. Energy Information Administration, 2014)