Natural Resources Canada | Ressources naturelles Canada

Review of Issues Affecting the Price of Crude Oil

October 2010

Petroleum Resources Branch
Energy Sector

Canada

Cameron Izzard was the main author of this report. Important written contributions were also made by Kevin Stringer and John Foran, who also edited the report.

The authors would also like to thank Maia Konrad for her assistance in assembly of the document, as well as Claude Lavoie, Patrick Perrier, and José Bourque of the Department of Finance, who provided a valuable perspective on a long-term model for future crude oil prices.

Copies of this publication may be obtained free of charge from:
Oil and Gas Policy and Regulatory Affairs Division
Petroleum Resources Branch
Natural Resources Canada
580 Booth Street, 17th Floor
Ottawa, Ontario K1A 0E4

Phone: (613) 992-0287, Fax: (613) 995-1913
TTY Service: (613) 996-4397 (Teletype for the hearing-impaired)
E-mail: mkonrad@nrcan.gc.ca

ISBN: 978-1-100-15549-4
Catalogue No.: M164-2/2010E-PDF

Aussi offert en français sous le titre *Examen des enjeux qui influence le prix du pétrole*

TABLE OF CONTENTS

I. Abstract

The crude oil industry is central to Canada and the world's economy and its future. The price of crude oil has traditionally been determined by supply and demand fundamentals[1]. However, there are new emerging drivers of oil prices. The oil market has become increasingly complex, with a variety of factors having an impact on oil prices. Oil price fluctuations reached unprecedented levels in 2008, when world crude oil prices swung wildly, from $147 per barrel in July, to $30 per barrel in December. These crude oil price swings were reflected in the prices that consumers paid for gasoline, diesel and furnace oil[2]. Given the importance of oil to Canada and the world, governments, industry and the public have an interest in understanding why oil prices fluctuate.

A Review of Selected Issues Affecting the Price of Crude Oil starts by reviewing the importance of crude oil to Canada and to the world and Canada's place as the world's sixth largest crude oil producing country, and second largest crude oil reserves holder.

The paper identifies the traditional drivers of oil prices including a review of prices over the 1970 - 2000 period. Then, we examine the new, emerging factors which have impacted prices since 2000, such as the "financialization" of crude oil markets[3], and concentration of crude oil production in National Oil Companies (NOCs).

The paper examines the economic impacts of oil price movements, and the outlook for crude oil prices, in both the short term (2010, 2011) and, on the basis of surveys of respected organizations, longer term (to 2030).

The paper's conclusions note that emerging factors - such as the prevalence of NOCs and growth of institutional investment in oil commodity markets – now interact with the traditional fundamentals, such as severe weather events, OPEC production decisions, crude oil inventory levels and other factors, to affect oil prices. The paper notes two opposing long-term views on oil prices. Some groups believe that long-term oil prices could trend downwards with gains in energy efficiencies, weaker than expected oil demand, and falling production costs due to technological advancement. A second group believes that long-term oil prices could trend upwards, driven by resource depletion effects, scarcity concerns, and higher demand for crude oil, particularly from China and India.

However, the paper concludes that there is no consensus on the future of crude oil prices. Given the impossibility of predicting the future of all the factors that can influence crude oil prices, we conclude that crude oil prices will continue to be very difficult to accurately forecast. However, on average, the reference cases shown in this report do show crude oil prices rising in the future.

[1] At any given time, the price of crude oil is determined by the intersection of the demand and supply curves in the oil market (the equilibrium).
[2] For more information on petroleum product pricing, refer to Natural Resources Canada's website on how prices are determined at http://www.nrcan.gc.ca/eneene/sources/pripri/howcom-eng.php.
[3] "Financialization" refers to the growth in financial investment and its affect on the commodities market. In recent years, the "financialization" of the futures market has been mentioned by some as a phenomenon that has driven oil prices.

II. The Importance of Crude Oil

♦ Global Importance of Crude Oil

Oil is a vital source of energy for the world and will likely remain so for many decades to come, even under the most optimistic assumptions about the growth in alternative energy sources. Most countries are significantly affected by developments in the oil market, either as producers, consumers, or both. In 2008, oil provided about 34% of the world's energy needs, and in the future, oil is expected to continue to provide a leading component of the world's energy mix.

The International Energy Agency (IEA) projects that oil will provide 30% of the world's energy mix in 2030[4]. In the United States and Canada about 2/3 of oil is used for transportation. In most of the rest of the world, oil is more commonly used for space heating and power generation than for transportation[5]. Oil is a key product for the world's agriculture industry, which helps feed the world's population of more than six billion.

♦ Importance of Crude Oil to Canada.

The oil industry is a major driver of Canada's economy:

- Oil and gas companies make up 20 to 30% of the value of the Toronto Stock Exchange (TSX), and these companies account for about 5% of Canada's Gross Domestic Product (GDP). The energy sector (including electricity, coal, and other energy sources) directly accounts for about 7% of Canada's GDP.[6]

- In 2008, the oil and gas extraction industry spent $54 billion in capital expenditures[7].

- In 2008, Canada's petroleum exports (crude oil and petroleum products, such as gasoline and liquid petroleum gases) accounted for 19% of all our exports[8]. Oil exports are a key component of Canada's merchandise trade surplus with the outside world.

- Millions of Canadians are affected by the petroleum industry, either through employment or ownership in shares of companies, Registered Retirement Savings Plans (RRSPs) and mutual funds. According to the TSX, the petroleum companies trading at the stock exchange were worth $357 billion as of December 31, 2009, with approximately half of these shares owned by Canadians[9].

[4] International Energy Agency, World Energy Outlook 2008
[5] US Energy Information Administration, website document: Global Oil Consumption.
[6] Statistics Canada, Energy Statistics Handbook, Forth Quarter 2009
[7] Canadian Association of Petroleum Producers, Energy Statistics Handbook
[8] Data source: Statistics Canada, Energy Statistics Handbook, Fourth Quarter 2009, Number 57-601-X
[9] Market capitalization value of all the oil and gas companies trading on the Toronto Stock Exchange

♦ Canada's Position in Global Oil

According to the IEA and the BP Statistical Review, Canada is the world's 6th largest oil producer (as illustrated in table 1). According to some forecasts, including those of the National Energy Board, with growing oil sands production, Canada could become the world's 4th largest oil producer as early as 2015.

Unconventional crude oil is petroleum produced or extracted using techniques other than the traditional conventional oil well methods such as vertical oil wells. In Canada, 97% of our proved oil reserves are unconventional oil sands reserves. Canada's oil sands are typically extracted using unconventional technology such as bitumen mining and in situ extraction.

2009 World's Top Oil Producers

Rank	Country	Million barrels per day (Mb/D)
1	Russia	10.21
2	United States	8.07
3	Saudi Arabia	7.92
4	Iran	3.74
5	China	3.79
6	Canada	3.22
7	Mexico	2.97

Source: IEA Oil Market Report, April 13, 2010.

Table 1

As seen in table 2, Canada's proved oil reserves are the second largest in the world. This represents about 13% of the world's proved oil reserves. Based on current Canadian rates of production, it would take more than 150 years to extract these reserves. Organization of Petroleum Exporting Countries (OPEC) member countries collectively control 70% of the world's oil reserves, and produce about 40% of world oil production.

The amount of oil in-place (not all in-place amounts will be economically recoverable) in Canada's oil sands is estimated at 1.8 to 2.5 trillion barrels. For comparison, the 150 year cumulative total of world oil production-to-date is approximately 1 trillion barrels.

World's Top Oil Reserves

Rank	Country	Reserves (Billion Barrels)	OPEC Member
1	Saudi Arabia*	262.4	Yes
2	Canada	174.7	No
3	Iran	137.6	Yes
4	Iraq	115.0	Yes
5	Kuwait*	104.0	Yes
6	Venezuela	99.4	Yes
7	U.A.E.	97.8	Yes

* Included half of the Saudi-Kuwaiti "neutral zone" which has 5 billion barrels of proved reserves. Source: Oil and Gas Journal (December 21, 2009).

Table 2

As technology improves, some of Canada's additional in-place oil sands resources will certainly become economic to produce. Even a fractional increase to the oil sands recovery rate could add large amounts of oil to Canada's proved oil reserves. New experimental oil sands recovery methods such as Toe-to-Heel-Air-Injection (THAI) could, according to project proponents, increase the oil sands recovery rates to a much higher percentage than traditional methods.

III. Traditional Factors Driving Oil Prices

The traditional factors driving oil prices have always been the fundamentals – factors or events which affect oil supply and demand[10]. Changes to factors such as weather, world oil supply and demand, OPEC spare capacity levels, the marginal cost of oil production, crude oil inventory levels, and technological changes have for decades played a significant role in determining the oil price. The effect of these factors is discussed below.

Seasonal Weather - Seasonal weather influences oil prices. In summer, gasoline use increases during the travel season, increasing demand for oil, leading to an increase in prices. Cold winters can result in higher heating fuel demand, causing oil prices to increase. A relatively mild winter can cause oil prices to fall.

Severe weather events - Hurricanes can have a significant influence on oil prices. In 2005, two severe hurricanes (Katrina and Rita) caused extensive damage to Gulf of Mexico offshore oil and natural gas rigs, pipelines and onshore oil refineries. U.S. gasoline prices jumped more than 40% in the immediate aftermath of hurricane Katrina.

Oil Supply or Demand Changes - Changes in oil supply levels have traditionally had an impact on oil prices. Unexpectedly low supply/high demand raises prices, and high supply/low demand causes price weakness.

U.S.Commercial Crude Oil Inventory Levels - U.S. commercial crude oil inventories are reported every Wednesday by the U.S. Department of Energy, and these reports have a significant effect on the crude oil price. Low crude oil inventories cause uncertainty about the ability of the market to meet demand, which supports higher prices. Conversely, high crude oil inventory levels support lower oil prices.

OPEC Production Decisions – Announcements by OPEC, particularly changes to production quotas, price targets, or production investments, can have immediate impacts on oil prices.

OPEC Spare Capacity Levels – OPEC spare oil production capacity gives the market comfort that supply can be maintained, and demand can be met. Accordingly, high levels of OPEC spare production capacity typically are correlated with falling or low oil prices, and vice-versa.

[10] Demand and supply curves are affected by the numerous factors set out in this paper or the underlying effect from increased world economic activity. These determinants lead suppliers and purchasers to make decisions about prices and quantities of crude oil. As these decisions are made, the aggregate supply and demand curves shift accordingly. The magnitude of price fluctuations is a function of the frequency or speed at which these factors or events occur and their impact on supply and demand.

Marginal Cost of Production – Rising marginal costs of producing oil have an upward effect on oil prices, and vice-versa for falling marginal costs. It is generally recognized, particularly in the western hemisphere, that the marginal cost of producing oil has risen significantly, due to rapidly increasing costs for steel pipes, drilling rigs, services, labour and other input costs associated with oil production, and this has impacted the price of oil. In addition, offshore oil producers could face higher costs, if regulations are tightened in light of the April 2010 Gulf of Mexico oil spill.

According to the U.S. Energy Information Administration (EIA), between 2003 and 2007, the average worldwide cost of barrel-of-oil-equivalent production rose by 50%[11]. In the future, the marginal cost of oil production could continue to rise as the world turns to more expensive, more remote, and more challenging oil resources to meet its energy needs – including offshore and unconventional oil supplies such as Canada's oil sands.

The Impact of Technological Changes on Oil Prices - Fifty years ago, technology such as oil sands production and offshore drilling were not commercially developed and this technology has been instrumental in increasing the world's oil reserves. Technological improvements act in only one direction – to increase oil field recovery rates and output, reduce production costs, and contribute to lower oil prices.

Refinery Infrastructure - Globally, aging and increasingly complex refinery infrastructure makes refineries more vulnerable to disruptions, which can cause a temporary loss of petroleum product supply to markets. While usually product markets (e.g. gasoline and diesel) track crude prices, in the case of a refinery outage, product prices can rise while crude declines. Crude prices decline in such a scenario, since only refineries can "use" crude oil, and a refinery outage causes a loss of crude oil demand. As the world's supply of conventional (light, sweet) crude oil declines, many of the existing refineries will have to make modifications to their facilities in order to be able to process more readily available heavy crude oil. Changes to refineries' ability to process crude oil have obvious implications for crude oil prices.

IV. Crude Oil Prices 1970 - 2000

♦ Overview

Many of the traditional fundamental factors described above explain crude oil price movements over the 1970 – 2000 period. The average annual West Texas Intermediate (WTI) crude oil price over the period, in both nominal and real (2008$) U.S. dollars, as well as factors that influenced the direction of crude oil prices during this period are shown on figure 1. Note that these are average annual prices, and monthly prices displayed a greater range of values – greater fluctuations.

[11] US Energy Information Administration, Performance Profiles of Major Energy Producers, Table 12.

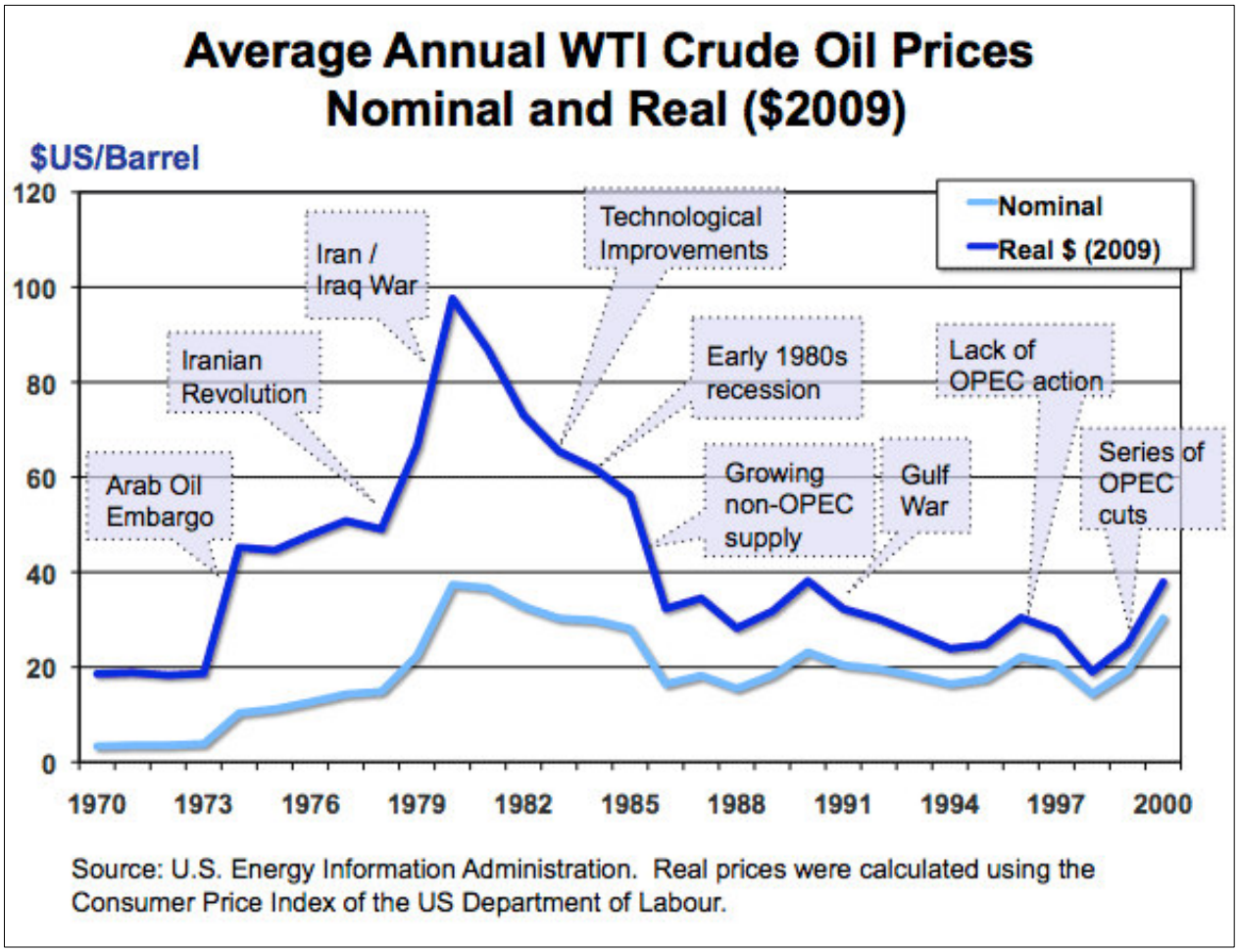

Figure 1

Energy analysts sometimes refer to oil's "golden age" as the 100-year span between 1874 and 1973, when the annual real price of crude oil (in 2009 dollars) was relatively stable, trading for most times within a narrow range of $10 to $30 per barrel.

This period of long term stability ended in the 1970s because of major geopolitical events. These included the Arab oil embargo in response to the Yom Kippur War in October 1973, the Iranian Revolution (1979) and the Iran-Iraq War that started in 1980. The decade was characterized by reduced oil production in non-OPEC countries, which enhanced OPEC's ability to dictate prices by coordinating their oil production policies. "At the peak of its influence, OPEC countries controlled about 55% of world crude production (1973-1974), and maintained over 50% control throughout the 1970s". [12] From 1973 to 1980 the crude oil price rose (in 2009 dollars) from $20 US per barrel to almost $100 US per barrel.

In the early 1980s, a recession reduced crude oil demand, and this had a significant downward impact on oil prices. Higher prices during the previous decade had led to increased fuel efficiency[13], further depressing demand, and had also created an incentive to find and develop non-OPEC production. This fact taken together with technological advances (particularly in

[12] Leonardo Maugeri, the Age of Oil, Praeger, Chapter 10, the Second Oil Shock.
[13] The average fuel economy of U.S. light duty vehicles rose from 13 miles per gallon (mpg) in 1975 to 22 mpg in 1987. (U.S. Environmental Protection Agency)

terms of offshore production in the North Sea, and production from Canada's oilsands) were keys to higher non-OPEC production. In sum, all these developments left OPEC with an ever-shrinking share of the world crude oil market. By the end of the decade, prices had declined steadily to below $40 US per barrel.

The 1990s brought the first Gulf war (1990-1991) which had an impact on supply and prices. Despite the low prices for crude oil for most of the 1990's, there was little discipline within OPEC to try to raise prices. OPEC's lack of action kept oil prices low for an extended period. However, when crude oil prices plummeted to $10 per barrel following the Asian financial crisis (1998), OPEC instituted a series of production cuts, starting in late 1999. This allowed OPEC to regain control over the oil market, and this began to result in higher oil prices.

V. Emerging Factors Driving Oil Prices

♦ Overview

We reviewed a variety of traditional factors that have affected oil prices (e.g. supply, demand, inventories and OPEC spare capacity levels). However, within the last five years, new emerging factors (set out below) have had a growing influence on oil prices.

In this section, these factors are identified and briefly explained. In sections to follow, we will track how these emerging factors help explain the crude oil price changes since 2000.

♦ Repeal of the Glass-Steagall Act and Financialization of Oil Markets

With the repeal of the U.S. Glass-Steagall Act[14] in November 1999, banks and other institutional investors (investment banks, hedge funds), increasingly participated in risky investments such as the crude oil and gasoline futures markets. According to many analysts, this new "market" for crude oil futures had a significant impact on crude oil prices.

♦ Asian Oil Demand

One of the most dominant factors contributing to crude oil prices after 2000 was the sharp rise in demand for oil from China and other Asian developing nations. As shown in figure 2, China and other Asia demand accounted for most of the global crude oil demand growth between 2004 and 2007, and about 40% of growth in 2008.

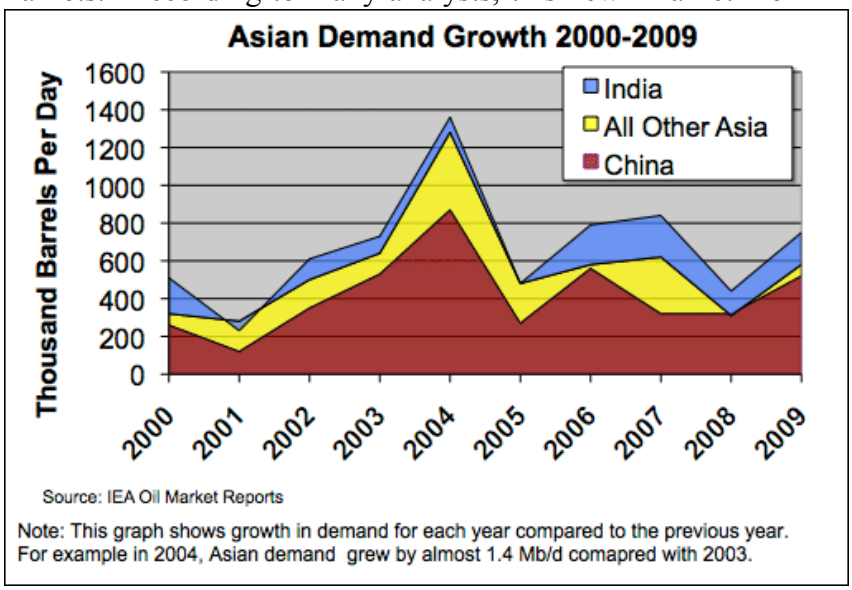

Figure 2

[14] The Glass-Steagall Act (1934), before its repeal in 1999, prohibited deposit taking banks and other financial institutions from investing in high-risk products such as crude oil futures contracts.

♦ Oil Price Subsidies

An International Monetary Fund (IMF) survey of 42 developing and emerging market countries including China, India and the Middle East found that less than half fully passed through higher world oil prices to retail customers in 2007. This subsidization reduced the incentive to conserve and contributes to rising oil prices by sustaining oil demand in the face of relatively high crude oil prices[15]. In many countries, the retail price of diesel fuel, a refined product made from crude oil, is less than the price of the crude oil used to make diesel.

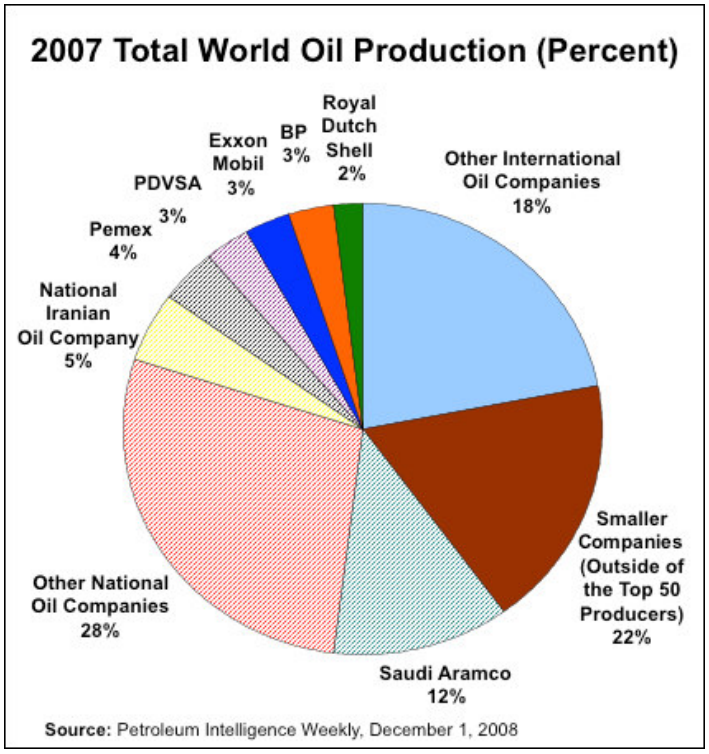

Figure 3

♦ Hypersensitivity to Geopolitical Events

While there is nothing new about geopolitical events affecting oil prices, what is new is a sense of hypersensitivity to geopolitics particularly among new traders who have gained increasing influence over the oil market with rising financial investment. To illustrate, while the 2007 Israel Lebanon war did not disrupt oil supply, it had a significant upward influence on oil prices. Similarly, threats made about cutting oil supplies by Venezuela in February 2008 also influenced oil prices even though there was no physical impact on oil supply.

♦ National Oil Companies (NOCs)

Prior to the 1970s, seven international oil companies (the "seven sisters") dominated world oil production At their peak, the seven sisters controlled almost 80% of world reserves, production, and refining capacity outside of the United States, Canada, and the Communist Block. In figure 3, the NOCs are striped. Figure 3 shows that in 2007, roughly 78% of world oil production was produced by only 50 companies, and about 52% of global oil production was controlled by state-owned NOCs. This dominance has had several effects. First, it encouraged the previously mentioned hypersensitivity to geopolitical events. Secondly, it contributed to crude oil price uncertainty, as commodity investors were more concerned about the timely development of required crude oil supply, given that more and more of the world's supply must be developed by NOCs.

[15] The IEA estimates that fossil fuel subsidies amounted to $557 billion in 2008. Iran's subsidy bill, in particular, reached approximately $101billion (the highest of any country that year), equivalent to about on third of the country's budget (IEA Medium-Term Oil and Gas Market Report, June 2010, page. 50).

♦ The Declining Value of the U.S. Dollar

Oil is priced in U.S. dollars and changes in the value of the U.S. dollar influences crude oil prices. The recent decline in the value of U.S. dollar against the Euro (illustrated in figure 4) has played a role in rising oil prices. The Euro rose 78% against the U.S. dollar between January 2002 and July 2008. This corresponded to a peak in oil prices.

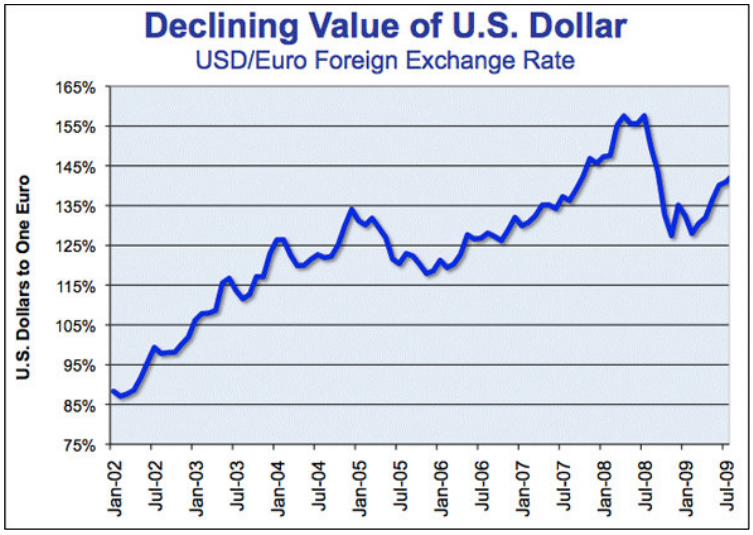

Figure 4

The decline in the value of the U.S. dollar is of particular concern to Middle East members of OPEC who purchase most of their consumer goods in Europe. In recent years, OPEC has raised its opinion as to what it considers an acceptable price for its crude oil. The decline in the purchasing power of the U.S. dollar, over the last decade, offers a key explanation for why OPEC has pushed for higher crude oil prices.

♦ Disappointing Non-OPEC Production

In recent years, disappointing non-OPEC production raised concerns about oil supply and this contributed to increased oil prices.

Within the last decade, the former Soviet Union (FSU) countries accounted for virtually all of the net growth of 5.3 million barrels per day (Mb/d) in non-OPEC production. It is clear that without the FSU countries, non-OPEC production would not have increased. As FSU oil production growth rates slowed (FSU crude oil production was flat in 2008), concerns about growing dependence on OPEC raised concerns about oil supply and prices rose in 2008. Furthermore, non-OPEC production from the North Sea declined by a third between 2000 and 2008, and production from Mexico's largest oil field, Cantarall, declined by half between 2004 and 2008. Oil traders bid up the prices of oil as they become more concerned about the world's increasing dependence on OPEC production.

♦ Gulf of Mexico Oil Spill

The bill for cleaning up the April 2010 Gulf of Mexico oil spill could be more than $10 billion. However, this cost could be small compared to cost the disaster adds to producing offshore oil in the future. Given the importance to global oil supply[16], few experts expect offshore drilling to be halted or sharply cut. A tightening of regulations and higher insurance premiums could add significant costs to finding and developing oil in deepwater[17], which could push world oil prices higher.

[16] Geologists estimate that more than 100 billion barrels of oil reserves lie in deep water of 1,000 feet or more, accounting for about 10% of world's remaining recoverable crude oil (Nickel's Daily Oil Bulletin, Spill Backlash Could Lift Drilling Cost, Oil Price, May 7, 2010)

[17] According to Edward Morse, a managing Director at Credit Suisse, a tightening of regulations, could potentially raise the costs of finding and developing a barrel of oil in deepwater by 10% to 15%, or $5 to $10 per barrel.

VI. Crude Oil Prices 2000 - 2010

♦ Overview

In this section, we examine world crude oil price movements, and analyze the drivers of those price movements. Figure 5 shows monthly WTI crude oil prices over the 2000 – 2010 period, in nominal and real ($2009) U.S. dollars. Nominal and real prices virtually converge by 2008, as there is very little inflation in 2009 with the economic recession.

As figure 5 indicates, we define four sub-periods: a period of relative price stability; a period of increasing oil prices; the 2007/08 oil price shock period, and lastly, the current recessionary period.

The next sections deal with each of these sub-periods, and review in detail the traditional supply and demand crude oil price drivers, the emerging factors, and specific events which influenced oil prices during each sub-period.

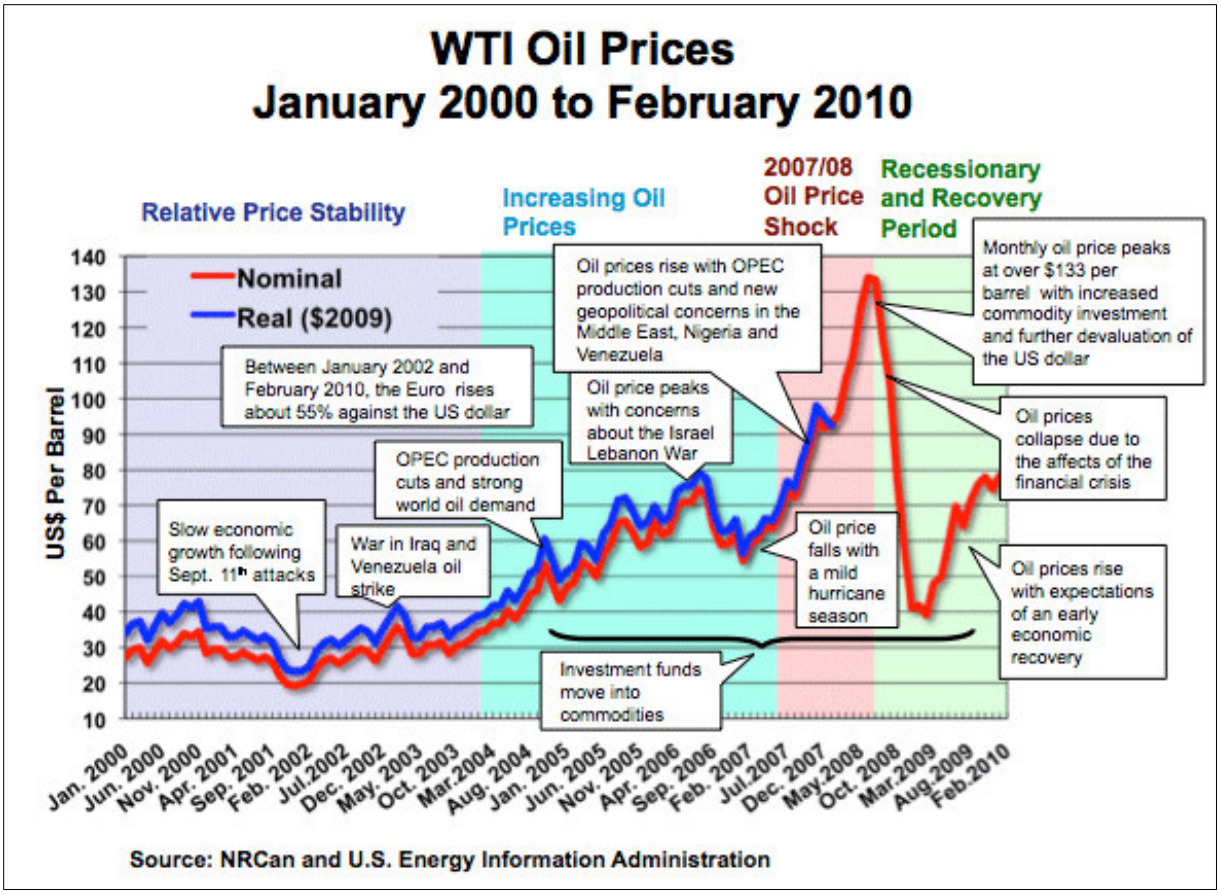

Figure 5

♦ Period of Relative Price Stability

During the January 2000 – December 2003 period there was relative stability in the oil market as WTI prices typically varied only $5 or so above or below $30 US per barrel. While the U.S. Glass-Steagall Act was repealed in 1999, the implications for world oil prices of its repeal would not become evident until 2004.

One explanation for this period's stability was that OPEC's considerable spare production capacity helped stabilize oil prices into a range that was acceptable for most cartel members. Also, following the September 11th, 2001 attacks there was slow economic growth, lower oil demand, and falling prices.

♦ Period of Increasing Oil Prices

Oil prices started to rise in 2004. According to the IEA, the surge in oil prices since the end of 2003 can legitimately be described as an oil shock[18], albeit a slow-motion one. The price of oil rose in 29 of the 40 months between September 2003 and December 2006.

One of the largest causes for the run-up in oil prices in the mid 2000s was the sharp rise in demand for oil from China and other Asian developing nations. Between 2000 and 2008, China's GDP growth rates averaged 10% per year.

High demand from Asia was the beacon that attracted financial investors to the oil market starting in 2004, because oil was seen as underpriced. The price of crude oil, which averaged only $34 per barrel in January 2004, rose steadily. During the Israel-Lebanon war of July 2006, oil prices reached $75 per barrel. Prices fell briefly below $55 per barrel in January 2007 due to a mild winter. Financial investors who speculated on rising prices during this period were richly rewarded. This is the so-called financialization of oil markets. For more information refer to the text on page 12.

♦ Period of 2007/08 Oil Price Shock

Beginning in 2007, oil prices entered their most volatile period in history. The volatility was characterized by sharp increases in the price of crude oil, immediately followed by equally sharp declines. In our view, this volatility was the result of a combination of numerous background "structural" factors and specific market events, namely:

i) the large volume of institutional investment in the crude oil market (financialization – see page 12);
ii) falling value of the U.S. dollar;
iii) Asian oil demand growth;
iv) the rise of NOCs;
v) related hypersensitivity to geopolitical factors (in particular to events in the Middle East, Nigeria and Venezuela);
vi) rising marginal costs of oil production;
vii) the established pattern of slow non-OPEC supply growth; and,
viii) OPEC production cuts[19].

[18] International Energy Agency, World Energy Outlook 2008, Chapter One, Energy Prices.
[19] In February 2007, OPEC implemented production cuts totalling 1.7 Mb/d that seem to have played a role in the escalation of oil prices in 2007/08.

Financialization of Oil Markets

Growing financial investment in the oil futures market may have magnified and influenced the scale of the oil price increases and declines of 2007 - 2008.

Global oil prices are determined in the futures market where crude oil futures contracts are traded. On the New York Mercantile Exchange (NYMEX), in 1990, there were 10 types of active oil futures contracts trading worldwide, with a combined daily volume equivalent to 150 Mb/d, or 130% more than oil demand at the time.[20] By 2009, NYMEX oil futures trading represented about 6 to 7 times the global daily volume of world oil production. This high volume of trading was facilitated by the November 1999 repeal of the U.S. Glass-Steagall Act[21].

Traders on the NYMEX fall into two categories.

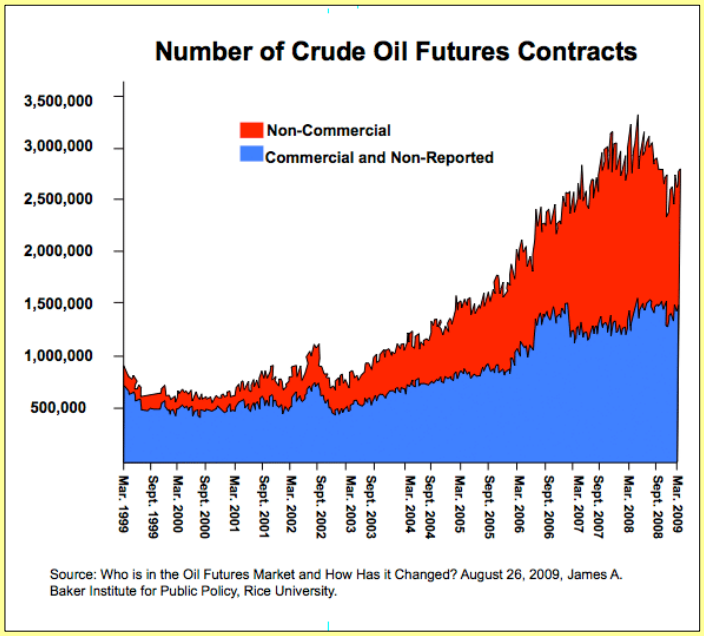

Figure 6

Commercial traders, e.g., oil companies and refineries invest in NYMEX futures contracts to guarantee (or hedge) the future price for the commodities they are actually producing (e.g. oil and gasoline) or buying (e.g. refineries buying crude oil for which at the end of the day they take physical delivery). These companies are not necessarily seeking profit, but use the futures markets to help stabilize future revenues.

Non-commercial traders, sometimes referred to as speculators, invest in the futures market to profit from price fluctuations. They do not take physical deliver of oil, and are neither producers nor users of oil. They include investment banks, insurance companies, hedge funds and other market participants who have moved into oil contracts because they are trying to diversify their investment portfolio, spread geopolitical risk and maximize investment returns.

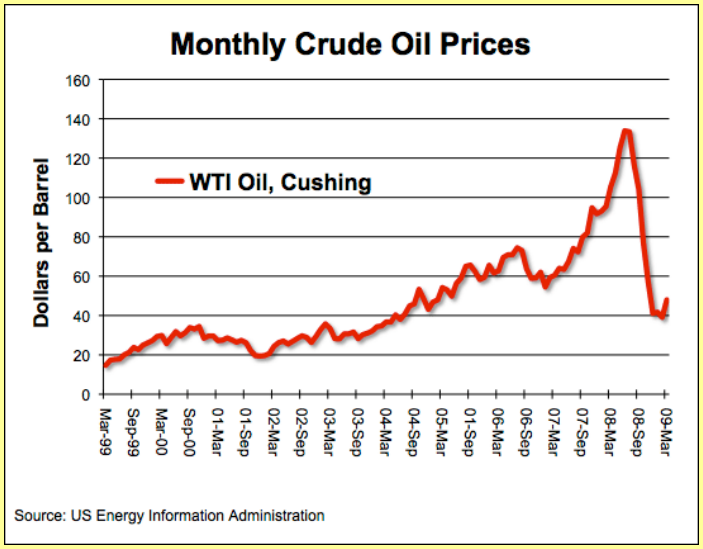

Figure 7

As displayed in figure 6, there was a dramatic increase in non-commercial trading beginning in 2003, and accelerating through 2008. While non-commercial players had averaged about 20% of contracts in the oil futures market in the early 2000s, by July 2008 they represented more than 55% of trading activity. This peak coincided with peak oil prices at almost $150 per barrel in 2008 as depicted in figure 7. According to analysts, the growing "financialization" of the oil market is likely to have contributed to increased oil price fluctuations by making the price spikes higher, and the price falls lower. The effect is most pronounced in the 2007-2008 period.

[20] Kenneth B. Medlock and Amy Myers Jaffe, James A Baker III Institute for Public Policy, Rice University, August 26, 2009, Who is in the Oil Futures Market and how has it Changed?, Chapter 2, Oil futures Market: Who Trades and Why?

[21] The Glass-Steagall Act (1934), before its repeal (1999), prohibited deposit taking banks and other financial institutions from investing in high-risk products such as crude oil futures contracts.

In particular, the decline in the value of the U.S. dollar played a role in the oil spike of 2007/2008. At the time of the oil price peak (July 2008), the U.S. Dollar had fallen to a value of only 0.63 Euros. Although OPEC was concerned about the high price of oil, OPEC was seemingly powerless to control a major spike in prices. The key event which triggered the global recession was rising U.S. house foreclosure rates. One out of every 54 U.S. homes was in foreclosure in 2008[22].

♦ Recessionary and Recovery Period

Development of a Global Recession

The 2008/09 global recession was characterized by collapses in U.S. housing prices[23], the failure of many financial institutions under the weight of bad debt, and a dramatic decline in the stock and commodity markets. In 2009, world economic output declined by -0.8%, with advanced economies experiencing a sharper decline at -3.2% according to the latest IMF reports. In 2009, world trade was expected to decline by 9%.

The global recession reduced the demand for oil in many sectors including transportation, manufacturing and construction. In April 2010, the IEA reported that world oil demand fell by 1.3 Mb/d from 86.2 Mb/d in 2008 to 84.9 Mb/d in 2009[24]. Oil demand declines were most pronounced in the Organization of Economic Development (OECD) countries, while the rate of oil demand growth slowed considerably in key emerging economies, such as China and the Middle East.

Oil Price Collapse

Weak oil demand caused by the recession was the major factor causing the late 2008/early 2009 collapse in oil prices. The daily oil price, which had peaked at $147 per barrel in July 2008, declined to a bottom of only $30 per barrel by late December 2008.

In October 2009, the IMF stated that the global recession appears to be ending but the recovery will be weak by historic standards, with continued credit constraints and slow employment growth. Canada along with many other nations felt the full impact from the global recession. At its worst, according to Statistics Canada, Canada's economy shrank 5.4% on an annualized basis in the first quarter of 2009, the largest decline since 1991[25].

Oil Price Recovery

A series of measures and events have served to cause a recovery in world crude oil prices:

- In the fall of 2008, responding to falling oil prices and weak oil demand, OPEC announced 4.2 Mb/d of production cuts (the largest cuts in the history of the organization).

[22] Stephanie Amour, USA Today, 2008 Foreclosure Filings Set Record, February 3, 2009.
[23] Stephanie Amour, USA Today, 2008 Foreclosure Filings Set Record, February 3, 2009.
[24] IEA Oil Market Report, April 13, 2010
[25] Louise Egan, Reuters News Service, Canada's Economy Shrinks 5.4% in the First Quarter, June 1, 2009.

- OPEC also announced an oil price target of $70 to $80 per barrel for a barrel of crude oil. At that target price, the budgets of most OPEC member countries will be balanced.
- Global economic growth was estimated at 3.0% in 2010 because of recent stimulus measures[26].

As the global economy recovers, the market expects that world oil demand will increase. According to the IEA, world oil demand is expected to grow by 1.7 Mb/d – from 84.9 Mb/d in 2009 to 86.6 Mb/d in 2010[27]. In 2010, more than 80% of the oil demand growth is expected from Asia, the Middle East and the Latin American regions.

Due to these factors, by April 2010, crude oil was trading at more than $80 per barrel, more than double the low price of December 2008. Crude oil has remained in the $70-85 per barrel range since.

OPEC's spare capacity, estimated at an average of 6.4 Mb/d for the first nine months of 2009, is more than twice as high as the five-year average (2004-2008 - 2.8 Mb/d). There is more than enough oil to deal with possible supply disruptions and this has perhaps had a stabilizing effect on oil prices, preventing them from rising to 2008 levels.

VII. Impacts of Crude Oil Price Changes

♦ Global Impacts

The IEA estimated that global upstream exploration and production investment budgets for 2009 totaled around $388 billion, down more than $90 billion or 19% lower compared with 2008[28]. In February 2009, OPEC reported that its member countries had delayed the completion of 35 of 150 planned upstream projects, due to falling oil prices. As a result, the planned addition of 5 Mb/d of gross oil production capacity will be delayed from 2012 to sometime after 2013[29]. Cutbacks have mainly affected projects in the planning stage. Projects already under construction are proceeding, although some slowdowns are reported. The reduction in investment has raised concerns within the IEA that spare oil capacity may eventually be squeezed given the long investment lead times. However, OPEC spare capacity has doubled in 2009 and it could take years to tighten the oil market.

[26] International Monetary Fund, World Economic Outlook, October 2009, Chapter 1, Global Prospects and Policies, Table 1.1.
[27] IEA Oil Market Report, April 13, 2010
[28] International Energy Agency, World Energy Outlook 2009, Chapter 3, Impact of the Financial Crisis on Energy Investment.
[29] Same reference material as footnote number 28.

♦ Impacts on Canadian Trade and Currency

Canada's dollar is often viewed as a petrocurrency because its movements often track oil prices. In February 2008, the price of WTI crude oil closed for the first time at over $100 U.S. per barrel and the Canadian dollar was trading around parity with the U.S dollar. When the price of crude oil collapsed, the Canadian dollar fell to about $0.82 U.S. by November 2008. In late 2009, as oil prices recovered, the Canadian dollar approached parity with the U.S. dollar.

The global economic downturn and the drop in commodity prices led to a weakening of Canada's trade position. In 2008, Canada's oil and natural gas exports were valued at $125.6 billion[30], or 26% of Canada's total merchandise trade exports ($483.6 billion).

In December 2008 and January 2009, due to a decline in commodity prices, led by crude oil, Canada recorded its first monthly merchandise trade deficits since March 1976. In 2009, Canada recorded its first annual trade deficit since 1975 due to a decline in commodity prices.

♦ WTI and Canadian Crude Oil

West Texas intermediate (WTI) crude is the benchmark crude oil for the North American market and Edmonton Par is the benchmark for the Canadian market. Both Edmonton Par and WTI are high-quality low sulphur crude oils with API gravity levels of around 40 degrees. These light crude oils sell at prices in close proximity to each other. Canada also sells a variety of heavy crude oil types such as Lloyd and Bow River blends and bitumen. Light crude oil sells at a premium to heavy crude oil because it easier for refineries to process the crude oil into refined petroleum products. US oil refineries have made significant investments in technology to handle heavy crude blends such as oil sands which has increased the demand, and prices have increased.

The differential between light and heavy crude oil has narrowed which has reduced the incentive to upgrade crude oil in Canada. To encourage upgrading within Canada, the Province of Alberta is considering its right to take bitumen in-kind in lieu of cash royalties. The province's share would then be used to supply upgraders and refineries in Alberta[31].

♦ Canadian Producer Investment

With the recession, upstream and downstream oil investment in Canada was scaled back due to lower oil prices, lower cash flow and some difficulties obtaining credit.

With respect to oil sands projects, most of which were upgraders, approximately $150 billion in oil sands projects representing 1.7 Mb/d of upgrading and production capacity was suspended[32]. For 2009, oil sands capital spending is estimated at $10 billion by the Canadian Association of Petroleum Producers – a reduction from $18 billion spent in 2008.

Oil and gas drilling was hard hit by the reduction of crude oil prices. For the first nine months of 2009, industry drilled 5,719 new wells; off 53% from the nine month period in 2008 (12,053 oil

[30] Data source: Statistics Canada, Energy Statistics Handbook, First Quarter 2009, Number 57-601-X
[31] Government of Alberta, Talk about Oil Sands, September 2009.
[32] International Energy Agency, World Energy Outlook 2009, Chapter 3, Impact of the Financial Crisis on Energy Investment, spotlight: Canadian oil sands is the boom over or taking a breather.

and gas wells were drilled in the first nine months of 2008)[33]. The peak was in 2006 when 17,747 wells were drilled at the three quarter mark.

The provinces have responded to the drop in drilling rates by offering incentives for new oil and gas production. To support new drilling of oil and gas wells, Alberta and British Columbia have reduced royalty rates. In March 2009, to support the energy industry during the global economic slowdown, the Alberta announced a new $200-per-metre-drilled royalty credit for new conventional oil and gas wells. Alberta's new well incentive program offers a maximum five-percent royalty rate for the first year of production from new oil and gas wells[34].

In August 2009, British Columbia announced reductions in its royalty rates to attract more exploration and development by the province's natural gas and oil drilling industry.

North America's refining sector has been significantly affected by the recession and current gasoline demand forecasts. Weak margins and surplus capacity has affected proposals for new refineries. In July 2009, Irving Oil and British Petroleum halted the proposed $8 billion Eider Rock refinery in St John, New Brunswick which was to supply 300,000 barrels per day of refined products to the U.S. northeast.

♦ Regulatory Reforms Affecting Institutional Investment

According to some analysts, speculation was excessive in 2007 and 2008, resulting in magnified price fluctuations, and confusion between real investment in developing oil supply and investment in oil futures. Several governments (India and the U.S.) and OPEC have called for restrictions on speculative investment. Canada, the United Kingdom, France, the European Union and the International Energy Forum have called for measures to increase the transparency of commodity markets.

In the United States, on July 21, 2010 the Obama Administration passed the "Dodd-Frank Wall Street Reform and Consumer Protection Act". This Act has been lauded as the most sweeping financial reform since the Great Depression. According to Analysts, the "Dodd-Frank Act" could help reduce excessive speculation in commodities markets, by:

- Regulating, for the first time, the $450 trillion over-the-counter derivatives market.
- Closing the so-called "Enron Loophole" in the futures market[35].
- Increasing the margin and capital requirements on derivatives such as oil futures.
- Limiting banks interest in hedge funds to just 3% of total ownership.
- Requiring centralized clearing and exchange trading of derivatives.
- Giving the Commodities Futures Trading Commission (CFTC) and the Securities Exchange Commission (SEC) the authority to set federal position limits in energy contracts and securities in exchanges and Swaps held by dealers (the intention is to

[33] Nickel's Daily Oil Bulletin, Nine Month Well Count down Two-Thirds from Peak Year in 2006, October 19, 2009.
[34] Government of Alberta, News Release, Province announces a Three-Point Incentive Program for the Energy Sector, March 3, 2009.
[35] The "Enron Loophole" exempts most over-the-counter energy trades and trading on electronic energy commodity markets from government regulation. Named for Enron Corporation, who lobbied for the changes to the U.S. Commodity Futures Modernization Act.

prevent any individual company or fund from gaining a dominant position in the trading of a particular energy commodity).
- Federally insured deposit institutions such as banks must spin off their derivatives activities into separate affiliates.

Participation in the energy futures markets is a legitimate tool for oil producers to hedge future revenues, and for refiners to hedge future costs. Note that position limits will not apply to commercial interests who are "bona fide hedgers"[36]. Bona fide hedgers – producers, industrial energy consumers, refiners – hedge oil prices to stabilize revenues from oil sales or to stabilize their costs of oil feedstock. They do not hedge purely to profit from oil price movements. Speculation in itself adds liquidity to the market and is healthy as long as it not excessive. Both commercial and non-commercial players (including speculators) are needed for well functioning futures markets. In order to facilitate trades in the futures market there must be a willing counterparty in a liquid market. Speculators serve this purpose by acting not only as a willing counterparty to trades from commercial interests, but also as a market participant who trades frequently, and adds liquidity to the market and has benefits in terms of market transparency and price discovery. But recently, there have been questions about how large the market presence of speculators should be to facilitate the efficient operations of futures markets. There are suggestions that the market presence of speculators could be excessive which may have contributed to the increased volatility of energy prices. U.S. regulatory authorities have made proposals to prevent the manipulation of energy prices by limiting the volume of investment by speculators in the futures market.

The "Dodd-Frank Act" reintroduces some of the protections to the market that were in place under the U.S. Glass-Steagall Act (1934). According to many, increased flows of money into commodity markets led by commercial interests (banks, hedge funds, insurance companies, etc.) could have contributed to increased volatility in oil prices (particularly in the 2007 to 2008 period). Since the repeal of the U.S. Glass-Steagall Act in 1999, non-commercial interests greatly increased their investments in commodity markets. The changes in banking regulations under the "Dodd- Frank Act" could help limit future oil price swings by reducing the flows of money into the commodity market by non-commercial interests.

Much of the scope and impact of the "Dodd- Frank Act" will depend on regulations the CFTC and SEC are directed to create. At this time, it is unclear what impact these regulatory changes could have on crude oil prices as the proposed regulatory changes have not yet been written into regulations or enacted.

[36] International Energy Agency, Medium Term Oil Market Report, Policing Speculators, June 2009.

VIII. Short Term Outlook for Crude Oil Prices

♦ Recap of Crude Oil Prices Through 2009

As we have seen, a number of recently emerged "structural" background factors mean the global crude oil market continues to be extremely sensitive to market events. In this environment, market events such as OPEC announcements, strikes at oil refineries, or severe weather events can have an impact on crude oil prices. Even market events which do not have significant crude oil supply or demand implications can affect oil prices, as we saw recently during the summer of 2007 (the Israel-Lebanon war caused price spikes even though it had no oil supply or demand implications).

The 2008/09 global recession has provided a temporary "time out" period from this environment of market hypersensitivity to oil-related market events. However, as the economy recovers, it seems possible that the environment of 2007/08 could return. In particular, the following structural factors remain firmly in place:

i) a large volume of institutional investment in the crude oil market;
ii) falling value of the U.S. dollar;
iii) Asian Oil demand rising;
iv) the rise of NOCs;
v) related hypersensitivity to geopolitical factors;
vi) rising marginal costs of oil production; and,
vii) the established pattern of slow non-OPEC supply growth.

However, some things are changing. For example, proposed regulatory reforms for commodity markets as described in the previous chapter may reduce the volume of institutional investment in the crude oil market. According to some, this could have an impact by moderating future oil price increases.

♦ Economic Stimulus Measures

To support the global economic recovery trillions of dollars have been spent on stimulus packages by countries around the world. The U.S. government announced a $1.3 trillion dollar toxic asset (e.g. sub prime mortgages) relief plan to help private investors buy bad bank assets, which could help unfreeze the credit market. It also passed a $787 billion stimulus package. Europe and China also introduced massive stimulus packages. Interest rates have also been kept low to stimulate the world's economy.

According to the IMF, the global economy shrank by -0.6 percent in 2009. However, reflecting the impact of recent stimulus measures, the global economy is expected to grow by 4.6% in 2010 and 4.3% in 2011.[37] According to the Bank of Canada, the Canadian economy is projected to grow by 3.5% in 2010, 2.9% in 2011, and 2.2% in 2012 after contracting by 2.5% in 2009[38].

[37] International Monetary Fund, World Economic Update, July 2010.
[38] Bank of Canada, Monetary Policy Reports, July 2010.

Over the next few years, the speed of the recovery from the recession will have a strong influence on the direction of oil prices. The stronger the economy, the more support there will be for higher oil prices.

♦ Currency Values & OPEC Policies

The value of the U.S. dollar against the Euro, in December 2009, was 40% lower compared to the start of 2002. As OPEC purchases most of its goods in Europe, its price targets are influenced by the value of the European currency - the Euro.

Current high spare oil production capacity levels could help limit the fluctuations of oil prices in the short-term. However, OPEC's spare capacity is expected to decline in the future as the world's economy recovers and the demand for oil increases. This could create upward pressure on crude oil prices. The IEA has warned that strong recovery in oil demand following the recession could squeeze spare capacity. Given the current decline in oil production investments, this could lead to an increase in prices.

OPEC has a current target of $70 to $80 per barrel for WTI and it is quite pleased with the current price of oil. OPEC's disciplined maintenance of production cuts has helped keep prices at this level. OPEC can be expected to maintain a production strategy which maintains the monetary value of its principal commodity.

♦ Short Term World Oil Demand Growth

According to the IEA[39], world oil demand in 2010 is expected to grow by 1.7 Mb/d – from 84.9 Mb/d in 2009 to 86.6 Mb/d in 2010. This represents the first annual increase in oil demand since 2007, and the strongest growth in world oil demand since 2005. Nearly half of the increase in world oil demand growth is expected from Asian countries.

♦ Short Term Oil Supply Growth

In 2010, the IEA[40] anticipates that world oil supply will grow by 1.7 Mb/d – from 84.9 Mb/d in 2009 to 86.6 Mb/d. Growth in world oil supply is expected from a number of regions including the FSU countries, Latin America and Asia.

♦ Short Term Outlook for Crude Oil Prices

Oil prices have risen by more than 50% since the start of 2009. In the absence of another

WTI Crude Oil Forecasts for 2010-2011

Institution	2010	2011
Goldman Sachs	$90.00	$100.00
Societe Generale	$86.00	$92.30
Barclay's Bank	$85.00	$92.00
Bank of America	$85.00	NA
Wells Fargo Securities	$84.20	$88.00
Credit Suisse	$82.90	$80.00
JP Morgan	$81.75	$90.00
BNP Paribas	$82.00	$91.00
Royal Bank of Scotland	$82.00	$85.00
AJM Petroleum Consultants	$80.00	$83.50
Scotia Capital	$79.00	$80.00
U.S. EIA	$78.69	$82.50
BMO Capital Markets	$78.00	$85.00
International Monetary Fund	$75.30	$77.50
Daiwa	$74.00	$85.00
TD Economics	$73.00	$76.00
Deutsche Bank	$71.00	$80.00
Average	**$80.45**	**$85.50**
Forecasts as of July 2010		

Table 3

[39] IEA Oil Market Report, April 13, 2010
[40] IEA Oil Market Report, April 13, 2010

major financial meltdown, we do not expect a return to the cheap oil prices of the early 2000s, for the variety of reasons mentioned above. In 2009, crude oil prices averaged $61.65 per barrel, and have increased to over $75 per barrel with markets optimistic about the economic recovery. Table 3 provides some recent oil price forecasts. As seen in this table, the latest forecasts suggest that the price of crude oil could average $80 per barrel in 2010, and $85 per barrel in 2011. Please note, oil price forecasts are often adjusted each month based on market conditions.

IX. Long Term Outlook: Crude Oil Prices to 2030

♦ World Oil Demand and Supply to 2030

World crude oil production follows demand. Production often falls simply because there is no demand. In some instances, demand can be limited by a lack of available supply. This could happen when productive capacity of wells is already fully utilized, and it takes some time (months, years) to develop additional productive capacity. In theory, demand could also drop if supply dropped. In short, oil demand and supply influence each other and cannot be analyzed completely separately.

The IEA's analysis of the 2008 to 2030 period indicates that world oil supply and demand are projected to grow by 1.0% per year[41]. An overview chart of the IEA outlook for global oil supply and demand to 2030 is shown in table 4.

World Oil Supply and Demand (Mb/d)						
World Oil Supply in the Reference Scenario						
	1980	**2000**	**2008**	**2015**	**2030**	**2008-2030**
Non-OPEC	36.8	44.3	46.8	46.3	49.2	0.20%
OPEC	26.7	30.8	36.3	40.3	53.8	1.80%
Processing Gains	1.7	1.7	1.5	1.8	2.2	1.70%
World	**65.2**	**76.8**	**84.6**	**88.4**	**105.2**	**1.00%**
World Oil Demand in the Reference Scenario						
OECD	41.3	44.7	43.2	41.2	40.1	-0.30%
Non-OECD	20.0	26.6	35.0	40.2	56.2	2.20%
Marine Bunkers	3.4	5.2	6.5	7.0	8.9	1.50%
World	**64.8**	**76.5**	**84.7**	**88.4**	**105.2**	**1.00%**
Source: International Energy Agency World Energy Outlook 2009						

Table 4

[41] International Energy Agency, World Energy Outlook 2009, Chapter 1, Global Energy Trends in the Reference Scenario, Tables 1.3 and 1.4.

♦ Focus on Long-Term Oil Demand

Between 2008 and 2030, countries not within the OECD account for all of the growth in global oil demand. In fact, OECD oil demand is actually expected to fall by an average rate of -0.3% per year from 43.2 Mb/d in 2008 to 40.1 Mb/d in 2030.

♦ Focus on Long-Term Oil Supply

Based on its Reference Scenario, the IEA expects non-OPEC conventional oil production to peak around 2010[42]. However, non-OPEC oil supply still grows, due to unconventional production. Non-OPEC oil supply grows by 0.2% per year to 49.2 Mb/d in 2030 from 46.8 Mb/d in 2008[43] from unconventional sources, such as Canada's oil sands. By 2030, unconventional oil represents 6.2% of world oil supply, up from 1.7% in 2008[44].

In the 2008 to 2030 period, most of the increase in global oil output comes from OPEC countries, which control most of the world's remaining recoverable resources. OPEC oil supply grows by 1.8% per year to 53.8 Mb/d in 2030 from 36.3 Mb/d in 2008[45].

The IEA has an alternative scenario for world oil production. Under the so called "450 Scenario" world oil demand is limited due to government climate change policies. The demand for global fossil fuels peaks around the year 2020. This limits supply growth. Global oil production reaches 91 Mb/d by 2030 versus 105 Mb/d in the Reference Scenario.

The projected increase in world oil output is contingent on adequate and timely investment. In its Reference Scenario, the IEA has projected that $5.9 trillion (2008 dollars) will need to be invested in global oil supply infrastructure over the 2008 to 2030 period[46].

♦ Theoretical Considerations for Long-Term Oil Prices

There is a very large, unknown amount of crude oil in the earth's crust. As geological knowledge and extraction technologies improve, more and more of this oil will become recoverable. Technological improvement also constantly reduces the real cost of extraction of crude oil of any particular quality, depth, and reservoir type. On the other hand, as the best oil pools are depleted, there is a need to move from high quality, shallow, very permeable crude oil reservoirs to lower quality, deeper, and lower permeability reservoirs. This "depletion effect" tends to cause higher extraction costs.

It then becomes a question of which effect predominates. At times, and for some resource types, technological improvements may overwhelm any resource depletion effect, with a net result of lower production costs over time. The price of most metals, in real terms, has declined since the 1950s.

[42] International Energy Agency, World Energy Outlook 2009, Chapter 1, Global Energy Trends in the Reference Scenario, Highlights.
[43] International Energy Agency, World Energy Outlook 2009, Chapter 1, Global Energy Trends in the Reference Scenario, Table 1.4.
[44] International Energy Agency, Monthly Oil Market Reports, August 2001 and August 2009, Table 3 Statistics.
[45] Leonardo Maugeri, the Age of Oil, Chapter 14, the Collapse of Oil Price and Industry Megamergers.
[46] International Energy Agency, World Energy Outlook 2009, Chapter 1, Global Trends in the Reference Scenario, Table 1.10.

A qualitative schematic of how future crude oil prices could evolve, based solely on the two main theoretical considerations – resource depletion effects and technological improvement effects – is given in figure 8.

Crude oil has many other complicating factors, of course, not least of which is the presence of a cartel organization (OPEC), and a heavy concentration of global crude oil resources controlled by NOCs. These factors mean that the above theoretical model is for some of the time, simply not relevant.

It is impossible to predict with complete accuracy whether any particular event that could have an impact on the price of crude oil will occur, or their timing. This means that to a certain extent, future crude oil prices and price fluctuations are not predictable. This could explain the significant variability in the reference forecasts shown in table 5.

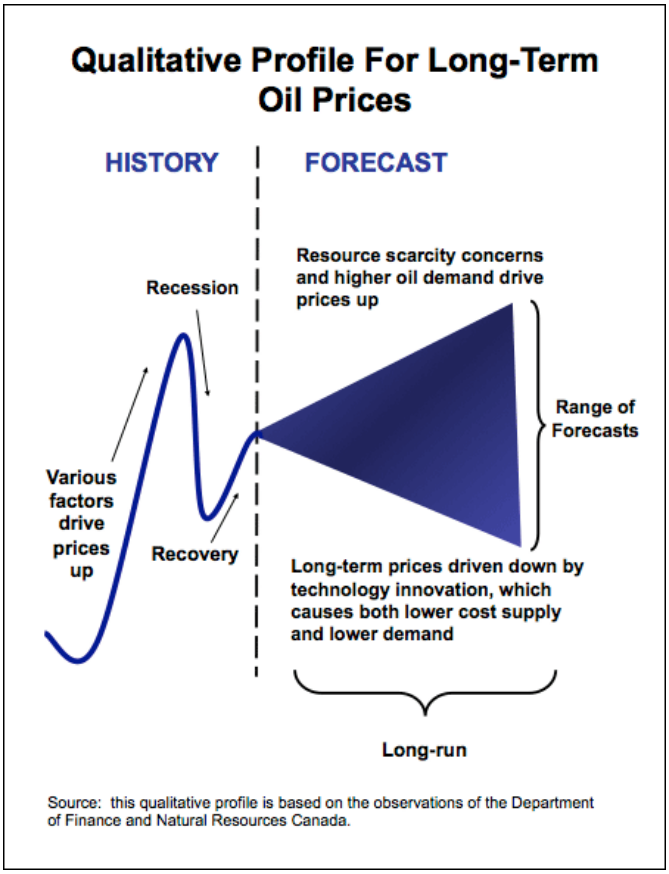

Figure 8

Long-Term Projections of World Oil Prices (Constant 2008 Dollars Per Barrel)				
Reference (unless indicated)	**2015**	**2020**	**2025**	**2030**
High Price Case	$144.72	$185.51	$196.51	$203.90
2010 U.S. EIA AEO – Reference	$94.52	$108.28	$115.09	$123.50
Low Price Case	$51.48	$51.90	$52.02	$51.90
High Price Case	$116.98	$121.16		
NEB – Reference	$85.30	$89.60	N/A	N/A
Low Price Case	$56.98	$61.16		
Deutsche Bank – Reference	$93.18	$105.81	$114.65	$121.16
INFORUM – Reference	$92.50	$107.98	$109.74	$116.81
IEA Reference	$86.67	$100.00	$107.50	$115.00
IEA 450 Scenario	$86.67	$90.00	$90.00	$90.00
IHS Global Insight – Reference	$85.07	$81.93	$74.86	$77.27
Energy Venture Analysis – Reference	$80.35	$84.45	$90.98	$100.45
Energy SEER – Reference	$79.20	$74.31	$69.73	$65.43
Energy SEER - Multi-Dimensional	$99.03	$101.52	$105.81	$113.19
Average Reference Cases	**$87.27**	**$94.10**	**$96.57**	**$101.20**
Source: U.S. Energy Information Administration and Natural Resources Canada Oil prices converted into constant 2008 dollars.				

Table 5

Reference forecasts project crude oil prices out into the future based on current market conditions. As seen in table 5, to deal with uncertainty, several organizations including the U.S. Energy Information Administration and the National Energy Board have high and low price forecasts, in addition to their reference cases. These forecasts take in account a wide range of factors which could affect their oil price forecasts. For these groups, the reference case is an average of their high and low price forecasts and represents their best estimate of where crude oil prices could be in the future.

Scenarios project crude oil prices based on specific factors which could occur in the future. For example, the IEA's so called "450 Scenario", shows the possible impact of greenhouse gas emissions regulations on oil prices. By 2030, under the IEA's "450 Scenario", stringent greenhouse gas emissions regulations result in crude oil prices which are $25 per barrel or 22 percent lower than its Reference forecast.

♦ Bank, Consultant, & Government Oil Price Forecasts

As seen in table 5, oil price forecasts vary dramatically. Forecasts which show a long-term trend towards falling prices place more emphasis on technological advances or on the view that oil demand will be weaker than expected by others (improvements in energy efficiency are cited as playing a strong role in reducing the demand for oil).

Other forecasts, which see higher oil prices, place more emphasis on factors such as a continued rise in Asian oil demand, the large volume of institutional investment in the crude oil market, the falling value of the U.S. dollar, the fact that most global oil resources are controlled by NOCs, rising marginal costs of oil production, and the established pattern of slow non-OPEC supply growth.

When the eight reference forecasts are graphed (see figure 9), one can imagine the "philosophy" of each forecast. The forecasts labelled "A" appear to place more emphasis on the view that technological effects (which drive down supply costs and demand) will cause prices to fall over time. The group labelled "B" appear to believe that the depletion effects and/or the market power of NOCs and OPEC will prevail. Finally, the forecast labelled "C" falls somewhere in the middle view.

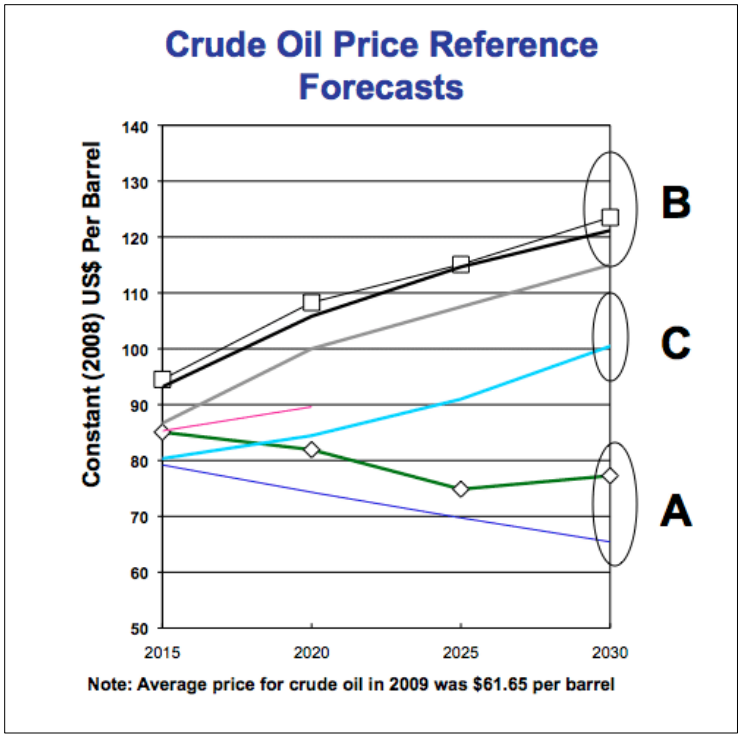

Figure 9

X. Conclusions

Oil is central to both Canada and the world's economy and will continue to be important into the future. Most countries are significantly affected by developments in the oil market either as producers or consumers of oil – or, as in Canada's case, both. Given the importance of oil to Canada and the world, governments, industry and the public have an interest in understanding the fluctuations of oil prices.

This paper has shown that oil prices are affected by a combination of complex factors. Traditional factors, such as oil supply and demand, OPEC production strategies and spare capacity levels, technological advances, the marginal cost of production, seasonal and severe weather patterns, and crude oil inventory levels, all continue to be important in determining the overall direction of crude oil prices.

However, in recent years, new emerging factors such as the devaluation of the U.S. dollar have had a growing influence on oil prices. Geopolitical events and resource nationalism, although not new, have gained increasing influence as well.

According to analysts, the growing "financialization" of the oil market is likely to have contributed to increased oil price volatility by making the price spikes higher, and the price falls lower. Deregulation of the crude oil market allowed financial interests to significantly increase their volume of trades, and this may have supported increased oil price fluctuations. It remains to be seen whether the proposed regulatory changes in U.S. legislation under the "Dodd-Frank Act" (2010) will: prevent "non-commercial traders"[47] from having undue influence on crude oil pricing.

Asian oil demand is likely to continue to have a significant impact on oil prices in the future because close to two-thirds of the projected increase in oil demand between 2008 and 2030 comes from China and India alone.

Crude oil is likely to see upward price pressure with the economic recovery, and a resultant recovery in oil demand. In the absence of another economic downturn, there are many factors which argue for strength in the price of oil. These include the recent devaluation of the U.S. dollar, OPEC production cuts, higher marginal costs for oil production, and an increased demand for crude oil as the world's economy recovers.

There are two opposing long-term views on oil prices: one view is based on technological advances driving down demand, the other view is based on resource depletion and NOC/OPEC considerations causing prices to rise.

Some groups believe that long-term oil prices could trend downwards, due to gains in energy efficiencies, weaker than expected oil demand, and falling production costs due to technological advancement. One of the biggest uncertainties in this regard would be around the potential for greenhouse gas emissions regulations. The IEA envisages a scenario where new emissions

[47] See page 12 for definition of non-commercial traders.

regulations in various countries put downward pressure on crude oil and petroleum product demand. Such a scenario, if realized, could result in significantly lower crude oil prices over the long-term, as is shown in the IEA's "450 Scenario".

Other forecasts, including the reference cases of the U.S. EIA and the IEA, show a long-term trend towards rising prices, driven by resource depletion effects, scarcity concerns, and higher demand for crude oil from countries like China and India.

Of the reference forecasts surveyed in this paper, the lowest price forecast for year 2030 (in 2008$) is $65 US per barrel, while the highest is $123. In addition, to the reference cases, there are high and low price cases shown in this report which reveal the possibility of even greater variability in future oil prices. The lowest price case shown for year 2030 (in $2008) is $52 US per barrel, while the highest price case is $203. Obviously, there is no consensus on the future of global crude oil prices. This is an important conclusion of this paper. However, on average, the reference forecasts shown in this report do show oil prices rising in the future. This paper has reviewed the factors and issues which affect the price of crude oil. Given the impossibility of predicting the future of all the factors that can influence crude oil prices, we conclude that crude oil prices will continue to be very difficult to accurately forecast.

GLOSSARY

Bitumen - heaviest, thickest form of petroleum.

Brent – is a light sweet (low sulphur) crude oil sourced from the North Sea. Brent crude oil is the benchmark crude oil for the European Market. Other well known benchmarks include West Texas Intermediate oil and the OPEC basket.

Deregulation - a significant decrease or elimination of government regulation over an industry, market, or economy.

Derivatives - contracts that gamble on the future prices of assets using financial instruments, such as options and futures. The values of derivatives are based on the perceived value of assets, such as commodities and currencies.

Downstream - oil industry term used to refer to all petroleum activities from the processing of refining crude oil into petroleum products to the distribution, marketing, and shipping of the products. The opposite of downstream is upstream .

"Enron Loophole" - Exempts most over-the-counter energy trades and trading on electronic energy commodity markets from government regulation. Named for Enron Corporation who lobbied for the changes to the U.S. Commodity Futures Modernization Act.

Financialization - refers to the growth in financial investment and its affect on the commodities market. In recent years, the "financialization" of the futures market has been mentioned by some as a phenomenon that has driven oil prices.

Futures - financial contracts giving the buyer an obligation to purchase an asset (and the seller an obligation to sell an asset) at a set price at a future point in time.

Glass-Steagall Act - act designed to keep the banks from speculating with the savings of their depositors who were entrusting their money to the banks, separating commercial banking from brokerage/investment banking activities.

Gramm-Leach-Bliley Act – act that repealed the Glass-Steagall act in 1999 and allowed commercial banks, investment banks, securities firms and insurance companies to consolidate.

Non-Commercial traders - classification used by the Commodity Futures Trading Commission to identify traders that use the futures market for speculative purposes.

Oil Reserves - estimated quantities of crude oil that are claimed to be recoverable under existing economic and operating conditions.

Organization of Petroleum Exporting Countries (OPEC) is an intergovernmental organization, formed in 1960, by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. The five founding members were later joined by nine other members. OPEC's mandate is to coordinate their oil production policies in order to achieve an acceptable return on their investments, and to help the oil producer's support their respective economies.

OPEC Basket - the reference price for a variety of crude oils sold by OPEC member countries.

Open interest - the total number of active futures contracts that have not been settled with cash or the delivery of a commodity.

PEMEX - Mexican national oil company.

Petrocurrency – currency of a major oil producing nation which tends to rise in value against other currencies when the price of oil rises (and falls when the price of oil falls).

Petrobas - Brazilian national oil company.

Petroleum – a flammable liquid which occurs naturally in deposits which can be refined into various products, such as gasoline and diesel.

Petroleos de Venezuela - Venezuelan national oil company.

Swaps Loophole – an exemption for investment banks which exempts them from reporting requirements and limits on trading positions under the Commodity Futures Modernization Act.

Unconventional Oil - petroleum produced or extracted using techniques other than the traditional oil well method. Includes oil shales, oil sands-based synthetic crudes and derivative products, coal-based liquid supplies, biomass-based liquid supplies and liquids arising from chemical processing of natural gas.

Unconventional Gas - natural gas that is contained in "difficult to produce" rock formations, which require different or special completion, stimulation, and/or production techniques to retrieve the resource. Examples include coal bed methane, tight sands, shale gas, and gas hydrates.

Upstream – refers to areas and processes of exploring for oil and gas, developing oil and gas fields and producing oil and gas from the fields. The opposite of upstream is downstream.

West Texas Intermediate Oil (WTI) - is a Texas light sweet (low sulphur) crude oil used as a benchmark for oil pricing in the North American Market.

ACRONYMS/ABBREVIATIONS

AOSC – Athabasca Oil Sands Corporation
BP – British Petroleum
CAPP – Canadian Association of Petroleum Producers
CERI – Canadian Energy Research Institute
CFTC – Commodity Futures Trading Commission
EIA – U.S. Energy Information Agency
FSU – Former Soviet Union Countries
GDP – Gross Domestic Product
IEA – International Energy Agency
IMF – International Monetary Fund
M&A – Mergers and Acquisitions
MEND - Movement for the Emancipation of the Niger Delta
NEB – National Energy Board
NOC – National Oil Companies
NYMEX – New York Mercantile Exchange
OECD – Organization for Economic and Co-operative Development
OPEC – Organization of Petroleum Exporting Countries
PEMEX – Petróleos Mexicanos
Petrobas – Brazil's national oil company
PetroMatrix – Swiss based independent research group specializing in oil markets
PdVSA – Petroleos de Venezuela
RRSP – Registered Retirement Savings Plan
SEC - Securities Exchange Commission
THAI – Toe-to-Heel-Air-Injection
TSX – Toronto Stock Exchange
WTI - West Texas Intermediate Oil

Measurements

Mb/d – million barrels per day
Bcf/day – billion cubic feet per day
Tcf – trillion cubic feet
Mpg – miles per gallon

LIST OF TABLES AND FIGURES

Tables

Figures

BIBLIOGRAPHY

Adam, S. "Global Financial Assets Lost $50 Trillion Last Year, Asian Development Bank Says". *Bloomberg,* March 9, 2009.

Adelman, M.A. *The World Petroleum Market* Baltimore, MD: John Hopkins Press, 1972.

Armour, S. "2008 Foreclosure Filings Set Record". *USA Today,* February 3, 2009.

Bank of Canada. "Bank of Canada maintains overnight rate target at ¼ percent".Press Release, October 20 2009. http://www.bankofcanada.ca/en/fixed-dates/2009/rate_201009.html

Bank for International Settlements, Monetary and Economic Department. "OTC derivatives market activity in the second half of 2008" (Press Release), May 19, 2009. http://www.bis.org/press/p090519.htm

Brown, G. and N. Sarkozy. "We Must Address Oil-Market Volatility, Erratic Price movements in such an important commodity are cause for alarm". *The Wall Street Journal*, July 8, 2009.

Canadian Association of Petroleum Producers website. http://www.capp.ca

Canadian Energy Research Institute. *Economic Impacts of the Petroleum Industry in Canada.* July 2009

Commodity Futures Trading Commission, Opening Statement of Gary Gensler. Hearing of the Commodity Futures Trading Commission. Washington, July 28, 2009. http://www.cftc.gov/ucm/groups/public/@newsroom/documents/speechandtestimony/genslerstatement072809.pdf

CTV.ca News Staff. "G20 may adopt Canadian bank reform proposals". *CTV News,* September 24, 2009.

Doering, C. and A. Rascoe. "CFTC considers limits on energy positions". *Nickel's Daily Oil Bulletin*, August 18, 2009.

Dunbar, J. "Obama vows to crackdown on energy speculators". *Associated Press*, June 22, 2008.

Editorial. "Nigeria and the Market". *Oil and Gas Journal*, Vol. 107, No. 27, July 20, 2009.

Editorial. :High oil process are an opportunity for change". *New Scientist,* Issue No. 2662, June 28, 2008.

Egan, L. "Canada's Economy Shrinks 5.4% in the First Quarter", *Reuters News Service*, June 1, 2009.

Groendahl, B. "OPEC and EU Say Regulation Needed To Stop Oil Bubble". *Nickels Daily Oil Bulletin*, June 23, 2009. (From Reuters)

Government of Alberta. *Talk about Oil Sands*, September 2009. http://www.energy.gov.ab.ca/OilSands/pdfs/FS_OilSands.pdf

Government of Alberta, "Province announces a Three-Point Incentive Program for the Energy Sector" (News Release). March 3, 2009. http://alberta.ca/home/NewsFrame.cfm?ReleaseID=/acn/200903/25402CDEFE818-F1BC-5D66-DF309066E457F2A4.html#

Harrison, L. "Oil Sands Projects a Good Investment: CERI". *Nickel's Daily Oil Bulletin*, November 4, 2009.

Herbst, M. "Speculation—but Not Manipulation". *Business Week*, May 29, 2008.

"India to be world's 4th largest car market by 2020: Study". *Economic Times,*. September 8, 2009. TV Segment. http://economictimes.indiatimes.com/videoshow/4711991.cms.

International Energy Agency. *Monthly Oil Market Report*. Subscription service, Various Dates. http://www.iea.org/stats/mods.asp

International Energy Agency. *World Energy Outlook 2008*. Paris, 2008. http://www.iea.org/weo/2008.asp

International Energy Agency. *World Energy Outlook 2009*. Paris, 2009. http://www.worldenergyoutlook.org/

International Energy Agency. *Impact of the Financial and Economic Crisis on Global Energy Investment*. May 2009. http://www.iea.org/papers/2009/G8_FinCrisis_Impact.pdf

International Energy Agency. *Medium Term Oil Market Report*. June 29, 2009.

International Energy Agency. *Annual Statistical Supplement, 2009 Edition*. Paris, August 2009. http://omrpublic.iea.org/omrarchive/sup2008.pdf

International Monetary Fund. *World Economic Outlook – Sustaining the Recovery,* Washington, October 2009.

Leising, M. "Amaranth Distorted Natural-Gas Market, Senate Finds". *Bloomberg Online*, June 25, 2007.

Loder, A. "US Natural Gas Fund Grows to Record on Demand Surge, Update One". *Bloomberg*, July 8, 2009.

Loder, A. and M. Whitney. "US Natural Gas Fund May Shrink with CFTC Rules, Update Two". *Bloomberg,* September 25, 2009.

Mati, A. "Managing Surging Oil Prices in the Developing World" *IMF Survey Magazine*, March 20, 2008.

Maugeri, L. *The Age of Oil: The Mythology, History, and Future of the World's Most Controversial Resource*. Westport, CT: Praeger Publishers, 2006.

Medlock, K. B. and A. Myers Jaffe, *Who is in the Oil Futures Market and how has it Changed?, Chapter 2, Oil futures Market: Who Trades and Why?*. Research Paper. James A. Baker III Institute for Public Policy, Rice University. August 26, 2009. http://www.bakerinstitute.org/publications/EF-pub-MedlockJaffeOilFuturesMarket-082609.pdf

National Energy Board. *Reference Case Scenario: Canadian Energy Demand and Supply to 2020 - An Energy Market Assessment*. Calgary: July 2009. http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyftr/2009/rfrnccsscnr2009-eng.html

National Energy Board. "Energy Briefing Note - Update to Short-term Canadian Natural Gas Deliverability 2009-2011". September 2009. http://www.neb.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/ntrlgs/ntrlgsdlvrblty20092011/ntrlgsdlvrblty20092011-eng.html

"Nine-Month Well Count down Two-Thirds from Peak Year in 2006", *Nickel's Daily Oil Bulletin*, October 19, 2009.

OECD. *The jobs crisis in numbers.* OECD Labour and Employment Ministerial Meeting: Tackling the Jobs Crisis: the Labour Market and Social Policy Response, Paris, 28-29 September 2009. http://www.oecd.org/site/0,3407,en_21571361_43235365_1_1_1_1_1,00.html

"Petroleum Intelligence Weekly Ranks the World's Top 50 Oil Companies". *Petroleum Intelligence Weekly*, Vol. 47, No. 48. December 1, 2008

Radler, M. "Worldwide Look at Reserves and Production". *Oil & Gas Journal*, Vol. 107, No. 47. December 21, 2009.

"Refinery Plans Reeling". *Petroleum Economist*, Volume 76. September 2009.

Rowley, I. "China: Car Capital of the World?" *Business Week*, May 18, 2009.

Saul, J. "Update - Crude at sea around 100 million barrels - Frontline". *Reuters,* August 6, 2009. (Accessed through Gulfbase.com)

Schneyer, J. "Anti-Speculation Push May Topple Prices", *Nickels Daily Oil Bulletin*, August 31, 2009. (From Reuters)

Simpson, Scott. "Spurs Oil and Gas Industry: Nominal Two Percent Royalty Rate doesn't require Direct Spending" *Times Colonist*. August 6, 2009.

Statistics Canada. *Energy Statistics Handbook, First Quarter 2009.* Ottawa: Minister of Industry, June 2009. Identifier Number 57-601-X---5. http://www.statcan.gc.ca/pub/57-601-x/57-601-x2009001-eng.htm

Statistics Canada. "Latest release from the Labour Force Survey" News Release, October 9, 2009. http://www.statcan.gc.ca/subjects-sujets/labour-travail/lfs-epa/lfs-epa-eng.htm

Strauss-Kahn, D. “A systemic crisis demands systemic solutions”. *The Financial Times*, September 25, 2008.

Taylor, R. “Canada rated world's soundest bank system: survey”. *Financial Post*, October 9, 2008.

“Times Topics - the Glass-Steagall Act (1933)”. *The New York Times*, October 1, 2009. http://topics.nytimes.com/topics/reference/timestopics/subjects/g/glass_steagall_act_1933/index.html

United Kingdom Cabinet Office Global Energy Team, *The rise and fall of oil prices: analysis of fundamental and financial drivers.* . United Kingdom Cabinet Office, December 2008. Identifier 292117 / 1208. http://www.cabinetoffice.gov.uk/media/112559/rise_and_fall.pdf

United States Environmental Protection Agency. Compliance and Innovative Strategies Division and Transportation and Climate Division: Office of Transportation and Air Quality. *Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2007*. September 2007. Identifier EPA420-R-07-008 http://www.epa.gov/oms/cert/mpg/fetrends/420r07008.pdf

U.S. Department of Transportation, “Americans Driving at Historic Lows”. News Release, May 23, 2008. http://www.dot.gov/affairs/fhwa1108.htm

U.S. Energy Information Administration: Official Energy Statistics from the U.S. Government. “Demand: Global Oil Consumption”. Web Document. http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/demand_text.htm#Global%20Oil%20Consumption

U.S. Energy Information Administration: Official Energy Statistics from the U.S. Government. “Historic monthly spot prices for West Texas Intermediate oil”. Web Data. http://tonto.eia.doe.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=D

U.S. Energy Information Administration: Official Energy Statistics from the U.S. Government. “Performance Profiles of Major Energy Producers 2007”. Washington, DC: December 2008. Identifier DOE/EIA-0206(07) http://www.eia.doe.gov/emeu/perfpro/020607.pdf

U.S. Energy Information Administration: Official Energy Statistics from the U.S. Government. “Country Analysis Briefs: Mexico - Oil”. March 2009. Web Document. http://www.eia.doe.gov/cabs/Mexico/Full.html

U.S. Energy Information Administration: Official Energy Statistics from the U.S. Government. “Country Analysis Briefs: China – Background”. July 2009. Web Document.http://www.eia.doe.gov/cabs/China/Background.html

U.S. Senate Committee on Homeland Security and Governmental Affairs. “Levin-Coleman Report Finds Speculation Adding to Oil Prices: Put The Cop Back On The Beat”. Press Release, June 27, 2006.

U.S. Senate Committee on Homeland Security and Governmental Affairs. “Investigations Subcommittee Releases Levin-Coleman Report On Excessive Speculation in the Natural Gas Market - Finds Hedge Fund Amaranth Distorted Prices Last Summer”. Press Release, June 25, 2007.