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The 2008 Oil Price Shock

Competing Explanations and Policy
Implications

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Executive Summary

Throughout 2008, world oil markets experienced volatility on an unprecedented scale. While crude oil prices shot up to the dizzying heights of almost \$150 per barrel by the middle of the year, they came plunging down to close to \$40 per barrel by December. Since that time, much ink has been spilled pondering the reasons for this unprecedented volatility.

This policy paper brings some clarity to the debate on the causes behind oil price volatility by disentangling the competing arguments and reviewing the evidence that supports them. The paper finds that market fundamentals on their own do not explain the recent rise and fall of oil prices, and that financial markets, government policies and macroeconomic variables all played contributing roles in exaggerating price movements. As such, the paper suggests that any policy seeking to smooth volatility in oil prices will need to be based on a holistic approach, taking all of these factors into consideration.

In terms of public policy, the paper suggests that increasing transparency and information about the oil market should be one of the most pressing concerns. In that context, a more vigorous strengthening of the Joint Oil Data Initiative (JODI) should be pursued. Also, the paper argues that producer and consumer countries need to make a greater effort to facilitate investment into additional upstream and downstream capacity. Without considerable new investments, oil markets will become both increasingly tight and volatile in the future. Finally, the paper posits that although the specific impact of financial markets on oil prices remains a contentious issue, closing regulatory loopholes that might allow market manipulation or fuel irrational exuberance amongst market participants would seem advisable.

1. Introduction

Throughout 2008, world oil markets have experienced volatility on an unprecedented scale. While crude oil prices shot up to the dizzying heights of almost \$150 per barrel by the middle of the year, they came plunging down to close to \$40 per barrel by the end of the same year. Since that time, much ink has been spilled pondering the reasons for this unprecedented volatility. Hearings have been held in the US Congress and European Parliaments, bills have been drafted and torn up again and a flurry of commentary from energy analysts, speculators, political scientists and others have raised more questions than they have been able to answer. Is it possible that simply the changing balance of demand and supply can explain recent oil price movements? Or has price volatility been exaggerated by the impact of financial markets and speculation? What role has the government played in the oil price crisis? And could governments and regulators have done something to mitigate its impact? Finally, what are the implications of the 2008 oil price shock? Do markets need more transparency and regulation? And what will be the effect of the crisis on the future balance of supply and demand?

Overall, analysts seem to be divided amongst three competing camps. On the one side are those stern believers in the laws of market economics that ascribe every single price movement to the shifting balance of supply and demand.¹ They argue that tightening market fundamentals are the sole reason for the recent spike in prices and dismiss all other arguments as bogus. They are opposed by an ‘unholy alliance’, consisting of political observers of any kind, which hold that ‘financial speculators’ are the main culprits of the recent crisis.² On their never-ending search for profit, they have flooded the oil futures market and driven prices to unwarranted heights by manipulating expectations about future supply shortfalls. Finally, there are those suggesting that the 2008 oil price shock has been a combination of these two factors.³ According to them, a tightening in market conditions and the steady rise in crude oil prices were necessary to stoke exuberant expectation and allow speculative trading. Not surprisingly, policy recommendations differ tremendously with each side of the argument.

This working paper seeks to bring some clarity to the debate by disentangling the competing arguments and reviewing the evidence that supports them. In order to do so, the paper will set out by recalling the special characteristics of oil markets. Some of these specificities – such as its inelasticity of supply and demand, its long lead times and lumpiness of investments, and the role of expectations – are directly responsible for a general

¹ See for example Noel Amenc, et al (2008), “Oil Prices: the True Role of Speculation”, *EDHEC*, November 2008; Philip K. Verleger, Jr. (2008a), ‘Comments on the Accidental Hunt Brothers – Act 2’, 10 September 2008; Philip K. Verleger, Jr. (2008c), “\$200 Oil!”, *International Economy*, Summer 2008; Robert P. Murphy, (2008), ‘Speculators Fixing Oil Prices? Don’t Bet on It’, Institute for Energy Research.

² See for example Michael W. Masters and Adam K. White (2008), “The Accidental Hunt Brothers – Act 2”, 10 September 2008; Michael W. Masters (2008), “Testimony before the Committee on Homeland Security and Governmental Affairs”, 20 May 2008.

³ See for example UK Cabinet Office (2008), “The rise and fall in oil prices: analysis of fundamental and financial drivers”, December 2008; Cambridge Energy Research Associates (2008), ‘Recession Shock: The Impact of the Economic and Financial Crisis on the Oil Market’, 19 December 2008; Kenneth B. Medlock (2008), ‘Speculation: A Cause or Symptom? An Important Question for Designing a Policy Remedy’, James A. Baker III Institute, 18 September 2008; Daniel Yergin (2008), ‘Oil at the Breaking Point’, Testimony before the US Congress Joint Economic Committee, 25 June 2008.

volatility of oil prices and therefore essential to understand the recent crisis. The second part of the paper will review the competing explanations for the 2008 oil price shock and discuss some of the empirical evidence supporting these explanations. Based on this review, it will be suggested that while tight fundamentals did play an important role in the rise of oil prices, on their own, they do not explain recent market volatility. The last section of the paper will weigh the evidence, discuss its implications and make some tentative policy recommendations. The analysis concludes that although some volatility in oil markets is inevitable, governments and regulators might be able to restrain price movements by increasing transparency and setting clear market signals.

2. Specificity and trends in world oil markets

2.1 Basic characteristics of oil markets

World oil prices, as all prices for goods and services, are determined by the balance of supply and demand. However, there are some specific characteristics that set crude oil markets apart and make them prone to more frequent price shifts than other markets for goods and services. On the one hand, there is no ready substitute for oil in the short run – especially in the transport sector.⁴ As a result, demand for crude oil is comparatively inelastic to changes in the price of oil. On the other hand, there are long lead times for the development of new production capacities in the oil market, which implies that supply is equally constrained in the short run. As a result of the large inelasticity of both demand and supply, unexpected shift in market conditions can lead to large shifts in prices and increasing volatility in the short run. Expectations about short-term disruptions of supply, even if only on a small scale, can therefore trigger substantial market movements. With much of the world's oil supply located in what is seen as geopolitically unstable regions, oil markets, unsurprisingly, have a tendency to be jittery.

In addition to the inelasticity of supply and demand, oil markets are characterized by significant hurdles to new investments. The fact that there is considerable uncertainty about future demand and prices, exaggerated by the fact that the oil market in general tends to be jittery, means that investment decisions are difficult to make. There is also a general lack of information with regards to future consumption and production, when it comes to some of the more important non-OECD players. Long lead times and high and rising capital and fixed costs further complicate investment decisions. Finally, investments in the oil industry are generally considered to be 'lumpy', meaning that the economically optimal increment of new capacity is very large. Once again, this forces investors to carefully consider and hedge all of their investment decision. Overall, the effect is that new investment decisions tend to follow price rises that result from a tightening balance of supply and demand, rather than anticipating them.

2.2 Connection between spot and futures markets

Due to the specific characteristics of world oil markets, expectations about the development of future demand and supply play an important role in the formation of current oil prices (spot prices). Current market conditions are similarly reflected in future oil prices (futures prices). The futures price, which is a contract for the delivery of a barrel of oil at some point in the future, is known to directly affect current spot prices through the so-called 'storage arbitrage condition'.⁵

⁴ According to World Energy Outlook, the share of transport in world oil demand has been 52% in 2006. The comparative figure for the US is 66%. International Energy Agency (2008c), 'World Energy Outlook 2008', OECD/IEA: Paris, p. 99.

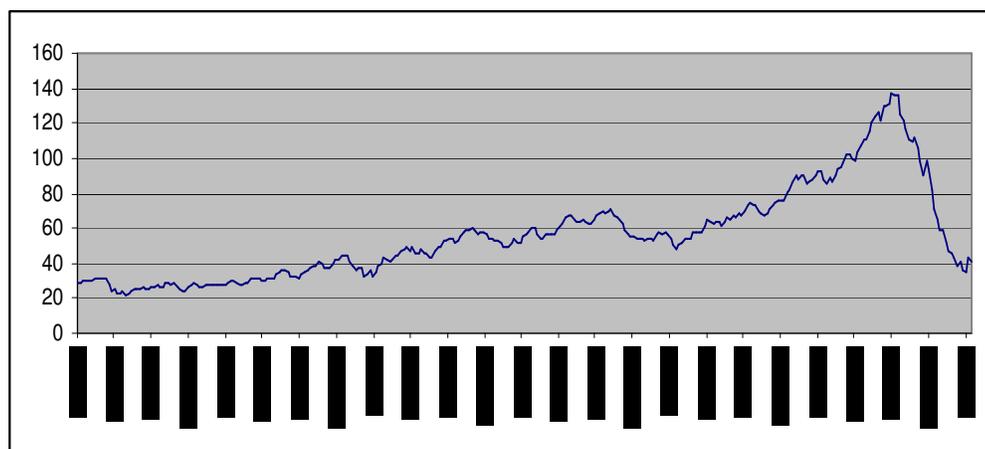
⁵ Expected futures price = spot price + cost of storage + opportunity cost of holding oil stocks. For a more details overview on oil pricing, see: Energy Charter Secretariat (2007), 'Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas', ECS: Brussels.

The arbitrage condition implies that when prices are expected to rise in the future, there is an incentive for market participants with storage capacity to buy oil today and sell it on at a higher price in a few months time. This way, expectations of future price changes have a tendency to become a self-fulfilling prophecy. As market participants begin to store oil, they reduce the available supply and exert an upwards pressure on spot prices. Similarly, the expectation of lower prices in the future might lead them to sell, increasing supply and bringing market prices down further. In tight market conditions, the fact that market participants hold their inventories might equally send important market signals about future price movements. Together, these specific characteristics of the oil market have made oil prices historically volatile and cyclical in nature.

2.3 Recent Price Trends in International Oil Markets

Overall, oil prices have remained relatively stable from the late 1980s to early 2000s. The one significant exception has been 1991, when prices shot up as a result of the First Gulf War and a brief dip of prices to around \$10 in 1998. Only in 2004 did oil prices begin to increase again at a steady pace, before accelerating in the course of 2007. From mid-2007 to mid-2008 prices almost doubled, peaking at close to \$150 per barrel. Ever since, crude oil has fallen sharply, plunging to a level of around \$40 per barrel in January 2009.

Figure 1: Weekly All Countries Spot Price (Dollars per Barrel)⁶



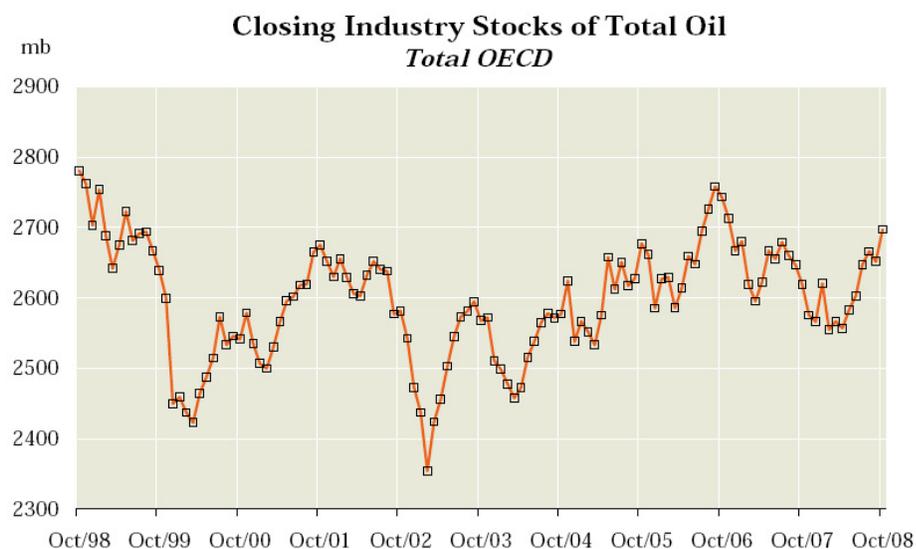
A notable feature during this period of rising oil prices has been that spot and futures prices seem to have become increasingly correlated. While previously futures prices have generally tended towards the long run marginal cost of supply, this has no longer been the case in recent years. Instead, spot and futures prices have increasingly moved in unison, as volatility in the futures market increased. A recent study noted that while during the 1994 to 2007 period a 1% rise in spot prices had correlated to a 0.38% increase in the 12-month futures prices, in 2008 a 1% increase in spot prices now correlates to a 0.65% increase in the 12-month futures price.⁷

Data made available at US Energy Information Administration at http://tonto.eia.doe.gov/dnav/pet/pet_pri_wco_k_w.htm.

⁷ UK Cabinet Office (2008), "The rise and fall in oil prices: analysis of fundamental and financial drivers",

This greater correlation between futures and spot prices would seem to indicate that price expectations have led market participants to withhold oil supplies, putting further pressure on the market and reinforcing price movements. However, there is little evidence for this behavior. Thus, while oil stocks have been rising throughout 2008, they are not exceptionally high by historical standards (see Figure 3 below). Still, it is possible that in a tight market incremental increases in stocks, or even the willingness to hold stocks, might have raised expectation about future price increases. Moreover, current OECD data on inventories obviously does not include stocks being held by important non-OECD countries such as China and India. That means there is a certain possibility that a build-up of stocks amongst non-OECD countries had an impact on prices. However, without any conclusive evidence, the impact that the increased correlation between spot and futures markets has on prices remains contentious.

Figure 2: OECD Total Oil Stocks⁸



December 2008
⁸ International Energy Agency (2008), Oil Market Report, 11 December 2008.

3. Competing Explanations for the 2008 Oil Price Shock

Many observers ascribe the steady climb in global crude oil prices over the last five years to a tightening of market fundamentals⁹. Oil demand is said to have increased rapidly, due to strong economic growth witnessed in China and India. Simultaneously, oil supply has stagnated as new investments are slow to be forthcoming. The effect has been a tightening balance of supply and demand and increased price volatility. However, some commentators have argued that shifts in market fundamentals have not been large enough to explain the dramatic oil price movements of 2008¹⁰. Rather, they point to a number of alternative and reinforcing explanations, such as misguided government policies, trends in macroeconomic variables and the role of financial investors. In fact, the 2008 oil price spike has triggered a flurry of commentary on the suspected impact ‘speculation’ has had on oil price movements. These suspicions have triggered significant political attention in both Europe and the United States where lawmakers are considering regulatory action to reign in ‘oil speculators’ that may drive price movements.¹¹ The following will review the available macro trends and data that support these different arguments and point towards their respective strengths and weaknesses.

3.1 Tightening Oil Market Fundamentals

3.1.1 Tightening Demand: The Rise of China and India

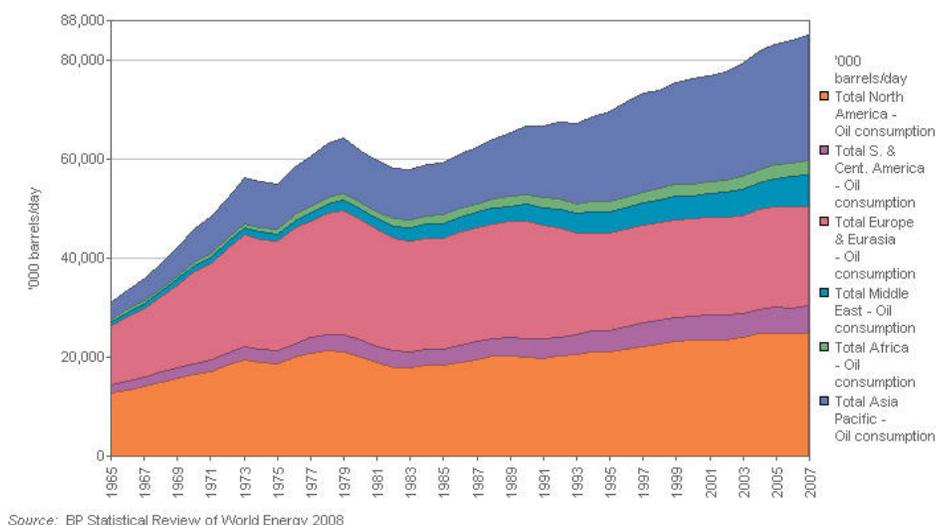
For most analysts, the starting point for last year’s oil shock has been the steady increase in global demand for crude oil over the last few years. While demand grew at an average annual rate of 1.1%, or a total of 4.2 million barrels per day in the five years from 1998 to 2002, demand growth accelerated to an average annual rate of 2.1%, or a total of 8.2 million barrels per day in the five years between 2003 and 2007. Most of this increase in energy demand has come from emerging market economies in Asia and the Middle East and particularly China and India. Figure 4 below clearly demonstrates the dramatic increase of crude oil consumption across Asia over the last forty years.

⁹ See for example Amenec, Noel, et al (2008), “Oil Prices: the True Role of Speculation”, op. Cit.; Verleger, Philip K, Jr. (2008a), ‘Comments on the Accidental Hunt Brothers – Act 2’, op. Cit.; Robert P. Murphy (2008), ‘Speculators Fixing Oil Prices? Don’t Bet on It’, op. Cit.

¹⁰ Michael W. Masters (2008), “Testimony before the Committee on Homeland Security and Governmental Affairs”, op. Cit.; Cambridge Energy Research Associates (2008), ‘Recession Shock: The Impact of the Economic and Financial Crisis on the Oil Market’, op. Cit.; Daniel Yergin (2008), ‘Oil at the Breaking Point’, op. Cit.

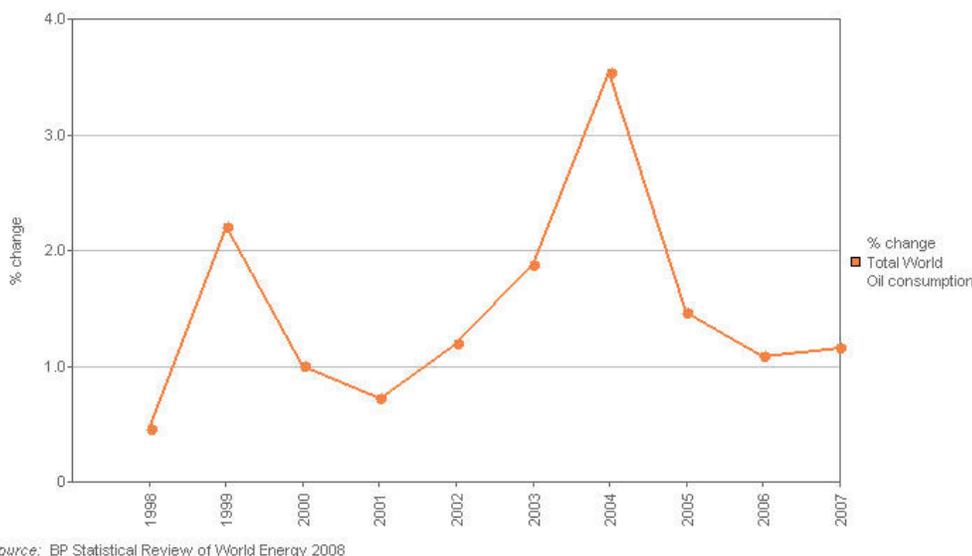
¹¹ Indeed, in mid-2008 the US Congress introduced the “End of Oil Speculation Act of 2008” that seeks to end manipulation and excessive speculation in oil futures. The bill has not progressed so far, due to the risk of a Presidential veto by the Bush administration, but is widely expected to be approved under the new Obama administration. Anne E. Kornblut (2008), ‘Obama Targets Speculation on Energy’, *Washington Post*, 23 June 2008.

Figure 3: Oil consumption in thousand barrels per day¹²



Rapid economic growth and a still comparably high oil-intensity (the amount of oil needed to produce a dollar's worth of output) of the newcomers' economies have been the main reasons for this steady increase in crude oil consumption. Indeed, from 2003 to 2007 alone, overall oil consumption in China grew by a staggering 35%, fuelled by economic growth of around 9% per annum. As per capita oil consumption in both India and China remains extremely low, any further growth in disposable income is expected to boost oil demand even further.¹³ Unless production increases in line, market fundamentals will continue to tighten and assert upwards pressure on prices.

Figure 4: Global Oil consumption in thousand barrels per day (% change)¹⁴



¹² BP 'Statistical Review of World Energy 2008', Energy Charting Tool, available at: <http://www.bp.com/iframe.do?categoryId=9024179&contentId=7044895.#>

¹⁴ Graph generated using the BP 'Statistical Review of World Energy 2008', Energy Charting Tool, available at: <http://www.bp.com/iframe.do?categoryId=9024179&contentId=7044895.#>

Looking at total global energy consumption over the last decade, the picture that emerges is somewhat more differentiated. While consumption growth spiked in 2004, global oil consumption grew by only 1.1% in 2007, slightly below the ten-year average of 1.3%.¹⁵ Indeed, demand growth seems to have been more or less in line with its ten-year average, after spiking briefly in 2004. Does that mean that increasing global demand on its own is unable to explain the sudden surge in oil prices in 2008?

Analysts have provided two reasons for why they think that demand growth has nevertheless played a major role during the 2008 shock. First, they have argued that by 2005 global spare capacity had dropped to the point that each additional demand increase contributed to a significant tightening of the market.¹⁶ With no way of easing market conditions in the short-run and because of the inelasticity of supply and demand of the oil market, small demand increases had a disproportionate effect on oil prices.

Second, some analysts noted that demand growth for certain fuel types – especially jet and diesel fuels – were on average much higher.¹⁷ In recent years, demand for diesel fuel has notably increased in Asia and Europe, where it is widely used in the transport sector. Indeed, worldwide demand for transport diesel has grown by 34% over the last decade, compared to a growth rate of only 13% for gasoline.¹⁸ Refining capacities for diesel fuel have been unable to keep up with this rapid growth in demand. Moreover, recent legislation in the US and Europe requiring refiners to cut the sulfur content of diesel fuels has further tightened market conditions. As most refineries lack the capacity to produce those newly mandated low-sulfur fuels from heavy sour crude, they are forced to compete for light, sweet crude, which is in much scarcer supply.¹⁹ In the meantime, some of the producers of sulfur-heavy crude ironically had problems selling their produce.²⁰

According to some, in the course of 2008 this disproportionate increase in demand for light, sweet crude began to affect overall crude oil prices. As one commentator noted: “Over the last six months, one can observe an extraordinarily tight link between the price of Brent crude (a sweet crude produced in the North Sea that is a key benchmark) and the spot price of low-sulfur gasoil, an indicator of the spot price of diesel fuel in Europe. The linkage is tight and the econometrics are compelling. The conclusion is clear: European demands for very-low-sulfur diesel are driving crude oil prices.”²¹ To make things worse, China began stockpiling diesel fuel in early 2008 in the run up to the Beijing Olympics, putting extra pressure on the market and driving prices even higher.²²

¹⁵ BP (2008), ‘Statistical Review of World Energy’, London: British Petroleum.

¹⁶ Noel Amenec, et al (2008), “Oil Prices: the True Role of Speculation”, op. Cit.

¹⁷ For an analysis of the link of crude and petroleum product prices, see Energy Charter Secretariat (2007), ‘Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas’, op. Cit.

¹⁸ Daniel Yergin, (2008), ‘Oil at the Breaking Point’, op. Cit, p. 3.

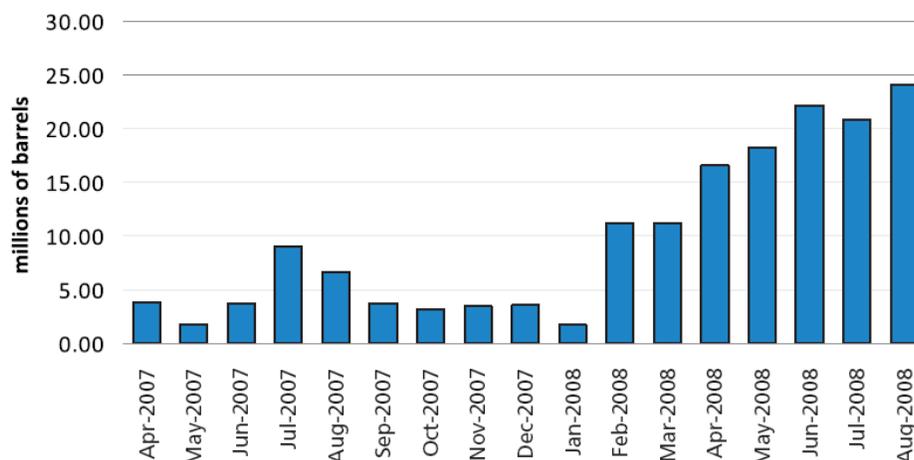
¹⁹ Nigeria is currently the world leading supplier of light crude with a capacity of 2.6 million barrels per day. However, Nigerian production has frequently been disrupted by civil strife.

²⁰ It has been reported that throughout 2008, Iran has struggled for months to sell some 25 million barrels of its oil, despite offering some of the steepest price discounts in history.

²¹ Philip K Verleger, Jr. (2008), “\$200 Oil!”, op. Cit.

²² Kathrin Hille (2008), ‘China’s Diesel and Petrol Buying Spree Poised to End, FPCC Warns’, *Financial Times*, 25 August 2008.

Figure 5: China's crude oil stock (monthly change million of barrels²³)



The overall increase in crude oil demand, in combination with a rapid rise in demand for light sweet crude, according to this argument, has led to an extraordinarily tight balance in the crude oil market and a rapid increase in prices. This price increase was further stoked by the widespread believe in ‘decoupling’ – that the world economy had evolved to the point, where China, Europe and other emerging economies would be insulated by an economic downturn in the United States. Fears about ‘peak oil’ further exaggerated expectations about future price increases. As a result, oil prices continued to rise, even as the US economic crisis began to deepen. Thus, even though US financial firms had been forced to write down more than \$500 billion in bad debt since the second quarter of 2007, it was only with the bankruptcy of Lehman Brothers that the real implications of the financial crisis on the economy seemed to filter through to impact oil prices.

3.1.2 Tightening Supply: Sluggish Investment & Supply Disruptions

While world oil demand, especially for certain fuel types, has grown strongly, supply has been slow to pick up the slack. Indeed, since 2004 oil production growth has slowed significantly, falling by 0.2% in 2007 for the first time in five years.²⁴ The main reasons for the recent fall in production growth seem to have been a prolonged period of sluggish investments in supply and refining capacity and an aggregation of different supply disruptions.²⁵ Moreover, OPEC policy has done little to mitigate recent price increases, while non-OPEC production increases have fallen short of expectations.²⁶ Thus, while OPEC production has grown by a moderate 2.4 million barrels per day since 2003, the call on OPEC (difference between world consumption and non-OPEC production) has simultaneously increased by 4.4 million barrels per day.²⁷

²³ UK Cabinet Office (2008), “The rise and fall in oil prices: analysis of fundamental and financial drivers”, op. Cit.

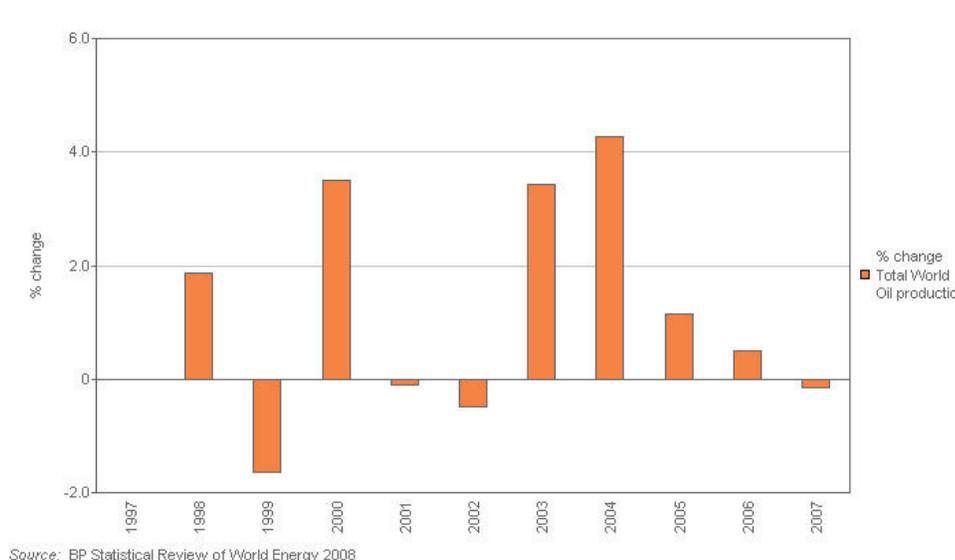
²⁴ BP, ‘Statistical Review of World Energy 2008’, op. Cit.

²⁵ International Energy Agency (2008), ‘World Energy Outlook 2008’, IEA/OECD: Paris.

²⁶ Robert J. Samuelson, ‘OPEC’s Triumph: Acting Like a True Cartel – with America’s Help’, *The Washington Post*, 12 March 2008

²⁷ Commodity Futures Trading Commission (2008), “ITF Interim Report on Crude Oil”, July 2008, p.10.

Figure 6: Oil production in thousands barrels per day (% change)²⁸

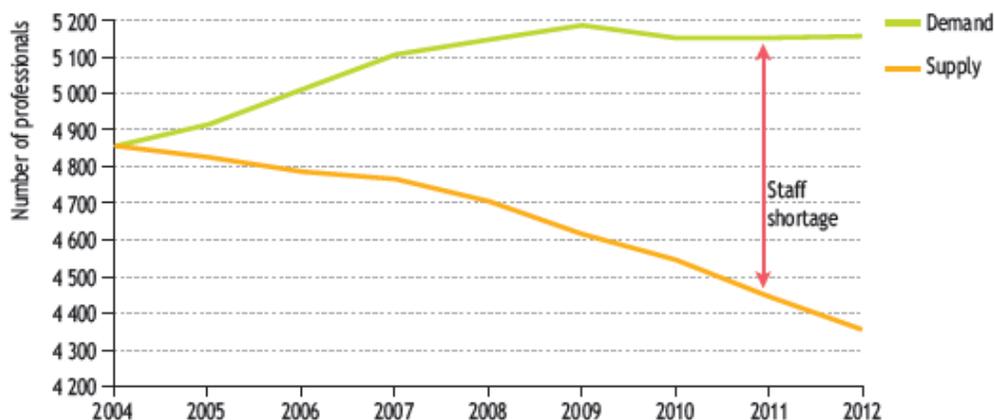


One of the main reasons for slow investment growth has been a sudden increase in the costs of new oil and gas fields. Following long periods of market contraction in the 1980s and 1990s, the oil industry had few incentives to invest in new production and refining capacity and was therefore caught off-guard by the recent price hike. Since then, analysts have reported an acute shortage of engineers, scientists, equipment and other necessary commodities. Indeed, the CERA Upstream Capital Cost Index has indicated that cost has more than doubled over the last four years²⁹ This means that much larger investments are now necessary to develop new productive capacity. Moreover, skill shortages and supply bottlenecks have led to the delay of many projects, further dampening growth in productive capacity. This situation is likely to continue in the future, as large parts of the current labor force in the oil industry are about to retire³⁰ However, as cost inflation is a relatively recent market phenomenon, it is unlikely to be responsible for last year's large increase in oil prices, due to the long-lead times of investment. Moreover, as cost inflation remained high throughout 2008 even while prices tumbled, this seems to indicate that costs only had a marginal impact on price volatility.

²⁸ Graph generated using the BP 'Statistical Review of World Energy 2008' Energy Charting Tool, available at: <http://www.bp.com/iframe.do?categoryId=9024179&contentId=7044895>.

Cambridge Energy Research Associates (2008), 'Recession Shock: The Impact of the Economic and Financial Crisis on the Oil Market', op. Cit.

Figure 7: Shortage of mid-career petroleum professionals in Europe and US³¹



Source: NPC (2007b).

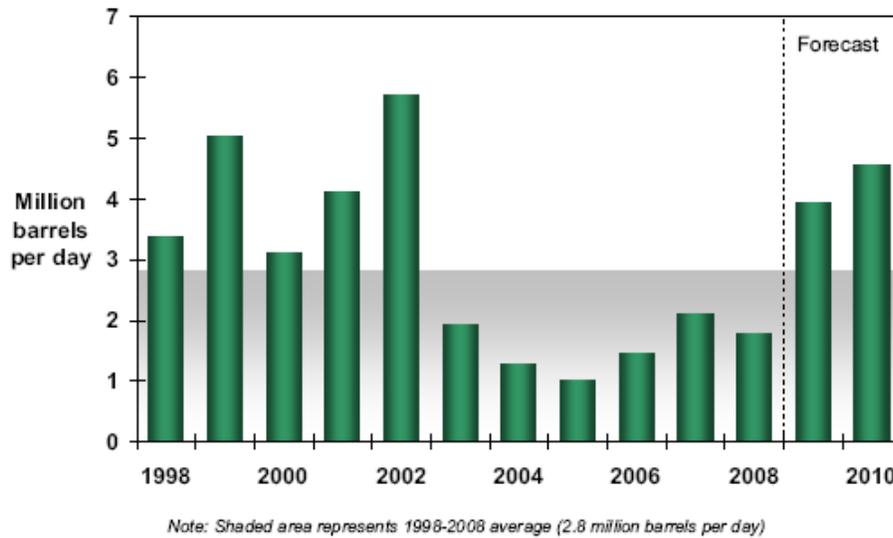
While low investments meant that no new productive capacity was added to existing supplies, intermittent disruptions further depressed the market. Although there have been no ‘major’ disruptions in global oil supplies in the last five years, it has been estimated that the ‘aggregate disruption’ stemming from different events caused a shortfall of some 2-3 million barrels per day³² Most significant among these has been the disruption of Nigerian oil supplies by rebel attacks, Hurricane Katrina, as well as a fall in Venezuela’s and Iraq’s productive capacities. Nigerian supply disruptions in spring 2008 – leading to a further reduction of light sweet crude – are thought to have contributed to rising prices.³³ Concerns about potential supply disruptions resulting from a future military confrontation with Iran have further impacted market conditions.

As a result of these different factors, world surplus production capacity has dropped markedly in the 2003 to 2008 period, remaining well below its ten year average. With insufficient surplus capacity, it is impossible for producers to offset potential supply disruptions and restore balance to the market without the need for price changes. As the imbalance between oil demand growth and supply growth increased, spare capacity tightened and spot prices began to rise. According to this explanation, tightening market fundamentals, together with the basic idiosyncrasies of the oil market have been responsible for the 2008 hike in crude oil prices. The panacea, it is assumed, lies in restoring a more favorable balance of supply and demand.

³¹ International Energy Agency (2008), ‘World Energy Outlook 2008’, op. Cit., p. 330

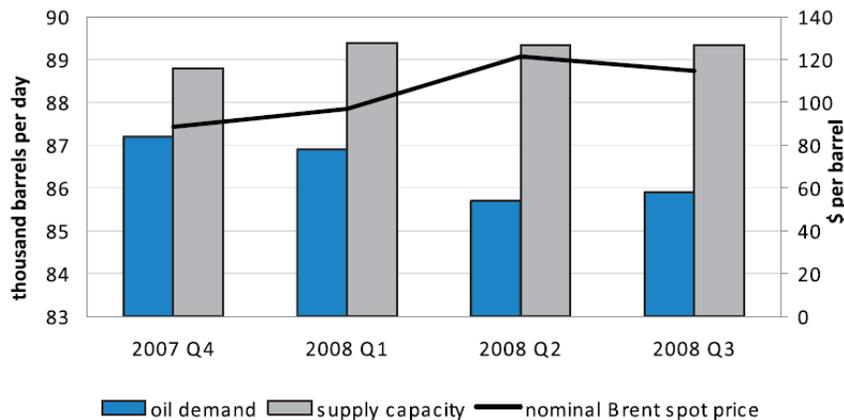
³³ In April 2008, Nigerian output of light sweet crude was estimated to have dropped from 2.6 million barrels per day to 1.76 million barrels per day.

Figure 8: OPEC Surplus Crude Oil Production Capacity³⁴



However, it seems difficult to relate price movements in oil markets in 2008 to the tightening balance of market fundamentals alone. Indeed, a closer look at market developments in 2008 seems to contradict at least part of this explanation. Throughout the first half of 2008, as oil prices were peaking, the balance between oil demand and supply actually began to ease slightly. Moreover, the rapid fall of oil prices from close to \$150 per barrel in mid-2008 to around \$40 per barrel in early 2009 was initially based on little change in the existing fundamentals. This indicates that either there has been a considerable time-lag between a change in fundamentals filtered through to prices, or that there are other factors that have influenced price movements.

Figure 9: Price Movement as Demand and Supply Ease³⁵



³⁴ US Energy Information Authority, 'Short-term Energy Outlook', 13 January 2009.

³⁵ UK Cabinet Office (2008), "The rise and fall in oil prices: analysis of fundamental and financial drivers", op. Cit.

3.2 Alternative Explanations

3.2.1 Market Distortions & Resource Nationalism

While tightening market conditions are considered by many to be the main explanatory variable for the steady increase in oil prices since 2003, some analysts have argued that misguided government policies have also made a major contribution to the 2008 hike in oil prices. Thus, it has been argued that misguided government policies have not only restrained access to oil resources around the world, but have also fuelled domestic demand for transport fuels in a period of rising prices.

'Resource nationalism' in some oil-exporting countries, such as Russia and Venezuela, have prevented multinational oil companies from accessing and developing new oil fields and thereby contributed to the previously discussed fall in oil production³⁶. Simultaneously, in many emerging market economies, such as Iran, fuel subsidies have kept the domestic price of gasoline artificially low preventing a reduction of consumption as prices began to rise.³⁷ However, with rising prices, fuel subsidies soon reached unsustainable levels. As a result, in early 2008 several countries beginning with China have engaged in significant cuts in fuel subsidies.³⁸ While restrained in part by popular protests in several regions, some analysts have argued that these subsidy cuts explain a portion of the subsequent drop in global demand. Finally, in some developed countries, high excise taxes on fuel have meant that fuel prices at the pump did not change as dramatically as might have been expected.³⁹ With only a fraction of the rise in international oil prices being passed on to domestic consumers, crude oil demand in OECD countries has therefore responded more slowly than expected to market conditions.

Furthermore, in some cases government policies have directly contributed to the tightening conditions on the oil market. As already mentioned, European and US rules to cut the sulfur content of diesel fuel has had an immediate impact on the price of light sweet crude oil. Also seemingly significant is the US Department of Energy's (DoE) decision to increase stocks being held in US Strategic Petroleum Reserves. The DoE replenishment of reserves restarted in late 2007 and took additional stocks of light sweet crude from the market, which were in short supply.⁴⁰ According to an estimate by Philip K. Verleger Jr. this might have led to a reduction of 0.1-0.5% of light sweet crude on the market.⁴¹ Figuring in the price elasticity for demand, Verleger comes to the conclusion that DoE actions on their own increased global prices by \$10 per barrel. In fact, this is no new develop-

³⁶ Joseph A. Stanislaw (2008), 'Power Play: Resource Nationalism, the Global Scramble for Energy, and the Need for Mutual Interdependence', Deloitte & Touche.

³⁷ Jad Mouwad & Diana B. Henriques (2008), 'Why is Oil so High? Pick a View', *The New York Times*, 21 June 2008.

³⁸ International Energy Agency, 'World Energy Outlook 2008', op. Cit., p. 96.

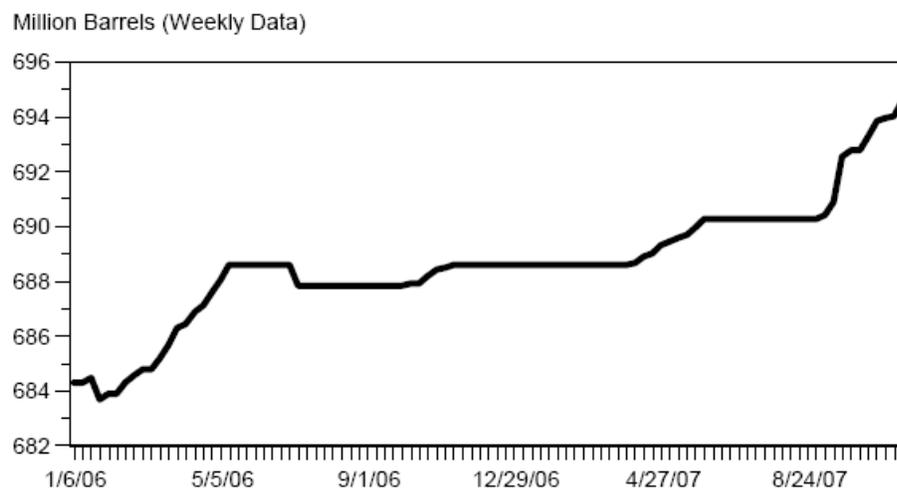
³⁹ At retail, European consumers pay around \$420 for a barrel of diesel. According to Philip K. Verleger Jr., the very high diesel price requires crude prices to increase by as much as \$40 per barrel to get a one percent cut in use. Philip K. Verleger, Jr, (2008b), 'Explaining the 2008 Crude Oil Price Rise', July 2008.

⁴⁰ The US started refilling its petroleum reserves in late 2007 with the goal to expand capacity to twice its current level. Refilling is suspended in May 2008 on the back of high prices.

⁴¹ Philip K. Verleger, Jr. (2007), "Testimony before the Committee on Homeland Security and Governmental Affairs", 11 December 2007.

ment, as part of the 1973 oil price shock has been attributed to ill-designed US policies that encouraged fuel hoarding.

Figure 10: US Strategic Petroleum Supply Stocks⁴²



3.2.2 Macroeconomic Variables: The Declining Dollar

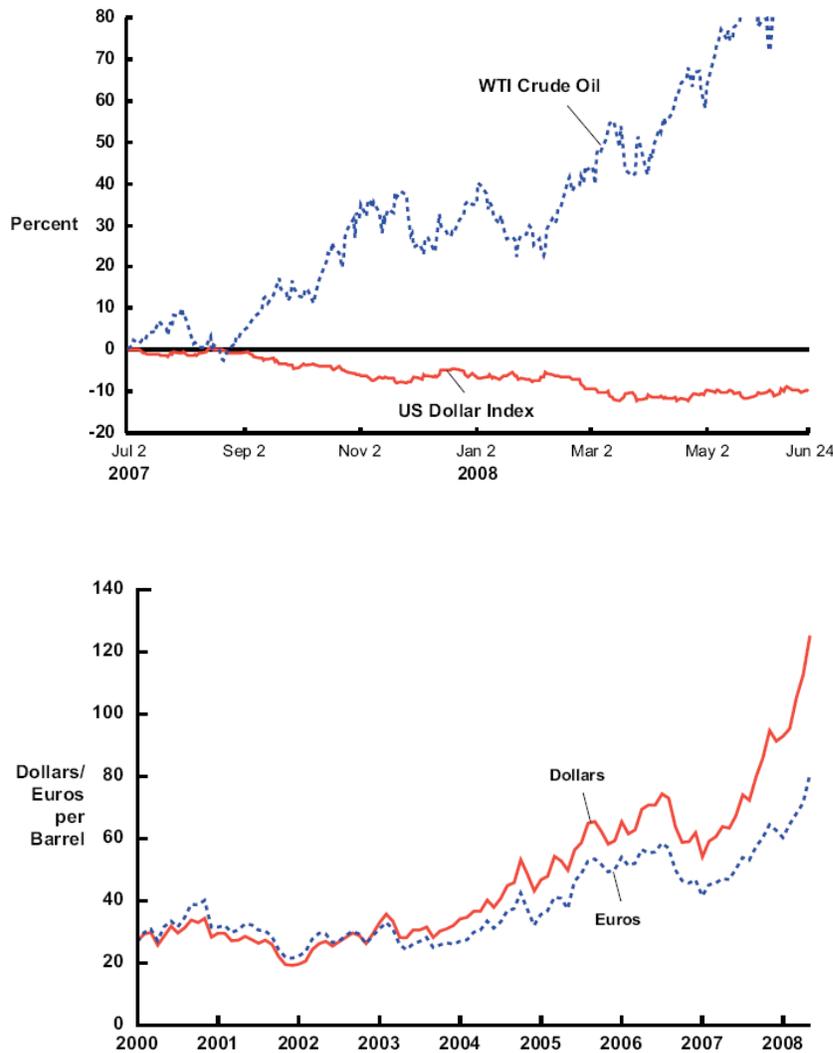
A different factor that is often considered to have had an impact on rising oil prices has been the steady decline in the US dollar over the last five years. While the relationship between oil prices and the dollar is complex and never has been satisfactorily explored, in general a depreciation of the dollar will lead to a rise in the dollar price of oil and vice versa. Since oil is denominated in US dollar it is assumed that a depreciation of the dollar lowers the foreign-currency price of oil and thereby raises demand. To allow the market to clear, the impact will be a rise in the dollar price of oil. In general, it has been assumed that the magnitude of both movements is roughly the same, so that a 10% depreciation of the dollar would lead to a 10% rise in the price of oil.

While this could partly explain the steady rise in oil prices over the last few years, it is unlikely to explain much of the sudden price spikes in early 2008. During the period from mid-March through June, the dollar remained stable and it only continued its slide against the euro as oil prices began to ease once more. It therefore seems unlikely that a declining exchange rate was a major factor in the 2008 oil price shock. Nevertheless, the slide in the dollar might have contributed to oil market volatility in a more indirect way. Daniel Yergin has argued that recent years have witnessed a “flight to commodities” as investors looked for stability in a time of currency instability and a falling dollar.⁴³ Thus, the sliding dollar might have led to an increase in financial investment in oil futures market, which according to some had an impact on volatility.

⁴² Ibid.

⁴³ Daniel Yergin (2008), ‘Oil at the Breaking Point’, op. Cit, p. 6.

Figure 11: Relationship between the Dollar and Oil Prices⁴⁴



3.2.3 The Impact of Financial Markets and 'Speculation'

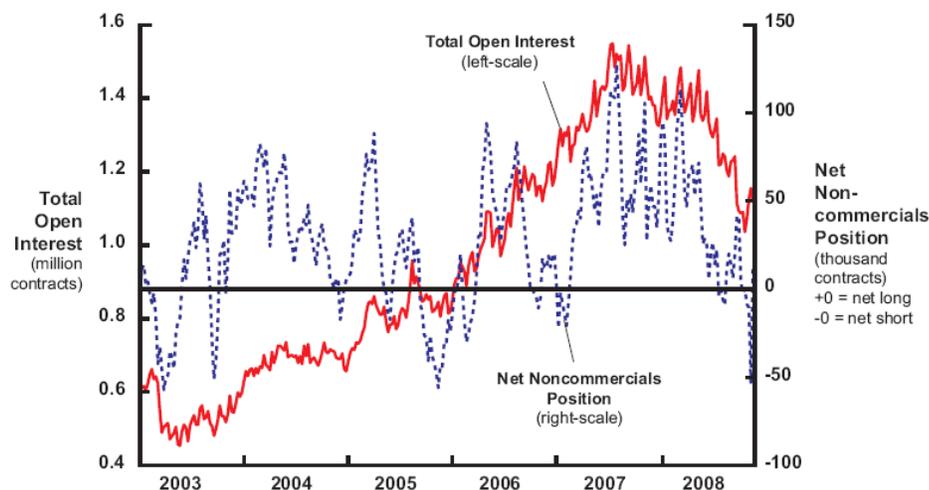
For some years now, there has been a growing interest in the use of commodities as financial assets. As a result, the oil futures market has seen a surge in participation over the last five years. Indeed, open interests (number of contracts open at the end of the day) in crude oil futures traded on the New York Mercantile Exchange (NYMEX) have doubled from 700,000 in 2004 to close to 1.4 million contracts in 2007. Innovations in the derivative market have egged this process on by allowing easier access to oil futures and other commodity markets for financial investors. Especially amongst large institutional investors, including pension funds and university endowments, investments in oil futures became popular throughout 2006 and 2007.⁴⁵ It is only with the collapse of oil

⁴⁴ Ibid, p. 7.

⁴⁵ Even as late as 2008, Calpers (California Public Employees' Retirement System), the largest pension plan in the US announced that it intended to increase its investments 16-fold until 2010.

prices from mid-2008 onwards that open interests in the oil futures market have declined rapidly, led by a decline in the net positions of non-commercial traders.

Figure 12: NYMEX Total Open Interests and Net Non-commercial Position⁴⁶



The reasons for this increased interest in oil futures amongst financial investors are varied. As commodities have historically moved in the opposite direction of asset markets, some investors, such as pension funds have actually moved toward commodities in order to reduce risk. Others have invested in oil futures in order to hedge against inflation and a falling dollar. Meanwhile, some have turned to oil in search of higher yields when faced with decreasing returns in the asset market. Herd behavior, as always in financial markets, seems to have also played a role. Overall, the increase in open interests has come from non-commercial traders, such as hedge funds, sovereign wealth funds, or government and pension funds. The activities of commodity swap dealers, who are classified as commercial traders, have also risen, probably because they often act as a front for financial investors.⁴⁷

The large increase in financial flows into the oil futures market has added significant liquidity to the market. Most economists would argue that this is a good thing, as additional liquidity should enable more effective price discovery and reduce the overall volatility of the market. However, evidence has been much to the contrary as volatility in futures prices increased much in line with those in spot prices. This has led many to believe that these financial inflows and the activities of speculators are largely to blame for recent crude oil price fluctuations.⁴⁸ However, there exists only scant evidence that traders have purposefully driven up prices. A recent investigation by the US Commodities Futures Trading Commission (CFTC) concluded that there is no evidence that net position changes of various trading groups, including hedge funds and swap dealers, had syste-

⁴⁶ Cambridge Energy Research Associates (2008), 'Recession Shock: The Impact of the Economic and Financial Crisis on the Oil Market', op. Cit., p. 14.

⁴⁷ Michael W. Masters (2008), "Testimony before the Committee on Homeland Security and Governmental Affairs", 20 May 2008.

⁴⁸ Ibid.

matically preceded price changes.⁴⁹ If at all, most traders seem to have adjusted their positions in response to price changes.

Does that indicate that there is no correlation between the increase of financial speculation in the oil futures market and market volatility? A recent background briefing for the London Energy Conference has concluded that even though there is no evidence that financial investors have deliberately manipulated prices, it is still possible that their action might have put upwards pressure on oil prices.⁵⁰ The reason for this is to be found in the difference between financial and traditional investors. Financial investors tend to act more coherently as a group; take primarily long market position; are less sensitive to price fluctuations; and tend to have a higher tolerance for risks because their market positions are often based on broader macroeconomic conditions, rather than the fundamentals of supply and demand in the oil market. Moreover, since around a third of open contracts at NYMEX are held by financial investors, their decision can be expected to have a considerable impact on the market.

The study concluded that “the volume of financial investments from commodity index traders and other investors with little or no specialist knowledge of oil markets may have allowed prices to rise beyond what would have otherwise been the case. Absent these investments, the recent run-up and subsequent fall in oil prices may have been less pronounced.”⁵¹ However, for the moment, there is little empirical evidence about the real impact that financial traders have had on oil market volatility. One of the problems in evaluating the impact of financial traders on the oil futures market is that current CFTC classifications are insufficient to make a real distinction between financial and hedging-related market activities.⁵² Moreover, little information exists about the activities of swap dealers and their potential role in recent market developments. In the absence of greater transparency and better information, the concrete role financial markets have played in the 2008 oil price shock therefore does and will remain blurred and open to speculation.

⁴⁹ Commodity Futures Trading Commission (2008), “ITF Interim Report on Crude Oil”, July 2008, p. 27.

⁵⁰ UK Cabinet Office (2008), “The rise and fall in oil prices: analysis of fundamental and financial drivers”, op. Cit.

⁵¹ Ibid, p. 31.

⁵² Published CFTC data makes a distinction between commercial and non-commercial traders and not about the type of activity they are engaging in, whether it is hedging or purely financial.

4. Implications and Policy Recommendations

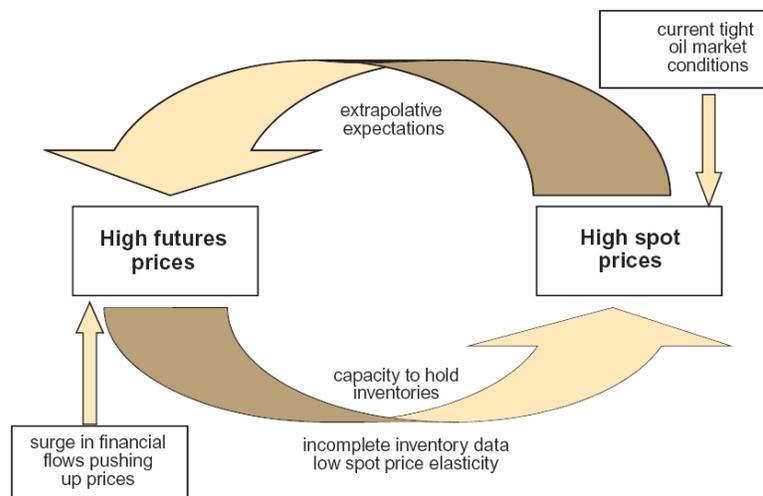
4.1 Weighting the Evidence

Based on existing evidence, it seems difficult to believe that market fundamentals alone have been responsible for the unprecedented spike and fall in crude oil prices throughout 2008. As previously noted, market fundamentals were already easing in the first half of 2008, as prices continued to rise. Similarly, the easing of market conditions since mid-2008 does not seem radical enough, to validate a \$100 drop in the price of crude oil on their own. On the other hand, while the slide in the dollar, US policies on the Strategic Petroleum Reserves (SPR) and market distorting actions by various governments have certainly contributed to rising prices and even their frequent collapse, neither of them can be given the sole responsibility for recent market developments. Rather, it seems likely that a tightening of fundamentals in combination with a host of other factors culminated in an upward shift in prices that became further inflated by a surge of financial investments into the oil futures market. As market conditions began to ease and the impact of the global recession became more apparent, prices collapsed. This led to a flight of investment out of the oil futures market further exaggerating the price slide.

A discussion paper by the UK Cabinet Office circulated in the run-up to the London Energy Meeting in December has illustrated this process, focusing on the contributing role played by financial investors on the oil futures market.⁵³ According to the paper, tight market conditions led to a short-term increase of spot prices and increased expectations about future price increases. Simultaneously, a decline in the dollar and other asset markets triggered a ‘flight to commodities’ and a surge of investments into the oil futures market. Financial investors, behaving markedly different to traditional traders, drove up the demand for oil futures and reinforced expectations about future price increases. The increase in futures prices in turn pushed spot prices higher through exaggerated expectations and the storage arbitrage condition. Once the full impact of the worldwide financial crisis became apparent, this process reversed.

⁵³ UK Cabinet Office (2008), “The rise and fall in oil prices: analysis of fundamental and financial drivers”, op. Cit.. A similar line of reason is applied in CERA’s most recent report on the subject: Cambridge Energy Research Associates (2008), ‘Recession Shock: The Impact of the Economic and Financial Crisis on the Oil Market’, op. Cit.

Figure 13: Reinforcing behavior between spot and futures markets⁵⁴



While this is a compelling narrative about what might have happened, it has the unfortunate weakness that there is currently little empirical evidence to back up this argument. As previously noted, there has been no known radical movement in inventories that could indicate that the storage arbitrage condition has played a significant role in the recent crisis. While this might be due to shortfalls in the existing data, it is still difficult to extrapolate that these movements might have taken place. Overall, it is therefore difficult to come to a definitive conclusion about the role of financial investors in the recent oil price spike. Nevertheless, it seems certain that market fundamentals on their own do not explain the recent rise and fall of oil prices, and that financial markets, government policies and macroeconomic variables all played contributing roles in exaggerating price movements. As such, any policy seeking to smooth volatility in oil prices will need to be based on a holistic approach, taking all of these factors into consideration.

4.2 Where to next? Future Outlook and Policy Implications

Notwithstanding the recent drop in oil prices to around \$40 per barrel, most forecasts are expecting prices to rise again in the mid- to long-term. Thus, IEA forecasts assume a real term average of \$100 per barrel in the period until 2015 and an increase of prices to \$122 by 2030.⁵⁵ OPEC forecasts are somewhat more moderate, predicting a nominal price of \$70-90 for the projection period to 2030.⁵⁶ Both projections are based on the assumption that non-OECD demand growth will continue unabated, while OECD demand will remain largely stagnant. At the same time, it is suggested that supply will continue to lag behind demand due to industry bottlenecks and sluggish investments. The implication will be that over the medium term market conditions are expected to tighten once more, with the potential for renewed market volatility. Indeed, some analysts have warned that low current prices might carry the seeds for a new oil price spike in the not so distant future. Thus, the IEA has estimated that in order to accommodate expected demand

⁵⁴ UK Cabinet Office (2008), "The rise and fall in oil prices: analysis of fundamental and financial drivers", op. Cit.

⁵⁵ International Energy Agency (2008), 'World Energy Outlook 2008', op. Cit.

⁵⁶ OPEC (2008), 'World Oil Outlook', OPEC: Vienna.

growth and to make up for the depletion of current oil fields, investments of around \$5 trillion are needed over the current period to 2030.⁵⁷ However, given currently low prices and considerable uncertainty about future price movements, investments might be slow, raising the potential of renewed price hikes and volatility in the future. Moreover, it is generally expected that the global financial crisis and credit crunch will constrain available credit and further limit investments.

All of this seems to suggest that price hikes and volatility might remain a constant feature of oil markets for the foreseeable future – as it did in the past. While some volatility in oil prices due to the specificities and the complexity of the oil market remains inevitable, both producer and consumer countries alike should have a keen interest in avoiding exaggerated price swings, based on the high socio-economic adjustment costs they imply. Acknowledging their common interests, representatives from the main producer and consumer countries and the oil industry met twice in 2008 under the auspices of the International Energy Forum (the recently established organization tasked to facilitate enhanced dialogue between consumers and producers) to discuss the causes, consequences and remedies of the current situation.⁵⁸ At these meetings, participants correctly identified the urgent need to enhance market transparency and to improve the general environment for investments in order limit future market volatility.⁵⁹ While some of the steps taken since then have been encouraging, more needs to be done in order to prevent a repeat of the dramatic market movements the world witnessed last year.

Arguably, increasing transparency and information about the oil market should be one of the most pressing concerns. In the past, market uncertainties have constituted one of the major obstacles to increased planning and investments. Market uncertainty can also lead to exaggerated price expectations in either direction that can cause the market to overshoot and increase volatility. More information is also needed to come to a better understanding of the recent price movements and the impact of financial markets. Finally, in a world where non-OECD countries hold an ever increasing market share, it is necessary to come to a better understanding of their policies and market behavior. To create greater transparency, oil ministers in Jeddah decided “the quality, completeness and timeliness of oil data submitted through the Joint Oil Data Initiative (JODI) should be enhanced.”⁶⁰ The objective of JODI is to provide free, timely and reliable information on oil market developments. However, for the time being, participant countries have at times been slow to provide information to JODI. Finally, additional data is needed in order to better understand the impact of financial investors on the oil futures market, which the CFTC so far has been reluctant to provide.

Secondly, producer and consumer countries need to make a greater effort to facilitate investment into additional upstream and downstream capacity. Without considerable new investments, oil markets will become both increasingly tight and volatile in the future. As one analyst has noted, “around 7 mb/d of additional capacity needs to be

⁵⁷ OPEC estimates are somewhat lower at a cumulative \$3.6 trillion.

⁵⁸ June 2008 in Jeddah and December 2008 in London.

⁵⁹ International Energy Forum (2008), ‘Progress Report on the Outcome of the Jeddah Energy Meeting’, 19 December 2008.

⁶⁰ International Energy Forum (2008), ‘Joint Statement: Jeddah Energy Meeting’, 22 June 2008.

brought on stream by 2015 (over and above the capacity that is already in the pipeline from current projects), most of which will need to be sanctioned within the next two years or so.”⁶¹ To put this challenge in perspective, 7 mb/d is almost equal to Saudi Arabia’s current production level. While reducing uncertainty is one way of increasing investment and production, other avenues are open. Investing in technology that raises the average recovery rate is one way. Providing work permits to foreign petroleum technicians and certified personnel could be another. Both aim at reducing the spiraling costs in the oil industry, which have reduced real investments while nominal investments are rising. A related issue is access. As most of additional production capacities are forecasted to be in OPEC countries and access to fields in many countries remains constrained, due to ‘resource nationalism’, investments by international oil companies are forecasted to fall. In order to avoid underinvestment and subsequent decreases in production, as has been the case in Venezuela, countries would be well advised to realize that ‘resource nationalism’ is not always in their best interest.⁶² As some analysts have noted, “it would be worth trying to convince producing nations that an institutional environment favoring an effective allocation of capital and investments is more likely to generate stable and reliable revenues, compared to a situation in which price hikes result from inelastic supply and an overstretch in oil [and gas] infrastructure.”⁶³ Alternatively, technological assistance and training could be offered to national oil companies to ensure efficiency.

Finally, although the specific impact of financial markets on oil prices remains a contentious issue, closing regulatory loopholes that might allow market manipulation or fuel irrational exuberance amongst market participants would seem advisable. Indeed, as long as the outlook for markets remains tight, this should be a high priority for legislators. At the same time, this has to be done without unnecessarily limiting market liquidity and restricting market operations. With this in mind, three specific areas seem to require further attention by regulators.⁶⁴ First, ‘over-the-counter’ (OTC) markets are only scantily scrutinized by regulators and are in need of more transparency. Secondly, an effort must be made to ensure that speculators cannot simply shift to foreign markets in order to avoid domestic regulations by the CFTC or others. Finally, and perhaps most challenging, something must be done to prevent institutional investors from influencing the direction of the market. Here, restricting their ability to use swap dealers might be one option. The new US administration appears serious about taking action on these different fronts, but at the point of writing it remains too early to tell whether and when it will decide to do so.

If governments were to make a consolidated effort to increase transparency and facilitate investment in the oil market along these lines, this might go a long way towards preventing the kind of price volatility markets have witnessed over the last few years. Naturally,

⁶¹ International Energy Agency (2008), ‘World Energy Outlook 2008’, op. Cit., p. 323.

⁶² Simon Romero (2009), ‘Chavez Reopens Oil Bids to West as Prices Plunge’, *The New York Times*, 15 January 2009.

⁶³ Andreas Goldthau (2008), ‘Preventing the Perfect Storm: How to Reform the Institutional Architecture of Global Energy Supply’, *FACET Commentary*, No. 10, May 2008.

⁶⁴ Mark Jickling & Lynn J. Cunningham (2008), ‘Speculation and Energy Prices: Legislative Responses’, *CRS Report for Congress*.

there is no guarantee that prices will not increase over the long run, as world demand continues to grow and supply of especially light crude oil is starting to decline. Ultimately, reducing world demand by promoting energy efficiency and diversifying the fuel mix of the economy by switching to alternative fuel sources will be the only way to keep price rises in check. In the meantime, greater transparency, increased investments and sensitive measures to constrain the exuberance of financial investors can help to smooth price movements and volatility in the oil market.

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