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The First Oil Price Shock of the New Millennium

Ca' Foscari
Dorsoduro 3246
30123 Venezia

Supervisor

Ch. Prof. Giovanni Favero

Co-supervisor

Ch. Prof. Duccio Basosi

Graduand

Gabriele Spiteri
Matriculation Number 988026

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ABSTRACT

Il lavoro mira a fornire un quadro interpretativo in cui collocare la straordinaria ascesa dei prezzi che, dai primi anni Duemila, portò il greggio a sfiorare i 150 dollari al barile nel luglio 2008.

Dopo una prima panoramica delle cause più spesso invocate dagli addetti ai lavori nell'ambito di un vero e proprio dibattito politico e accademico, il capitolo 2 evidenzia le condizioni necessarie al darsi di una crisi petrolifera di tale portata. Dopo due decenni di scarsi investimenti nel settore petrolifero, il mercato assisté a una graduale erosione della capacità produttiva inutilizzata, fenomeno che espose i prezzi del greggio a un'eventuale impennata della domanda o improvvise interruzioni dell'offerta. Parimenti, gli scarsi investimenti colpirono anche il settore di raffinazione che, alle soglie del nuovo millennio, si rivelò sempre più inadeguato a distillare la crescente offerta di petroli pesanti sui mercati internazionali.

Il capitolo 3 è dedicato alle dinamiche della domanda e dell'offerta. In una prima parte viene preso in esame lo "shock" della domanda: alimentato dalla crescente sete di petrolio da parte delle economie emergenti e degli Stati Uniti, dal 2003 il consumo di petrolio registrò un tasso di crescita paragonabile a quello degli anni Settanta. La seconda parte del capitolo tratta invece di un'offerta al di fuori dell'OPEC incapace di stare al passo del consumo. In questo contesto, assume particolare rilevanza il calo della produzione statunitense e dei greggi del Mare del Nord. Infine, vengono riportate alcune interruzioni dell'offerta che, sebbene non particolarmente rilevanti se considerate individualmente, si rivelarono determinanti in assenza di capacità produttiva inutilizzata. Si tratta dello sciopero del personale della PdVSA in Venezuela, dello scoppio della guerra in Iraq e degli attacchi alle infrastrutture petrolifere nel Delta del Niger. Pertanto, per ristabilire l'equilibrio di mercato, il prezzo del

greggio dovette aumentare sensibilmente.

Nei capitoli 4 e 5, il quadro si estende al contributo dell'OPEC, attore principale della scena petrolifera internazionale, e alla speculazione nei mercati finanziari. Quanto al cartello, sebbene nell'attuale regime di mercato non possa più fissare unilateralmente il prezzo del greggio, va detto che le politiche di produzione che scelse di perseguire contribuirono alla volatilità dei prezzi negli otto anni presi in esame. Nel 2000, il cartello decise di introdurre una banda di fluttuazione per i prezzi del petrolio in risposta al crollo che, nel 1998, aveva messo a repentaglio la sua stessa esistenza. Nello specifico, l'OPEC si impegnò ad aumentare o diminuire il suo tetto produttivo non appena l'oro nero avesse rispettivamente superato i 28 dollari o fosse scivolato al di sotto dei 22. Si trattava di un prezzo ritenuto sufficientemente alto da garantire rendite petrolifere accettabili, e porre così fine alla continua inosservanza delle quote da parte di alcuni paesi membri, ma anche sufficientemente basso da non scoraggiare il consumo. Tuttavia, il meccanismo non poté che essere abbandonato nel 2005, data la continua inattività del cartello di fronte a prezzi da tempo al di sopra dei 28 dollari. La sete di rendite petrolifere e l'erosione della capacità produttiva inutilizzata impedirono di fatto il funzionamento della banda. Da quel momento, di fronte a prezzi in continua ascesa, l'OPEC assunse un ruolo passivo, additando la speculazione nei mercati finanziari come causa prima del rialzo a giustificazione della propria inazione.

Precisamente a partire dai primi anni Duemila, infatti, gli eventi fin qui menzionati spinsero vari fondi speculativi e investitori istituzionali a riversare ingenti quantità di capitali nei mercati finanziari legati alle materie prime, al fine di fare profitti scommettendo su un aumento dei prezzi. Tale fenomeno non passò inosservato ed è ancora oggi al centro di un acceso dibattito in letteratura che riguarda il presunto impatto della speculazione finanziaria sul mercato fisico. Da un lato, gli scettici pongono l'accento sul fallimento degli studi in materia nel trovare un nesso di causalità tra la crisi petrolifera e le posizioni aperte nei circuiti borsistici ufficiali. Dall'altro, i sostenitori della tesi speculativa

sostengono che non può essersi trattato di una coincidenza e che, pertanto, il repentino aumento dei prezzi a partire dal 2007 non fu altro che una bolla speculativa. Dopo aver passato in rassegna alcuni dei più significativi argomenti a favore o contro l'ipotesi speculativa, il capitolo 5 attribuisce un ruolo complementare alla speculazione, per due ordini di ragioni. In primo luogo, le dinamiche della domanda e dell'offerta non erano in grado di giustificare una tale impennata dei prezzi: già dal 2007 il consumo mostrava evidenti segni di cedimento e, allo stesso tempo, l'offerta sul mercato era in aumento. In secondo luogo, l'analisi del comportamento tenuto dall'OPEC negli anni caratterizzati dai movimenti di prezzo più estremi suggerisce che il ruolo attribuito alla speculazione finanziaria ebbe almeno un effetto "indiretto", nella misura in cui spinse il cartello a perseguire politiche di produzione che amplificarono la volatilità dei prezzi.

L'epilogo è interamente dedicato all'altrettanto straordinario crollo dei prezzi che, tra luglio e dicembre del 2008, portò l'oro nero poco sopra i 30 dollari al barile, e identifica due momenti distinti in cui si manifestò. In una prima fase, da luglio a settembre, il crollo fu il risultato degli effetti degli alti prezzi sulla domanda e sull'offerta; in un secondo momento, l'inasprirsi della crisi economica e finanziaria spinse le economie dei principali paesi importatori di petrolio in recessione, facendone conseguentemente collassare la domanda.

Il lavoro conclude analizzando una cruciale conseguenza della crisi petrolifera in questione, ossia la cosiddetta "rivoluzione del petrolio da scisto": i prezzi stellari della decade resero economicamente vantaggioso l'impiego sistematico delle tecniche della trivellazione orizzontale e della fratturazione idraulica.

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INTRODUCTION

At the turn of the century, Saudi oil minister Ali al-Naimi defined \$25 a fair price for a barrel of crude oil, a price to conciliate the needs of both oil producers and consumers, and pointed out that the Organization of the Petroleum Exporting Countries (OPEC) would have tried its utmost to achieve such a price level. At the end of the OPEC meeting held in March 2000, the cartel fiercely announced the implementation of a price band, a tool with which the cartel committed to open its taps whenever prices outstripped \$28 or to turn them off when they fell below \$22 per barrel¹. From that moment on, however, crude oil prices started an unstoppable march which, in July 2008, led them to skyrocket at \$147, before eventually collapsing to \$32 by the end of the year.

That staggering oil price ascent captured political and academic attention and triggered a debate about the root causes of such a phenomenon. Much ink has been spilled and a wide range of explanations have been provided so far, but with little consensus. Indeed, the debate continues to be dominated by two different positions: one ascribes the events to the dynamics of supply and demand; the other focuses on the role of speculative activity in financial markets.

In more specific terms, some commentators argued that the oil shock at issue has primarily been a demand-led phenomenon, bringing to the fore the rapid and unexpected economic growth of a group of developing countries, notably from the Far East². Others, instead, put emphasis mainly on a set of supply shortfalls that deprived the oil market with huge quantities of petroleum, like the PdVSA affair in Venezuela in 2002 or the U.S. invasion of Iraq in 2003³.

¹ KOHL, W.L., "OPEC behavior, 1998-2001", *The Quarterly Review of Economics and Finance*, 42(2), 2002, p. 216.

² See, for instance, KILIAN, L., HICKS, B., "Did unexpectedly strong economic growth cause the oil price shock of 2003-2008?", *Journal of Forecasting*, 32(5), 2013, pp. 385-394.

³ See, for instance, STEVENS, P., "The coming oil supply crunch", Chatham House Report, 2009;

Although acknowledging that the dynamics of supply and demand have been a major ingredient, the supporters of the speculative thesis pointed instead their finger to the quick expansion of commodity markets and to the massive inflows of funds in the future exchanges⁴. For instance, one of the more active on the speculation front has been William Engdahl, with his famous article entitled *Perhaps 60% of today's oil price is pure speculation*⁵. Nonetheless, even though the last few years saw the development of several theoretical models analyzing the role of financial investors in commodity price booms, the empirical literature failed to provide much in the form of unambiguous conclusions, leaving the impact of speculators on the price of black gold still unclear.

Also the role played by OPEC, the protagonist of previous oil price shocks, came under close scrutiny. A number of behavioral models have been proposed to assess whether OPEC is able to exert some kind of control over the market, or whether its weaknesses, especially its intrinsic “rampant quota busting”, prevent it from having an impact on crude oil prices⁶. The majority of the studies, however, came to the conclusion that OPEC, nowadays, can only play a minimal role in the price discovery process, a view perfectly exemplified by Leonardo Maugeri. In a 2009 paper dedicated to the oil crisis at issue, he dismissed the cartel's involvement in the story stating that “it is a mistake to view OPEC as an effective cartel, or even as a cartel at all”⁷.

In the following chapter, the present study will test the validity of all the

GALLO, A., MASON, P., SHAPIRO, S., FABRITIUS, M., “What is behind the increase in oil prices? Analyzing oil consumption and supply relationship with oil price”, *Energy*, 35(10), 2010, pp. 4126-4141.

⁴ See, for instance, KHAN, M.S., “The 2008 oil price 'bubble'”, Peterson Institute for International Economics, 2009.

⁵ ENGDahl, W., “Perhaps 60% of today's oil price is pure speculation”, <http://www.globalresearch.ca/perhaps-60-of-today-s-oil-price-is-pure-speculation/8878>, accessed on February 1, 2016.

⁶ See, for instance, SMITH, J.L., “Inscrutable OPEC? Behavioral tests of the cartel hypothesis”, *The Energy Journal*, 26(1), 2005, pp. 51-82; GATELY, D., “OPEC's incentives for faster output growth”, *The Energy Journal*, 25(2), 2004, pp. 75-96; RAMCHARRAN, H., “Oil production responses to price changes: an empirical application of the competitive model to OPEC and non-OPEC countries”, *Energy Economics*, 24(2), 2002, pp. 97-106.

⁷ MAUGERI, L., “Understanding oil price behavior through an analysis of a crisis”, *Review of Environmental Economics and Policy*, 3(2), 2009, p. 160.

explanations mentioned so far and provide a possible interpretation of the events, trying to offer a more inclusive framework which takes into consideration the interactions of the various variables at stake and the actors involved in the international trade of petroleum that, together, could have contributed to the first oil price shock of the new millennium.

Chapter 2 outlines a set of structural changes that occurred in the petroleum market since the aftermath of the 1986 oil price collapse. The dynamics of supply and demand are instead the object of Chapter 3, while OPEC and the paper oil market are dealt more in depth respectively in Chapter 4 and 5. Finally, Chapter 6 is entirely dedicated to the oil price fall of the second half of 2008 and to the U.S. “shale oil revolution”, a phenomenon made possible by the stellar prices of the decade.

STRUCTURAL CHANGES IN THE PETROLEUM MARKET

2.1. The erosion of spare capacity

International commentators and observers of the oil sector have mainly put emphasis on the dichotomy between market fundamentals and speculation to explain the staggering ascent – and subsequent bust – of crude oil prices since the very beginning of the new millennium. Some argued that the oil shock should be interpreted in the light of the incredible growth of oil consumption in the previous years, most importantly on the part of non-OECD countries, combined with a set of supply interruptions that are said to have tightened the oil market, notably the U.S. invasion of Iraq in 2003. Others tried to highlight how market fundamentals are not at all sufficient to explain the \$147-peak reached in July 2008, thus bringing to light the contribution of *paper barrels* and financial markets. Also, the role played by OPEC has been a recurring explanation, even though there is a strong debate as to whether the organization should be thought of as a veritable cartel or, instead, a bunch of countries seeking the achievement of their individual interests.

Nonetheless, these explanations are often presented in an exclusive way, but most importantly, overlooking a set of structural features of the oil market which seem to be necessary, albeit insufficient, conditions for the happening of the oil crisis at issue. For this reason, before delving into what has been referred to as the main drivers of the first oil price shock of the new millennium, it is meaningful to begin with these often underestimated causes. More specifically, there is enough evidence to claim that the genesis of the first oil price hike of the new millennium should be traced back to a set of structural changes that have occurred within the oil market in the two previous decades, starting from the

aftermath of the second oil crisis of 1979.

Since the 1986 oil price crash, the petroleum market has witnessed a gradual though inexorable thinning of what is referred to as *spare capacity*: it can be defined as the security cushion of idle oil production capacity to be quickly activated when needed. In other words, as Daniel Yergin put it, "a shock absorber to manage sudden surges in demand or some kind of [supply] interruption"⁸. Over time, spare capacity has always proven to be a critical factor in the making of crude oil prices volatility. It has been underlined, indeed, that a spare capacity falling below a certain floor is able to ignite a sudden price rise: since oil supply is quasi-inelastic in the short and medium term, oil production is not likely to keep up with a sharp increase in demand; thus, in case of little idle production capacity, a large rise in prices is necessary to clear the market⁹. In more specific terms, that floor is deemed to be around 3 or 4 percent of global oil demand. On the contrary, a spare capacity outstripping the ceiling of 6 percent can bring about a rapid plunge in crude oil prices¹⁰.

Consider that in 1986, when prices nosedived below \$10 per barrel, global spare capacity hovered around 15 percent of global oil demand, and in general, until the late 1990s, oil markets were awash with spare production capacity, causing crude oil prices to oscillate between \$18 and 20\$ per barrel, before eventually falling again under \$10 in 1998. Observers have argued that the conditions responsible for the emergence of such a large capacity margin have been mainly due to the surge in non-OPEC supply, accompanied by a decline in global consumption, in the aftermath of the high prices of the 1970s¹¹.

When it comes to the twenty-first century, things started going in a different way. In 2005, oil prices began climbing exponentially – they more than doubled

⁸ YERGIN, D., *The Quest: Energy, Security, and the Remaking of the Modern World*, London, Penguin, 2011, p. 165.

⁹ FATTOUH, B., "The drivers of oil prices: the usefulness and limitations of non-structural models, supply-demand frameworks, and informal approaches", *European Investment Bank Papers*, 12(1), 2007, p. 143.

¹⁰ MAUGERI, L., *Understanding oil price behavior*, cit., p. 152.

¹¹ FATTOUH, B., *The drivers of oil prices*, cit., p. 143.

between December 2006 and mid-July 2008¹² – and global oil production hovered around 85 mbd, whereas global oil consumption reached 83 mbd: the security margin was by then reduced to less than 2 percent, leaving the market even tighter than in 1973¹³. Indeed, since the late 1990s, and specifically from 1999, just after the collapse in oil prices caused by the Asian financial crisis, stagnating prices let demand finally surge again, peaking in 2003 and 2004, with the "demand shock". It was the beginning of the story. From 2004 onwards, crude oil prices took the path that led them to the stellar \$147-peak on July 2008.

In parallel, non-OPEC supply was a good deal below the rates seen earlier that decade, and it was its first significant decrease since 1973: from 2004 to 2008, it decreased by 23 percent¹⁴. At the same time, world oil consumption increased by 33 percent, and it has been outpacing non-OPEC production every year since 2003¹⁵; these developments inevitably increased reliance upon OPEC production to bridge the gap between the two. From 2003, however, OPEC production has grown by only 2.4 mbd while the "call on OPEC" – the difference between global demand and non-OPEC supply – increased by 4.4 mbd¹⁶. So, in the time span going from 1999 to 2004, demand was largely met by increases in OPEC production, which delivered a severe blow to the very spare capacity margin. Indeed, as early as 2002, OPEC accounted for a spare capacity of around 8% of global oil demand – non-OPEC spare capacity being zero – and was therefore in a position to raise supply with relatively little delay. It is precisely what OPEC did: from 2002 to 2005, the cartel enlarged quotas by 6.3 mbd. Nonetheless, since 2005, global oil supply grew annually by less than 1 percent, down from 3.3 percent over the previous two and a half years; by mid-2005, OPEC countries

¹² IMF, *World Economic Outlook*, 2008, p. 84.

¹³ MAUGERI, L., *The Age of Oil: The Mythology, History, and Future of the World's Most Controversial Resource*, New York, Praeger, 2006, p. 227.

¹⁴ SMITH, J.L., "World oil: market or mayhem?", *Journal of Economic Perspectives*, 23(3), 2009, p. 151.

¹⁵ Interagency Task Force on Commodity Markets, "Interim report on crude oil", 2008, p. 10.

¹⁶ *Ibidem*.

were left with a spare capacity cushion of slightly more than 1.5 mbd¹⁷. The reason is straightforward: the increase in output by OPEC resulted from high utilization of existing capacity, rather than from the provision of new capacity, leading to a gradual decline in OPEC's spare capacity. This had the effect of steepening an already inelastic supply curve¹⁸. As also oil demand in the short run is inelastic, prices would bear the bulk of the adjustment¹⁹, as well exemplified by the trend in oil prices from 2005 to 2008.

What seems worthy of highlighting is that the erosion of spare capacity proved to be a critical factor in the tightening of the oil market just on the eve of the surge in oil consumption, led particularly by non-OECD countries. In the light of these assumptions, then, the various geopolitical events that have been brought to light as being the main drivers of the oil price shock in question become relevant, but simply because crude oil markets could not count on that security cushion. Thus, the supply side of the coin, often exemplified by the 2003 U.S. invasion of Iraq, the PDVSA affair in Venezuela or the conflicts in the Niger Delta, among others, do not enter the oil equation *per se*, but because the world oil markets were short of spare capacity. In this sense it is worth to mention, for instance, the 1991 First Gulf War. The conflict saw the interruption of oil flows from both Iraq and Kuwait, which rank among the top five of oil exporters globally, but this had relatively little impact on oil prices, because the 1990s were years characterized by a huge spare production capacity. In other words, the more idle capacity is cut down to the bone, the more geopolitics plays a crucial role; however, the direct influence of geopolitical events on prices is minimal when the global oil market is flooded with spare production capacity²⁰.

¹⁷ SAPORTA, V., TROTT, M., TUDELA, M., "What can be said about the rise and fall in oil prices?", *Bank of England Quarterly Bulletin*, 49(3), 2009, p. 219.

¹⁸ FATTOUH, B., "Oil market dynamics through the lens of the 2002-2009 price cycle", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM39-OilMarketDynamicsThroughTheLensofthe2002-2009PriceCycle-BassamFattouh-2010.pdf>, accessed on September 30, 2015, p. 21.

¹⁹ FATTOUH, B., *The drivers of oil prices*, cit., p. 149.

²⁰ MAUGERI, L., *Con Tutta l'Energia Possibile*, Milano, Sperling&Kupfer, 2011, p. 67.

2.2. The inter-shock under-investment decades

2.2.1. A plunge in crude oil prices: OPEC's and IOCs' responses

The erosion of spare capacity that tightened oil markets in the 2000s has been determined by some specific developments that have occurred in the oil market precisely during the 1980s and mid-1990s.

The 1970s saw crude oil prices increasing twice: in 1973, when OPEC doubled and then redoubled the posted price in two-months' time, and in 1979, when the cartel had to adjust prices in the aftermath of the supply interruptions brought about by the Islamic revolution in Iran and the Iraq-Iran war the following year²¹. The 1979 oil shock was said to have kept around 6 mbd off the market²². From that moment onwards, the higher price that the world started paying for a barrel of oil not simply ignited an inflationary spiral that hit the main consuming countries, and provided fertile ground for the advent of neoliberalism, but also made it profitable to undertake a new cycle of high-profile investments in oil exploration and production in those difficult regions whose marginal costs of production were simply prohibitive, given the price level of the 1960s. The hot spots were Alaska, the United Kingdom and Norway in the North Sea, and Mexico. Furthermore, in the early 1980s, USSR oil production jumped as well to a spectacular 12 mbd, a 40-percent increase from 1973²³.

At the same time, global oil consumption was falling sharply, settling at 58 mbd in 1983, that is 6 million less than in 1979²⁴. An oil price collapse was looming. In the words of Yamani, as early as 1979, there would have been "a glut in the market"²⁵. In effect, in 1986, a Saudi move aiming at carving out a fair market share, literally flooded the marketplace, which hence underwent a

²¹ For a comprehensive review of the 1973 and 1979 oil crises, see YERGIN, D., *The Prize: The Epic Quest for Oil, Money, and Power*, New York, Touchstone, 1991.

²² SMITH, J.L., *World oil: market or mayhem?*, cit., p. 151.

²³ MAUGERI, L., *The Age of Oil*, cit., p. 133.

²⁴ *Ibidem*.

²⁵ YERGIN, D., *The Prize*, cit., p. 701.

historic price depression. At one point, Dubai's benchmark plummeted to a dramatic \$7 per barrel²⁶. The event marked the beginning of a 20-year period in which prices averaged between \$18 and \$20 per barrel, before eventually crashing once more in 1998, following on from the Asian financial crisis.

The plunge in crude oil prices, therefore, adds a new variable to the oil shock equation: the gradual erosion of spare capacity of the 2000s has been the result of a twenty-year interlude of sluggish investment all along the petroleum supply chain, both in the upstream and downstream sectors. The nexus between this twenty-year trend and the oil shock at issue is not surprising: in general, there is strong evidence that the oil market has a natural tendency towards over and under-production capacity²⁷. Oil price spikes, indeed, tend to reduce global oil demand and give new momentum to a phase of intense investment. This, in turn, generates an excess of production capacity that eventually causes prices to crash. Ultimately, a plunge in oil prices is supposed to stimulate oil demand growth and to calm the investment race, gradually reducing spare capacity and pushing oil prices up again. In this sense, Zellou and Cuddington speak of "super cycles in oil prices"²⁸.

The events that have occurred from the mid-1980s to the 2000s can be interpreted in this light: by virtue of little demand, stagnating prices and huge spare capacity, major producing countries and international oil companies (IOCs) had no incentive in expanding their production capacity and, thus, refrained from investing capitals in the oil sector. From the mid-1980s, OPEC countries sought to avoid creating excess production capacity in order not to flood an already too liquid market with crude oil; otherwise, they would have risked causing prices to dive again below the \$10 threshold. On the other hand, the cartel was facing growing pessimism about demand growth rates for the

²⁶ PARRA, F., *Oil Politics: A Modern History of Petroleum*, London, IB Tauris, 2010, p. 287.

²⁷ LESCAROUX, F., "The petroleum market: the ongoing oil price "shock" and the next "countershock", *International Economics*, 121(1), 2010, p. 101.

²⁸ ZELLOU, A.M., CUDDINGTON, J.T., "Is There Evidence of Super Cycles in Oil Prices?", *SPE Economics & Management Journal*, 4(3), 2012, pp. 171-181. The authors give evidence that the years spanning from 1966 to 1996 constitute a "super cycle" in oil prices, precisely the period dealt with here.

years to come. The overproduction price collapse of 1998 further reinforced their fears, to the extent that, as late as 2004, Saudi petroleum minister Ali al-Naimi warned his fellow colleagues in an OPEC meeting at Algiers that they could not "forget 1998"²⁹. This trend of demand pessimism was fueled by continuously wrong forecasts, notably on the part of the International Energy Agency. The IEA consistently underestimated global oil consumption rates, which were in any case expected to be met by non-OPEC oil producers³⁰. In this respect, Paul Horsnell highlighted that, over the period spanning from 2001 to 2002, forecasts overestimated global oil production by some 1 mbd and underestimated global oil consumption by 2 mbd: a combined mismatch of 3 mbd for year 2003, which, to get an idea, corresponded to "the oil production of [...] Norway". That gap was met by OPEC and spare capacity kept on narrowing³¹. In this respect, OPEC countries preferred to concentrate on exploiting already existing oilfields, in order to maintain steady production levels, rather than expanding production capacity. After all, the decision to wait and not increase production is a good deal more fruitful than to invest and increase production in the face of a slump in oil consumption. It is simply absurd to invest capitals in expanding the production of a good that will be inevitably unsold, and, most importantly, that will probably induce a general price fall of that very good³². Put it another way, it was more profitable for OPEC to "err on the side of under-producing as opposed to over-producing"³³.

By the same token, IOCs' responses to the low price challenge have also somewhat contributed to that outcome: the 1990s and early 2000s have been two decades of little returns on capacity investment in the oil sector and, since crude oil prices were expected not to outpace the twenty-dollar ceiling, it was

²⁹ YERGIN, D., *The Quest*, cit., p. 163.

³⁰ FATTOUH, B., "The investment challenge for oil producing countries", *Middle East Economic Survey*, XLVII(38), 2004.

³¹ *Ivi*, p. 3.

³² MAUGERI, L., *The Age of Oil*, cit., p. 227.

³³ FATTOUH, B., "How secure are Middle East oil supplies?", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM33-HowSecureAreMiddleEastOilSupplies-BassamFattouh-2007.pdf>, accessed on October 14, 2015, p. 20.

unlikely that returns would have increased. The statement rendered by Stanley Luckoski, spokesman for Chevron/Texaco, at an IEA-organized meeting in Paris in 2004, is somewhat enlightening: "our long-term price guidelines are around the low \$20s"³⁴. Precisely during the 1990s, the IOCs devoted to the so-called *value-based management* strategies: if companies could not earn a rate of return on capital at least as great as the equities in the sector, then they should return funds to the shareholder, by means of share buy-backs or dividends, rather than investing themselves³⁵. "We'll give the money back to shareholders if we have to", said Robert Castaigne, chief financial officer for the French Total SA, at the same meeting, following Luckoski's argument³⁶. Accordingly, they had long ignored a great deal of investment chances, since returns were deemed to remain below the standards required by investors. Hence, IOCs refrained from undertaking costly and uncertain exploration campaigns³⁷. On the other hand, that was nothing but the logic outcome of being forced to deal with a low price context, and to operate under the belief that the oil industry had fully matured. It should not be forgotten that peak-oil theories had been brought back to the fore precisely in those years³⁸.

Within an environment of this kind, IOCs identified the key to maximizing profits in strict cost-cutting measures. Managements were put under pressure by investors, who asked them to demonstrate "capital discipline" and hold back expenditures. The watchwords were thus "take out costs" and "reduce capacity". This was the cause of reductions in professionals like geologists or engineers, drilling rigs, and everything else³⁹. The human cost has been particularly

³⁴ BHUSHAN, B., BARTA, P., "Awash in a gusher of cash, oil firms are reluctant investors", *The Wall Street Journal*, <http://www.wsj.com/articles/SB109348561733701631>, accessed on October 30, 2015.

³⁵ STEVENS, P., "Oil markets", *Oxford Review of Economic Policy*, 21(1), 2005, p. 22.

³⁶ BHUSHAN, B., BARTA, P., *Awash in a gusher of cash*, cit.

³⁷ MAUGERI, L., *The Age of Oil*, cit., p. 192.

³⁸ See for instance CAMPBELL, C.J., *The Coming Oil Crisis*, Multi-Science Publishing Co. & Petroconsultants, Brentwood, 1997 or CAMPBELL, C.J., LAHERRERE, J.H., "The end of cheap oil", *Scientific American*, 278(3), 1998. In his forecasts, the author, inspired by the contribution of Marion King Hubbert, came to the conclusion that at the very beginning of the twenty-first century, world petroleum production would have reached its peak.

³⁹ YERGIN, D., *The Quest*, cit., p. 166.

astonishing, with a loss of nearly 30 percent of the industry staff since 1990⁴⁰. In the late 1990s and early 2000s, not simply did skilled people leave the oil industry, but also university enrollments in petroleum engineering and other petroleum-related disciplines fell abruptly⁴¹.

In the short run, however, IOC's cost-cutting responses were being effective. The beginning of the twenty-first century was an era of staggering profits for international oil companies. 2004 and 2005 net profits of ExxonMobil were higher than those of any other industrial company, with an all-time record of \$36.1 billion in 2005⁴². In the first four years of the century, the operating cash flows of the six biggest international oil companies reached a total of around \$500 billion, the registered net profits were more than \$300 million cumulatively, and \$200 billion were the dividends and share buy-backs returned to shareholders⁴³. However, some companies fell victims to their own policy of short-term financial performance, which thus proved unsustainable: at the dawn of 2004, for instance, Shell unexpectedly downgraded its proven reserves by 4.47 million barrels of oil and gas.⁴⁴

It is useful to note another barrier to the flow of investments, which adds up to low prices and financial prudence, a barrier which the IEA itself acknowledges. It is the impossibility for IOCs to practically access the largest and cheapest reserves on earth. Given that the relationship between the owner of the natural resource, namely the government, national oil companies and international oil companies is one of non-cooperation, IOCs control no more than 8 percent of oil reserves globally⁴⁵. In other words, oil companies' investment plans were limited by their financial prudence and by their lack of access to the

⁴⁰ ANTILL, N., ARNOTT, R., "Oil company crisis: managing structure, profitability, and growth", Oxford Institute for Energy Studies, SP 15, 2002, p. 13.

⁴¹ YERGIN, D., *The Quest*, cit., p. 166.

⁴² MAUGERI, L., *The Age of Oil*, cit., p. 192.

⁴³ *Ibidem*.

⁴⁴ The New York Times, "Shell says overstated reserves led to exaggerated profits", <http://www.nytimes.com/2004/07/03/business/shell-says-overstated-reserves-led-to-exaggerated-profits.html>, accessed on October 30, 2015.

⁴⁵ FATTOUH, B., *How secure are Middle East oil supplies?*, cit., p. 19.

largest oilfields globally.

This does not mean, however, that investment did not take place at all: between 2003 and 2006, nominal capital expenditure increased by 70%, but a large share of the investments was being blunted by climbing industry costs⁴⁶. Expressed in cost inflation-adjusted terms, investment in 2005 was only 5% above that in 2000⁴⁷. In addition, a large part of that gross investment is likely to have been absorbed by the necessity to maintain production in fields already in place, rather than adding new production capacity⁴⁸. With regard to the latter, instead, the EIA has shown that, by the end of 1998, drilling activity in North America collapsed by 25 percent from its level a year earlier⁴⁹. The picture gets even more alarming as to whether Middle East is concerned. OPEC itself accounted for only 10 percent of the oil industry upstream investment during the 1990s⁵⁰, and the share slips to 2 percent by looking exclusively at the new wildcat wells drilled, even though the region is deemed to hold more than 30 percent of the world's yet-to-be-discovered petroleum⁵¹. Iraq, for instance, the OPEC country with the greatest margins of oil production growth for the years to come, has an immense potential still unexpressed, its western desert area being almost entirely virgin⁵². Saudi Arabia itself, the largest world oil exporter, owes more than a half of its massive oil production mainly to a single, giant field: al-Ghawar. Nonetheless, between 1995 and 2004, fewer than 100 new-field wildcats, only 150 appraisal wells and fewer than 5,000 development wells have been drilled in the entire Persian Gulf⁵³. It is instead North America, a region deemed to be mature, and with limited potential for new discoveries, that

⁴⁶ SAPORTA, V., TROTT, M., TUDELA, M., *What can be said about the rise and fall in oil prices?*, cit., p. 219.

⁴⁷ IEA, *World Energy Outlook*, 2006, p. 40.

⁴⁸ SAPORTA, V., TROTT, M., TUDELA, M., *What can be said about the rise and fall in oil prices?*, cit., p. 220.

⁴⁹ EIA, *International Energy Outlook*, 2003, p. 36.

⁵⁰ SMITH, J.L., *World oil: market or mayhem?*, cit., p. 153.

⁵¹ IEA, *World Energy Outlook*, 2006, p. 89.

⁵² MAUGERI, L., "The virgin oilfields of Iraq", *Newsweek*, <http://www.newsweek.com/virgin-oilfields-iraq-130617>, accessed on November 1, 2015.

⁵³ IDEM, "Two cheers for expensive oil", *Foreign Affairs*, 2(85), 2006, p. 152.

surprisingly accounted for 70 percent of global exploration activity in the 2000s: indeed, it is said to hold only about 3 percent of world's oil reserves⁵⁴.

In sum, all these elements are deeply intertwined and contributed crucially to eliminate excess production capacity both upstream and downstream throughout the industry. As a consequence, when demand for oil began to pick up again in the first years of the twenty-first century, little spare capacity resulted in market forces producing dramatic price increases. This happened because, in such a context, any sudden supply disruption or consumption peak could have done nothing but exacerbate the upward trend in crude oil prices. In the middle of the first decade of the century, high prices and the fact that the world demand had reached staggering peaks eventually determined investments to restart. However, there is always a time lag before the results of increased investment in oil production become visible, and here is where the problem lies. Even during a period of heavy investment, there is an average six-to-eight-year lag before new oil production capacity eventually comes on stream⁵⁵.

However, under-investment and the subsequent erosion of spare production capacity was not simply caused by stagnating prices, but there is another relevant ingredient that will now be taken into consideration.

2.2.2. Economic sanctions further restrict the market

Economic sanctions, the oil weapon of consuming countries, are another element on the list of the under-investment explanations, since they limit foreign investment flows and transfers of technology to the oil sector, thus hitting the productive capacity of the affected countries⁵⁶.

The Iraqi affair is the most meaningful example. Following the Iraqi invasion of Kuwait, on 6 August 1990, the United Nations passed Resolution 660⁵⁷,

⁵⁴ IDEM, *The Age of Oil*, cit., pp. 221-223.

⁵⁵ IDEM, *Understanding oil price behavior*, cit., p. 151.

⁵⁶ FATTOUH, B., *How secure are Middle East oil supplies?*, cit., p. 17.

⁵⁷ UN Security Council, *Resolution 661 (1990) Adopted by the Security Council at its 2933rd*

sanctioning an oil embargo on both Iraqi and Kuwaiti oil exports, while calling for the re-establishment of the *status quo ante*, that is the liberation of the little emirate. The embargo cut some 4 mbd from the international oil market. Saudi Arabia committed to offsetting the loss and OPEC temporarily abandoned production ceilings for all the members. In February 1991, then, the United Nations established a cease-fire, whose condition attached was the prohibition for Iraq of selling oil without U.N. authorization. As a consequence, by the end of 1996, the country was producing some 500,000-600,000 bd, with only a modest level of exports to neighboring countries, mainly Turkey and Jordan, in the form of smuggling⁵⁸.

In April 1995, the United Nations adopted a second resolution, Resolution 986⁵⁹, establishing a few measures under the name of *Oil-for-food Programme*. This time, Iraq was allowed to export oil for \$2 billion – and for \$ 5.2 billion from 1998 – over a six-month's time span. A special U.N. Commission, however, would have managed the petroleum revenues, deposited them in an escrow account and authorized their spending only for food and drugs. Finally, in 1999, Resolution 1284⁶⁰ eliminated all limitations on exports, but the United Nations were still in control of Iraqi oil revenues.

Iraq, however, was not the only country suffering economic sanctions. In July 1996, the U.S. Congress approved the Iran-Libya Sanctions Act (ILSA). As for Iran, these sanctions hit the country's oil sector, which was already suffering from the eight-year war with Iraq. As regards Libya, the country had already been hit by U.S. economic sanctions in 1986, which had led U.S. companies to leave the country. The measures imposed by the ILSA thus worsened an already problematic situation, since they “threatened even non-U.S. countries making large investments in energy”⁶¹. Indeed, some key provisions included in the Iran-

meeting, on 6 August 1990, 6 August 1990, S/RES/661 (1990).

⁵⁸ MAUGERI, L., *The Age of Oil*, cit., p. 151.

⁵⁹ UN Security Council, *Resolution 986 (1995) Adopted by the Security Council at its 3519th meeting, on 14 April 1995, 14 April 1995, S/RES/986 (1995).*

⁶⁰ UN Security Council, *Resolution 1284 (1999) Adopted by the Security Council at its 4084th meeting, on 17 December 1999, 17 December 1999, S/RES/1284 (1999).*

⁶¹ KEDDIE, N.R., *Modern Iran: Roots and Results of Revolution*, New Haven, Yale University Press,

Libya Sanctions Act required the U.S. President to impose at least two, out of a menu of six, sanctions on foreign companies undertaking an annual investment of more than \$20 million in the Iranian energy sector, or \$40 million in the Libyan one. In addition, foreign companies would have also been subject to those measures if they were to export to Libya technology that could be employed, among other uses, in developing its energy sector⁶².

The imposition of such limitations hindered spare capacity expansion: it prevented Iraq, Iran, and Libya to invest adequately in their own energy sector, therefore curtailing their long-term production capacity. More in general, the cut on investments on the energy sector triggered by the sanctions contributed to the inexorable thinning of spare capacity that would have then reached its peak at the dawn of the twenty-first century.

2.3. Light and sweet vs. heavy and sour oils: the refining challenge

Lastly, it is worth to spend a few words on a specific development intimately linked with the already mentioned period of restrained investment in the oil sector. Emphasis lays here on the downstream side of the industry, and most importantly on the refining sector. To begin with, it has been noted that historically low spare capacity in the upstream side of the oil industry goes hand in hand with low spare capacity in the downstream side of the oil industry. However, if spare capacity grows at a lower rate than demand in both sectors of the industry, the market is bound to witness an increase in prices⁶³. It can be meaningful to take a glance at some data in order to better grasp this phenomenon.

From the early 1980s, while global oil consumption was floundering, and as

2003, p. 265.

⁶² KATZMAN, K., "The Iran-Libya Sanctions Act (ILS)", Congressional Research Service Report for Congress, 2001, p. 2.

⁶³ MAUGERI, L., *Understanding oil price behavior*, cit., p. 148.

already mentioned it literally crashed to 58 mbd in 1983, global refining capacity jumped to 80 mbd⁶⁴. Thus, between the 1980s and the 2000s, the main problem facing the downstream sector was again the need to absorb excess capacity and, just like the upstream side of the industry, it went through two decades of inadequate investments. In addition, the refining industry is usually the weakest ring of the entire oil supply chain. After all, investment in the downstream sector has historically lower returns than the upstream sector⁶⁵. The fact that the price range remained for most of the time at \$18-\$20 put pressure on many little refineries; the owners were suffering deep-rooted fear of not being able to recover their investment, and this prevented them from upgrading their facilities. It is sufficient to consider that in the United States not a single refinery has been built since 1981⁶⁶; moreover, the situation for the management of refineries was worsened in the 1990s, and most importantly in the 2000s: stringent ecological regulations and specifications on products were imposed on gasoline, diesel, and other oil products worldwide, discouraging upgrading even more⁶⁷. Given these premises, it is no accident that refining utilization rates were slightly more than 90 percent for the whole 1990s, and over 95 percent since 2004⁶⁸. Therefore, in the 1990s, but also in the first years of the new millennium, it was very difficult to expand or upgrade facilities in refineries in industrialized countries due on the one hand to a low price context, and on the other hand, to environmental regulations and local opposition, thus preventing companies to make significant investments in the oil refining industry.

But that was not the end of it. At the OPEC meeting held in Caracas in 2006, Saudi oil minister Ali Naimi underlined that oil markets were "oversupplied" at the time, thus taking positions against a possible enlargement of production

⁶⁴ IDEM, *Two cheers for expensive oil*, cit., p. 155.

⁶⁵ MABRO, R., "Introduction", in MABRO, R. (ed.), *Oil in the Twenty-first Century: Issues, Challenges, and Opportunities*, Oxford, Oxford University Press, 2006, p. 13.

⁶⁶ DÉES, S., GASTEUIL, A., KAUFMANN, R.K., MANN, M., "Assessing the factors behind oil price changes", Working Paper Series No. 855, European Central Bank, 2008, p. 5.

⁶⁷ KESICKI, F., "The third oil price surge – what's different this time?", *Energy policy*, 38(3), 2010, p. 1600.

⁶⁸ *Ibidem*.

quotas on the part of the cartel⁶⁹. By the same token, the President of Venezuela Hugo Chavez, in keeping with the minister's statement, added that there was "an excess of oil in the market"⁷⁰. By making these statements, the two figures brought to light another structural, and in some way inherently paradoxical, feature of the oil market, notably in the 2000s: tight spare capacity can coexist with oversupplied oil markets. Put it another way, one of the main ingredients of the first oil price shock of the twenty-first century has its roots in an oil market witnessing an erosion of spare capacity of *certain qualities* of crude and, at the same time, the abundance of other qualities of crude.

It can be helpful to take a step back. Crude oil is not at all a homogeneous good; on the contrary it comes in a wide spectrum of qualities and types⁷¹. The two most relevant features to determine the quality of a specific kind of petroleum are density – thickness or lightness – and its sulfur content. The former is quantified through the API gravity index, a scale which measures the density of crude oil relative to water: the higher the API value, the lower the density of the oil. The API scale for crudes ranges from 10° - that also equals the density of water – for the heaviest oils, to more than 45° for the lightest. As for sulfur content, which is instead an undesirable element for the purposes of the refining process, crudes with more than 1.5 percent of sulfur are referred to as sour crudes, whereas those with less than 0.5 percent of sulfur are said to be sweet crudes. In the middle lie medium-sour crudes⁷².

The vast range of different crude oils, however, challenges the downstream side of the industry, since each type of oil yields different quantities and qualities of final oil products, based on the following principle: the better the quality of petroleum, the more the quantity of value-added petroleum products that a

⁶⁹ FATTOUH, B., "OPEC's discounts on heavy crude oil: is a new policy instrument taking shape?", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/June2006-OPECsdiscountso-HeavyCrudeOil-BassamFattouh.pdf>, accessed on September 30, 2015, p. 1.

⁷⁰ *Ibidem*.

⁷¹ MAUGERI, L., *The Age of Oil*, cit., p. 233.

⁷² FATTOUH, B., "The dynamics of crude oil price differentials", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM36-TheDynamicsofCrudeOilPriceDifferentials-BassamFattouh-2008.pdf>, accessed on October 11, 2015, p. 7.

refinery can get⁷³. Therefore, different qualities fetch different prices: the lightest and sweetest qualities, such as the two benchmarks West Texas intermediate (WTI) and Brent, generally command a premium over the heaviest and sourest ones, for instance the Arabian Heavy⁷⁴. This entails that developing more refining capacity is insufficient by itself; new refining capacity should be able to convert different varieties of crude into the various refined products, for instance gasoline and diesel. Lacking such flexibility, even a supply excess might not necessarily be sufficient to match demand⁷⁵, and this is likely to be the case if world refining capacity is not able to handle certain qualities of crude oil.

When the 2000s kicked off, indeed, much of the world's refining capacity was set up to deal with light and sweet crude oils, and all growth in oil products demand since the 1990s was for light ones. The problem was that only 20 percent of global oil supply fell within the categories of light and sweet crudes. On the contrary, in the 1990s, and in the 2000s in particular, much of the idle production capacity globally was made up of heavy and sour qualities, accounting for around 60 percent of globally available crudes, even 80 percent including the medium-heavy and sour qualities⁷⁶. In other words, the marginal barrel of crude oil that refineries were able to handle was of a light and sweet quality, whereas the marginal supply was of a heavy and sour quality⁷⁷. This means that the global refining industry has been increasingly incapable of dealing with those specific kinds of petroleum made available by major producing countries. Specifically, what the global refining industry lacked was de-sulfurization and deep conversion capacities, reflecting the interlude of restrained investment in the oil sector throughout the 1980s and 1990s⁷⁸. The picture gets even more worrisome by considering that OPEC was holding and still holds some 70 percent of the world's proven reserves. It is in this light that

⁷³ MAUGERI, L., *The Age of Oil*, cit., p. 235.

⁷⁴ FATTOUH, B., *OPEC's discounts on heavy crude oil*, cit., p. 1.

⁷⁵ MAUGERI, L., *Two cheers for expensive oil*, cit., p. 155.

⁷⁶ IDEM, *Understanding oil price behavior*, cit., p. 157.

⁷⁷ DÉES, S., GASTEUIL, A., KAUFMANN, R.K., MANN, M., *Assessing the factors*, cit., pp. 10-11.

⁷⁸ *Ivi*, p. 20.

one should interpret the words of Ali Naimi: "no refinery is able to handle heavy crudes", or the words of the Iranian delegate at the same meeting, "anybody who has oil of less than 30 API can't find buyers"⁷⁹. The paradox was that, while the market appeared to be sufficiently supplied with crude oil, it was not of the right quality.⁸⁰

Furthermore, on 29 August 2005, Hurricane Katrina pounded the Gulf of Mexico, along whose shores was located almost a third of the U.S. entire refining capacity⁸¹, which is also the single largest refining complex on earth⁸². Besides bringing about a dramatically severe human tragedy, the storm had a destructive impact on the Gulf's petroleum-refining industry, cutting off about 10 percent of the U.S. refining capacity⁸³. The impact is even more striking by considering how the storm affected the utilization rates of the complex: prior to the event, those refineries were operating at about 95 percent, whereas Katrina reduced utilization to 87 percent⁸⁴. To give an idea of the proportions of such a phenomenon, Déés *et al.* proposed a model in which, by simulating a decrease in the global refinery utilization rate by 5 percent, crude oil prices would increase by around 20 percent⁸⁵. Indeed, oil prices moved accordingly: on August 30, the WTI reached \$70 per barrel⁸⁶.

In sum, at the turn of the twenty-first century, all the ingredients were there for the perfect oil-shock recipe: a twenty-year-long period of under-investment, both in the upstream and downstream sides the petroleum supply chain, inhibited the only instrument available to oil markets to keep oil prices at bay, namely spare capacity, thus setting the table to sudden demand shocks and

⁷⁹ FATTOUH, B., *OPEC's discounts on heavy crude oil*, cit., p. 1.

⁸⁰ MAUGERI, L., *The Age of Oil*, cit., p. 195.

⁸¹ YERGIN, D., *The Quest*, cit., p. 141.

⁸² MAUGERI, L., *The Age of Oil*, cit., p. 196.

⁸³ YERGIN, D., "The Katrina crisis", *The Wall Street Journal*, <http://www.wsj.com/articles/SB112562841827429987>, accessed on November 1, 2015.

⁸⁴ BRADLEY, R., TANTON, T., "U.S. petroleum refining: let the market function", Institute for Energy Research, <http://instituteforenergyresearch.org/studies/petroleum-refining-and-the-free-market/>, accessed on November 1, 2015.

⁸⁵ DÉÉS, S., GASTEUIL, A., KAUFMANN, R.K., MANN, M., *Assessing the factors*, cit., p. 20.

⁸⁶ MAUGERI, L., *The Age of Oil*, cit., p. 196.

supply disruptions.

3

MARKET FUNDAMENTALS: THE LAW OF SUPPLY AND DEMAND

3.1. Premises

The price of crude oil, as for all goods and services, is determined by the intersection of the supply and demand curves. However, crude oil is not like all goods and services. There are some specific features that set crude oil markets apart and make them prone to more frequent price movements than other markets for goods and services⁸⁷.

One of the peculiarities of petroleum is that it is largely confined to a small circle of countries, namely OPEC, the cartel that boasts 70 percent of world proven reserves and about 40 percent of the global market share. A big portion of OPEC members are actually fringe producers, with the bulk of production being concentrated only in a fistful of countries, namely Saudi Arabia, Kuwait, Iran, and Iraq. Overlooking for a moment the extent to which OPEC effectively exerts an oligopolistic control over the market⁸⁸, such a limited number of suppliers represents a major risk for the oil market: should they be unable to put oil on stream, markets would easily be subject to price shocks.

Another crucial characteristic of black gold, this time on the demand side, is that it is largely irreplaceable in some key sectors of the economy, the transport sector above all. A 2008 report by the IEA, for instance, found that the share of transport in global oil consumption was 52 percent in 2006⁸⁹. Hence, oil

⁸⁷ BEHR, T., "The 2008 oil price shock: competing explanations and policy implications", Global Public Policy Institute, Global Energy Governance Project, Policy Paper Series No. 1, 2009, p. 7.

⁸⁸ See Chapter 4.

⁸⁹ IEA, *World Energy Outlook*, 2008, p. 99.

consumers are not able to switch to other sources of energy at a rapid pace. On the contrary, they keep on demanding barrels, making price changes even more “shocking”. Supply and demand for oil, thus, do not seem to work in the same way like those for all goods and services.

That said, here is a snapshot of supply and demand during the years of the first oil price hike of the twenty-first century.

3.2. The demand side of the crisis

3.2.1. The demand shock (2003-2004)

At the turn of the twenty-first century, the oil sector went through a set of events that would indelibly mark the path of crude oil prices for the decade to come: one of these was an oil rush that was acquiring a global dimension. In other words, since 2000 oil markets witnessed the emergence of what Yergin defined the "globalization of energy demand"⁹⁰. In the aftermath of the Asian financial crisis, which brought once again crude oil prices below \$10 per barrel in 1998, world oil consumption started to climb seamlessly up until 2005. During that very year, when prices broke the barrier of \$60, demand peaked to a staggering 83 mbd. From that moment on, however, demand growth began to slow down, but it nevertheless outstripped 86 mbd in July 2007⁹¹, and almost touched 87 mbd one year later⁹².

Let us consider the first half of the 2000s. The 83 mbd achieved in 2005 were the outcome of an exceptional two-year demand growth occurred between 2003 and 2004: the "demand shock". In those two years, global oil demand leapt forward by 1.8 mbd and by 3.2 mbd respectively, with the latter being the largest

⁹⁰ YERGIN, D., *The Quest*, cit., p. 162.

⁹¹ IEA, *Medium-Term Oil Market Report*, July 2007, p. 11.

⁹² IEA, *Medium-Term Oil Market Report*, July 2008, p. 19.

annual increase since the 1970s⁹³. By contrast, from 2000 to 2002, growth was on average only around 600,000 bbl annually. The possibility that such a jump was simply reflecting a cyclical recovery of demand was soon dismissed because of the growing thirst for petroleum elsewhere on earth. For decades, global oil demand had been the preserve of industrial countries: from 1980 to 2000, they were accounting for about two-third of global oil consumption. Nevertheless, at the dawn of the new millennium their predominance was ebbing away with the rise of emerging economies. In addition, a relevant portion of that growth was a good deal unexpected⁹⁴: from 2002 to 2005, the sixth-month ahead forecasts of oil demand by the IEA were on average 2 percent lower than the actual outcome⁹⁵.

Throughout 2004, crude oil demand in non-OECD countries registered a robust growth rate of 7.9 percent, equivalent to 2.4 mbd, and thus reached 33.1 mbd⁹⁶. Among them, China was bearing the lion's share. The country's energy needs were expanding, and coal, the country's main energy source, simply could not adequately fuel the Chinese export machine. Since oil domestic output was remaining stable, Beijing had to order a massive increase in imports, to the extent that from the mid-1980s to the 2000s China passed from a position of net exporter to that of net importer. Between 2003 and 2004, Chinese oil consumption jumped by 900,000 bbl, or by 16 percent, accounting for over one-quarter of the annual growth of global demand⁹⁷. Overall, its 2004 oil consumption settled at 6.4 mbd, compared with the 4.7 mbd in 2000: Chinese oil demand grew by almost 40 percent in four years. These figures indicate that China had by then become the second largest oil consumer on earth, second only to the United States. Nonetheless, even after the 2000-2004 buying rush, the

⁹³ SHIHAB-ELDIN, A., "The outlook for oil to 2020", in MABRO, R. (ed.), *Oil in the Twenty-First Century*, cit., p. 21.

⁹⁴ Besides, in January 2004 the IEA expected global oil demand to increase by 1.2 mbd for the end of the year. As previously mentioned, instead, demand rose by a record 3.2 mbd. For further detail, see IMF, *World Economic Outlook*, April 2005, p. 58.

⁹⁵ SAPORTA, V., TROTT, M., TUDELA, M., *What can be said about the rise and fall in oil prices?*, cit., p. 217.

⁹⁶ IEA, *Medium-Term Oil Market Report*, July 2006, p. 17.

⁹⁷ *Ivi*, p. 18.

"China factor" was still accounting for only 8 percent of the entire oil demand⁹⁸. Just add India to the equation. By the mid-1990s, Indian oil demand was hovering around 1.5 mbd, but in 2004 it touched 2.5 mbd, an increase of 60 percent within a sole decade. According to the IMF, the joint impact of the Chinese and Indian petroleum needs contributed on the order of 35 percent to the incremental oil consumption between 1990 and 2003, and 40 percent if year 2004 is included⁹⁹.

It is not by chance that precisely China and India were among the most active countries seeking new producing areas to satisfy their growing domestic energy needs. China, for instance, was by then negotiating new drilling rights for oilfields in Kazakhstan and Siberia, but the hot target was Russian oil. In the mid-2000s, Beijing established contacts with the Russian leadership for the construction of a pipeline reaching the craved Siberian oil wells. India, for its part, concluded new oil and gas deals with countries like Ecuador and Iran¹⁰⁰.

Having provided these data about the huge increase in oil consumption of China and India, it must be borne in mind that such increase never got to fill the consumption gap between these countries and OECD countries: in absolute terms, the latter never ceased to be the main consumers of petroleum worldwide. The United States, Western Europe, and Japan together were still draining about half of the annual oil production¹⁰¹. Yet OECD average demand was declining year on year, and remarkably since 2005¹⁰². The United States represented the only exception to that downward trend in oil consumption on the part of industrial countries. Here, a robust demographic growth and low taxes on petroleum-derived products caused demand for oil to hike through the 1990s, almost reaching 22 mbd in late 2005: an astonishing figure, equivalent to

⁹⁸ MAUGERI, L., *The Age of Oil*, cit., p. 243.

⁹⁹ IMF, *World Economic Outlook*, April 2005, p. 158.

¹⁰⁰ KLARE, M., *Blood and Oil: The Dangers and Consequences of America's Growing Dependency on Imported Petroleum*, New York, Henry Holt and Company, 2005, p. 208.

¹⁰¹ IMF, *World Economic Outlook*, April 2005, p. 158.

¹⁰² SAPORTA, V., TROTT, M., TUDELA, M., *What can be said about the rise and fall in oil prices?*, cit., p. 217.

almost the oil demand in the entire Asian continent¹⁰³. By 2004 U.S. demand rose by 3.5 percent over the previous year, that is nearly 700,000 bd¹⁰⁴. It is noteworthy that also for the United States, demand growth rates have been underestimated, this time on the part of the Energy Information Administration (EIA). In its forecast of August 2004, it reported an increase of only 1.9 percent for the end of the year¹⁰⁵.

Now a question arises. Why did demand rebound so quickly and unexpectedly?

3.2.2. *A matter of elasticity: demand*

According to Hamilton, changes in income are the key determinants of the quantity of oil demanded and, to demonstrate it, he plotted petroleum consumption against GDP for the United States from the 1950s and found that oil consumption followed income growth remarkably steadily¹⁰⁶. Thus, to throw light to the consumption trend globally, it could be meaningful to take a glance to the relationship between global demand and economic activity. In other words, there is evidence that the upward trend in global energy demand can be ascribed to the sudden economic development registered in the first half of the 2000s.

In 2004 world GDP growth peaked at an exceptional rate of 5.3 percent, the highest annual rate since the 1970s, and remained strong at 4.3 percent in 2005. A big portion of this peak can be attributed to non-OECD countries, notably those belonging to the Asian continent, what led to much higher-than-expected oil quantity demanded¹⁰⁷. One reason for the continuous underestimation in demand growth was precisely errors in expectations of income growth. The IMF forecasts for GDP growth in non-OECD Asia, for instance, were repeatedly

¹⁰³ MAUGERI, L., *The Age of Oil*, cit., p. 244.

¹⁰⁴ NORENG, O., *Crude Power: Politics and the Oil Market*, London, I.B. Tauris, 2006, p. xxx.

¹⁰⁵ EIA, *Short-Term Energy Outlook*, August 2004, p. 3.

¹⁰⁶ HAMILTON, J., "Causes and consequences of the oil shock of 2007-08", National Bureau of Economic Research, Working Paper No. 15002, 2009, pp. 1-2.

¹⁰⁷ IEA, *World Energy Outlook*, 2006, p. 290.

revised upwards over the period 2003-2005: annual growth rates turned out to be on average 1.6 percent higher than expected the previous year¹⁰⁸.

By 2004, China's economic growth had an impressive double-digit rate of 15 percent, and the rate was 8.2 for India¹⁰⁹. What these figures show is that the impressive demand growth rates occurred in those regions seem to go hand in hand with income growth¹¹⁰. Therefore, it could be worthy to interpret the demand shock through the lens of the *income elasticity of demand*, the notion that measures the responsiveness of global demand to an increase in gross domestic product.

Estimates for the income elasticity of crude oil demand differ widely with respect to the method employed, and the periods and countries under study, but most results range from as low as 0.2 to above unity¹¹¹. This means that each 1-percent increase in global GDP could trigger an increase by 0.2 to 1 percent in global oil demand. The width of the reference interval suggests that there is large heterogeneity across countries. Oil demand in developed countries is usually highly inelastic in terms of income, meaning that as GDP increases demand for oil responds, but to a smaller extent. On the contrary, developing countries exhibit a higher income elasticity: for them, especially those that experienced the higher rates of GDP growth, improvements in income are associated with a more than proportional increase in demand. In general, income elasticity of demand for non-OECD countries is at least double than that for OECD countries¹¹². This means that non-OECD economies showed a greater oil intensity, that is the quantity of oil demand for each dollar of GDP, whereas OECD economies saw

¹⁰⁸ SAPORTA, V., TROTT, M., TUDELA, M., *What can be said about the rise and fall in oil prices?*, cit., pp. 217-219.

¹⁰⁹ IEA, *Medium-Term*, July 2006, cit., p. 18.

¹¹⁰ SAPORTA, V., TROTT, M., TUDELA, M., *What can be said about the rise and fall in oil prices?*, cit., pp. 217-219.

¹¹¹ See for instance KRICHENE, N., "World crude oil markets: monetary policy and the recent oil shock", IMF Working Paper, No. 62, 2006; GATELY, D., HUNTINGTON, H.G., "The asymmetric effects of changes in price and income on energy and oil demand", *The Energy Journal*, 23(1), 2002, pp. 19-55; HAMILTON, J., *Causes and consequences*, cit.

¹¹² FATTOUH, B., *The drivers of oil prices*, cit., p. 133-134.

their demand responsiveness to income decline over time¹¹³.

The period at issue is also a discriminating factor. Taking the estimates provided by the IEA, between 1971 and 1990, each 1 percent increase in global GDP was accompanied by a 0.66 increase in oil consumption. The corresponding increase in demand dropped to only 0.44 between 1990 and 2000, but it recovered and reached 0.68 precisely in 2000-2005¹¹⁴. Extremely rapid economic expansion in many countries outside the OECD, especially in Asia, is the first reason why energy demand has accelerated in recent years. In this sense Saporta *et al.* argued that between 2002 and 2007, income growth in non-OECD countries generated some 5.2 mbd of additional oil demand, while it added only 1.8 mbd in developed economies¹¹⁵.

The big news at the end of 2004 was, however, that \$60 oil was surprisingly not sufficient to prevent quantity demanded from registering record peaks. While income elasticity of oil demand is relatively high, especially in countries witnessing persistent high growth rates, demand seemed to be a good deal resilient to even large changes in prices. Petroleum demand is therefore highly inelastic with respect to oil prices. In other words, the global oil market is also characterized by a low *price elasticity of demand*¹¹⁶. Price elasticity of oil demand measures the responsiveness of consumption to a relative change in oil prices, that is the extent to which consumption growth will slow down in response to higher prices.

Estimates of price elasticity of demand for crude oil vary by place, time and the statistical techniques employed. It ranges from 0.01 to 0.1 for the short term and from 0.1 to 0.64 for the long term¹¹⁷. Let us take the average figure, proposed by the IEA in 2008 across all regions, of 0.03 for the short term and 0.15 for the

¹¹³ MAUGERI, L., *The Age of Oil*, cit., p. 242.

¹¹⁴ IEA, *World Energy Outlook*, 2008. p. 64.

¹¹⁵ SAPORTA, V., TROTT, M., TUDELA, M., *What can be said about the rise and fall in oil prices?*, cit., pp. 217-219.

¹¹⁶ FATTOUH, B., *Oil market dynamics*, cit., p. 16.

¹¹⁷ See for instance ASKARI, H., KRICHENE, N., "Oil price dynamics (2002-2006)", *Energy Economics*, 30(5), 2008, pp. 2134-2153; KRICHENE, N., *World crude oil markets*, cit.; COOPER, J.C.B., "Price elasticity of demand for crude oil: estimates for 23 countries", *OPEC Review*, 27(1), 2003, pp. 1-8; FATTOUH, B., *The drivers of oil prices*, cit.

long term. Such figures show that variations in prices generate little response in the quantity of crude oil demanded: a permanent doubling of crude oil prices would be expected to cut oil demand by about 3 percent in the short run and by 15 percent in the long run¹¹⁸.

Even though there are sizable variations among estimates, there are some elements they all seem to share. All the authors cited agree about the fact that price elasticity is lower in non-OECD countries than in OECD countries, meaning that in the face of higher prices, demand in the former would be much more insensitive than in the latter with respect to prices. A convincing explanation might be the administrative distortion of energy prices by means of subsidies or price regulations in emerging economies. Those measures kept the final prices of gasoline and other oil derivatives artificially below market levels, thereby cushioning the impact on demand¹¹⁹. Indeed, essentially all of the increase in global oil consumption in the first half of the 2000s occurred in countries in which fuel prices were heavily subsidized and demand was not fully responsive to price signals. Price controls and subsidies were thus interfering with the economic relationship between market prices and consumption¹²⁰. China was one of the most meaningful example¹²¹.

In addition, the price elasticity of demand is lower in the short run than in the long run: there is no available substitute for oil and petroleum products in the short run, especially in the transport sector. It is difficult for end users to switch to other fuels or alter the stock of fuel-consuming equipment¹²². It can take years before rising oil prices lead to a substantial reduction in oil consumption. It has been noted that the erosion of demand began somewhere within the range of \$75-100 per barrel¹²³.

¹¹⁸ IEA, *World Energy Outlook*, 2008, p. 97.

¹¹⁹ IEA, *World Energy Outlook*, 2008, p. 94.

¹²⁰ Interagency Task Force on Commodity Markets, *Interim report*, cit., pp. 8-9.

¹²¹ See for instance TAN, X., WOLAK, F., "Does China underprice its oil consumption?", http://web.stanford.edu/group/fwolak/cgi-bin/sites/default/files/files/china_oil_pricing_020909.pdf, accessed on December 1, 2015.

¹²² SMITH, J.L., *World oil: market or mayhem?*, cit., p. 154.

¹²³ MAUGERI, L., *Understanding oil price behavior*, cit., p. 162.

The combination of high income and low price elasticities of demand is thus a major issue to be borne in mind to understand the tightening of the oil market at issue.

3.3. The supply side of the crisis, part one

3.3.1. Global supply constraints

At the same time, supply was going through some hard times. As already seen, OPEC was "called" to respond by depleting its remaining spare capacity to offset all those barrels that were requested on the market.

The unexpected under-performance of global oil supply lies in the producing areas outside the cartel¹²⁴. For non-OPEC producers, the golden age of the 1970s and early 1980s was long gone. Their supply was by then struggling to keep pace even in a relatively high price context like that of the early 2000s, whilst a couple of decades before let them make their way over the oligopoly of OPEC and claim a fair share of the world oil market. Indeed, in spite of the overall rise in oil prices between 2000 and 2008, the response of non-OPEC supply remained static, mirroring the key structural changes occurred in the oil market since the mid-1980s. A 2009 OPEC report shows perfectly that lack of responsiveness. Non-OPEC annual decline rate averaged at 4.6 percent over the entire period 2000-2008¹²⁵.

Much of the growth in non-OPEC supply occurred in the Former Soviet Union territories, with the Russian Federation as their leader. From 2000 to 2004, Russia accounted on average for 65 percent of total non-OPEC oil supply growth, with an annual growth hovering around 6 percent and a peak of 11 percent in

¹²⁴ For instance, in IEA, *Oil Market Report*, July 2004, p. 1, the agency forecast that in 2005 non-OPEC countries would have produced 51.3 mbd, or 1.1 mbd lower than the quantity actually produced.

¹²⁵ OPEC, *World Oil Market Outlook*, 2009, p. 22.

2003¹²⁶. However, the former Cold War player represented just an isolated case.

The poorest performance was offered by OECD countries. As correctly predicted by Marion K. Hubbert in 1956, the United States had already reached peak production in the early 1970s, and in the time span considered here its production was about half the level achieved at the time¹²⁷. In 2005, oil wells in the Gulf of Mexico, which account for one-quarter of the entire U.S. crude production, were still recovering from the devastating impact of Hurricane Katrina. Their output was nearly 1.7 mbd in 2003; after the storm, the barrels daily produced were 1.28 million¹²⁸. Along the spectrum of OECD producers, nonetheless, the North Sea was undoubtedly the region that disappointed the most. From 2000, when it was still accounting for 8 percent of world oil production, the North Sea witnessed a sudden and irreversible decline¹²⁹. Supply passed from 6.39 mbd in 2000 to a dramatic 2.11 mbd in 2005¹³⁰.

It should come as no surprise that by the fall of 2004, when prices climbed over \$50 per barrel, OPEC had little option but to quickly raise short-term production, putting on stream what was left of spare capacity. Indeed, during 2003-2005, installed OPEC capacity increased to 32.1 mbd, a rise of about 1.5 mbd, with the Saudis accounting for the most of the adjustment¹³¹.

3.3.2. *A matter of elasticity: supply*

In Chapter 2, the fundamental elements of every discourse regarding the 2000-2008 oil price shock have been examined. Let us see more in depth how the erosion of spare capacity actually constrained global oil supply. To begin with, developing new oil production capacity is a long-term business: there are

¹²⁶ IEA, *Medium-Term Oil Market Report*, July 2006, p. 33.

¹²⁷ HAMILTON, J., *Causes and consequences*, cit., p. 9.

¹²⁸ IEA, *Medium-Term Oil Market Report*, July 2008, p. 44.

¹²⁹ HAMILTON, J., *Causes and consequences*, cit., p. 9.

¹³⁰ EL-GAMAL, M.A., JAFFE, A.M., *Oil, Dollars, Debt, and Crises: The Global Curse of Black Gold*, New York, Cambridge University Press, 2010, p. 155.

¹³¹ IEA, *Medium-Term Oil Market Report*, July 2006, p. 39.

enormous time lags between the initial discovery of a new oilfield and the time at which new oil comes on line. This suggests that also crude oil supply is inherently *inelastic*, notably in the short run¹³².

Price elasticity of crude oil supply – the extent to which production responds to a relative change in price – is supposed to range from 0.02 to 0.26 for the short term and from 0.08 to 0.6 for the long term, depending again on the method employed, the time-span and the region considered¹³³. Even though the reference interval is significantly large, what matters is that oil supply is highly insensitive to price movements. A doubling of prices would indeed induce an immediate supply response on the order of 2 to 26 percent.

One of the most relevant findings of the estimates is that the non-OPEC supply curve is much more inelastic than the one of the cartel. In non-OPEC countries, most oilfields run at or near full capacity, in the sense that they usually operate with little spare capacity or even without it. The reason is that marginal costs for barrel are typically greater for non-OPEC countries, something that restricts the ability of the country's market operators to increase production as price increases. On the contrary, OPEC's supply curve is in theory much flatter. Having lower marginal costs of production lets member countries “spare” their capacity, that is put aside barrels of oil so that they can stem a price rise in case of interruptions of the normal flow of supply. Therefore, OPEC's and especially Saudi Arabia's reaction to price movements depends on expectations of future demand, with the aim of maximizing the value of their reserves. More in general, such reaction depends on the production quota established within the organization.

The fact that it takes six to eight years for new capacity to come on stream entails that the burden is borne by the production capacity which is immediately available. However, at the turn of the century, the majority of supply consisted of heavy grades of crude, and most importantly, markets were made up of

¹³² SMITH, J.L., *World oil: market or mayhem?*, cit., p. 150.

¹³³ See for instance KRICHENE, N., *World crude oil markets*, cit.; SMITH, J.L., *World oil: market or mayhem?*, cit.

dramatically thin levels of spare capacity. All this could do nothing but steepen an already inherently inelastic supply curve. As Hamilton put it, "in the absence of significant excess production capacity, the short-run price elasticity of oil supply is very low"¹³⁴. By contrast, abundant spare capacity effectively increases the elasticity of oil supply and generates strong signals to the oil market, even when it is going through strong supply shocks¹³⁵.

A direct implication of these low price elasticities is that even small excess demand or excess supply of crude oil requires large jumps in prices to clear the global oil market¹³⁶.

3.3.3. *The joint impact of low price elasticities of supply and demand*

In a 2009 report, the IEA argued that low elasticity on both supply and demand curves is a "clear recipe for high volatility" in crude oil prices¹³⁷. Indeed, if crude oil demand is highly inelastic, oil producing countries may refrain on purpose from quickly expanding production capacity, so that they can safeguard the revenues coming from the higher oil prices. Price elasticity of oil demand thus feeds back into the behavior of oil producers by further postponing investments in new production, and leading to a gradual depletion of spare capacity¹³⁸.

As already observed, however, the erosion of that security cushion since the mid-1980s went hand in hand with the decrease in the price elasticity of oil supply. Under-investment periods and capacity constraints do not simply affect the supply side of the oil market, but are also able to induce a different behavior on the demand side. In fact, supply constraints can put considerable strain on

¹³⁴ HAMILTON, J., "Understanding crude oil prices", *The Energy Journal*, 30(2), 2009, p. 204.

¹³⁵ FATTOUH, B., *The drivers of oil prices*, cit., p. 137.

¹³⁶ BAUMEISTER, C., PEERSMAN, G., "The role of time-varying price elasticities in accounting for volatility changes in the crude oil market", *Journal of Applied Econometrics*, 28(7), 2012, p. 1090.

¹³⁷ IEA, *Medium-Term Oil Market Report*, June 2009, p. 102.

¹³⁸ GATELY, D., *OPEC's incentives*, cit.

consumers, since they expect markets to be even tighter, what raise fears about possible oil scarcity in the future. This made market participants willing to pay a higher price for the same amount of barrels, in order to protect themselves from possible supply disruptions. This, in turn, means that in the first half of the 2000s the demand shock was driven also by a relevant portion of *precautionary demand*¹³⁹: it reflects the convenience yield from having access to inventory holdings of oil that can work as insurance in the face of supply constraints, as a shortfall in production may not be replaced by other producers¹⁴⁰. As a result, price elasticities seem to reinforce each other: they inversely combine to create a large multiplier effect, at the same time pushing demand and limiting supply.

All was ready for a supply disruption.

3.4. The supply side of the crisis, part two

3.4.1. Global supply disruptions

History teaches that most oil crisis require the conjunction of a number of events that normally do not occur simultaneously and basically they are a matter of contingency. Among these events, geopolitical tensions hold undoubtedly a prominent position and are usually the spark that triggers large jumps in oil prices. Take, for instance, the 1973 oil crisis and its link with the Yom Kippur war. Or consider the thread binding the 1979 oil shock, the Islamic revolution in Iran, and the Iran-Iraq war. In Alan Greenspan's words, "existing reserves and production capacity [had] become subject to potential geopolitical adversity"¹⁴¹. Indeed, the fears of the former chairman of the Federal Reserve Bank were valid.

¹³⁹ BAUMEISTER, C., PEERSMAN, G., *The role of time-varying price elasticities*, cit., p. 1090.

¹⁴⁰ KILIAN, L., "Not all oil price shocks are alike: disentangling demand and supply shocks in the crude oil market", *American Economic Review*, 99(3), 2009, p. 1054.

¹⁴¹ Quoted in KLARE, M., *Blood and Oil*, cit., p. 210.

3.4.2. *Petróleos de Venezuela*

On April 7, 2002, Venezuelan President Hugo Chavez went live on television at the talk show *Alo Presidente* and announced the layoff of seven executives from the board of the national oil company *Petróleos de Venezuela S.A. (PdVSA)*¹⁴², a drastic measure against the continuous opposition to the energy policy pursued by the Venezuelan leader since 2001. Chavez, indeed, had put in place a profound reshaping of the Venezuelan economy, passing a package of forty-nine laws which included a new law on hydrocarbons, whose provisions aimed at tightening government's control over the oil industry by raising to 30 percent the royalty rates to be paid if foreign investors were to open a joint venture in Venezuela¹⁴³.

Two days later, on April 9, unions responded by calling a general strike: 500,000 people, among which political opponents, labor groups, business organizations, and members of the civil society marched towards the Miraflores presidential palace to force Chavez to resign. Violence escalated quickly and what was a peaceful protest ended up with the death of seventeen demonstrators and more than one hundred injured. An unsuccessful *coup d'état* followed on April 11: Chavez regained the President position in just two days thanks to some military units still loyal to him. Having failed to oust Chavez militarily, unions and the business community, with PdVSA managers at the forefront, called a second general strike in order to force the Venezuelan leader into a referendum on his governance¹⁴⁴. This time, however, the protest would eventually last sixty-three days from December 2002 to February 2003, with dramatic backlashes for the country's oil sector.

In a few weeks after the onset of the strike, Venezuela's oil production collapsed, moving from 3.1 mbd to about 200,000 bd¹⁴⁵. As the protest eroded,

¹⁴² YERGIN, D., *The Quest*, cit., p. 132.

¹⁴³ HULTS, D., "Petróleos de Venezuela: the right-hand man of the government", Stanford University, Working Paper No. 70, 2007, p. 12.

¹⁴⁴ FATTOUH, B., *How secure are Middle East oil supplies?*, cit., p. 3.

¹⁴⁵ YERGIN, D., *The Quest*, cit., p. 133.

output was able to recover and reach half its pre-strike level by mid-February 2003, but Chavez ultimately struck a lethal blow to the industry. In response to the turmoil, 18,000 workers of the state-run oil company, almost half of its workforce, were fired¹⁴⁶.

One of the hawks within OPEC was thus the first victim of the supply disruptions that hit OPEC in the first years of the 2000s, but the next in line was one at the very heart of the system: the Middle East.

3.4.3. *Operation Iraqi Freedom*

George W. Bush took office at a critical juncture in the shaping of the U.S. energy policy. Less than two years before, in April 1998, the country had imported more than half of the oil it consumed for the first time in its history. An addiction that was destined to grow and that was forcing the United States to rely upon oil imports coming from those countries that "do not always have America's interests at heart"¹⁴⁷.

In the wake of 9/11, the Bush administration championed what the President himself labelled the "war on terror" in his January 2002 State of the Union address, calling to arms against the "axis of evil", made up of Iraq, Iran, and South Korea, and was thus determined to curb the threat posed by the proliferation of weapons of mass destruction¹⁴⁸. The first country to fall, however, had been Afghanistan the preceding year, due its presumed ties with the man who claimed responsibility for the attacks to the World Trade Center, namely Osama Bin Laden.

Two years after, on March 19, 2003, a quick raid covered with bombs the Iraqi capital of Baghdad. It was the turn of Iraq. The raid was indeed the beginning of a massive invasion that, as early as April 9, led to the quick toppling of Saddam

¹⁴⁶ MAUGERI, L., *The Age of Oil*, cit., p. 190.

¹⁴⁷ KLARE, M., *Blood and Oil*, cit., p. 57.

¹⁴⁸ EL-GAMAL, M.A., JAFFE, A.M., *Oil, Dollars, Debt, and Crises*, cit., p. 95.

Hussein's government¹⁴⁹. In the very first days of the operation, the U.S. military took control of the Iraqi oil-export facilities north of Kuwait and the southernmost oilfields in the Basrah region, and, when they later entered Baghdad, they quickly occupied the oil ministry. According to plans, the U.S. forces thus managed on the one hand to seize Baghdad in just a couple of weeks, a well-oiled campaign already tested in Kabul two years before, while at the same time, avoiding further damage to the Iraqi oil infrastructure.

What the troops witnessed once in Iraq was an oil industry in deplorable conditions. After all, it went through two major conflicts, the wearing-out war against Iran started in 1980 and the 1991 First Gulf war; a decade of UN-sponsored economic sanctions; and poor management under Saddam's dictatorship. Nonetheless, instead of "exporting democracy" in a country apparently full of chemical weapons to sanction a new era of steady oil production levels, *Operation Iraqi Freedom* turned to be the onset of a renewed nightmare for the country, and for the purpose of this paragraph, for the country's oil sector.

The invading army, and a plethora of multinational troops, with Blair's UK at the forefront, put in place a full-fledged occupation of the Iraqi territory. As part of the De-Baathification occupation strategy, the Iraqi army and the police were being dismissed without providing a substitute to restore security and enforce law and order¹⁵⁰. From then on, key elements of the oil industry were daily and badly damaged by the violence that escalated following the collapse of the Baathist regime, reducing the ability of Iraq to export its crude oil. Pipelines and export terminals were blown up by repeated bombings¹⁵¹. The most of attacks were targeted to the crucial pipeline stretching from Kirkuk, the oilfield accounting for a big portion of the Iraqi crude production, to the Turkish port of Ceyhan, the window to the Mediterranean for the Iraqi petroleum. The 600,000-bd pipeline was subject to eighty-five attacks and sabotages between May and

¹⁴⁹ YERGIN, D., *The Quest*, cit., p. 153.

¹⁵⁰ FATTOUH, B., *How secure are Middle East oil supplies?*, cit., p. 10.

¹⁵¹ YERGIN, D., *The Quest*, cit., p. 159.

December 2003 alone, what put the line out of commission repeatedly. Also several other Iraqi pipelines were being hit, including the Kirkuk-Baniyas one that ends up in Syria¹⁵².

Ironically, one of the major benefits of the US invasion of Iraq, as envisioned by then U.S. Secretary of Defense Paul Wolfowitz, was that a newly independent and democratic Iraq would develop its huge oil reserves, thereby breaking the oligopolistic power of OPEC¹⁵³. On the contrary, as the insurgents stepped up their attacks, the effects were being felt quickly in the market. Immediately after the overthrow of Saddam Hussein, oil production collapsed to 1.3 mbd in 2003, though it rebounded to 2.4 mbd in 2004. Then, crude oil production fell back to only 1.87 mbd in July 2005, as insurgents has been sabotaging oil facilities. Throughout the whole occupation, Iraqi production remained, at best, at only two-thirds of its capacity: it was not until 2009 that the country managed to reach the pre-war level of production¹⁵⁴.

Much has been said about the reasons that pushed Washington to invade Iraq. In any case, be it the possession of weapons of mass destruction on the part of Saddam Hussein, the growing thirst for petroleum on the part of the United States, or the decision of denominating Iraqi oil exports in euros by the Iraqi leadership¹⁵⁵, it is irrelevant here. What is relevant is that the 2003 Iraqi war deprived world oil markets of a crucial cushion of supply, leaving only a tiny sliver of spare capacity concentrated in Saudi Arabia.

3.4.4. *Petro-violence in Nigeria*

Among the regions of Nigeria, the Niger Delta plays certainly a pivotal role in the framework of the international trade of petroleum. Indeed, this is about a vast coastal region in the southernmost part of the country, whose massive

¹⁵² KLARE, M., *Blood and Oil*, cit., p. 100.

¹⁵³ EL-GAMAL, M.A., JAFFE, A.M., *Oil, Dollars, Debt, and Crises*, cit., p. 94.

¹⁵⁴ YERGIN, D., *The Quest*, cit., p. 160.

¹⁵⁵ See CLARK, W., *Petrodollar Warfare*, Gabriola Island, New Society, 2004.

oilcamps make it an unlimited reservoir from which Nigeria is able to extract three-quarter of its entire petroleum production. And almost all the oil daily produced lies in the hands of the oil giants, such as Royal Dutch Shell, ChevronTexaco, ExxonMobil and TotalFinaElf¹⁵⁶.

The nine states that constitute the Niger Delta are crossed by thousands of miles of pipelines, and by a multitude of refineries and export terminals. In parallel, they host about one hundred-and-fifty ethnic groups, a diversity that has often, and inevitably, led to competition for resources in the form of land, economic benefits, or political primacy¹⁵⁷. Its inhabitants, however, share a sense of grievance about the exploitation and neglect of their region by the federal government, whose control over the Niger Delta has historically took the shape of political marginalization. The result was a territory in which the international oil corporations are "the state"¹⁵⁸.

Thus, Niger Delta's endemic poverty and ecological destruction, combined with its high population density and ethnic divisions, fueled hostility both toward the petroleum industry and the local and national governments¹⁵⁹. One of the historical hot questions that has been exacerbating that inherent instability concerns the long-lasting dispute about the "derivation formula", the tool by which oil revenues are allocated between the federal government, the states, and the local communities, and one of the basic motives behind the continuous attacks towards local oil facilities ever since. In order to protect oil installations and the staff of foreign investors, the Nigerian military acted as security forces, perpetrating numerous human rights violations in the process¹⁶⁰. Year 1999, however, marked a turning point: as enshrined in the newly drawn-up constitution, local communities are provided with only 13 percent of the

¹⁵⁶ OBI, C., RUSTAD, S.A., "Petro-violence in the Niger Delta – the complex politics of an insurgency", in OBI, C., RUSTAD, S.A. (ed.), *Oil Insurgency in the Niger Delta: Managing the complex politics of Petro-Violence*, London, Zed Books, 2011, p. 4.

¹⁵⁷ ASUNI J.B., "Blood oil in the Niger Delta", United States Institute of Peace, Special Report 229, 2009, p. 3.

¹⁵⁸ ZALIK, A., "The Niger Delta: 'petro violence' and 'partnership development'", *Review of African Political Economy*, 31(101), 2004, pp. 402-406.

¹⁵⁹ YERGIN, D., *The Quest*, cit., p. 137.

¹⁶⁰ ZALIK, A., *The Niger Delta*, cit., p. 405.

revenues resulting from the exports of black gold onto the world market, what leaves oil wealth even more in the sole hands of the federal ruling elite¹⁶¹.

The event thus renewed hostility towards the oil industry: it had by then become the symbol of the government oppression over the Niger Delta. Militant youths started pursuing by violent means their political goal of resource control. They formed gangs under names like the Bakassi Boys, the Icelanders, or the Niger Delta's People's Volunteer forces and transformed their territories into sovereign jurisdictions over which exerting law and order and through which challenging the federal government and the oil corporations for the bulk of the oil revenues¹⁶².

Since 1999 oil vandalism became the custom in the petroleum industry. From the 497 cases reported in 1999, they passed to 909 in 2000, 600 in 2003 and 2,258 in 2005. One of the most profitable business was "oil bunkering", that is stealing oil from pipelines and flow stations. It has been estimated that more than 10 percent of the annual oil exported from the country has been bunkered. To make matters worse, in the run-up to the 2003 elections, local politicians patronized and encouraged these armed gangs to intimidate political opponents and steal oil to raise campaign funds, providing them with more autonomy, more power, and more weapons¹⁶³.

Among the daily acts of oil stealing and sabotage, the years of the demand shock in the oil markets witnessed a handful of major supply interruptions, depriving the oil market of key amounts of crude oil. In March 2003, gangs attacked a series of producing fields in the Delta state. Oil companies had to evacuate their staff, and more than a third of Nigeria's production, over 800,000 bd, was shut down. In December 2004, 300 people from the Kula community seized three oil flow stations by Shell and Chevron, shutting in 100,000 bd for one week. In December 2005, some explosions on a pipeline produced sixteen casualties and shut in about 180,000 bd, forcing Shell to declare *force majeure* on

¹⁶¹ OBI, C., RUSTAD, S.A., *Petro-violence in the Niger Delta*, cit., p. 7.

¹⁶² IFEKA, C., "Violence, market forces, and militarisation in the Niger Delta", *Review of African Political Economy*, 31(99), 2004, p. 145.

¹⁶³ YERGIN, D., *The Quest*, cit., p. 137.

its exports from Nigeria¹⁶⁴.

All things considered, the amount of petroleum that did not reach the market during the events in Venezuela, Iraq, and Nigeria was not significant. The 1991 Gulf war, for instance, had been far more devastating in terms of lost barrels¹⁶⁵. However, these geopolitical tensions took place in a context where spare capacity was at its lowest level since the 1970s, together with a stellar increase in global demand and a stammering oil supply, especially outside OPEC. Under this light, they acquire a greater relevance such that they justify a sudden price increase like that of the first half of the decade. Therefore, it is no surprise that prices started an unstoppable march that took the WTI to \$31.1 per barrel in 2003, \$41.4 per barrel in 2004, and \$60 in 2005¹⁶⁶.

3.5. Supply, demand, and \$147 oil

It is possible to draw some major conclusions from the events depicted up to this point. Firstly, the run-up in oil prices witnessed from the immediate post-Asian crisis to 2005 is totally in line with the behavior of market fundamentals described. Unexpectedly strong economic growth on the part of non-OECD countries fueled the surge of a highly inelastic demand. In parallel, petroleum supply was not able to keep up with the increasing global energy needs, mainly due to two decades of under-investment in the industry and its intrinsic, short-run inelasticity. This, in turn, forced key producing countries to draw upon their idle capacities, tightening an oil market that was by then extremely sensitive to interruptions in the flow of supply. Finally, the PdVSA affair, the U.S. invasion of Iraq, and the escalation of violence in the Niger Delta removed a relevant amount of barrels from the market. As a result, crude oil prices had to jump from \$10 dollars in 1999 to \$60 dollars in 2005.

¹⁶⁴ FATTOUH, B., *How secure are Middle East oil supplies?*, cit., p. 3.

¹⁶⁵ EBEL, R., "Geopolitics and energy in Iraq: where politics rule", Report of CSIS Energy and National Security Program, 2010, p. 21.

¹⁶⁶ MAUGERI, L., *The Age of Oil*, cit., p. 187.

However, this is only half of the story. The extraordinary oil path to \$147 in July 2008 is hard to read in this light. In other words, the toolkit of explanations provided so far seems not to be sufficient to legitimate such an increase in less than three years, and the reasons are the following.

Firstly, the annual rate of growth in demand was significant only in 2003 and 2004. Afterwards, oil demand grew much more slowly, reflecting the higher sensitiveness of demand to prices in the long run¹⁶⁷. As noted above, the erosion of demand begins somewhere between \$75 and \$100. Indeed, since 2005, demand registered more modest annual growth rates: 1.3 percent in 2006 and 1.1 percent in 2007, both even lower than the rate during the sluggish 1990s, when it averaged 1.4 throughout the whole decade. As far as 2008 is concerned, that is the year of \$147 oil, demand growth was not any faster. In the first two quarters of the year, demand growth was nearly identical to the 2007 average, and in the third quarter of 2008, when prices reached \$147 per barrel, demand actually dropped to 85.3 mbd¹⁶⁸. China perfectly exemplifies how demand slowed down after 2005. In two years, between 2005 and 2007, the country increased consumption by the same amount of petroleum that it did in a sole year between 2003 and 2004, that is nearly 900,000 bd: the country's thirst for more black gold was thus halved¹⁶⁹.

Secondly, production actually recovered in the second half of the 2000s. In 2005, world crude oil production was 86 mbd¹⁷⁰, while in 2008, it reached 89.4 mbd, the highest supply level ever since.

The dynamic of supply and demand should have caused crude oil prices to decline. On the contrary, between December 2006 and July 2008 they more than doubled.

So, the main finding up to now is that 2005 can be seen as a watershed which splits the oil shock into two parts. The first part is highly consistent with the set

¹⁶⁷ IDEM, *Understanding oil price behavior*, cit., pp. 153-154.

¹⁶⁸ KAUFMANN, R.K., "The role of market fundamentals and speculation in recent price changes for crude oil", *Energy Policy*, 39(1), 2011, p. 106.

¹⁶⁹ HAMILTON, J., *Causes and consequences*, cit., p. 11.

¹⁷⁰ MAUGERI, L., *The Age of Oil*, cit., p. 227.

of explanations that has been provided so far. From 2005 on, there has to be something else. The next sections try to assess two further drivers. On the one hand there will be a review of the OPEC behavior in the time span considered, to evaluate the extent to which the cartel contributed to the run-up in oil prices. On the other hand, it is useful to take a look at petroleum from another perspective. So far, the work has focused mainly on the spot market, but now it is time to move onto futures and forward markets, or, to put it differently, onto crude oil as a *financial asset*.

THE ORGANIZATION OF THE PETROLEUM EXPORTING COUNTRIES

4.1. OPEC's control over the petroleum market

4.1.1. OPEC in the news

Although there was once a time in which a handful of oil companies dominated the international oil scene, that time is long gone. In 2007, ExxonMobil, the largest private oil company on earth, produced some 2.5 mbd of crude oil, that is only 3 percent of the entire global output. By adding up the market shares of the five largest oil companies globally, the result is slightly more than 10 percent. Nowadays, it is sovereign countries, rather than private oil companies, that would be calling the tune¹⁷¹, and at the time of the first oil shock of the twenty-first century, OPEC included eleven of the most oil-rich ones¹⁷².

However, despite its huge share in the international trade of petroleum, OPEC's influence over oil price movements has been a highly controversial subject, and notably since the mid-1980s. There is wide consensus in the literature that OPEC seems to play a limited role in the oil price formation in the framework of the current pricing regime. Since "markets" today determine the price of black gold, OPEC countries, like other suppliers, just take the market price, plug it into their pricing formula, and find out the price at which they put their petroleum on the international markets.

Nonetheless, even though the Organization can no longer impose its price

¹⁷¹ HAMILTON, J., *Understanding crude oil prices*, cit., p. 199.

¹⁷² In 2007, the Organization welcomed two further countries, Angola and Ecuador. The latter was already a member, but since 1992 it had to suspend its membership.

unilaterally, none of the world oil suppliers can count on as large a market share as that of OPEC. Nearly 40 percent of the petroleum one may purchase on the market comes from the cartel's reserves. Therefore, OPEC is bound, one way or another, to exert some kind of influence over oil prices. In fact, it is able to influence them, though only indirectly, depending on the amount of barrels it decides to put on stream. Specifically, OPEC sets production quotas based on its assessment of the market's call on its output, taking into account the levels of demand and non-OPEC supply¹⁷³. In this way, indeed, the cartel managed to influence price movements several times in the last thirty years, at times efficiently, at times less. The 1991 First Gulf conflict, for instance, saw the collapse of oil exports from belligerents, Iraq and Kuwait, but OPEC countries, and especially Saudi Arabia, swiftly turned on the taps, making up for the lost barrels and preventing prices from rising¹⁷⁴.

4.1.2. *From administered prices to production quotas*

The emergence of the marketplace as the oil price setter in the late 1980s turned the page on the history of oil price formation. It has been adopted in response to some crucial developments that deeply reshaped the structure of the oil market from the 1970s and eventually led to the short-circuit of the administered prices system, the pricing regime in force at that time¹⁷⁵.

The era of the administered prices stretched from the 1950s to 1986 and lived two distinct phases, involving different actors and price concepts. The first phase revolved around the concept of *posted price*, something that had nothing to do with market forces; its introduction, instead, well encapsulated the dominance

¹⁷³ FATTOUH, B., "OPEC pricing power: the need for a new perspective", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM31-OPECPrisingPowerTheNeedForANewPerspective-BassamFattouh-2007.pdf>, accessed on December 21, 2015, p. 6.

¹⁷⁴ IDEM, "The origins and evolution of the current international oil pricing system: a critical assessment", in MABRO, R. (ed.), *Oil in the Twenty-first Century: Issues, Challenges, and Opportunities*, Oxford, Oxford University Press, 2006, p. 90.

¹⁷⁵ IDEM, *The origins and evolution of the current international oil pricing system*, cit., p. 42.

over extraction, production, and sale of black gold by a bunch of international oil companies, the Seven Sisters as notoriously labeled by Enrico Mattei. That was about a fiscal parameter which was employed to calculate the royalty and income tax per barrel of crude oil directed at the host country¹⁷⁶. Indeed, until the 1970s "oil revolution" led by OPEC, oil-rich nations did not participate in the production of crude oil or in its pricing mechanism, but simply granted concessions for the exploitation of the oilfields over their territories. In an environment of that kind, there was no room for spot markets. The horizontal and vertical integration of the majors entailed that, at the time, the international trade of petroleum was nothing but transactions between the subsidiaries and the oil companies themselves¹⁷⁷.

The 1970s marked a watershed in the oil-pricing history. At the turn of the decade, the surge of oil demand created what is known as a "sellers' market", in which oil producers were able to ignite a supply-side crisis by simply cutting off oil supplies¹⁷⁸. That provided OPEC with the sufficient market power to reclaim a fair share of the oil market, since there was no other short-term "petroleum alternatives" other than the cartel. After the historical 1971 Teheran and Tripoli agreements, two milestones in the balance of power between OPEC and the IOCs, the inevitable happened. On October 16, 1973, OPEC made use of the oil weapon and unilaterally doubled the posted price of crude oil from \$3.65 to \$5.11 per barrel, before eventually doubling it again on December 23 of the same year. The posted price was then \$11.75¹⁷⁹. The torch was passed to OPEC: for the first time in its history, the cartel assumed the role of price administrator.

The OPEC-administered regime was based on two oil price concepts. The price at which member countries sold their oil, the *government selling price*, was set in relation to that of a specific crude benchmark, or *marker price*, at a

¹⁷⁶ MABRO, R., "On oil price concepts", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM3-OnOilPriceConcepts-RMabro-1984.pdf>, accessed on December 29, 2015, pp. 6-7.

¹⁷⁷ FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit., p. 43.

¹⁷⁸ YERGIN, D., *The Prize*, cit., p. 591.

¹⁷⁹ *Ivi*, p. 625.

discount or premium depending on the quality of the crudes. The Saudi Arabian Light 34° API was the chosen one. A wave of nationalization of oil concessions quickly followed: in the early 1970s, oil producing countries owned near 10 percent of their oil industries; by the end of the decade the figure rose to almost 70 percent¹⁸⁰. That phenomenon radically changed IOCs position: in fact, they did not have enough access to crude oil reserves anymore.

At the same time, the policy of higher prices pursued by OPEC turned out to be a double-edged sword: it encouraged the development of an oil market outside the oligopoly of OPEC, and increasing volumes of crude oil supply, which could not be economically worth to extract at lower prices, found their way into the international scene. Between 1975 and 1985, non-OPEC countries have been able to increase their share of world total oil exports from 48 percent in 1973 to 71 percent in 1985¹⁸¹.

At its meeting of March 1982, OPEC decided to tackle the situation by introducing a mechanism that, although inefficient at the time, will serve as the basis for the OPEC production policy during the twenty-first century. Besides continuing to uphold a fixed price policy, the cartel imposed on all its members a production ceiling of 18 mbd, as the sum of individual production quotas allocated among members. A year later OPEC further strengthened its commitment, lowering of other 500,000 their ceiling for all the members but Saudi Arabia. The country was left free to act as swing producer “to supply the balancing quantities to meet market requirements”¹⁸². For the first time, the Saudis were explicitly charged with the responsibility of raising and lowering its output to balance the market and sustain the oil price. To get a solid grasp of the significance of such a production restraint, consider that by 1979, only three years before, OPEC oil production was almost double¹⁸³.

In any case, the new policy proved unsuccessful. Indeed, the most of OPEC

¹⁸⁰ PAINTER, D.S., "Oil and the American Century", *The Journal of American History*, 99(1), 2012, p. 34.

¹⁸¹ FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit., p. 50.

¹⁸² YERGIN, D., *The Prize*, cit., p. 721.

¹⁸³ MAUGERI, L., *The Age of Oil*, cit., p. 136.

members, notably those fringe producers with higher marginal cost of production, were selling oil under the table on the external market in order to boost revenues and to regain the market share that the more competitive non-OPEC oil had just acquired. Instead of facing the new reality, OPEC members blamed each other for the events, while the whole cartel blamed non-OPEC countries for taking advantage of the OPEC's production ceiling to gain market share¹⁸⁴. The adjustment weighed on Saudi Arabia, the sole country that was trimming its output to sustain crude oil prices, but to the detriment of its own market share. Markets were saturating with the oil coming from both non-OPEC producers and OPEC cheaters, and the Saudi Kingdom saw its export drop to 2.2 mbd in May 1985, down from 10.5 mbd in 1980¹⁸⁵. In 1985, the Saudis decided that they would no longer defend prices on their own. The loss in oil revenues was alarming. They abandoned the role of swing producer and thus “declared” a price war on both OPEC and non-OPEC producers, flooding the market with their oil. All of a sudden, the move aiming at a fair share of the international trade of black gold translated instead into a quick downward pressure on prices, which collapsed to \$10 per barrel. The OPEC-administered system simply broke.

After the collapse of the OPEC-administered era, oil exporting countries relied on the market to price their oil. Initially adopted by the Mexican national oil company in 1986, the market-related pricing system received wide acceptance and by 1988 it became and still is the main tool for pricing petroleum in international trade¹⁸⁶. Its structure is based on *formula pricing*: the price of a specific variety of crude oil is set as a differential to a certain benchmark. The differential, also called *coefficient of adjustment*, is determined independently by each of the oil-producing countries, and is supposed to reflect variations in the quality of crude. This is not constant over time, however; it is subject to

¹⁸⁴ MAUGERI, L., *The Age of Oil*, cit., p. 138.

¹⁸⁵ MABRO, R., "Netback pricing and the oil price collapse of 1986", http://www-personal.umich.edu/~twod/oil/NEW_SCHOOL_COURSE2005/articles/research-oil/research-oil/mabro_netback_pricing_and%20collapse_1986_oxford1987.pdf, accessed on December 28, 2015, p. 47.

¹⁸⁶ FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit., p. 52.

continuous changes depending on the relative demand and supply of the various crudes. Brent, WTI and Dubai/Oman were the chosen main crude oil benchmarks of the newly born oil pricing regime¹⁸⁷.

In the meanwhile, at its meeting in December 1986, OPEC initially insisted with a fixed price system, aiming at a more modest official price of \$18 per barrel. That time, then, the policy was officially backed up by more flexible production quotas, which provided for a revision once every three months¹⁸⁸. Not even that time OPEC's choice succeeded in preventing quota busting; the majority of the members kept on offering discounts from the official export prices, what continued to invalidate the efficiency of the whole Organization. Then, Saudi Arabia, threatened by the Aramco group, shifted to spot markets to price its oil sales. One by one, hence, OPEC countries followed the example of the Saudis, and the fixed-price system translated *de facto* into a "target" price one¹⁸⁹.

That was how OPEC showed up at the turn of the twenty-first century.

4.2. A new tool for OPEC: the \$22-\$28 price band

The 1986 "countershock" left a huge amount of spare capacity, deemed around 12 mbd, in the hands of OPEC, which thus assumed the roles of spare capacity manager and residual producer, relying on its idle capacity to fill the gap between consumption and non-OPEC production and making up for the eventual supply shortfalls elsewhere in the market. As well summarized by Robert Mabro, "the West [wanted] surplus capacity to be provided by OPEC but expects demand increases to be met by non-OPEC"¹⁹⁰.

After a decade of sluggish demand levels, since 1996 consumption began to gain ground, thanks to the contribution of the so-called Asian tigers. That was a good occasion for Venezuela, Nigeria, and Qatar to gain some extra profits by

¹⁸⁷ *Ivi*, p. 58.

¹⁸⁸ MAUGERI, L., *The Age of Oil*, cit., p. 145

¹⁸⁹ PARRA, F., *Oil Politics*, cit., p. 289.

¹⁹⁰ Quoted in FATTOUH, B., *The investment challenge*, cit., p. 2.

cheating on their quotas. Immediately, Saudi Arabia responded in a similar vein as it did in 1986: it increased production on the assumption that, at the time, its action would not have triggered a downward pressure on oil prices. Indeed, data showed that demand was growing, and notably from the Far East. It was a signal to all cheaters within OPEC. Then, however, there came about "one of the biggest mistakes in OPEC history"¹⁹¹. At the 1997 November meeting in Jakarta, the Saudis pressured their fellow colleagues so as to raise OPEC's ceiling to a more "realistic" level, an action that would have given back credibility to the cartel after years of quota-busting, while at the same time responding to a demand that appeared to be more solid than expected¹⁹². In reality, that was a big miscalculation. The newly adopted ceiling turned out to be in any case lower than what cheaters were already producing, while the Asian financial crisis made demand for OPEC's oil plummet¹⁹³. OPEC thus went through the second, dramatic collapse within twelve years.

The oil price crash of 1998 brought to light perceptions of a permanent market glut. A piece by *The Economist*, for instance, warned that the possibility of \$5 oil for the foreseeable future was not so remote¹⁹⁴. The event dealt a heavy blow to the OPEC economies, their state budget being terribly dependent on oil revenues. That such possibility could befall was out of the question. OPEC realized that if it was to avoid such a dark future looming in front of the oil industry, it had to figure out a more efficient mechanism to allocate production quotas among its members, one also capable of stemming the endemic cheating. The first attempt occurred in March 1999. OPEC countries agreed to implement a substantial production cut, almost 2 mbd, but this time assisted by various non-OPEC producers, including Mexico, Norway, and Oman, which also committed to

¹⁹¹ KOHL, W.L., *OPEC behavior*, cit., p. 211.

¹⁹² *Middle East Economic Survey*, "Saudi oil minister calls for increase in OPEC's production ceiling to a more realistic level", 40(44), 1997.

¹⁹³ Mabro, R., "The oil price crisis of 1998", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/SP10-TheOilPriceCrisisof1998-RMabro-1998.pdf>, accessed on January 6, 2016, p. 18.

¹⁹⁴ *The Economist*, "The next shock?", March 4, 1999, <http://www.economist.com/node/188181>, accessed on December 21, 2015.

reducing their supply in concert with the cartel. Adherents implemented successfully the cut, with a historical 90 percent of adherence to the newly adopted ceiling. As a result, oil prices shrugged off the consequences of the Asian crisis and rebounded to a double-digit figure, reaching an unhoped-for \$30 per barrel¹⁹⁵. However, as Al-Naimi repeatedly warned, the long-price target for OPEC had to be around \$25 per barrel¹⁹⁶. \$30 was too optimistic. Demand was just recovering from its historical minimum of the previous year and there was the risk that a sudden price increase could make it plummet again. As expected the Asian market became again oversupplied, and crude oil prices started to slide significantly. OPEC had to change tack.

The year 2000 represented a turning point for the OPEC output policy. The Organization realized the necessity for oil prices to remain stable at a level deemed acceptable by producing countries, but also by consuming countries. As OPEC's official position goes: "extreme price levels, either too high or too low, are damaging for both producers and consumer"¹⁹⁷. Put it differently, there would be a "comfort zone" in which prices would be sufficiently high to warrant fair revenues and allow adequate reinvestment on the supply side, and sufficiently low not to erode long-term demand growth rates. The latter was a crucial point, since the collapse in oil demand had been a key ingredient in the two most harmful price collapse of the oil history, that is the 1986 and 1998 ones¹⁹⁸. In March 2000, finally, OPEC reached a crucial agreement, sanctioning its commitment to the oil market stability: it introduced a brand new mechanism, a price band for the OPEC basket¹⁹⁹. Firstly, the mechanism targeted a range within which prices could freely fluctuate; and secondly, OPEC committed to intervene by raising or cutting production when prices outstripped the bounds of the range. In more specific terms, the cartel would have automatically adjusted

¹⁹⁵ MAUGERI, L., *The Age of Oil*, cit., p. 174.

¹⁹⁶ KOHL, W.L., *OPEC behavior*, cit., p. 216.

¹⁹⁷ FATTOUH, B., *Oil market dynamics*, cit., p. 22.

¹⁹⁸ SHIHAB-ELDIN, A., "The outlook for oil to 2020", in MABRO, R., (ed.), *Oil in the Twenty-first Century*, cit., p. 25.

¹⁹⁹ KOHL, W.L., *OPEC behavior*, cit., pp. 215-217.

production on a pro rata basis among members whenever the basket price exceeded \$28 per barrel for twenty consecutive days or fell below \$22 per barrel for ten consecutive days, in order to bring the price back within the band²⁰⁰.

As Brook *et al.* argued, that was a practice known as *entry-limit pricing*²⁰¹. Indeed, the target price range was low enough to prevent the entry of substitutes and investments in new producing areas; as already highlighted, the dangerous policy of targeting the highest prices of the past led to the emergence of new sources of oil that had eventually eroded the cartel's market share. In parallel, it would have warranted OPEC to earn significant revenues anyway; the struggle for oil revenues had often led to competition and cheating on quotas, and most importantly among OPEC's fringe producers, what had often inhibited the cartel from exerting an effective oligopolistic control over the market. In addition, it would have carried the benefit of maintaining healthy and stable growth in global oil consumption. Above all, the price band represented a commitment to market stability: the time span between 1997 to 2000 had been one of extreme price volatility.

As oil prices continued to hover well over \$30 per barrel in the first half of 2000, OPEC invoked its price band for the first time and announced at the end of October an increase in quotas on the order of 500,000 bd. Oil prices suddenly dropped, and to stem the slide, OPEC met again in January 2001 and reduced production by 1.5 mbd. All of a sudden, the OPEC basket rose to around \$25 from its December low of \$21. OPEC managed to bring prices back within the bounds and thus the mechanism seemed to work²⁰².

Since its inception, the tool received wide acceptance on the part of market operators; indeed, it kept prices solidly within the desired range from 2000 to 2003, although a set of events had been threatening sudden price volatility in the

²⁰⁰ BINA, C., VO, M., "OPEC in the epoch of globalization: an event study of global oil prices", *Global Economy Journal*, 7(1), 2007, p. 10.

²⁰¹ BROOK, A., PRICE, R., SUTHERLAND, D., WESTERLUND, N., ANDRÉ, C., "Oil price developments: drivers, economic consequences, and policy responses", Organisation for Economic Cooperation and Development, Working Paper No. 412, 2004, p. 26.

²⁰² KOHL, W.L., *OPEC behavior*, cit., pp. 215-217.

process²⁰³. The 2002 strike in Venezuela, the turmoils in Nigeria and the 2003 Iraqi war caused three major supply shortfalls in as many OPEC countries, but the Organization swiftly activated the mechanism in an effort to limit price rises. As previously noted, however, those increases were implemented to the detriment of the cartel's spare capacity. The low investments of the past were having an impact, threatening the very existence of the price band that OPEC had just introduced.

At the end of 2003, prices climbed over the \$28 ceiling.

4.3. The boom

4.3.1. The end of the band

OPEC members gathered in Algiers in the first week of February 2004. During the opening address, Purnomo Yusgiantoro, chairman of the conference and minister of energy of Indonesia, took stock of the oil market situation. "Why [...] have we not taken an action on price levels which have consistently exceeded the top end of our price band [...] since our December meeting?", asked rhetorically. Then, he went with the answer. "The principal reason is our judgment that the oil market is already well-supplied"²⁰⁴. After all, to further support his claim, forecasts were for standard growth in oil consumption: looking at the figures, the oil that OPEC was pumping was more than enough. "Even if we could make a significant [...] increase in supply now", continued Yusgiantoro, "we would be reluctant to do so"²⁰⁵. The rise in oil prices was seen as a temporary phenomenon, and according to its long-term projections, the Organization was even running up against an oil glut worthy of that of 1998. "OPEC views oil

²⁰³ SHIHAB-ELDIN, A., *The outlook for oil to 2020*, cit., p. 25.

²⁰⁴ OPEC, "Opening address to the 129th (Extraordinary) Meeting of the OPEC conference", http://www.opec.org/opec_web/en/press_room/1049.htm, accessed on January 3, 2016.

²⁰⁵ *Ibidem*.

market dynamics as a continuum which extends beyond immediate short-term concerns [...]. Our projections indicate that there will be a significant surplus of oil", what would cause "excessive downward pressure on prices", concluded the chairman²⁰⁶. The cartel thus agreed to endorse a significant reduction in supplies: 1 mbd with effect from April 1, 2004.

Paradoxically, at its very beginning, the year which saw oil demand jumping by 3.2 mbd coincided with an OPEC production cut.

Then, it came about the demand shock. Non-OPEC supplies tumbled and China was the leader of an unprecedented surge in oil demand. To make matters worse, Iraqi and Nigerian poor performances started being felt by market forces. Crude oil prices sudden rose to restore the balance between supply and demand and stayed well above the upper bound throughout the whole year, oscillating between \$40 and \$50 per barrel.

The fact that prices remained above the upper hand for well more than twenty consecutive days raised concerns about OPEC's actual commitment to market stability. If one was to understand OPEC behavior in that high price environment, Robert Mabro suggested in 2005 that a "literal interpretation of the price band", according to which the Organization would have acted actively and thoroughly on crude oil prices whenever these happened to fall outside the two predetermined bounds, "is not terribly relevant"²⁰⁷. This, at least, as far as the upper bound is concerned, since in theory the lower bound could be shielded by cutting production, as OPEC did several times between 2000 and 2001. The extreme resilience of the world economy to a rapid escalation in oil prices, or in other words, the highly inelastic nature of global oil demand with respect to oil prices, generated the perception within OPEC that an upward price path would not have undermined consumption trends in the immediate future. During an interview at the World Economic Forum in January 2005, Al-Naimi's words seem to reinforce this argument: "My view is that the world is not suffering, as far as

²⁰⁶ *Ibidem*.

²⁰⁷ MABRO, R., "The international oil price regime: origins, rationale and assessment", *The Journal of Energy Literature*, 11(1), 2005, p. 20.

economic growth is concerned, from where prices are today. [...] The price today doesn't seem to be affecting economic growth negatively, and we do not want it to"²⁰⁸. This despite the numerous claims made by Al-Naimi himself that the fair price for an oil barrel would be around \$25. After all, however, it was hard to believe that OPEC would have rejected, in Mabro's words, "manna falling from heaven"²⁰⁹.

Let us take Saudi Arabia. On one side, the Kingdom had to deal with high rates of unemployment and in those years was embarking on a heavy social welfare programme to respond to the growing population, resulting in ever-escalating debt levels. On the other, half of the Saudi GDP growth was basically dependent on oil revenues, which also represented 90 percent of the country's export and three-quarters of the state budget. Thanks to the higher prices of 2004, therefore, the Saudis have been able to generate oil revenues on the order of \$106 billion, an increase of 30 percent from the previous year²¹⁰.

There is another element that renders the struggle for oil revenues a plausible motive behind the passive approach of OPEC countries in the face of rising crude oil prices. Since petroleum is a dollar-denominated commodity, the currency depreciation turns out to be a crucial variable in the shaping of the cartel's output policy. Getting back to the Yusgiantoro speech of February 2004, "of particular concern to us [...] is the falling value of the U.S. dollar against other leading currencies. This can have serious budgetary repercussions, because it reduces the purchasing power of our petroleum revenues and affects the ability of our Member Countries to develop their domestic economies"²¹¹. Indeed, between 2002 and 2004, the greenback fell by close to 20 percent in real effective terms²¹². In the November 2004 OPEC's *Monthly Oil Market Report*, one can find an interesting statement concerning the escalation in oil prices and the

²⁰⁸ MOUAWAD, J., "Saudis shift toward letting OPEC aim higher", *The New York Times*, <http://www.nytimes.com/2005/01/28/business/worldbusiness/saudis-shift-toward-letting-opec-aim-higher.html? r=0>, accessed on January 3, 2016.

²⁰⁹ MABRO, R., *The international oil price regime*, cit., p. 20.

²¹⁰ IEA, *World Energy Outlook*, 2005, pp. 487-488.

²¹¹ OPEC, *Opening address to the 129th (Extraordinary) Meeting*, cit.

²¹² IMF, *World Economic Outlook*, 2004, p. 16.

impact of inflation and the falling dollar on oil prices. According to the report, by mid-2004, the OPEC basket price hovered around \$32 per barrel in real terms, which is far more consistent with the \$22-\$28 price band²¹³. In this sense, it has been noted that on various occasions the price hawks Venezuela and Iran had lobbied the Saudis to have the \$28-ceiling raised, reflecting the fact that market conditions had deeply changed since the inception of the price band in 2000. OPEC's inaction towards prices outstripping the band has been thus interpreted as if the Organization was implicitly shifting its price target somewhere around \$40 per barrel²¹⁴. According to Horsnell, thus, OPEC was putting in place a "delicate choreography", in which it was "accompanying where the market [saw] prices going in the future", and there was "nothing terribly explicit about it"²¹⁵.

However, as months went by, OPEC soon realized that forecasters actually underestimated the size of global oil consumption. For these reasons, at its June 2004 meeting in Beirut, the Organization reversed its previous decisions and decided to hastily draw upon its left excess capacity, putting on stream 2 mbd with effect from July 1, and further 500,000 bd from August 1. Yet OPEC action did not have the desired effect: prices kept on rising and, on August 19, oil stood at \$48.75 per barrel; but because of the huge increase in production, spare capacity was by then near zero, leaving the market exposed to any supply disruption²¹⁶.

At its 134th conference of January 2005, OPEC could do nothing but suspend its short-lived price band mechanism, due to its inability to maintain prices within the target range. It had become "unrealistic", as OPEC itself acknowledged. Indeed, in tight market conditions, due to the lack of spare capacity, OPEC could do little to prevent prices from going farther; the upper limit of the band became simply irrelevant, if OPEC was not able to defend it²¹⁷.

²¹³ OPEC, *Monthly Oil Market Report*, November 2004, p. 8.

²¹⁴ MOUAWAD, J., *Saudis shift toward letting OPEC aim higher*, cit.

²¹⁵ *Ibidem*.

²¹⁶ KOHL, W.L. "The perfect storm", *Harvard International Review*, <http://hir.harvard.edu/energythe-perfect-storm/>, accessed on January 3, 2016.

²¹⁷ FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit., p. 91.

Interestingly, OPEC official position went that, although the objective of the band had become by then unrealistic, its dismissal was not to undermine the cartel's commitment to market stability; on the contrary, OPEC reiterated that markets were well supplied²¹⁸.

In the meanwhile, nonetheless, prices jumped to \$50 per barrel.

4.3.2. *Too late*

The price spiral kept on in 2006, and by July consuming countries had to pay \$70 to purchase a barrel of crude oil. Prices interrupted significantly their upward path for the first time since 2001: from \$70 they slid to their 2004-2005 level, that is around \$50. It did not last long, however. Fearing another price crash, in November 2006, OPEC cut production by 1.2 mbd, and did it again on February 2007, by cutting additional 500,000 bd. The former price band was by the time a distant memory. The rises in oil prices since 2001, instead, created the perception that the long-term market clearing price had adjusted upwards, and OPEC was simply taking advantage of the situation²¹⁹. Soon afterwards, therefore, prices quickly recovered. As shown in Chapter 3, however, the higher oil prices were starting to affect consumption. The demand shock was over and, at the same time, supply was gaining ground, meaning that spare capacity was widening. Yet prices continued to rise. By contrast, OPEC went ahead behaving passively, to the extent that, even if oil broke the \$100 barrier in March 2008, it refused to raise its total production ceiling, under the assumption that, again, markets were not short of barrels²²⁰.

Then, things suddenly changed. By mid-2008, the sharp rise in crude oil prices had the features of a bubble and was creating serious concerns about the ability of the world economy, which was already showing signs of a slowdown, to

²¹⁸ OPEC, *OPEC Bulletin*, XXXVI(2), 2005, pp. 7-8.

²¹⁹ HORSNELL, P., "The dynamics of oil price determination", *Oxford Energy Forum*, 71, 2007, p. 14.

²²⁰ EL-GAMAL, M.A., JAFFE, A.M., *Oil, Dollars, Debt, and Crises*, cit., p. 58.

handle such energy prices²²¹. Consuming countries feared a dire future of \$200 oil; producing countries looked at the demand contraction, by then at the sluggish levels of the 1990s, as the foreboding of a catastrophic price collapse. Saudi Arabia rapidly called a conference to be held in Jeddah on June 22, 2008, with the aim of discussing the oil market situation and figure out a way to calm down oil prices, which stood at nearly \$130 per barrel. Among the participants were thirty-six countries – both oil producers and consumers - nineteen national and international oil companies, and seven intergovernmental organizations. After recognizing the need for a more efficient dialogue between oil producers and consumers, the Saudis committed to auction their renewed spare capacity and increase output by additional 500,000 bd with effect from the next month, in a desperate effort to put a ceiling on the price hike²²².

It was too late. On July 8, 2008, oil skyrocketed to a historical \$147.

One may wonder why OPEC waited for so long before increasing production. Fattouh suggested to think of OPEC's response to oil price movements as being asymmetric. In a falling market, that is when prices decrease, OPEC pursues a more active policy, implementing production cuts to defend prices from falling below levels considered unfair, as its actions taken in 2000 and 2006 clearly showed²²³. On the contrary, in a rising market, OPEC assumes a more passive approach, supplying the market upon demand at market-determined oil prices, until it realizes that the price level is one capable of destroying long-term demand trends and perhaps inducing a price collapse²²⁴. A reason could be that poor data about market conditions may induce OPEC to misread the market's direction and adopt policies that add to the price volatility. As already observed, data about consumption are often uncertain, subject to revisions and made available with significant lags, and the same is true for the supply side; OPEC itself partly relies on "secondary sources" to discover what its own members are

²²¹ *Ibidem*.

²²² OPEC, *OPEC Bulletin*, XXXIX(6), 2008, p. 6.

²²³ FATTOUH, B., *Oil market dynamics*, cit., pp. 23-24.

²²⁴ MABRO, R., FATTOUH, B., "Whither OPEC", *Oxford Energy Forum*, 75, 2008, p. 14.

supplying²²⁵. In addition, the Organization has no mechanism to prevent quota cheating and may cut output when it believes that some of the members are overproducing.

However, it seems that to better understand the cartel's passive approach, one should dwell on its continuous claims that markets were well supplied. First of all, as already seen in Chapter 2, markets were flooded with heavy grades of crude. Those heavy and sour petroleums, however, were barely finding buyers, given the poor level of the refining industry. The recurring argument, however, reveals also that OPEC was blaming some "non-fundamentals" factors for the oil shock. Among them, the falling dollar was certainly a factor and, in effect, after slightly appreciating in 2005 and 2006, the greenback kept on devaluating in 2007 and 2008; but as OPEC repeatedly argued, the whole story was about speculation and the "significant flow of funds into the commodities market"²²⁶.

Nonetheless, as prices continued to go farther, at the Jeddah meeting OPEC had to intervene and the Saudis raised their production quota, despite the fact that, in the words of King Abdullah himself, the first oil price shock of the new millennium was driven by the "the frivolity of the speculators [...] for selfish interests"²²⁷.

Was that interpretation true?

²²⁵ FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit., p. 90

²²⁶ OPEC, "148th Meeting of the OPEC Conference", http://www.opec.org/opec_web/en/961.htm, accessed on January 3, 2016.

²²⁷ IDEM, *OPEC Bulletin*, XXXIX(6), 2008, p. 6.

THE ROLE OF SPECULATION

5.1. Fundamentals or speculation?

All the explanations that have been provided so far to explain the first oil price shock of the new millennium are precisely the same that fueled the rapid expansion of the crude oil futures markets. The demand shock, geopolitical tensions, and a razor-thin spare capacity made speculation on possible supply shortfalls very attractive for financial operators. In this sense Alan Greenspan expressed himself in 2006: "it became apparent that the world's industry was not investing enough to expand crude oil production capacity quickly enough to meet rising demand [and] increasing numbers of [...] institutional investors began bidding for oil"²²⁸.

However, the history of paper oil is a good deal less recent. On March 30, 1983, the New York Mercantile Exchange (NYMEX) started to trade a futures contract related to the WTI crude, quickly followed by the London-based International Petroleum Exchange (IPE) in June 1988 with its Brent crude futures contract²²⁹. An oil futures contract is an agreement in which a seller, who is said to go "short", commits to deliver to a buyer, who instead goes "long", a specified quantity and quality of petroleum, usually in lots of 1,000 barrels, at a specific date in the future, and at a price locked in advance. The only feature to change is its price, which instead responds to the dynamics of supply and demand in financial markets²³⁰.

The main *raison d'être* of the emergence of such derivative contracts lies in the

²²⁸ GREENSPAN, A., "Prepared statement before the U.S. Senate Committee on Foreign Relations", Washington D.C., June 7, 2006.

²²⁹ YERGIN, D., *The Quest*, cit., p. 169.

²³⁰ FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit., p. 69.

fact that they enable both oil producers and consumers to shield themselves against crude oil price volatility, locking in the price at which they would sell or purchase oil barrels once entered the contract. This characteristic makes the futures market a "risk-management tool": market participants can spread the risk of, or in technical terms "hedge" against, possible oil price fluctuations²³¹. In theory, when the contract reaches its expiry date, it comes about the physical delivery of the quantity of petroleum demanded, but in practice, the main goal of the futures market is not to provide a mechanism for actual delivery. Rather, it is estimated that only 1 percent of futures contracts runs to the physical delivery of petroleum. They are instead settled through the practice of *offsetting*: physical market participants, or "hedgers", just close their position by selling the contract previously bought, thus extracting liquidity to balance the fluctuations in their operative earnings²³². Since the mechanism does not translate into the trade of physical barrels, the quantity of crude oil purchased or sold under these contracts can exceed by far the actual volume of oil physically produced. In financial jargon, hence, futures markets involve the trade of *paper barrels*, whereas in the spot market are traded *wet barrels*²³³.

On the other side of the trading market lie non-commercial agents, those who do not have a physical exposure to the commodity and are generally referred to as "speculators". They risk their own capital taking a long or short position in futures market in hopes of making profits on price movements. Their bets, nonetheless, perform a crucial task for the functioning of the paper market: on one side they absorb the risk taken by hedgers, while at the same time increasing the overall trading volume, thus contributing to more liquid and well-functioning markets. A market solely made up of actual producers and consumers may not in fact be sufficiently liquid to enable the parties involved to hedge at acceptable prices²³⁴.

²³¹ O'SULLIVAN, D., *Petromania: Black Gold, Paper Barrels and Oil Price Bubbles*, Petersfield, Harriman House Publishing, 2009, p. 57.

²³² *Ivi*, p. 59.

²³³ FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit., p. 68.

²³⁴ O'SULLIVAN, D., *Petromania*, cit. pp. 66-67.

What Greenspan was referring to is that, precisely in the opening years of the twenty first century, the composition of the actors involved in the purchase and sale of futures contracts widened dramatically; "paper oil" started attracting a wide range of non-commercial actors, such as the largest financial institutions, hedge funds, index funds, pension funds, floor traders, and insurance companies, which have been pouring billions and billions of dollars into the financial markets to try to take advantage of oil price volatility and make some profit²³⁵. Oil had by then become a financial asset, a tool to diversify the asset class within the investment portfolios of financial agents, so that they could hedge against a weaker dollar, inflation and equity market weakness²³⁶.

A widespread way to assess the impact of such a massive entry of capitals in futures markets is to take a glance at the total open interests. They measure the total number of positions, either long or short, that have not yet been settled by an offsetting transaction or physical delivery. It has been estimated that between 2003 and 2008, open interests in the WTI futures contract more than doubled, passing from about 600,000 to 1,3 million. In addition, the share of non-commercial players in total open interests on the NYMEX market grew significantly from less than 20 percent in 2000 to more than 40 percent in 2008²³⁷.

Hence, as the price of crude oil moved from an average of \$20 per barrel in the early 2000s to almost \$150 per barrel in July 2008, suspicion grew that precisely those billions of dollars invested in the futures exchanges were moving crude oil prices away from their "fundamental" value, that is the balance of supply and demand on the physical side of the market. The conjunction of these events polarized views in the political and academic institutions on the impact of speculative activity on wet barrels. According to some, it could not be a matter of coincidence; the explosion of interests in financial markets coincided with the

²³⁵ *Ivi*, p. 70.

²³⁶ JUVENAL, L., PETRELLA, I., "Speculation in the oil market", *Journal of Applied Econometrics*, 30(4), 2015, p. 622.

²³⁷ ALQUIST, R., GERVAIS, O., "The role of financial speculation in driving the price of crude oil", Bank of Canada Discussion Paper, 2011, pp. 3-5.

run-up in oil prices, and notably from July 2007 and July 2008, when the price of oil literally doubled. In a speech delivered before the U.S. Senate, Michael Masters, a portfolio manager of a private investment fund, stated that: "because the commodities futures markets are now dominated by speculators, [...] prices in these markets move for reasons that increasingly have little to do with specific commodity supply and demand fundamentals"²³⁸.

Others, instead, pointed their finger on the lack of an evident causal relationship between the two phenomena. A number of recent studies have failed to discover a direct link between the oil price hike and the activities in the paper market: for this reason, the oil shock had to be a matter of oil consumption and production. As Paul Krugman wrote in 2008: "the rise in oil prices isn't the result of runaway speculation; it's the result of fundamental factors, mainly the growing difficulty of finding oil and the rapid growth of emerging economies like China"²³⁹.

5.2. Arguments in favor of and against the speculative thesis

According to the law of supply and demand in financial markets, an increase in the net long positions on the part of non-commercial players, that is when they bet on rising prices, would generate an upward pressure on oil futures prices, as a price rise is required to convince others to take the opposite side of the transaction. In other words, when non-commercial entities hold the net long position, future prices rise, and the opposite happens when these actors hold instead net short positions²⁴⁰. Among the non-commercial investors, commodity index funds, such as the United States Oil Fund or the Goldman Sachs Commodity Index, drew the most attention. Unlike traditional speculators, who go long or

²³⁸ MASTERS, M., "Testimony before the Committee on Homeland Security and Governmental Affairs, United States Senate", Washington D.C., May 20, 2008.

²³⁹ KRUGMAN, P., "The oil nonbubble", *The New York Times*, May 12, 2008, http://www.nytimes.com/2008/05/12/opinion/12krugman.html?_r=0, accessed on January 15, 2016.

²⁴⁰ SINGLETON, K.J., "The 2008 boom/bust in oil prices", Stanford University Report, 2010, p. 13.

short depending on the expected futures price, commodity index funds just hold long positions, what may potentially push futures prices even further²⁴¹.

In the light of these premises, several studies attempted to show whether it has been the case during the decade at issue. More specifically, relying on the data provided by the Commodity Futures Trading Commission (CFTC), they sought a link of causality between the changes in the net long positions of various classes of non-commercial traders and the spectacular ascent in oil prices between 2000 and 2008²⁴². Büyüksahin *et al.*, for instance, compared the data on the daily trader positions for the period 2000-2004 to those for the period 2004-2008, with the latter being marked the most by both extreme price movements and increased participation of non-commercial investors in futures markets. The authors eventually found that "the changing net positions of any specific trader group [did] not lead to price changes in either sub-period or over the entire sample period", and concluded that speculators seemed to follow, rather than driving, price movements²⁴³. All the other studies reached similar conclusions.

In the light of these results, another strand of the literature decided to assess the speculative component of the oil price shock through the impact it might have had on the underlying spot market. Put it differently, they focused on how higher futures prices could have physically translated into higher spot prices. As Hamilton wrote, "the key intellectual challenge for such an explanation is to reconcile the proposed speculative price path with what [was] happening to the physical quantities of petroleum demanded and supplied"²⁴⁴. A common

²⁴¹ See, for instance, MASTERS, M., *Testimony before the Committee on Homeland Security and Governmental Affairs*, cit.; PARSONS, J.E., "Black gold & fool's gold: speculation in the oil futures market", *Economia*, 10(2), 2010, pp. 81-116; IRWIN, S.H., SANDERS, D.R., "The impact of index and swap funds on commodity futures market", OECD Food, Agriculture and Fisheries Working Papers, No. 27, 2010.

²⁴² See, for instance, Interagency Task Force on Commodity Markets, *Interim report*, cit.; BRUNETTI, C., BÜYÜKSAHİN, B., "Is speculation destabilizing?", John Hopkins University Working Paper, 2009; GILBERT, C.L., "Speculative influences on commodity futures prices, 2006-2008", University of Trento Working Paper, 2009.

²⁴³ BÜYÜKSAHİN, B., HARRIS, J.H., "Do speculators drive crude oil futures prices?", *The Energy Journal*, 32(2), 2011, p. 168.

²⁴⁴ HAMILTON, J., *Causes and consequences*, cit., p. 17.

approach to evaluate whether spot prices are driven by speculative pressures is to witness variations in the level of crude oil inventories held worldwide. As the theories of storage demonstrated, stocks are the channel through which an exogenous increase in oil futures prices can influence spot prices, in that the two markets are linked by an arbitrage condition²⁴⁵. According to this approach, if speculative trading led to price rises above their fundamental values, therefore the oil market should have shown a sizable buildup in oil inventories. "If speculators are driving spot prices, an imbalance in the form of higher stocks should be apparent", suggested the IEA²⁴⁶.

Expecting the price for future delivery to rise, i.e. a market exhibiting *contango*, an oil producer would have the incentive to leave petroleum off the market, accumulate inventories, and go short in a futures market by selling a contract²⁴⁷. As explained by Kaldor, there would be a *convenience yield* in abstaining from putting oil on stream insofar as the oil producer could enhance profits due to the fact that oil could be sold at higher prices in the future²⁴⁸. The result is a speculative accumulation of crude oil stocks, which becomes profitable as long as the futures price exceeds the spot price plus the cost of storing oil. In this way, inventory holding means reducing the oil available for immediate delivery, what causes the spot price to increase²⁴⁹. This outcome contrasts with the traditional understanding of inventory behavior, according to which as inventories grow, prices fall. This time, instead, the upward-sloping futures price curve would push up both inventory and prices. Furthermore, Fattouh affirmed that precisely in 2005 the term structure of the oil futures curve passed from *backwardation* to *contango*, and reported that from 2005 to 2007 there has been a relevant buildup in inventories in the United States, which by then stood at 320

²⁴⁵ See ALQUIST, R., KILIAN, L., "What do we learn from the price of crude oil futures?" *Journal of Applied Econometrics*, 25(4), 2010, pp. 539-573.

²⁴⁶ IEA, *Medium-Term Oil Market Report*, July 2008, p. 12.

²⁴⁷ KILIAN, L., "Oil price shocks: causes and consequences", University of Michigan Working Paper, 2014, p. 7.

²⁴⁸ KALDOR, N., "Speculation and economic stability", *Review of Economic Studies*, 7(1), 1939, pp. 1-27.

²⁴⁹ JUVENAL, L., PETRELLA, I., *Speculation in the oil market*, cit., p. 635.

mb, that is some 25 mb over the average of previous years²⁵⁰.

However, some observers have refuted this argument, pointing out that the level of inventories worldwide did not rise enough over the period in question to assess whether a speculative accumulation of stocks was taking place. In this sense, according to Smith the level of inventories at the time could not justify the path taken by oil prices from 2007 to mid-2008: during the "oil's furious ascent of 2008", he wrote, U.S. stocks were no higher than previous years, and they were even below the prevailing level for 2005-2007²⁵¹.

It has been noted however that the available data on oil stocks are often insufficient, and that the most precise ones are available only for OECD countries²⁵². Juvenal *et al.* added that, in reality, there have been two contrasting forces that pushed crude oil inventories simultaneously in opposite directions. On the one hand, the demand shock led by the Asian continent, combined with a stammering supply, should have caused an inventory drawdown, while on the other hand, speculative activity on paper markets were causing an inventory buildup. According to them, therefore, it should not be surprising if, as a result of the two effects, oil stocks did not show large variations²⁵³.

Lastly, Pirrong highlighted that one would barely find a common thread in the behavior of inventories and prices; at times there would be a negative relation between the two; but there are also long periods in which stocks and prices rise simultaneously. His work suggested that the correlation between the two factors is only an "imperfect indicator" to quantify the speculative component of the price of oil. He concluded, then, that the buildup in crude oil inventories could be considered a necessary, though insufficient, condition to legitimate the distortion on oil prices on the part of financial markets²⁵⁴.

A last strand of the literature focused on the fact that speculative activity in

²⁵⁰ FATTOUH, B., MABRO, R., "The oil price regime", *Oxford Energy Forum*, 68, 2007, p. 11.

²⁵¹ SMITH, J.L., *World oil: market or mayhem?*, cit., p. 159.

²⁵² AMENC, N., MAFFEI, B., TILL, H., "Oil prices: the true role of speculation", EDHEC Research, 2008, p. 12.

²⁵³ JUVENAL, L., PETRELLA, I., *Speculation in the oil market*, cit., p. 635.

²⁵⁴ PIRRONG, C., "Stochastic fundamental volatility, speculation, and commodity storage", University of Houston Technical Report, 2009.

paper markets can be spontaneously transmitted to the physical market without inventory buildups. According to this view, the futures market expanded to become not simply a place in which market participants could spread their risk and speculators hold positions, but also the pivot of the entire market-related pricing regime, in which the price of oil is discovered²⁵⁵.

From the late 1990s, a number of oil producing countries began relying on futures market to price their oil exports, including several OPEC members, like Saudi Arabia, Kuwait and Iran. Instead of using Brent for exports to Europe, for instance, they started to employ the IPE Brent Weighted Average (BWAVE), the weighted average of all futures price quotations that arise for a given contract of the IPE during a trading day²⁵⁶. Indeed, the main physical benchmarks, Brent, WTI and Dubai, were no longer able to represent the marginal barrel of oil. At the turn of the century, the production of Brent plummeted to 350,000 bd, and the same was true for WTI and Dubai. The former fell to 400,000, what reflected the rapid fall in U.S. production already dealt with in Chapter 3, and the latter even less, standing at 120,000 bd²⁵⁷.

The declining liquidity of the spot base of the marker crudes increased their vulnerability to manipulation, distortions and squeezes, whereas the huge liquidity of futures markets warranted instead a more transparent price discovery process.

According to Horsnell, thus, it was the futures market that set the level of prices, while the physical markets could only set the differentials²⁵⁸.

²⁵⁵ See, for instance, HORSNELL, P., "Oil pricing systems", <http://www.oxfordenergy.org/2000/05/oil-pricing-systems/>, accessed on January 20, 2016; FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit.;

²⁵⁶ FATTOUH, B., *The origins and evolution of the current international oil pricing system*, cit., p. 63.

²⁵⁷ *Ivi*, p. 64-66.

²⁵⁸ HORSNELL, P., *Oil pricing systems*, cit.

5.3. Evidence from the physical market

5.3.1. OPEC and its claims

A direct implication of the fact that OPEC members employ futures prices in their pricing formulas is the wide range of elements that OPEC has to take into account to shape its output policy, such as the level of inventories, the shape of the futures curve, the volume of open interests and the net positions in the futures market, the market's bearish or bullish sentiment, and the inflows and outflows of funds in the paper market. As Fattouh highlighted, the exposure of OPEC to financial markets could complicate its decision-making process, inasmuch as the Organization can solely rely on one tool, that is choosing its production ceiling, to achieve its objectives²⁵⁹.

With this in mind, let us consider OPEC's repeated claims that prices were being driven away from their underlying fundamentals by speculators and their “selfish interests”.

In its communiqué after its conference in June 2006, the cartel reiterated that there was no clear shortage of oil in the market and stated that “price volatility [was] exacerbated by geopolitical developments and speculation in the oil futures market”. Eventually, while oil prices were approaching for the first time the \$70 barrier, OPEC decided not to intervene on its production ceiling²⁶⁰. As already seen in Chapter 4, then, after reaching its peak in summer 2006, prices started to slide significantly for the first time since the turn of the century, moving from \$70 to around \$50 per barrel. Thus, at its Doha meeting of October 2006, OPEC suddenly decided to restrict its output by 1,2 mbd with effect from November 1, and did it again in February 2007²⁶¹. In response to the accusations of pursuing a policy aiming at a new, fair price floor, among its justifications,

²⁵⁹ FATTOUH, B., MABRO, R., *The oil price regime*, cit., p. 14.

²⁶⁰ OPEC, *OPEC Bulletin*, XXXVII(4), 2006, p. 6.

²⁶¹ IDEM, *OPEC Bulletin*, XXXVIII(6), 2006, p. 5.

OPEC invoked a change in the market sentiment towards a more bearish phase: “the crude oil futures market continued the downward trend since its peak in July with the front-month average falling for the fourth consecutive month [...]. The net long positions decreased by 13,500 contracts to stand nearly flat at 130 lots, the lowest level since March”. As a consequence, “speculators [continued] to have an impact on the crude market in the period of falling prices. The behavior of non-commercials may have contributed to somewhat exacerbating price trends”²⁶².

Once stemmed the price slide, at its 2007 meeting in Abu Dhabi, OPEC resumed its passive behavior in the face of rising oil prices and decided not to auction its spare capacity to put a ceiling on the price hike: “market fundamentals have essentially remained unchanged”; nonetheless, “at the same time [...] world oil prices remained volatile [...] exacerbated by non-fundamental factors, including the heavy influx of financial funds into commodities and speculative activity in the markets”²⁶³.

In May 2008, with spot prices well above the psychological barrier of \$100 per barrel, President George W. Bush went to Saudi Arabia to meet King Abdullah and Saudi oil minister Al-Naimi, determined to get some clarification on OPEC's passive approach and to convince the Saudis to open their taps. “If you want to move more oil, you need a buyer”, said the minister. That was another way to tell the same story: OPEC was not to blame for the higher prices²⁶⁴.

Finally, in June 2008, Saudi Arabia shifted to a more active output policy and committed to auction its spare capacity, providing the oil market with additional 500,000 bd, in an effort to calm prices, by then around \$130 per barrel. The move was again accompanied by the claim that markets were well supplied, but that time the production cuts turned out to be strictly necessary, as the level of prices was one capable of literally destroying consumption levels.

A possible interpretation of the OPEC's output choices described above for the

²⁶² IDEM, *Monthly Oil Market Report*, November 2006, pp. 3-20.

²⁶³ IDEM, “146th (extraordinary) Meeting of the OPEC Conference”, http://www.opec.org/opec_web/en/press_room/1006.htm, accessed on January 20, 2016.

²⁶⁴ YERGIN, D., *The Quest*, cit., p. 176.

period 2005-2008 can be that OPEC behaved as if the massive inflow of funds in paper markets played a major role in the making of the crisis, and thus acted accordingly, pursuing policies that in some way contributed to the large price movements occurred in the second half of the 2000s. Speculative activity has been a key ingredient in the choice of cutting production in 2006, inasmuch as OPEC believed that the change in the net positions in financial markets was about to trigger a price fall. By contrast, when it seemed that non-commercial players were driving prices upwards, it resumed a more passive approach, since, as OPEC itself stated, it had "little or no influence over speculation"²⁶⁵. Otherwise, as long as the cartel believed that fundamentals were sound, any increase in quotas, like those demanded by Bush himself, would just result in an overhang of supply and, thus, in a subsequent price collapse. Nonetheless, the cartel's behavior could be also interpreted in terms of cosmetics, a justification to a deliberate policy which aimed at taking advantage of the situation to pile up some extra dollars in its members' reserves. In any case, at least as far as speculation seems to have induced market participants, and most importantly OPEC, to behave and pursue policies in some way adding to the price volatility of the period, it can enter the list of explanations of the first oil price shock of the new millennium.

5.3.2. *Circumstantial evidence*

The quick review of the positions on the subject reveals that an unambiguous conclusion about a direct contribution on the part of financial markets is far from being reached. The impact of speculative activity on spot prices during the first decade of 2000s is still unclear, even though the premises suggesting the development of a speculative bubble were all present at the time: a sudden and staggering price rise – prices doubled in twelve months from July 2007 and July

²⁶⁵ OPEC, "Opening Address to the 148th Meeting of the OPEC conference", http://www.opec.org/opec_web/en/960.htm, accessed on January 16, 2016.

2008; a sudden and dramatic crash soon thereafter – prices dropped from \$147 to \$35 per barrel within just five months; and a massive inflow of funds in the futures market.

However, it does not seem convincing to argue that, as the link between speculation and the 2007-2008 events has not yet been found, then that very link does not exist, and especially when the cited authors, in order to provide an answer to the events, rely on generic assumptions about global supply and demand. In 2008, Krugman spoke of the “growing difficulty of finding oil” and the “growth of emerging economies like China”²⁶⁶. Firstly, as shown in Chapter 2, two of the largest oil exporter on earth, Saudi Arabia and Iraq, still have an enormous potential unexpressed, the former owing almost its entire production to an only, huge oilfield, the al-Ghawar one, and the latter having a big portion of its territory still unexplored. Secondly, the EIA estimated that in 2008 the global proven reserves of crude oil stood at 1,3 trillion barrels, what warranted a quite stable supply of oil at by then consumption rates still for a long time²⁶⁷. Thirdly, as Ali Naimi put it in a speech delivered at the World Petroleum Congress in 2005, the problem of the oil industry was one of “deliverability”, the “capacity [...] to develop, produce, transport, refine and deliver to end consumers the energy they require [...]”; we should not confuse this very real 'deliverability' with resource 'availability', which is not a problem”²⁶⁸. As for China, even if the country registered a 15-percent increase in GDP from 2003 to 2004, from 2007 to 2008 its GDP grew “only” by 9 percent, and its 900,000 bd of demand increase in 2004 were by then confined to history: between 2007 and 2008, China increased its oil demand by less than 200,000 bd²⁶⁹.

Kilian *et al.*, instead, developed a “structural model of the global market for crude oil” which found that speculation had actually been a key ingredient during the 1979 oil shock, the 1986 countershock, and even in the short-lived

²⁶⁶ KRUGMAN, P., *The oil nonbubble*, cit.

²⁶⁷ Based on the *International Energy Statistics*, see www.eia.gov.

²⁶⁸ Quoted in FATTOUH, B., MABRO, R., "The investment challenge", in MABRO, R., (ed.), *Oil in the Twenty-first Century*, cit., p. 101.

²⁶⁹ IEA, *Oil and Gas Security: People's Republic of China*, 2012, p. 2.

price rise in the aftermath of the 1991 Iraqi invasion of Kuwait²⁷⁰. On the contrary, oil price volatility during 2000-2008 had to be a matter of “shifts in the flow demand for crude oil” which created “cumulative effects [...] over the course of several years”²⁷¹. Lastly, Smith dismissed the speculative hypothesis arguing succinctly that the behavior of spot prices was entirely consistent with “surging demand and falling supply”²⁷². As already observed in Chapter 3, however, in 2007 the annual growth rate of demand stood at 1.1 percent, even lower than the average for the whole 1990s, when prices were hovering around \$18-\$20 per barrel. In addition, in 2008 global demand growth turned out to be negative. By contrast world oil supply recovered and almost touched 90 mbd in 2008. The same is true for the price slide of late 2006 and early 2007: as Fattouh wrote, the price fall “occurred despite the fact that the fundamentals that have driven the oil market in the [previous] year did not change so much”. All this seem to suggest that market fundamentals were unlikely to justify alone the upward price path witnessed in the second half of the 2000s, and especially from 2007 to 2008.

Though their impact has not yet been demonstrated, it seems in any case far more convincing to lay emphasis on the increasing volumes of funds which found their way into financial markets in conjunction with rising prices. This kind of explanation is certainly in line with the state of market fundamentals and the level of prices. In addition, the coincidence between the increase in the net short positions and the increase in oil prices, as most of the time since 2005, and between the decrease in the net long positions and the decrease in oil prices, as in the case of the 2006-2007 price slide, is somewhat suspicious.

Furthermore, all the available data on open interests and net positions which are generally relied on to assess the impact of speculative activity on prices make reference only to official exchanges, like the NYMEX and the ICE. However, the volume of trading in these two markets represent only a fraction of global

²⁷⁰ KILIAN, L., MURPHY, D., “The role of inventories and speculative trading in the global market for crude oil”, *Journal of Applied Econometrics*, 29(3), 2014, pp. 454-478.

²⁷¹ KILIAN, L., MURPHY, D., *The role of inventories and speculative trading*, cit., p. 467.

²⁷² SMITH, J.L., *World oil: market or mayhem?*, cit., p. 156.

futures transactions in oil. There is instead a big portion of financial activity which is not subject to this kind of registration: the activity in over-the-counter markets (OTC), informal and unregulated forward markets in which oil trading takes place through non-standardized contracts negotiated bilaterally²⁷³. Information on the actors involved in these markets and on the total volume of trading is not available. According to some estimates, in any case, the volume of activity in these unregulated markets is several times larger than the one in the official markets, with a market value of the positions estimated around \$2 trillion by mid-2008²⁷⁴.

To conclude, in the light of these elements, although several studies failed to discover a link between paper barrels and wet barrels, to reach the conclusion that the first oil price shock of the new millennium has been driven solely by fundamental factors seems a hasty verdict. A speculation-inclusive explanation would be more in line with the events occurred from the early 2000s to mid-2008.

²⁷³ PARSONS, J., *Black gold*, cit., p. 87.

²⁷⁴ *Ivi*, p. 88.

6

TOWARDS A NEW CYCLE

6.1. The other side of the oil crisis

6.1.1. A supply-side revolution

As with all oil price cycles, significant increases in the price of crude oil end up in a response on the part of demand and supply. On the one hand, they lead to an erosion of long-term consumption levels and to efforts to differentiate the sources of energy; on the other hand, they create incentives to invest in new oil production capacity. That happened in the 1970s, when the quadrupling of the price of oil had driven the rapid expansion of oil production in difficult areas, like Mexico, Alaska and the North Sea. Also in the case of the 2000-2008 oil price cycle, a big wave of production capacity was soaring worldwide, pushed by a more expensive crude oil. For instance, at the Jeddah meeting of oil producers and consumers of late June 2008, the Saudis announced an ambitious programme of “massive investments” both upstream and downstream, totalling around \$130 billion over the next five years²⁷⁵.

However, a consequence of this pattern which is peculiar to the oil crisis at issue is that the higher prices of the 2000s resulted in a significant investment response in the exploitation of *unconventional* sources of oil, a process that Maugeri has defined as the “de-conventionalization” of petroleum²⁷⁶. For the first time, it was by then economically viable to explore new regions of the world to extract that petroleum not otherwise recoverable with the conventional

²⁷⁵ OPEC, *OPEC Bulletin*, XXXIX(6), 2008, p. 8.

²⁷⁶ MAUGERI, L., *The Age of Oil*, cit., p. 220.

techniques, an effort which was primarily concentrated in Canada, Venezuela, Brazil and the United States. The increasing volumes of supply coming from the Canadian tar sands, the Venezuelan huge ultra-heavy oil resources, and the Brazilian ultra-deep offshore pre-salt formations were all “pieces of the unconventional oil mosaic that, by 2020, could deliver more than 10 mbd from the Western Hemisphere alone”²⁷⁷. However, the fastest-growing frontier of unconventional oils was shale oil in the United States.

The dramatic rise in oil prices witnessed in the first decade of the twenty-first century triggered the so-called “shale revolution” in the United States²⁷⁸. This phenomenon was brought about by the employment on a large scale of horizontal drilling and hydraulic fracturing – the latter most commonly known as “fracking” – to extract the oil trapped in some particularly dense and impermeable rock formations, which is otherwise not recoverable with the conventional, vertical drilling methods²⁷⁹. In more specific terms, after having drilled the well vertically, it is turned in horizontal position so that it can reach the desired reservoir, and then a mixture of water, sand and chemicals is injected in the shale formation in order to free up the hydrocarbons present therein²⁸⁰.

However, this technique was not something new to the oil industry. The first well being drilled “horizontally” dates back to the 1920s and the notion of fracturing shale formations to recover the petroleum hidden inside has been around since the times of Rockefeller. Nevertheless, the high costs involved in the process made it uneconomical, given also the fact that the price of the conventional oil remained flat for the majority of its history. Only the oil shocks of the 1970s gave new momentum to the development of such technique, before it was eventually abandoned again due to the plunge in crude oil prices from

²⁷⁷ IDEM, “Oil: the next revolution”, <http://belfercenter.ksg.harvard.edu/files/Oil-%20The%20Next%20Revolution.pdf>, accessed on January 28, 2016, p. 8.

²⁷⁸ CAMPBELL, C., “Modelling oil and gas depletion”, *The Oil Age*, 1(1), 2015, p. 22.

²⁷⁹ KEMP, J., “A brief history of the oil crash”, <http://fingfx.thomsonreuters.com/2015/02/05/1612277de1.pdf>, accessed on January 28, 2016, p. 7.

²⁸⁰ MAUGERI, L., *Oil: the next revolution*, cit., pp. 42-43.

1986 to the late 1990s²⁸¹. Then, the staggering oil price ascent of the 2000s provided fertile ground for a veritable revolution in the industry, making it cost-effective to employ horizontal drilling and hydraulic fracturing extensively. Within a handful of years, the number of drilled wells grew significantly: from 150 in 2005, they soared to almost 900 by 2010 and more than 2000 three years later.²⁸²

The event which sparked the U.S. shale oil revolution took place in a giant shale formation, the Bakken field, an area that stretches for about 200,000 square miles between North Dakota and Montana. After the formation was discovered during the 1950s, it was only in 2006, with the price of the conventional crude oil approaching \$70 per barrel, that it was economically viable to test the horizontal drilling and fracking techniques, which had immediate success. Thanks to the Bakken shale formation, oil production in North Dakota passed from around 100,000 bd in 2006 to 530,000 bd in late 2011. Given such positive results, the exploration of the surrounding regions was rapidly activated, and led to the expansion of the Three Forks field – also in North Dakota – the Eagle Ford in Texas and the Utica in Ohio, other large shale formations deemed to hide massive petroleum reserves²⁸³.

The impact of the shale oil boom on the U.S. petroleum industry was such that it managed to recover the entire production of the country which had been declining inexorably since the 1980s. Overall, the share of shale oil production out of the entire U.S. crude oil production rose from 2,5 percent at the turn of the century to over 40 percent in 2012²⁸⁴.

The rebound in the U.S. oil production was quick and sharp, and resulted in U.S. oil imports falling from 9.8 mbd in 2009 to 7.5 in 2013²⁸⁵; this opened a new

²⁸¹ KEMP, J., *A brief history of the oil crash*, cit., p. 8.

²⁸² *Ibidem*.

²⁸³ MAUGERI, L., *Oil: the next revolution*, cit., p. 46.

²⁸⁴ FATTOUH, B., "The U.S. tight oil revolution: what kind of revolution?", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2013/06/The-Us-Tight-Oil-Revolution-What-Kind-of-a-Revolution.pdf>, accessed on January 28, 2016, p. 6.

²⁸⁵ SEN, A., "U.S. tight oils: prospects and implications", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2013/10/WPM-51.pdf>, accessed on January 28, 2016, p. 26.

scenario also from a geopolitical standpoint for the years to come. The notion of “energy independence” found again its way in the political debates of the time, after years of silence since the expression had been firstly pronounced under the Nixon administration²⁸⁶. The enthusiasm that surrounded the unexpected escalation of shale oil production rapidly endorsed the belief that the U.S. could reduce their vulnerability to the inherently “unstable petroleum-producing regions like the Middle East and West Africa”²⁸⁷.

Others have been more prudent about the long-term prospects of shale oil, showing concern notably for its environmental impact and its financial sustainability. Firstly, the techniques involved in the extraction of shale oil are said to have contributed to land and water contamination. Secondly, unlike conventional oil, shale oil wells present an extremely high decline rate, meaning that frackers have to resort to continuous drilling activity to sustain their output levels, and this is possible only with relatively high crude oil prices. Otherwise, in order to sustain production, the only solution is fueling debt levels²⁸⁸.

The extreme success of horizontal drilling and hydraulic fracturing brought to an overhang of supply in the oil market, peaking in late 2014. According to some commentators, this was one of the reasons behind Saudi Arabia abandoning once again its role of swing producer, leaving its production quota unaltered, despite another slide in prices; indeed, cutting production would have meant risking an erosion of its market share, just as happened in 1986. A collapse in prices would have pushed U.S. producers of shale oil out of business, at the same time sparing Saudi Arabia, whose extremely low marginal costs of production would have granted it a cost-effective production even at such low prices²⁸⁹. Therefore, prices crashed once again, as they did in 1986, 1998 and in the second half of 2008.

²⁸⁶ KILIAN, L., "The impact of the shale oil revolution on U.S. oil and gasoline prices", CFS Working Paper No 499, 2014, p. 1.

²⁸⁷ SEN, A., *U.S. tight oils*, cit., p. 4.

²⁸⁸ *Ivi*, p. 29.

²⁸⁹ See, for instance, FATTOUH, B., SEN, A., "Saudi Arabia oil policy: more than meets the eye?", <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2015/06/MEP-13.pdf>, accessed on January 29, 2016.

6.1.2. *The bust of the bubble*

After reaching their record peak of \$147 per barrel in July 2008, oil prices abruptly halted their march and started witnessing a slide, which quickly translated into a free-fall, that led them to \$32 at the end of the year. In a first phase, from July to September 2008, the cooling off in oil prices was the outcome of the joint impact of a supply-side response to the higher prices and the erosion of consumption levels²⁹⁰. The first signs that oil demand was slowing down were already present in late 2007, when most developing countries, China included, started to ease or lift the price controls and subsidies on petroleum derivatives, by then become unsustainable for their national budgets. Once those countries were exposed to a more expensive petroleum, the effects of the higher international prices were suddenly felt at the gasoline pump. Thus, the mechanism that fueled the steady rise in oil prices a few years before jammed and the Asian demand rates of growth began stepping back²⁹¹. As a result, prices slid to \$124 by the end of July, to \$115 by mid-August and again to \$100 during the first weeks of September²⁹². However, the market sentiment, shaped by inaccurate forecasts, overlooked these early symptoms and was still oriented towards a strong growth in global oil demand for the end of 2008, what renewed once again concern about the inadequacy of future petroleum supplies. Until September 2008, indeed, dire forecasts predicting ever-escalating prices were still in the news, to the extent that, even as late as September 2008, Fortune Magazine published a piece entitled "Here comes \$500 oil".²⁹³

In the meanwhile, amid a two-month price decline, OPEC countries met in Vienna on September 9. Despite the insistent pressures on the part of the hawks Venezuela and Iran to restrict production in order not to "kill the golden goose", the conference just called for a stricter observance of the production quotas

²⁹⁰ FATTOUH, B., *Oil market dynamics*, cit., p. 43.

²⁹¹ MAUGERI, L., *Understanding oil price behavior*, cit., p. 14.

²⁹² FATTOUH, B., *Oil market dynamics*, cit., p. 43.

²⁹³ O'KEEFE B., "Here comes \$500 oil", *Fortune Magazine*, http://archive.fortune.com/2008/09/15/news/economy/500dollaroil_okeefe.fortune/index.htm, accessed on January 29, 2016.

established at the September 2007 meeting. On one side, there was the recognition that the market was oversupplied, and the price slide was clearly signaling it; the decision could thus be seen as an implicit call to Saudi Arabia to abide by its production ceiling, as the Kingdom was still overproducing by 500,000 bpd since the Jeddah energy meeting of June 2008. On the other, however, an actual production cut was not at all a solution; OPEC was not to make the same mistake of February 2004, when it hastily restricted output precisely on the eve of the demand shock, misled by the forecasts predicting standard growth rates in oil demand. In addition, the price slide was somewhat compensated by a stronger dollar. "Less income, but a stronger dollar. What is the use of earning a lot of income with a weak dollar?", asked rhetorically Ali Naimi. In the following days, the withdrawal of the supply overhang from the market seemed to have stemmed the slide in oil prices and was therefore welcomed with optimism. Certainly, OPEC countries were not to underestimate the events and the decision could also be interpreted as a preemptive action to engineer a "soft landing" in the event that demand declined further²⁹⁴.

On September 15, nevertheless, the bubble burst. The U.S. subprime mortgage crisis reached its apex with the bankruptcy of the Wall Street giant Lehman Brothers. The outbreak of the financial and economic meltdown delivered a lethal blow to the economies of OECD countries, which were already suffering from the stellar oil prices. The EIA quickly revised down its forecasts about demand for the foreseeable future and reported that just between September and October, U.S oil demand plummeted by 1.8 mbd²⁹⁵. On the financial side of the market, the prospects for a global economic contraction created the conditions for a rush to liquidity away from the risks in the oil market, resulting in a quick unwinding of positions²⁹⁶.

In the face of the financial crisis and mounting evidence of a demand destruction, OPEC rapidly organized an emergency meeting to be held in Vienna

²⁹⁴ *Middle East Economic Survey*, "OPEC acts to engineer soft landing", 51(37), 2008.

²⁹⁵ EIA, *Weekly Petroleum Status Report*, October 10, 2008, www.eia.gov.

²⁹⁶ FATTOUH, B., *Oil market dynamics*, cit., pp. 43-44.

on October 24. By then, the price of oil was half the level of July and was already putting at risk many existing oil projects in member countries, devised on the basis of the previous price level. However, the collapse was unprecedented for its speed and magnitude, and the risk of another 1998 began looking probable. There were even talks of reintroducing a sort of price band mechanism – under Venezuelan proposal – whose bounds should have been between \$80 and \$100 per barrel²⁹⁷. The conference agreed to curtail the cartel's output by 1,5 mbd with effect from November 1, at the same time appealing to non-OPEC producers for help, since the cartel could not be expected to bear alone the burden of halting the price fall, and Russia was one of the most active players on the non-OPEC front²⁹⁸. Despite the effort, prices proved immune to the OPEC cut and kept on declining as a result of the unfolding global recession.

At its December meeting in Oran, with prices just above \$40 per barrel, OPEC resorted again to a production cut, trimming its output by further 2,2 mbd. Adding the two previous decisions to the equation, the cartel adopted a cumulative cut of 4.2 mbd, the largest cut ever adopted by the Organization in such a short time span²⁹⁹. However, the slump in consumption was such that oil closed the year at \$32 per barrel, a price level not seen since 2003. After a eight-year long climb, thus, oil prices lost more than \$100 in five months' time, making it the third, and the largest, collapse in the history of the commodity.

The 1986, 1998 and late 2008 price crashes, although sharing a common denominator, that is falling demand, present various differences, the most important being the role of the Organization itself. Indeed, the first two episodes were primarily an OPEC affair. The cartel was plagued by a continuous non-compliance with quota levels on the part of several members, resulting in both cases in a price war within the cartel. In 1986, this pattern led to Saudi Arabia adopting the netback pricing system, with the subsequent flooding of the oil

²⁹⁷ *Middle East Economic Survey*, "OPEC meets to address global economic turmoil", 51(43), 2008.

²⁹⁸ OPEC, "150th (Extraordinary) Meeting of the OPEC Conference", http://www.opec.org/opec_web/en/947.htm, accessed on January 29, 2016.

²⁹⁹ IDEM, "151th (Extraordinary) Meeting of the OPEC Conference", http://www.opec.org/opec_web/en/945.htm, accessed on January 29, 2016.

market with its crude; in 1998, the internal divisions of OPEC led to the disastrous meeting of Jakarta, when the Saudis insisted on increasing the cartel's output, despite evident signals of the unfolding Asian financial crisis. The price collapse described here, by contrast, was basically a demand-led phenomenon. Initially, it was the only possible outcome of a price almost touching \$150 per barrel; later on, the recession caused by the credit crunch and the bankruptcy of several financial institutions led to a further fall in the level of oil consumption, despite the continuous effort by OPEC to reduce its production³⁰⁰.

David Kirtsch, a petroleum analyst at PFC energy, interpreted OPEC's behavior during the frenetic months of the 2008 price collapse in a different light. According to the analyst, the cartel's member countries were perfectly aware that they could not alter the market short-term sentiment. By curtailing their production ceiling, instead, they were already trying to set the table for a quick rebound in crude oil prices in the following months. "What OPEC [was] looking for [was] managing the fundamentals so they [could] create the conditions for a price recovery at some point, when the global economy [would] start to recover", he warned³⁰¹.

By spring 2009, oil prices shrugged off the consequences of the financial and economic crisis and started to climb once again, heading towards a new cycle. After having outstripped the \$100 barrier again in 2011, crude oil remained stable for more than three years, until June 2014. As in late 2008, prices started to slide significantly. This time, however, emphasis lays on the supply-side of the equation: the oil market was witnessing a glut, brought about primarily by the U.S. shale oil revolution. OPEC was left with another critical decision, that is whether to close its taps or not. Nonetheless, it was not so difficult for the Saudis to realize that major OPEC members, like Iraq and Venezuela, and non-OPEC countries, like Russia and Mexico were not to share the burden of halting the price fall by cutting output in concert with the Kingdom. Every single Saudi

³⁰⁰ MABRO, R., "The oil price crises of 1998-9 and 2008-09", *Oxford Energy Forum*, 77, 2009, p. 13.

³⁰¹ MOUAWAD, J., "Oil prices drop to 20-month low", *The New York Times*, <http://www.nytimes.com/2008/11/12/business/worldbusiness/12oil.html?pagewanted=print>, accessed on January 29, 2016.

barrel left off the market would have been rapidly replaced by increasing volumes of Iraqi, Venezuelan, Russian or Mexican petroleum. Cutting production was not an option for Saudi Arabia; its market share was at risk, given also the reduced call for its supply on the part of the United States. The Saudis understood that they had to compete more aggressively in the Asian markets, the engine of the demand shock of the previous decade, but also a region in which Russia had been able to increase significantly its oil exports in recent years. The solution was found in a shift in paradigm: abandoning the role of swing producer and going for market share³⁰². Such a measure would have warranted the Saudis three main benefits: first of all, enforcing discipline within the cartel; secondly, putting out of business the high-cost U.S. frackers; thirdly, putting out of business also the Russians, thus clearing a passage for Saudi oil exports into the Asian continent.

In January 2015, prices dived again below \$50 per barrel.

³⁰² FATTOUH, B., SEN, A., *Saudi Arabia oil policy*, cit., pp. 14-17.

CONCLUSION

The aim of the present study was to provide a possible interpretation of the staggering price path that, starting from the early 2000s, led oil to almost touching \$150 per barrel.

Initially, the study identifies some conditions deemed to be necessary, albeit only insufficient, explanations of the oil crisis at issue. From the mid-1980s to the late 1990s, the global petroleum market went through a long period of deep under-investment in the industry, both upstream and downstream. The low price environment of the period, crude oil prices hovering around \$18-\$20 per barrel, pushed both OPEC and the IOC's to refrain from investing in new production capacity. Specifically, the cartel was not to flood with crude an already too liquid market, given also its growing pessimism about future demand levels. The majors avoided to embark in expensive exploration campaigns, due to, on one side, a price level not warranting adequate returns on the capital invested and, on the other, its impossibility to access the largest and cheapest petroleum reserves on earth. As a result of the two phenomena, the oil market witnessed a gradual but inexorable thinning of spare production capacity, the only instrument available to market forces to shield against sharp increases in oil consumption and sudden supply disruptions. In addition, the poor investment decisions of the past made global refining more and more inadequate to handle the sourest and heaviest grades of petroleum, which, however, represented the bulk of the oil supplied globally. This brought to light an inherent, and somewhat paradoxical, condition of the oil market during the 2000s. It witnessed at the same time the scarcity of certain qualities of crude and the abundance of other qualities of crude. In other words, tight market conditions went hand in hand with oversupplied markets.

In the opening years of the twenty-first century, global oil demand "shocked", driven by the spectacular economic growth of some emerging economies, and China bearing the lion's share. In the meanwhile, global oil supply was floundering, especially in non-OPEC countries, as a result of the poor performance of the U.S. production and the declining North Sea output. In such a context, the supply shortfalls resulting from the 2002 PdVSA affair in Venezuela, the 2003 U.S. invasion of Iraq and the turmoil in the Niger Delta turned out to be crucial variables. These events dealt a severe blow to the market, since, in the absence of spare capacity, a sharp increase in the price of oil is required to clear the market. As a result, crude oil moved from around \$20 per barrel in 2000 to \$60 in 2005.

Despite being quite often too hastily dismissed as a contributing factor, OPEC was ascribed a prominent role in the present study. In March 2000, the extreme price volatility of the previous years led the cartel to adopt a price band mechanism, in an effort to commit itself to the stability of the market. Then, the unexpected surge in oil demand and the poor performances of non-OPEC supplies widened the call on the cartel's supply, which had to auction its remaining spare capacity to restore the market equilibrium. Such developments, together with the OPEC's struggle for more oil revenues, made the mechanism inoperable and led to its abandonment in 2005. From that moment on, crude oil prices accelerated their march, while OPEC assumed a passive approach, justifying its inaction by blaming speculative activity in the futures market.

The justification invoked by the Organization was just a voice in a wider debate in the literature about the presumed impact of speculation on spot prices. Tight market conditions made speculation on future prices increases an attractive way to bid for oil and massive amounts of capital found their way in the futures market. As the price of oil passed from an average of \$20 per barrel in 2000 to \$147 by mid-July 2008, some observers pointed out that precisely the growing speculative activity in the futures exchanges was moving crude oil prices away from their fundamental value. By contrast, others refuted this

position bringing to the fore two main arguments. First of all, a number of studies failed to discover an evident causal relationship between the run-up in oil prices and the activities in the paper markets; secondly, the increase in the level of inventories – a primary condition to assess whether speculation drives spot prices – was not enough to come to that conclusion. Skeptics, thus, concluded that the oil shock was entirely consistent with the dynamics of supply and demand.

After a quick review of the various positions in favor and against the speculative hypothesis, the present study reached the conclusion that speculative activity in futures markets played a major role in the making of the oil shock. Firstly, market fundamentals alone were not able to justify the extreme price swings witnessed after 2005: during the years characterized the most by price volatility, the rate of growth of global oil demand was slowing down, and global oil production was already gaining ground. In addition, a detailed analysis of OPEC's behavior during the period showed that changes in the net long positions in the futures market induced the cartel not to auction its by then renewed spare capacity margin, following the assumption that markets were “well supplied” and prices were being driven by factors other than OPEC policies. Put it differently, the paper barrel enters the oil shock equation at least as long as it pushed OPEC to pursue output policies which contributed to the oil price volatility of the time.

As the price of crude oil started to rebound in 2009, various governments in oil producing countries started to look at the events as the onset of another July 2008. In a speech delivered at the July 2009 G-8 meeting, the French President Sarkozy and U.K. Prime Minister Brown talked about reintroducing a mechanism similar to that implemented by OPEC in March 2000: they underlined the need for a “target price range, based on a clearer understanding of the long-term fundamentals”³⁰³. At the same time, steps have been made, especially in the

³⁰³ *Financial Times*, “Rising oil price seen as risk to global recovery”, July 8, 2009, <http://www.ft.com/intl/cms/s/0/98b4c5be-6b56-11de-861d-00144feabdc0.html#axzz3zDDulNro>, accessed on February 1, 2016.

United States, towards a greater regulation of crude oil futures markets, especially in terms of limiting the positions to be held in futures contracts³⁰⁴.

Such proposals, however, are not short of flaws. As the present study highlighted, the past inability of OPEC in handling its price band mechanism makes every talk of a “target price range” simply irrelevant. Furthermore, limiting the functioning of paper markets could turn out to be a double-edged sword. While perhaps reducing excessive speculation, it may also result in reduced liquidity, which could prevent futures market from performing their task: letting physical market participants spread the risk of price volatility.

As Mabro suggested, thus, oil consuming countries should not concentrate on possible policy responses, but should question the very sustainability of the pricing regime currently in place, a system which is inherently “embedded [...] in the futures markets”³⁰⁵.

³⁰⁴ FATTOUH, B., *Oil market dynamics*, cit., p. 9.

³⁰⁵ FATTOUH, B., MABRO, R., *The oil price regime*, cit., p. 16.

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