

Oil Supply and Demand

A new paradigm is gradually developing on the world oil market. Under extreme pressure from growing demand in emerging countries, the supply side is progressively adjusting. As the market stabilizes, prices are seeking their equilibrium. Although the WTI seems to be finding its level at about USD 60 per barrel, it is still too soon to take this price quotation as a reference. Due to the inertia in behaviours, the effects of recent trends are not all visible yet and adjustments are still underway. In this uncertain business environment, key market players have not yet finalized their strategies.

Before reviewing the current situation, we will start out by comparing current trends on the oil market with what happened in the 1970s. We will point out the similarities between the first oil shock and the recent price hikes while stressing the differences between the two events, notably with regard to probable consequences. We will review the highlights of 2005 during which, despite the combined factors pushing prices up both in the short term (violent exogenous shocks due to climatic phenomena) and over the long term (persistence of production and refining bottlenecks), the oil market showed the first signs of stabilization. It seems to be gradually moving towards equilibrium and the oil price looks as if, in the medium term, it might stabilize.

Is this demand shock very different from its predecessors?

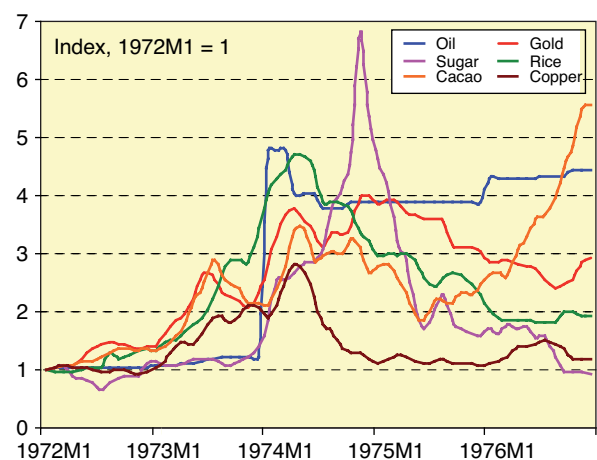
In spite of appearances, today's situation recalls the early 1970s in some ways.

The causes...

Generally, it is considered that the first oil shock was the result of a purely political decision by OPEC that reflected the development of Arab nationalist sentiment and aggressively asserted the cartel's power over the market. The statements made by OPEC at the time support this point of view. Because embargo measures were implemented briefly by the countries belonging to the Organization of Arab Petroleum Exporting Countries (OAPEC), the soaring crude price is also perceived as a supply shock, the consequence of suddenly turning off the oil spigots. Although these different factors certainly contributed to the change in how the oil markets worked, their influence on events was exerted more on form than substance. There were several mainstream trends that are now often forgotten.

In the first place, global oil demand was exploding. Although there were already signs that the economic "Golden Age" that followed World War II was running out of steam, the Keynesian full employment economic policies implemented by Western countries in general and the United States in particular sustained the pace of economic activity. In 1973, the OECD countries posted the strongest growth since the Korean War, with GNP up by more than 6% in volume. The particularly strong economic growth shown by the industrialized countries allowed their populations to acquire durable goods at a time when raw materials were plentiful and cheap. For all types of natural resource, consumption grew at an unsustainable rate, as noted in "The Limits to Growth", a 1972 report by The Club of Rome. Specifically, demand targeting OPEC countries rose from 6.7 Mbb/d in 1960 to 20.2 Mbb/d in 1970 and 27.5 Mbb/d in 1973; at the time, its output represented 55% of world production.

Fig. 1 Prices of natural resources



Source: IMF - IFP.

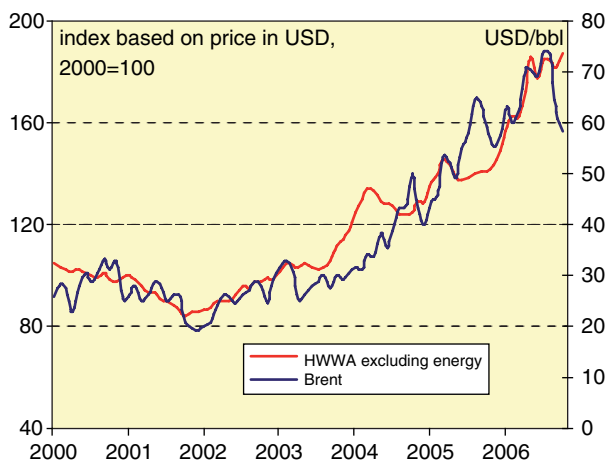
In the face of rising demand, the nominal rigidity of the oil price and its downwards trend in constant money terms had

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constrained prospects for investment. Supply could not keep up with demand. In the early days of the first shock, OPEC had very little spare capacity at its disposal. In the short term, the supply was likely to be inadequate and, for the first time, prices practiced on the world spot market exceeded posted prices¹, a sign that the oil market was becoming a seller's market. The East Coast of the United States was hit by a shortage of oil and gas.

As the 'sixties moved into the 'seventies, the economy heated up and demand for raw materials accelerated, creating inflationary conditions illustrated by the successive devaluations of the U.S. dollar and the decision to go off the gold standard. The average unit value, expressed in U.S. dollars, of all commodities involved in international trade increased by nearly 40% between first half-year 1972 and second half-year 1973. This being so, what was particular about the increase in the oil price was more that it was so sudden and deviated from other products, than its magnitude (cf. Fig. 1). Price adjustments due to variations in supply and demand could not take place smoothly but in fits and starts, due to the use of long-term contracts and the relative rigidity of the price-setting system. In this respect, the Yom Kippur War provided an opportunity for rather than caused the shock.

Fig. 2 Price of oil and raw materials



Source: Global Insight - IFP.

Today, the stage set may look different, but the plot is still the same. True, the increase in oil demand has migrated from what are now post-industrialized countries to emerging countries, especially China. True, pan-Arab aspirations in the Gulf have eased. True, the oil price is presently following the rationale of the market, reacting day by day to a tightening of supply. The fact remains that the continued improvement of living condi-

(1) The price agreed upon by companies and producing countries, which was the reference used in the determination of royalties and taxes.

tions in key developing countries, especially China and India, is causing an upsurge in demand for raw materials. Short-run acceleration in the pace of economic growth is intensifying this long-run trend. On many markets, supply is having trouble keeping up and the mediatized increase in the prices of oil and certain metals is actually common to all of the production factors; for instance, since 2001, the oil price has run parallel to the HWWA index excluding energy² (cf. Fig. 2).

... and the effects

The first oil shock led to major changes in behaviours. In the short term, oil consumption dropped for two reasons: end users had to pay higher prices and the economy was contracting. In the long term, demand slowed because of the optimization of the energy-mix, notably in the production process of electricity and heat where substitutions were possible (nuclear, coal, gas).

Although one can draw parallels between trends past and present concerning the causes leading to a new oil market paradigm, the consequences are less severe today and should continue to be so.

Generally speaking, the fact that the increase in prices was gradual probably helped economic agents adjust progressively, which was not the case for the oil shocks of 1973 and 1979, and the shift in the equilibrium price will be less painful now than it was then.

As for the OECD countries not including the United States, the increase in petroleum product prices will provide incentive to pursue energy conservation, although energy intensities are already low and declining for structural reasons. Petroleum products are very heavily taxed, which serves as a buffer minimizing the effect on production and consumption prices. This should limit the impact of the crude price hike on industrial and household demand. The rise in prices will no doubt facilitate the development of alternative energies already undertaken for environmental reasons. It may also effectively help reduce road traffic. However, given the orders of magnitude of demand elasticities with respect to final prices, oil intensity should continue to decline in the developed countries with no sharp deviations in the trend curve.

The effects on North American demand could be more pronounced for several reasons. First of all, oil products are taxed much more lightly there than in the rest of the OECD countries, so, when the crude price went up, consumers were harder hit. Furthermore, the level of consumption per capita or per unit of value add is relatively high, which leaves a substantial margin for progression. The change in the oil market

(2) Index reflecting the price variations of various raw materials provided by the Hambourg Institute of International Economics.

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paradigm could encourage behaviours more oriented towards energy conservation. The consensus is that economic activity in the United States will slow down in the short term. The conjunctural cycle that started in 2002 will enter its deceleration stage, which means that the increase in demand will probably be lower than forecast by the IEA (+0.35 Mbb/d). The slowdown could be even more pronounced: there is still a risk that, in 2007, the increase in the oil equilibrium price will have a delayed impact on the economic cycle. This would amputate growth by about 0.8 percentage point if the United States can adjust quickly to the new price system (and by more than one percentage point if adjustment takes longer). If this scenario were to materialize, North American oil demand would undergo a significant contraction.

As for the emerging countries, the conjunctural slackening of the U.S. economy could affect growth in Asian countries, whose economic activity depends on a great deal on exports, but their situation does not seem to be in great jeopardy. The tight supply on the oil market was aggravated when these countries entered a stage of rapid growth. Their situation is therefore very different from that of OECD countries hit by a sharp rise in the price per barrel at the end of the post-WWII "Golden Age". Two factors will be instrumental in sustaining the pace of demand. Firstly, the effects of any conjunctural deceleration in economic activity will not be amplified by a downtrend in growth rates. On the contrary, the long-run increase in their income could offset a short-run crisis. Secondly, these countries find themselves at a lower level of development than the OECD countries in 1973 and the elasticity of their demand for petroleum products to GDP is therefore higher. As subsidy programs are eliminated, the increase in the crude price will gradually be passed on to petroleum product retail prices, which should promote productivity gains without translating into a decrease in consumption. Furthermore, some of these countries, including China, currently rely on oil to a relatively small extent, because coal plays a key role and rising oil prices only have a low impact on their competitive edge in general and the labour cost in particular.

Finally, very low-income countries are experiencing great difficulties. This being said, and no matter how tragic their choices may be, they will not affect world demand because they only play a negligible role on the oil market.

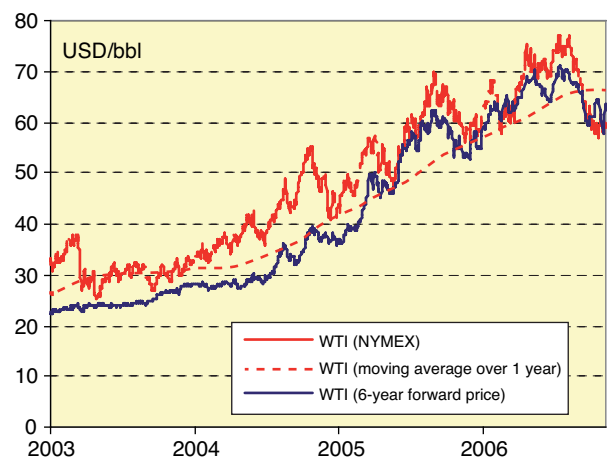
2005: First indications that the market is easing

After the energy splurge in 2004 (+3.1 Mbb/d), 2005 saw growth on the world oil market (+1.2 Mbb/d) drop to the historical average prevailing since the early 1990s (+1.1 Mbb/d). Responsible for this consumption peak, Asia and North America experienced the biggest slowdown. In

2005, consumption increased by 0.18 Mbb/d in China, by 0.16 Mbb/d in the other Asian countries and by 0.13 Mbb/d in North America compared to 0.88, 0.55 and 0.85 Mbb/d, respectively, in 2004. In general, the demand for oil slowed as consumers gradually adjusted to higher oil prices. Specific factors were also at work on either side of the Pacific, contributing fortuitously to the fact that consumption trends in the two biggest oil-consuming countries ran in parallel. In the United States, demand virtually stagnated due to the combination of a mild winter, disturbed conditions in the supply of petroleum products after the summer hurricanes and a relative slowdown in economic activity, which is gradually returning to its long-run growth path (3.2% in 2005 compared to 3.9% in 2004). In China, the regulation of retail prices and their disconnect with the level of quotations on international markets is leading apparently paradoxically to a slackening of consumption. The control of the State over pump prices, at a time when import prices were soaring, has made refining margins fall sharply since 2004. In 2005, the sector reported losses on the order of USD 1.3 billion. Many installations had to be closed and, despite strong underlying demand, refiners cut back their sales on the domestic market.

As for the world oil supply, between 2004 and 2005 it moved in step with demand thanks to a significant increase in OPEC production capacities (+1.1 Mbb/d), especially Saudi Arabia (+0.54 Mbb/d). Other parts of the world reported contrasting performances: increases in Latin America (+0.2 Mbb/d), Africa (+0.3 Mbb/d) and the CIS countries (+0.4 Mbb/d) offset the net production decrease in Europe (-0.5 Mbb/d) and North America (-0.4 Mbb/d). The non-OPEC supply remained virtually unchanged at 50.3 Mbb/d.

Fig. 3 Variations in prices on the Nymex



Source: Platts - NYMEX - IFP.

As a result, the tight market conditions that appeared in the early 2000s, aggravated by the explosion of demand in 2004,

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did not ease in 2005. The movement of panic caused during the summer by Hurricanes Katrina and Rita is a perfect illustration, clearly demonstrating the lack of flexibility of the market. The only way to meet immediate supply needs and bring soaring crude prices under control was to draw on strategic reserves. It became obvious that, all along the oil supply chain, there exists little margin for manoeuvre and that this state of affairs is likely to endure. This realization pushed up the most remote WTI forward price (2011) on the NYMEX. In one way or another, this price is supposed to reflect what market players think the equilibrium prices will be in the medium/long term. From close to USD 35 per barrel in January, well below the spot price, this quotation soared to USD 58 per barrel in December, pulling the entire forward curve up with it.

However, the rise in the level of price forecasts encouraged the industry to invest in production capacity and take a closer look at projects to develop refinery capacity. In the oil upstream sector, capital expenditure worldwide reached about USD 214 billion in 2005, up 25% year on year. Although part of this increase is owing to the strong inflation in service and supply activities, the forecasts of an increase in supply in the medium term had a moderating effect on markets. Despite a particularly turbulent hurricane season in the Gulf of Mexico and the conjunctural shock to short-term prices in its wake, the latter gradually returned to the level of the 2011 price quotation (cf. Fig. 3). Spot prices did continue to rise, but more slowly.

This alignment seems to indicate that the market is entering a stabilization phase characterized by a price for WTI in the vicinity of USD 60 per barrel.

2006-2010: The market is seeking equilibrium in the medium term

Even though the Brent and WTI exceeded the symbolic threshold of USD 50 per barrel in 2005, the oil markets in 2006 presented various signs indicative of stabilization in the medium term.

Of course, the new equilibrium resulting from the pronounced trends in supply, and especially in demand, that have prevailed since the start of the millennium will be very different from the equilibrium established following the counter-shock. The price level will be much higher than the ceiling of USD 28 per barrel enforced by OPEC for a while (and significantly higher than the price band within which quotations fluctuated during the 1990s). In addition, it is likely that short-term volatility will be greater than in the past. Yet it is still too soon to say what the "normal" price level could be. Trends during the first eleven months of 2006 suggest that the

new reference price could be in the neighbourhood of USD 60 per barrel for benchmark crudes on the European and North American markets. This being said, we still lack perspective on recent events and there are still too many uncertainties as to what adjustments consumers will make and what attitudes producers will adopt.

Moreover, this period of stabilization is only temporary. Unless solutions are rapidly found to develop the supply of petroleum products and promote possibilities for the substitution of crude with alternative energies, the market should again experience tensions towards the end of the decade. The equilibrium price per barrel would then be likely to take another step upwards.

Contrasting trends in world demand

Whereas the upsurge in the price per barrel in 2005 should be viewed as the result of acceleration in demand in 2004 and oil market bottlenecks, the slowdown in world consumption in 2006, up by "only" 0.9 Mbbbl/d (+1.1%) made a significant contribution towards easing tensions.

This overall trend conceals great regional disparities. In all OECD countries, demand is down: Asia, North America and Europe have all seen a drop (by 0.1 Mbbbl/d, 0.07 Mbbbl/d and 0.03 Mbbbl/d, respectively). On the other hand, it is still strong in rapidly emerging areas including China (+0.41 Mbbbl/d, up 6.2%) and the Middle East (+0.33 Mbbbl/d, up 5.4%).

These contrasting trends reflect the differences in the mechanisms used to set retail prices. In countries where the price hike of crude is passed on to consumers, the latter reacted and domestic consumption with them. This trend, typical of OECD countries, could be detected in other countries as well, such as Argentina and Thailand, where gasoline pump prices doubled since 1995 (constant dollars).

In contrast, domestic demand stayed strong in countries where prices are subsidized by the State. This is especially true of producing countries in the Persian Gulf. The increase in their oil revenue allows them to keep consumer prices very low. Nonetheless, the fact that their energy intensities are high imply a substantial loss of revenue, especially countries running a refining deficit that must import to cover a non-negligible percentage of domestic motor fuel consumption (e.g. Iran). This is why a few governments, including the UAE, have implemented symbolic retail price increases.

The problem is much more dramatic for a number of poor countries: while their populations would consider an energy price increase to be unacceptable, their governments do not have the financial capacity to maintain subsidy programs whose costs are rising.

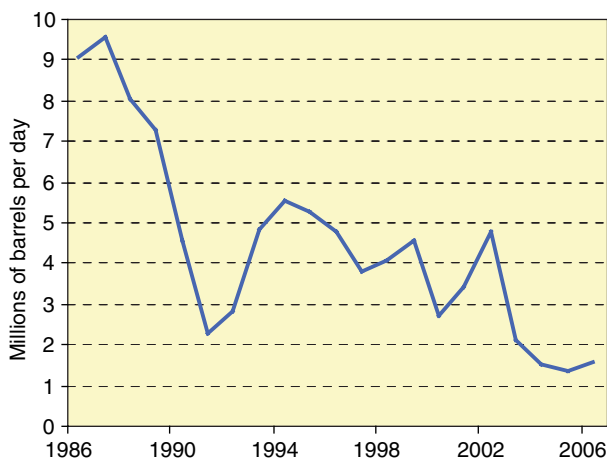
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The increase in Chinese demand is atypical. It resulted from higher pump prices, which encouraged refiners to boost sales on the domestic market.

Will spare capacity be restored in the upstream sector?

Although 2006 brought confirmation of the decline of mature zones (starting with the North Sea) and a decrease in OECD output for the fourth straight year, there were significant increases in non-OPEC production elsewhere. Once again, ex-USSR countries represented the bulk of growth, with an increase of 0.4 Mbb/d, while Africa and Latin America accounted for 0.3 Mbb/d and 0.15 Mbb/d, respectively. All in all, non-OPEC production rose by nearly 0.7 Mbb/d to 51 Mbb/d. For the first time since 2003, it rose faster than world demand. If one includes OPEC's increase in the condensate supply (+0.2 Mbb/d), call on OPEC crude stabilized in 2006. Before Angola joined on December 14, forecasts by IFP, in line with recent figures published by the IEA, had anticipated it decreasing in 2007 and 2008.

Fig. 4 OPEC's spare capacity



Source: IEA - IFP.

In the short term, the forecasts for growth in supply are encouraging until the end of the decade. Upstream investments amounted to USD 267 billion in 2006, up 25% for the second year in a row. Although part of this increase in value is due to the inflationary pressures exerted by the saturation of the oil service sector and the higher cost of industrial raw materials, it still indicates growth in activity. We estimate that the increase in volume corresponds to about half of the increase in value. Before Angola joined OPEC, the forecast was that the non-OPEC supply would grow at an average rate of 1.4 Mbb/d per year between now and the end of the decade. This forecast has been revised downwards to 0.7 Mbb/d.

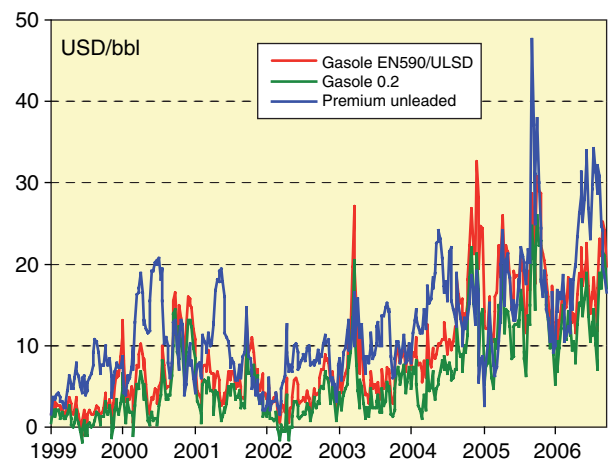
The IEA predicts that demand will increase by 1.8 Mbb/d per year by 2011. Consequently, the anticipated growth in OPEC production capacity — by +2.8 Mbb/d by year-end 2009 (IFP) or +3.3 Mbb/d by 2011 (IEA), not including Angola; or by +4.9 Mbb/d by year-end 2009 (IFP) including Angola — should make it possible to generate spare capacity in the years to come. In the short term, we might see it return to something like its 1990s level. This trend seems to be emerging in 2006 yet still remains embryonic (cf. Fig. 4).

While the fact that Angola has recently joined OPEC adds to the latter's market share and influence, it has not affected the forecasts for the growth of supply, which should increase faster than demand in the short term, although a reversal in trend should occur after 2009.

Things quieter on the downstream front

In the refining sector, growth is less striking in financial terms: in 2006, investments totalled USD 52.1 billion, up 4.8% for the year.

Fig. 5 Cracks on petroleum product prices in Europe



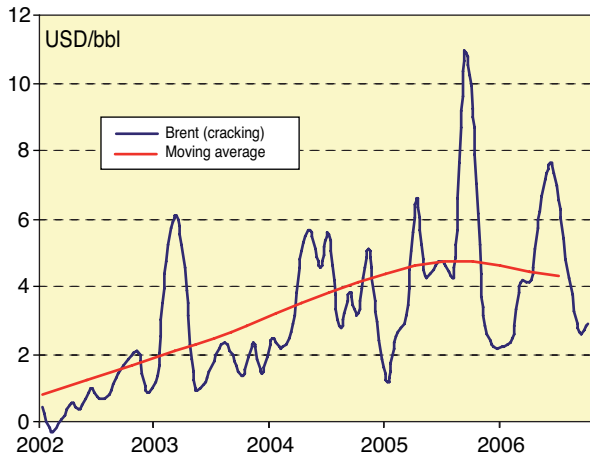
Source: Platts - IFP.

The U.S. Department of Energy issued a preliminary forecast that world refining capacity would grow by 2.5 Mbb/d per year. More recent predictions by the IEA suggest a lower value, on the order of 1.3 Mbb/d per year. In both cases, the bulk of new capacity would be located in China and the Middle East.

Investments materialized more slowly than in the upstream sector, primarily due to delays specific to the sector. It takes a long time for light products shortage to ease and refinery margins stay high, due to large differences between the valuation of crude and that of certain products (cf. Fig. 5).

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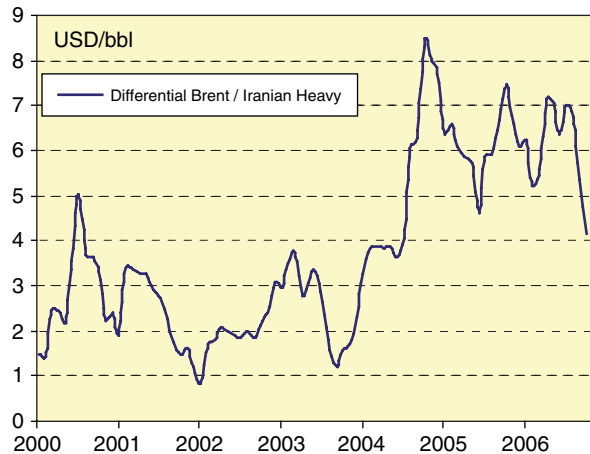
Fig. 6 Trend in NWE refining margins



Source: IEA - IFP.

First of all, the price of gasoline climbed all summer due to large-scale maintenance operations at Atlantic Basin refineries. For other products, the trend seemed to be more in line with seasonal variations.

Fig. 7 Price differential between light and heavy crudes



Source: Platts - IFP.

Despite the persistence of substantial gasoline shortages and high volatility, the general situation in the refining sector is easing. The utilization rate will be down slightly compared to 2005. The stabilization of the trend in margins since 2004 indicates that conditions had stopped deteriorating (cf. Fig. 6). The stabilization of price differentials between light and heavy crudes is another sign (cf. Fig. 7).

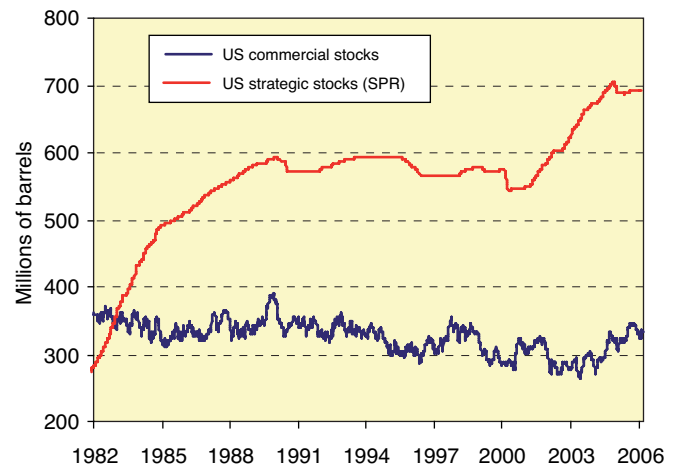
However, most of the new capacity will not come on-stream until after 2010. In the short term, light products prices will still be high and they will be prone to spike occasionally, in case of rising uncertainty.

Uncertainty, stock levels and volatility

There is another sign of the structural change affecting the oil market in the last six years: demand for stocks is rising.

In the United States, the strategic reserve has swelled by 100 millions of barrels, up 17% since the end of the 1990s (cf. Fig. 8). For commercial crude stocks, the increase is much less pronounced, but this turnaround in trend indicates that the market feels vulnerable. The movement of stocks in North America is representative of a general trend, common to all importing countries. For instance, in 2006, the Indian government started to build up strategic reserves large enough to cover two weeks of consumption.

Fig. 8 US crude stocks



Source: EIA/DOE - IFP.

The increase in stocks' levels and the high degree of monthly volatility show that markets feels vulnerable to exogenous shocks to supply, whether climatic or geopolitical in nature.

OPEC's game

Just before the military intervention in Iraq, certain scenarios predicted that this country would make a strong comeback on the oil scene once its underground resources would be opened up to foreign investments. A threat of oversupply loomed for the other members of OPEC, which would have had to choose between supporting prices or defending market share — in other words, selling less or at a lower price — and, anyway, they would have seen their revenue shrink.

Once again, the oil market took forecasters by surprise. Far from being weakened by an abundant supply, OPEC found itself in a strong position. Given the structural nature of this trend, OPEC will continue to play a key role in the years to come. Not since the mid-1970s has its power over the market been so strong.

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The factors bringing about the change in the oil market paradigm may be the same as those prevailing thirty years ago, but OPEC's attitude is very different. From being a destabilizing force in 1973, it proceeded to evolve and become a market regulating organization until the end of the 1990s. For the last six years, it has tried in vain to curb price hikes by slowly mobilizing virtually all of its capacity. Now that it is clear that this increase is structural and not conjunctural, OPEC is feeling its way along to find its proper place.

The quota reductions approved on October 19 and December 14 show that producing countries are convinced that the market paradigm has changed and that the equilibrium price will be higher. It would seem that, recently, OPEC has started to defend a lower price limit of USD 55 per barrel for its crude price basket, even if it not yet officially defined a target price or price range. Fluctuations in the exchange rate of the U.S. dollar could play a major role in determining the new target: the erosion of the value of the dollar, particularly against the euro, compels OPEC to defend its purchasing power.

However, since their policy to support an excessively high price in the 1980s failed, the producing countries, especially Saudi Arabia, are apparently working to stabilize the market at a "reasonable" level so that they can continue to sell in quantity and thus maintain their oil revenue.

For one thing, there is little risk of jeopardizing demand: in the short or medium term, there is no significant alternative to oil for transport sector utilizations, which are predominant. Secondly, now that production in many non-OPEC countries is about to peak, it is highly improbable that the market will see large-scale growth of the conventional oil supply. On the contrary, even before Angola joined, there was a consensus that the non-OPEC supply of crude would grow more slowly than demand starting in 2009-2010. We now know that OPEC's market share will rise starting next year. Its weight is

likely to increase even more rapidly if other producing countries decide to join the organization. Ecuador is thinking about it, and so is Sudan. These new members would immediately reinforce OPEC's influence: its output would gain a little less than 1 Mbbbl/d compared to 2006 figures.

Technology could eventually present a threat, with the improvement of energy efficiency and the development of substitutes to petroleum products. Even if today there is no miracle solution that can be substituted for oil, an excessively high price could have a lasting impact on consumption behaviours and provide a strong incentive to search for and invest in alternative solutions. In the medium and long term, OPEC has to avoid killing the goose laying the golden eggs.

For now, OPEC must strive to restore spare capacity if it wants to assert its role as a "moderator" and regain its power of limiting the amplitude of price fluctuations upwards or downwards. By implementing a moderate quota policy, the organization could meet two objectives: it could neutralize downward price pressure (exerted as the non-OPEC supply grows) and regain its margin for manoeuvre.

OPEC is gradually formulating its strategy and the choices that it makes will be decisive. There is great uncertainty about what attitudes it will adopt in the near future. It is not clear whether OPEC can keep its members in line or how it would react to variations in exchange rates or demand adjustments in countries where the higher cost per barrel impacts consumer prices. Yet it seems likely that, at least in the medium term, increases in oil prices are behind us. The equilibrium price is expected to stabilize for a few years close to its current level.

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Final draft submitted on December 20, 2006