
CRUDE OIL SQUEEZE TO EASE NEXT YEAR
But Era of High Prices Here to Stay

TD Economics
Special Report

September 22, 2005



Bank Financial Group

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Executive Summary

This year's dramatic run-up in crude oil prices to above US\$65 per barrel for West Texas Intermediate (WTI) has sparked talk of a "new era" of high prices. It would not be the first time that these bold predictions have come to the forefront. Indeed, past periods of skyrocketing prices for crude oil in the early 1970s, 1980s, and 1990s were followed by similar prognostications, but each time, they have failed to materialize. Notably, market mechanisms, such as the lagged impact of high prices on crude oil consumption, investment and output, subsequently kicked in, helping to restore balance in the market and push down prices. As such, the price of crude oil has remained prone to among the largest cyclical swings of any traded commodity.

TD Economics' 5-year oil price projections

TD Economics' 5-year crude oil price forecast rests on two convictions. Firstly, we don't believe that the laws of the oil-price cycle have been repealed. And, next year, the major catalyst for the correction is expected to be a significant slowdown in the U.S. economy. Secondly, we see some merit behind the new-era hypothesis this time around. In other words, the key drivers behind the recent rally are expected to persist to some extent, supporting crude oil prices over the medium- to longer-term. These include:

- *Rising global demand* – With populous and highly oil-intensive developing economies of China and India projected to continue industrializing at a rapid rate, there is good reason to believe that longer-term demand prospects for crude oil will remain strong. Last year, crude oil consumption in China alone grew by 18 per cent – almost ten times the world average – as the country surpassed Japan as the second largest world consumer after the United States.
- *Limited world output growth* – Although there has been little compelling evidence that world crude oil supply is soon poised to reach a peak, the outlook for world production increases over the next five years is lack-

lustre at best. OPEC, the global production powerhouse, is bumping up against its capacity constraints, while weak investment in exploration over the past decade and declining production of existing conventional reservoirs have left output in many of the leading non-OPEC producers growing at a snail's pace. Even in Canada, significant expansion in oil sands output in Alberta is being offset by declining productivity on the conventional side.

- *Alternative energy sources unlikely just around the corner* – Although there is likely to be stepped up efforts to develop alternative energy sources, it remains unlikely that crude oil will be displaced as the number one energy transportation fuel worldwide over the foreseeable future.
- *Refinery capacity to remain inadequate* – There is a severe shortage of capacity available to refine crude output into its useful products. And, the biggest strains are apparent in converting relatively-dense grades of crude oil, and removing sulphur in order to meet steadily-tightening environmental regulations. This crunch is largely the result of low margins – at least until very recently – and long time lags associated with receiving project approval. The lack of refining capacity has increased the demand for West Texas Intermediate, which is a lighter/sweeter crude oil grade and requires less processing.

Fundamental price has increased

Boosted by these structural factors, the longer-term equilibrium or fundamental price of crude oil has probably increased over the past decade. Over the past few decades, US\$30 per barrel (in real 2005 dollars) appears to be a level that has been well supported by supply and demand fundamentals. However, given the increasing costs of extracting conventional supplies and the gradual trend towards developing non-conventional crude oil, the fundamental price has probably increased to US\$40 per bar-

rel. There is a good case to be made that at least part of the massive US\$25-odd gap between existing spot prices and the fundamental price reflects the current tightness of supply-demand conditions within the market. However, a more important component is the “fear” premium, which we believe has ballooned to as high as US\$20 per barrel in recent months, as investors increasingly fret about geopolitical risk and other Katrina-style supply disruptions.

Price to fall to US\$45 in 2007

While an estimate of the long-term fundamental price provides a benchmark for where the price of crude will converge to over the long term, it may say little about the medium-term direction of spot prices. Indeed, as we reveal in our 5-year projections, crude oil prices are likely to remain above this fundamental price over the next five years. The highlights of the forecast are:

- The direction of crude oil prices over the very short run is a wildcard, especially in the wake of Hurricane Katrina, where temporary damage to U.S. energy infrastructure has added to the substantial jitters about supply that had already been present in the market since the start of 2005. Although we have set a year-end target of US\$60 per barrel, we certainly don't rule out prices moving above US\$70 or even US\$80 later this year if further unanticipated shocks along the same lines as Katrina sideswipe the crude oil market.
- Next year, the picture will begin to crystallize. More specifically, once the dust from Katrina-related impacts subsides by mid-2006, a significant mid-cycle slowdown in the U.S. economy is likely to be revealed, stoking concerns about the demand picture going forward in the broader global economy. At the same time, the past surge in energy prices is likely to lead to some limited conservation efforts by consumers and businesses in major industrialized countries.
- The prospects for a scaling back of gains in global consumption and for modest supply increases will lead to some further easing in the tight global supply-demand balance in 2006 and 2007, and in turn, a pull back in the massive fear premium currently embedded in crude oil prices. By early-2007, the price of WTI is expected to head back to US\$45 per barrel.
- The extent that prices move up higher later this year would set the stage for a larger percentage correction in prices in 2006-07.

Resumption in tight markets beyond 2007

- In 2008-10, TD Economics' forecast calls for crude oil prices to bounce back above US\$50 per barrel. By then, both the U.S. and world economies are expected to have snapped out of their sub-par period of growth, driving up annual consumption gains closer to the recent trend rate. And, with world production continuing to plod along at a sluggish rate, the supply-demand balance is likely to shift back into a deficit position.
- In this environment, nervousness about supply shortages for crude oil and refined products is likely to move back to the forefront, elevating the level of the risk premium.
- Hence, look for crude oil prices to follow a U-shape over the next half decade. On the plus side, in spite of the increased non-conventional output contribution from Canada and ongoing shortage of refining capacity, according to a study done by CERA (Cambridge Energy Research Associates), most of the incremental oil coming on stream over the next half decade is expected to be light and medium sweet crudes. This should lead to a narrowing in the current lofty price spreads between the different grades.

Implications on gas prices and other conclusions

- In line with the likely path of the price of crude oil, we expect to see some easing in gasoline pump prices over the next 12-18 months to between C\$0.70-0.80 per litre from current levels of over \$1.00.
- Likewise, we expect natural gas prices to fall back in tandem with those of crude oil. In 2007, we expect natural gas prices to average US\$8 per MMBtu from current levels of US\$12 per MMBtu.
- This projected profile of crude oil prices in 2006-07 is no doubt likely to temper at least some of the enthusiasm that is currently evident within the crude oil and natural gas sector. For one, not all projects are created equally. And, in a more sustainable environment of US\$50 per barrel prices, some lower quality projects are likely to be looked at with increasing scrutiny.
- Above all, the next five years is likely to witness exciting new developments, as significant amounts are poured into exploration and development. And, while crude oil is unlikely to go the way of the dodo bird any time soon, heightened efforts to developing alternative energy sources in response to high prices could bring that day closer.



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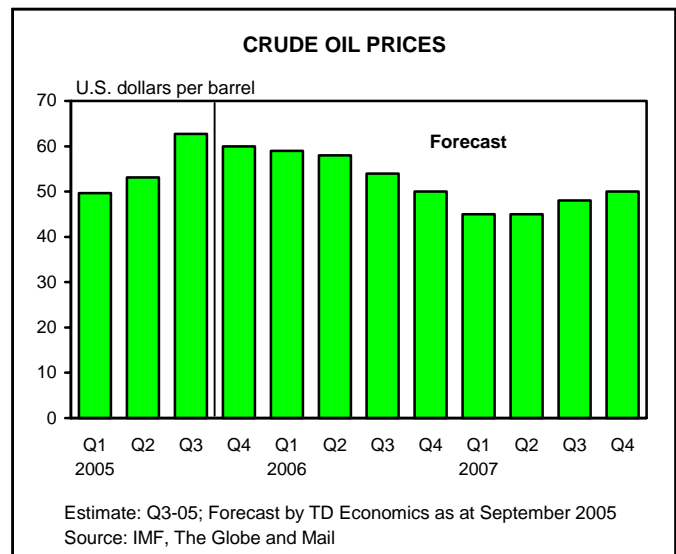
Special Report

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CRUDE OIL SQUEEZE TO EASE NEXT YEAR *But Era of High Prices Here to Stay*

There has been a growing perception over the past few years that the global crude oil market has entered a new era of high prices. Investors have been caught off guard in recent years by the strength in demand for crude oil and refined products globally, reflecting in part the insatiable appetite of developing economies such as China and India. Meanwhile, gains in global crude oil production have not only lagged behind – leaving the world hovering on the brink of excess demand – but some observers have predicted that output may be on the verge of peaking. This sentiment has catapulted prices to as high as US\$70 per barrel in late August – roughly three times the price recorded on average in the 1990s. What’s more, while consensus forecasts still point to a pull back in prices to more normal levels over the next few years, an increasing number of analysts are now projecting that the current run-up will be sustained over the medium term. One forecaster is even calling for prices to reach US\$100 per barrel by 2007.

It’s not the first time that “new era” predictions have come to the forefront. Indeed, past periods of skyrocketing crude oil prices in the early 1970s, 1980s and 1990s have led to similar prognostications. But, each time, these



theories have failed to materialize, as market mechanisms – notably the positive impact of high prices on oil development and the negative impact on consumption – subsequently kicked in, helping to restore balance in the market and push down prices. As such, the price of crude oil has remained prone to among the largest cyclical swings of any traded commodity.

Still, we believe that there may be some substance behind the new-era hypothesis this time around. At the same time – as is most often the case – the most likely outcome lies somewhere between the extreme scenarios that have been recently capturing attention. Here are the highlights of TD Economics’ crude oil forecast.

- The direction of crude oil prices over the very short run is anybody’s guess, especially in the wake of Hurricane Katrina, where damage to U.S. energy infra-

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structure has added to the substantial jitters about supply that had already been present in the market for months. While we have set a year-end target of US\$60 per barrel for West Texas Intermediate (WTI), we don't rule out prices moving above US\$70 or even US\$80 later this year if further unanticipated Katrina-style shocks sideswipe the oil market.

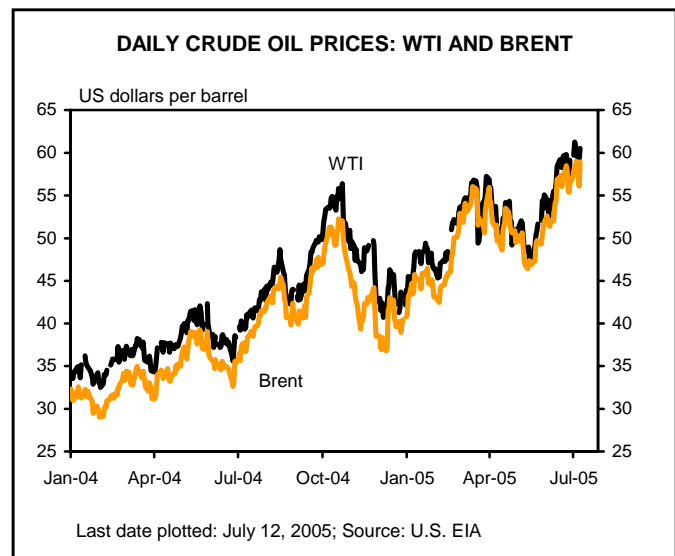
- Next year, the picture will begin to crystallize, when investors are served up a stern reminder that the laws of the oil-price cycle are far from being repealed. More specifically, once the dust from Katrina-related impacts subsides by mid-2006, a significant mid-cycle slowdown in the U.S. economy is likely to be revealed, stoking concerns about the demand picture going forward in the broader global economy.
- At the same time, the past surge in energy prices is likely to lead to some limited conservation efforts by consumers and businesses in major industrialized countries, while current investment underway gives the supply side a modest boost.
- The prospects for a scaling back of gains in global con-

sumption and for supply increases will lead to some easing in the tight global supply-demand balance, and in turn, a reduction in the massive fear premium currently embedded in crude oil prices. By early 2007, the price of WTI is expected to head back to US\$45 per barrel.

- To the extent that prices move up higher later this year would set the stage for a larger percentage correction in prices in 2006-07.
- Looking beyond 2007, our view on the market is bullish, as many of the factors that have helped to prop up crude oil prices in recent years – notably, the persistence of strong demand from developing economies, sluggish growth in supply and a lack of refining capacity – will remain in place to a large extent. Further, alternative fuel sources, such as hydrogen and ethanol, are not expected to displace crude oil as the main transportation fuel over the foreseeable future, since they are unlikely to be commercially viable on a widespread basis.
- Crude oil prices should resume an upward trend in

Crude oil – a few key definitions

- In this study, our reference point is the price of West Texas Intermediate (WTI), which is the benchmark crude used in North America.
- The price for Brent, an alternative benchmark, is used in Europe. As shown in the chart, the prices of WTI and Brent move in lockstep.
- WTI and Brent are just two of the many varieties of crude produced worldwide.
- Along the crude oil spectrum, WTI and Brent are considered to be among the highest quality, meaning that they are both “light” (i.e., relatively less dense and easy to refine) and “sweet” (i.e., contain less sulphur and more environmentally-friendly). Still, WTI sells at a premium to Brent, since it is even lighter and sweeter.
- In contrast, for example, Canada's Lloyd Blend and Venezuela's BCF 17 – which are “heavy” and “sour” – sell at a sizeable discount to WTI and Brent.
- Also important is the distinction between conventional and non-conventional sources of oil. While conventional oil is produced from reservoirs through a well



bore using primary, secondary, or enhanced methods, non-conventional oil (i.e., Canada's oil sands) must be extracted using techniques other than traditional oil well method. Conventional oil currently comprises about 98 per cent of the world's total production.

2008-10, to above US\$50 per barrel. Adjusting for inflation, this would be the equivalent of US\$48 per barrel in today's terms.

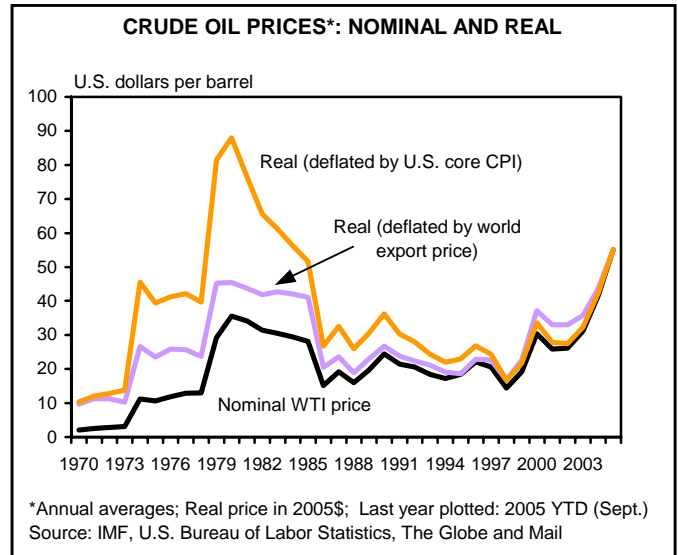
- Thus, beyond the big swing expected in 2005-07, the price of crude oil in real terms is expected to settle in the longer run at almost twice the average US\$30 price recorded over the past five decades. As well, with markets likely to continue to build in a fear premium to a greater extent than has historically been the case, oil prices will continue to be prone to substantial month-to-month volatility.
- In line with the likely path of the price of crude oil, we expect to see a pull back in Canadian gasoline pump prices during the 2006-07 period to the \$0.70-0.80 per litre range. Moreover, natural gas prices, which are currently about US\$12 per MMBtu, are projected to drop to about US\$8 per MMBtu.

Crude oil prices hit the stratosphere...

The relentless uphill climb in the price of crude oil has been a particularly major story in the news this year. Yet, the path taken by prices in arriving at the current stratospheric levels has actually been seven years in the making. After sinking to a mere US\$11 per barrel in 1998, prices began to gain traction in 1999. And, apart from suffering a setback in 2001 – when the U.S. recession led to concerns about global crude oil demand – prices have followed a steady upward path. This year, price gains have accelerated, soaring from US\$42 per barrel at the beginning of January to as high as US\$70 per barrel in late August – a new record level and roughly six times the lows set in 1998.

... regardless of how you measure them

Stripping away the impact of inflation and translating prices into current (i.e., 2005 dollar) terms yields a more accurate, albeit slightly different picture. As the accompanying chart shows, current readings of real crude oil prices are not the highest on record. Between the early 1970s and early 1980s, a sequence of events including the Yom Kippur war, the Iranian revolution and two steep production cuts by the OPEC cartel drove inflation-adjusted prices from US\$20 per barrel to over US\$90 per barrel. Still, apart from the three-year period in 1979-81, the level of real prices has never been higher. Even the subsequent spike in the early 1990s, which corresponded with Iraq's

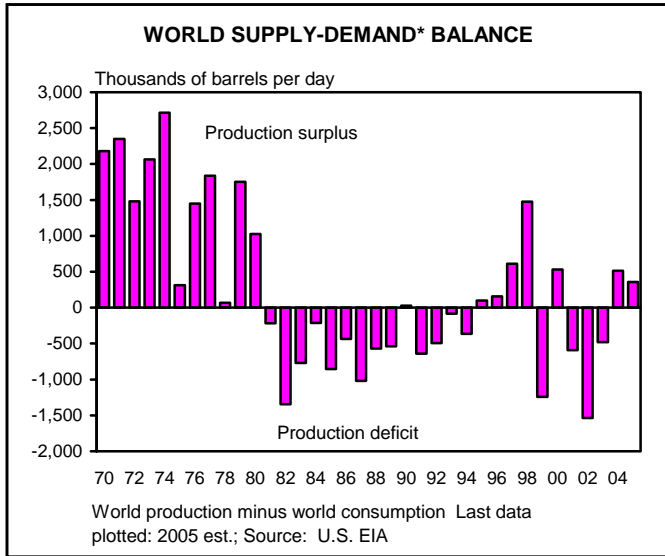


invasion of Kuwait, pushed real prices up to only just over US\$50. Moreover, we have used U.S. core CPI to calculate real prices, but there is good justification that global export prices should be used in the deflation process, since higher crude oil prices impact a nation largely through its terms of trade. Applying this measure actually puts current prices at all-times high in both real and nominal terms (refer back to the earlier chart). Lastly, at its current level of around US\$65 per barrel, the real price of crude is just over two times the five-decade average of US\$30 per barrel (in 2005 dollars deflated by U.S. core CPI) and about 75 per cent higher than the average of US\$37 recorded since the first price spike in the 1970s.

This spike different than those past

The chart of supply-demand balance on the next page shows vividly what has been powering a good deal of the frenzy in the oil markets in recent years. After being in a position of a supply deficit – or, alternatively, excess demand – throughout the 1980s, conditions in the market had shifted back to a state of over-production in the mid-to-late 1990s. Since the late 1990s, however, conditions have once again tightened, with the market actually tipping over into a position of supply deficit (i.e., 2001-2003) or just sitting slightly in surplus (i.e., 2004 and 2005).

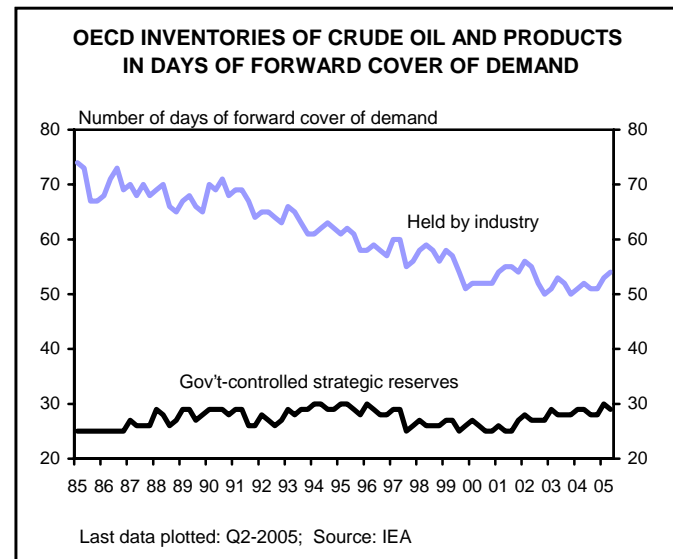
This stress has been reflected in figures on crude oil inventories. There has been some focus of late on the upward trend in stockpiles held by OECD countries posted since 2002, which taken together with actual estimates of the global supply-demand balance, point to some slackening in the world crude oil market over the past few years.



ages in the wake of Hurricane Katrina.

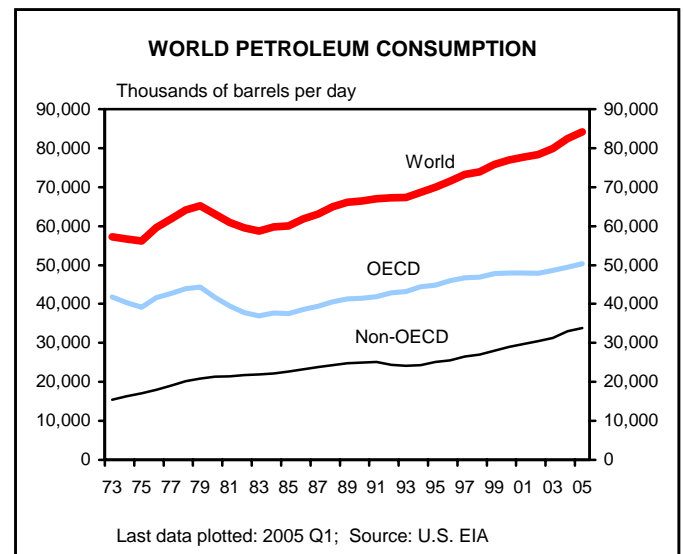
Producers having trouble keeping up with surging demand

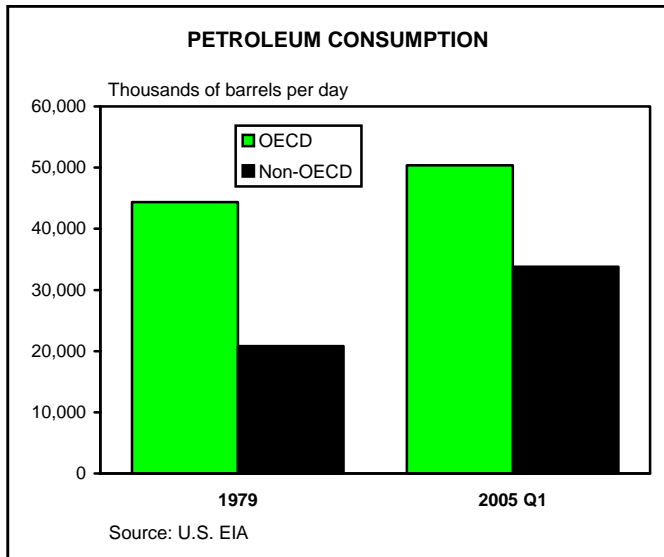
A closer look at the underlying fundamentals shows that the current picture differs significantly from past periods of sharply rising crude oil prices. First and foremost, rather than being driven exclusively by fears about diminished supplies – as was the case in the early 1970s, 1980s and 1990s episodes when markets fretted about sharp cut-backs in oil exports from OPEC – the upward price pressure evident of late has been rooted in large part to an unexpected strengthening in global crude oil demand. Notwithstanding the fact that the current rally has accelerated dramatically in 2005, the more demand-driven nature of the run-up explains in good part why price increases this time round have taken place over a multi-year period. In contrast, the supply-driven price gains in the early 1970s, 1980s and 1990s occurred within a year.



Global consumption trends not only show an increasing crude-oil appetite globally, but a major demand shift from the industrialized to developing countries. Since 2000, growth in consumption worldwide has accelerated to nearly 2 per cent per year from the 1.4-per-cent average rate in the 1990s and a mere 0.2 per cent increase in the 1980s. Meanwhile, gains in the developing world (+2.3 per cent) have exceeded those of the OECD countries (+0.6 per cent) by a four-to-one ratio so far this decade, and a two-to-one ratio (1.5 per cent versus 0.7 per cent) over the previous two decades. As a result, non-OECD countries now account for about 40 per cent of global consumption com-

However, the level of stocks stockpiles as a share of forward demand has remained close to record lows of about 50 days, while the world supply-demand balance remains very close to the “break-even” level. Keep in mind that the OECD inventory readings take into account inventories held by industry only. A number of governments in the industrialized world – including the United States, Germany and France – also hold strategic reserves as a buffer against unforeseen developments. Adding on these reserves would provide another 30 days of coverage approximately, although this buffer has not been rising meaningfully in recent years. Indeed, led by the United States, several large economies agreed in late August to tap their petroleum reserves in order to ease fears of supply short-

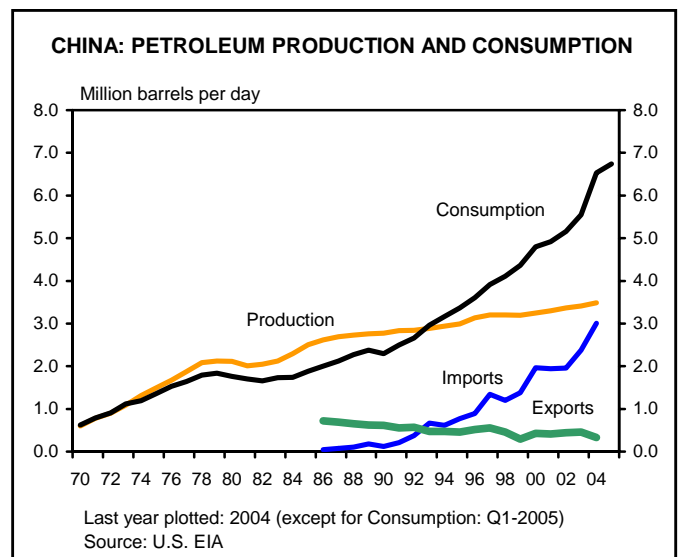
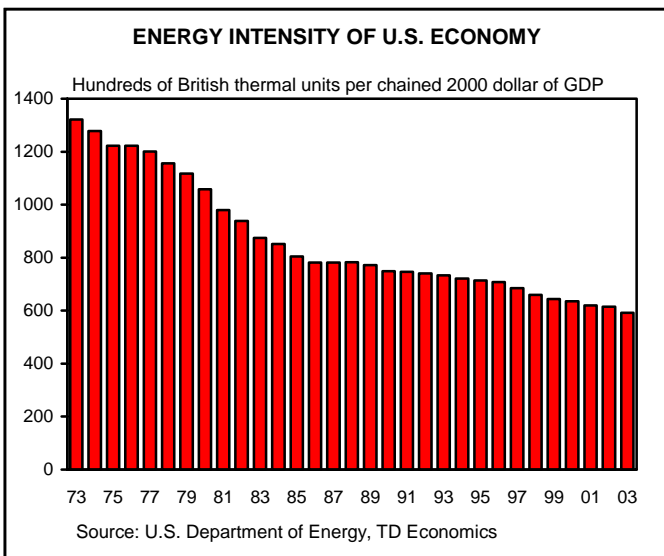




the industrialized economies to developing ones is owing to more than just the stronger relative growth being recorded in countries such as China and India. Indeed, spurred in part by the painful adjustments that were required to cope with the extended period of high-energy prices in the early-to-mid 1980s, advanced economies have become increasingly energy efficient. In the United States, for example, energy consumption as a share of GDP has tumbled by about 40 per cent since 1970s. Across the OECD, the comparable figure is about 50 per cent. In contrast, developing countries remain highly-energy intensive.

High past increases yet to show up in lower demand

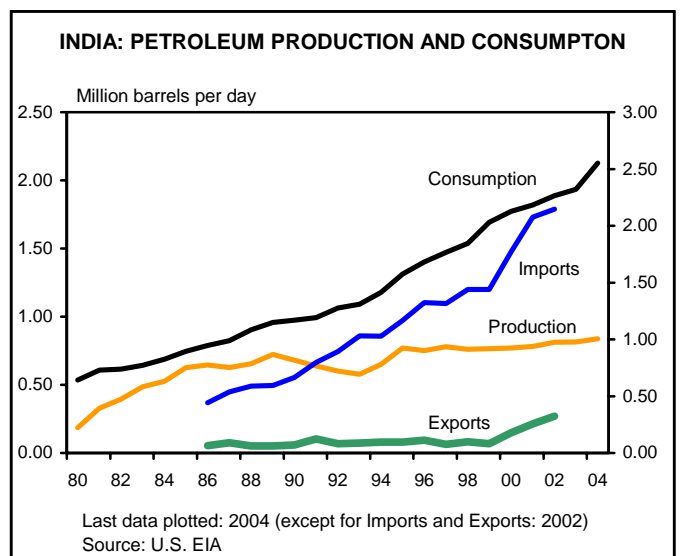
What is perhaps most surprising is that in contrast to



pared with 30 per cent at the end of the 1970s.

Even more striking has been the rising importance of China in the overall demand equation. Since 2000, annual average consumption gains in the most populated country on the planet topped 8 per cent per year, and reached a sizzling 18 per cent last year alone or nearly 40 per cent of the total increase recorded globally in 2004. In fact, China overtook Japan as the second largest consumer last year, trailing only the United States. Among the non-OECD countries, consumption growth in India has also been notable, running at roughly 3 per cent per year since the start of this decade. These demand increases are primarily due to the rapidly-rising use of cars, trucks and other transportation vehicles that run on internal combustion engines.

This swing in worldwide consumption patterns from



previous price spikes – when rising prices promptly fed through to weaker demand – both developing and developed economies around the world are proving to be impervious to the lofty levels of high crude oil prices this year, adding further credence to the robust demand story. Indeed, driven by ongoing strength in Asian developing economies, world real GDP growth is expected to remain above 4 per cent in 2005 for the third year in a row. Moreover, oil consumption gains are expected to tip the scales at an above-trend rate of 2.5 per cent this year. In contrast, following the price spike in 1979-80, world economic growth slumped and the level of oil demand fell by 3 per cent in 1980 alone and by a further 7 per cent during 1981-83.

Notwithstanding the fact that oil-producing countries are currently beneficiaries of the high-price environment, it remains the case that a sustained rise in the price of crude remains a net negative for the world economy as a whole – an outcome that is likely to become more apparent in the months ahead as a growing share of consumers and businesses across the developed world gradually look at ways of securing cost-savings. Still, there are a number of forces that are currently at work lessening the impact of high world prices on crude oil consumption. As just noted, the demand-driven nature of the current spike and the lower oil intensity of OECD countries are a few key factors that separate general conditions today from the past, but there are others:

- Compared to past price spikes, the energy-price increases have not translated into the broad price measures, in part owing to the impact of globalization and the credibility that central banks have earned in keeping inflation low and stable. As a result, interest rates have been kept at stimulative levels in the United States and many other parts of the world.
- In North America, rising personal incomes and corporate profits have helped to offset some of the bite on spending from dearer energy prices.
- Subsidies provided for the purchases of refined products in a number of developing countries, notably Thailand, Indonesia and China, have been supportive to consumer demand during this period of rising world prices. Nonetheless, as evidenced in Thailand and Indonesia, these practices do not appear to be sustainable, since they have put an enormous burden on governments and

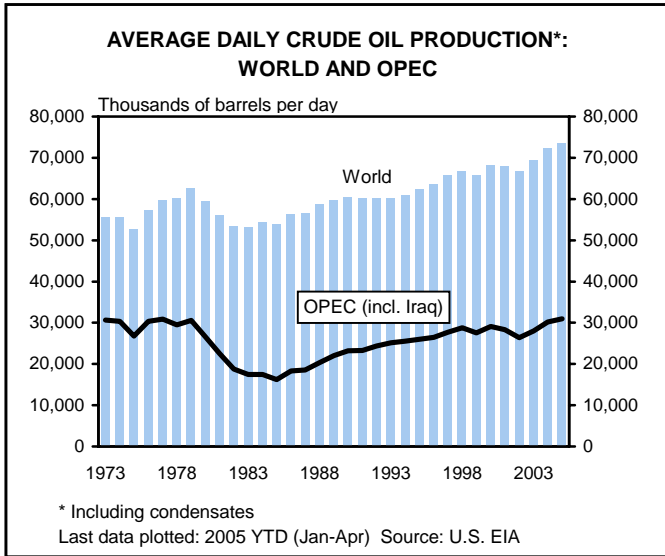
| IMPACT OF A \$10 INCREASE IN CRUDE OIL PRICES | | |
|--|------|------|
| | GDP | CPI |
| World | -0.5 | 0.8e |
| U.S. | -0.3 | 0.5 |
| Japan | -0.4 | n.a. |
| Euro-zone | -0.5 | 0.5 |
| Developing Asia | -0.8 | 1.4 |
| China | -0.8 | 0.8 |
| Latin America | -0.2 | 1.2 |
| e: estimate by TD Economics | | |
| *All numbers refer to impact on year-over-year per cent change | | |
| Source: International Energy Agency | | |

led to growing shortages of gasoline and other fuel.

In fact, the OECD has estimated the impact of rising crude oil prices on growth and inflation (see table). These are first-year impacts, with effects on future years dissipating over time. Not surprisingly, developed countries have a relatively large vulnerability to energy-price impacts, with the United States – where domestic production accounts for a larger share than average of its total consumption – among the least hit. In contrast, Canada is estimated to enjoy a small net benefit, given its position as a net exporter. Based on these estimates, the run-up in prices of US\$25 per barrel in 2003-04 lowered world real GDP growth by more than 1 percentage point last year and raised global inflation by about 2 percentage points. In ballpark terms, these growth and inflation impacts appear to be playing out largely as the model estimated. Even Fed Chairman Greenspan himself has acknowledged that the price spike over the past few years has subtracted roughly 0.75 percentage points from U.S. real GDP, which is in line with that predicted by the OECD model.

Supply factors also front and centre

Unexpectedly strong global demand growth may be the most important culprit behind the current oil squeeze, but concerns about crude oil supply have also been squarely on the radar screen over the past few years. It is not that investors have been bombarded with news that supply growth has been on the wane over the past few years – in fact, production has increased by 4 per cent on average over the past two years, and 2 per cent per year over the past decade. It is more the case that there is considerable skepticism about the ability of the world to pump increasing amounts of crude oil down the road. These expectations have surfaced due to four key factors.



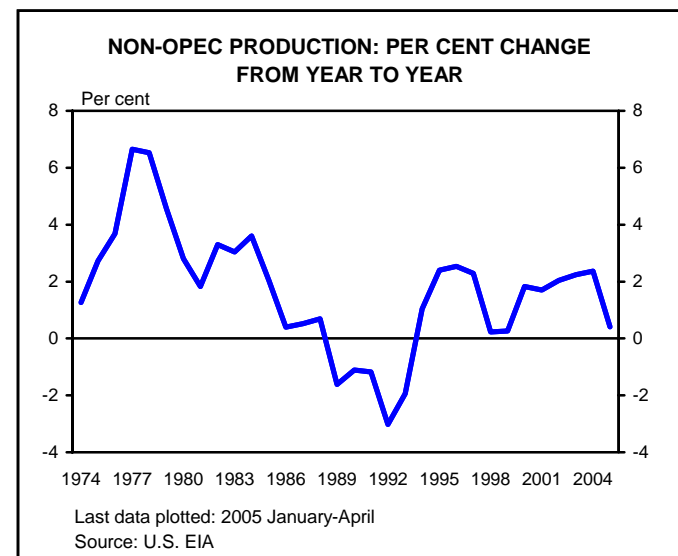
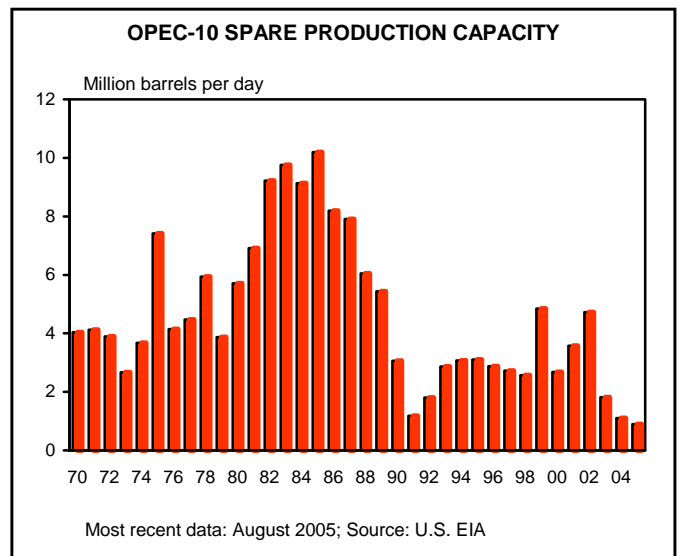
eral years now. The most significant growth in production over the past few years has been from African-OPEC countries of Nigeria and Algeria.

Yet, despite these hefty production increases, crude oil prices have continued to escalate, eventually leading the cartel to suspend its price target earlier this year. After all, the upper target was exceeded throughout in 2004. While additional new supply from OPEC has merely prevented a tight market from getting tighter in view of the continued strong demand picture, more important is the growing concern that the cartel has lost its flexibility to raise output significantly further, as all members – except Saudi Arabia – have bumped up against their output capacity limits. In fact, as the chart on the previous page reveals, since the mid-1980s, available production slack within OPEC has

Supply Factor 1: OPEC has limited spare capacity

The 11 members of the Organization of the Petroleum Exporting Countries (OPEC) – namely, Saudi Arabia, Iran, Venezuela, Nigeria, U.A.E., Kuwait, Iraq, Algeria, Libya, Indonesia, and Qatar – account for a sizeable 40 per cent of world production and 55 per cent of exports. Since its formation in 1960, OPEC has attempted to coordinate their oil production policies in an effort to stabilize global oil markets and reap reasonable and stable longer-term returns on investments. Although the importance of OPEC in global oil markets has declined over the past three decades, as non-OPEC countries have posted stronger gains in output, the cartel still wields considerable influence. Among OPEC nations, Saudi Arabia remains a particular powerhouse, alone accounting for one in seven barrels of crude oil produced globally. Iran, Venezuela and Nigeria are the next most important producing countries within the cartel.

The major swings in prices have resulted in OPEC abruptly shifting directions over the past few years. In 2001 and 2002, the cartel cut output significantly in an effort to support prices within its explicit target range, which at the time was set at US\$22-28 per barrel. However, in view of the subsequent surge in prices, OPEC-10 (i.e., excluding Iraq which is not assigned a quota) ramped up production by a hefty 8 per cent per year in 2003 and 2004. Practically all the OPEC-10 countries increased their production during that period, with the exception of Venezuela where output dropped in 2003 due to political turmoil, and Indonesia where it has been declining for sev-



dropped from 10 million barrels per day to less than 1 million barrels per day. As stated earlier, whatever is left of the remaining capacity (about 900,000 barrels per day or less than 1 per cent of daily world production) is attributable to Saudi Arabia alone.

Supply Factor 2: Non-OPEC output flattening out

As OPEC production growth faces the risk of stalling in view of limited spare capacity, hopes that non-OPEC countries will be able to take up the slack have been dwindle.

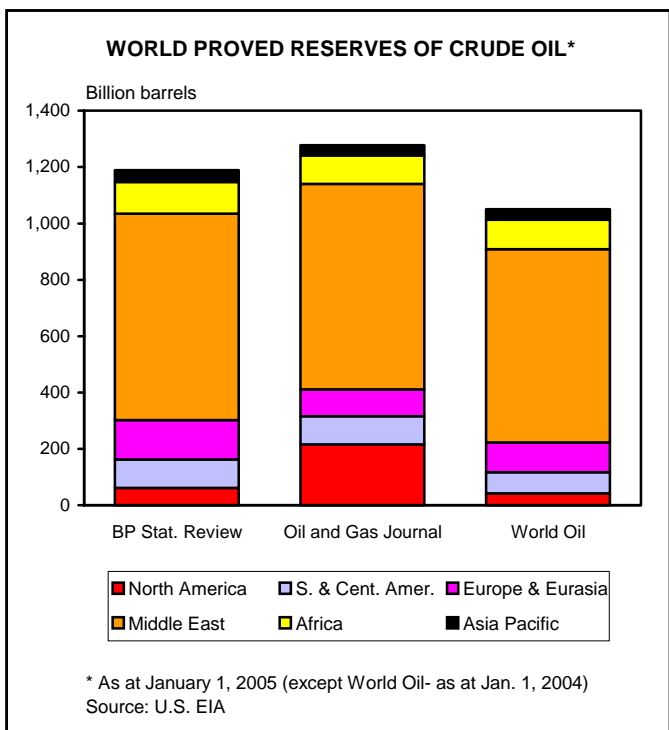
Not only has growth in production among non-OPEC countries trailed behind that of its OPEC counterparts in recent years, but output trends of this former group have also tapered off significantly so far this year, raising concerns that it too has little spare capacity. More specifically, production in the North Sea – which includes offshore contributions from Norway, Denmark, the U.K., Netherlands and Germany – has been slipping since 2000, while the growth in Russian output has slowed drastically this year. Together, these two producing regions account

The Debate Surrounding Peak Oil

Not only is the earth's endowment of conventional crude oil large but finite, but production tends to follow a bell-shaped curve – rising to a maximum, and when about half of the deposits in an oil field are depleted, begins to decline. What's more, all or nearly all of the largest oil fields in the world have already been discovered and are being produced, with output indeed clearly past its peak in some of the most prolific basins. This has raised fears that the global supply of crude oil, including both conventional and unconventional, may be poised to peak, then start to drop on a trend basis.

The task of determining when crude oil production will peak is quite straightforward if the ultimate resource base, the rate at which it will be exploited and the pace of consumption are all known. The problem is that these variables are highly uncertain. Case in point is the wide range of estimates on the total crude oil reserves in the world. The reputable Oil and Gas Journal estimates that worldwide proved reserves (i.e., those that can be exploited given recent prices and technology) are as high as 1.3 trillion barrels, while other estimates believe the number is about 1 trillion or 25 per cent lower (chart). Put simply, estimating existing global oil reserves, let alone future oil supply changes, is a guessing game.

The most notable theorist in the area of peak oil was M. King Hubbert, an American geophysicist. His first claim to fame was his prediction in 1956 that American crude oil production would peak and begin to decline between 1965 and 1970. In the end, he was remarkably accurate, as U.S. crude oil production did ultimately reach a high point in 1970, and has been on a steady path downward since. Using Hubbert's methodology, a number of experts have forecast that global crude oil output may soon peak or, that the peak has already been reached, which has added to the significant fears already in the market.



It is important to point out that the debate on peak oil is not new. Over the past few decades, a number of individuals, companies and institutions have predicted at various times that world production would reach an apex three to 30 years from the time of their forecast, with some predicting dire effects – including stratospheric prices and weaker standards of living – resulting. The time of many of these predicted peaks has already come and gone.

While the most recent estimates of the Hubbert peak are predicting that oil output will reach a maximum between 2006 and 2020, Matthew R. Simmons, an investment banker from Texas, claims that the world peak is

(continued on next page)

The Debate Surrounding Peak Oil (*continued*)

here and now. He derives his conclusion from trends in the world's largest producer, Saudi Arabia, where – by his calculation – more than 90 per cent of its oil output has been attributed to five fields. Over-production in these fields, he contends, has damaged them, while intense exploration has failed to find additional oil.

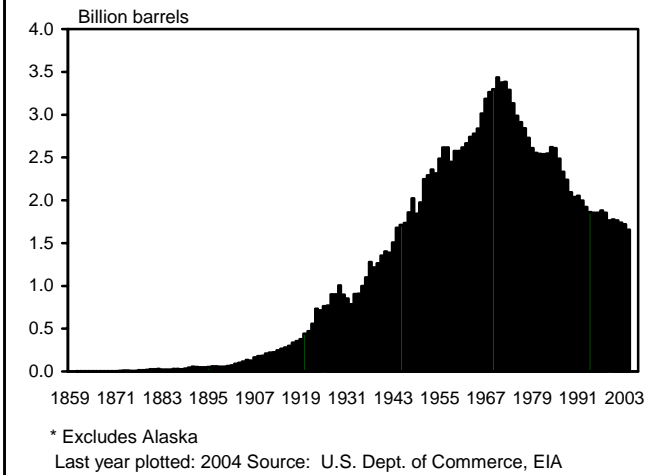
Not surprisingly, this contention has been disputed by the Kingdom itself. Saudi Arabian officials have argued that the country can raise its production capacity without much difficulty from 9.5 million barrels per day to about 12 million b/d by 2009. Nonetheless, they have acknowledged that the cost of production is rising, as reservoirs mature and output extraction becomes more complex.

Other organizations which don't buy into Simmons' views include the ranks of the Paris-based International Energy Agency (IEA) and the U.S. Energy Information Administration (EIA). These organizations believe that the peak of *conventional* oil will occur this century, but that point is at least several decades away. Just as unanticipated technological progress has been a key reason why earlier forecasts of the global Hubbert peak have failed to materialize, their belief remains rooted in the ongoing benefits of innovation:

- Recoverable oil resources are not fixed, but tend to rise over time – despite continued exploitation – boosted by advances in technology. While much of these resources are still uneconomic to develop, ongoing innovation may open the door for the production of these deposits. These include both enhanced recovery from fields already developed as well as those in the earth's crust which have not yet been identified with sufficient certainty to be considered "proved".
- There are likely to be increases in conventional reserves even from existing knowledge and processes. Notably, in view of geopolitical risk and limitations on foreign investment in several parts of the world, much of the world's resources of conventional oil have yet to be explored with the help of the latest

for about one-third of the non-OPEC total. In Canada, which contributes about 2.5 million barrels per day or 3.4 per cent of global production, increases have also been steady over the last several years, powered largely by rising activity in the Alberta oil sands and off the coast of Newfoundland & Labrador.

CRUDE OIL PRODUCTION IN THE UNITED STATES LOWER 48*



technology. For example, when India liberalized its foreign exploration rules, oil was found in the northern state of Rajasthan. As a result, there are significant opportunities to add to current discoveries of conventional crude.

- As innovation continues, there are enormous future opportunities for the development of non-conventional sources of oil. In fact, the global in-place resources of three major non-conventional plays – Canada's oil sands, extra heavy oil from Venezuela, and shale oil in the U.S. – are three times greater than the recoverable resources of conventional crude oil.

In sum, the majority view is that the peak in oil will occur sometime this century, but not for at least 30 years. This long time frame would open the door to a seamless transition away from crude oil toward alternative sources of energy, such as hydrogen. At the same time, however, even if production capacity continues to head higher down the road, there is likely to remain considerable uncertainty as to the magnitude of these increases, and thus the price required to equate supply and demand over the next 5-10 years.

Supply Factor 3: Concerns about long-term oil supply

This year's slowdown in world crude oil output would not likely have generated much anxiety in the market had investors believed it to be temporary in nature. However, weakness in exploration spending in recent years – com-

bined with poor drilling results – have boosted expectations that the global supply picture will continue to deteriorate well into the future. Some observers have even gone to the length of betting that the peak of global production is either at hand or that it will be reached over the next few years (see topic box on page 8-9).

Before taking a closer look at trends on this front, it is important to first distinguish investment in exploration and that of development. Development spending is required to produce crude oil from a company's existing pool of proved reserves, with a usual time lag of one to four years. In contrast, exploration allocates funds to the discovery of additional reserves, and is thus the number-one driver of output growth over the long haul. Companies can also grow their reserve base through mergers and acquisitions, although this approach is not normally sustainable and at the very least, has zero net impact on the global reserve tally.

Global supplies appear to be plentiful ...

The good news is that the world is far from running out of crude oil. At last count, estimates of "proved" crude oil reserves globally – or those that could be developed at current prices using existing technology – are 1-1.3 trillion barrels, or about 40-50 years of supply based on current production. Although production has been rising, so too have reserves, keeping the reserve-to-output ratio relatively constant in recent decades. Furthermore, a more broad measure, which would include not only the proved volumes but also those that have yet to be discovered as well as the expected additions due to enhanced recovery, has world reserves pegged as high as 3 trillion. And, this doesn't include some potential non-conventional sources – such as producing oil from shale in areas such as the United States, which are still uneconomic to develop. A recent estimate suggested that potentially recoverable oil shale resources in the United States could add a massive 800 billion barrels – more than three times the proved reserves of Saudi Arabia – to the count, although it is believed that it is at least two decades away from economic viability.

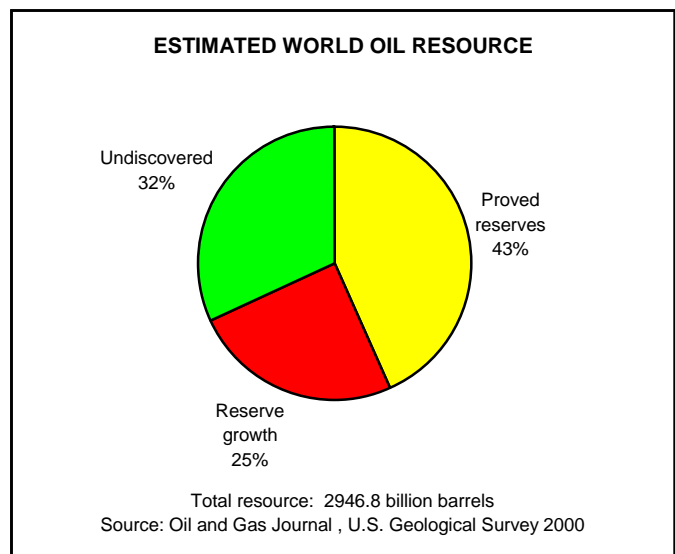
... but exploration trends raise question about sustainability

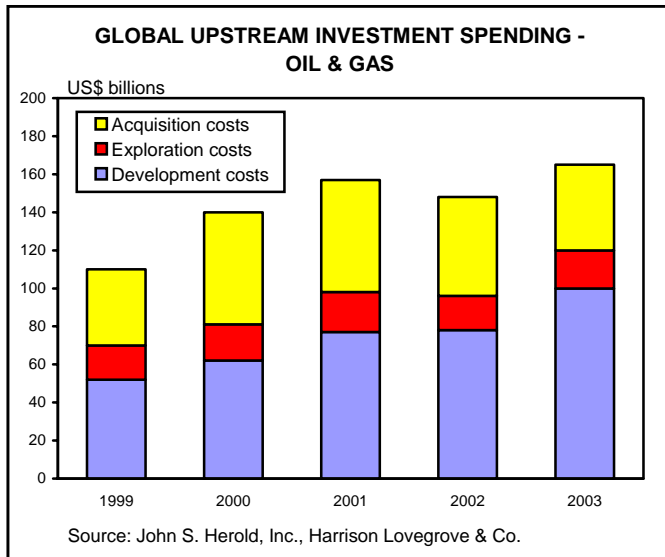
These large numbers certainly fly in the face of views that the oil tap is about to run dry. But, as we noted in the topic box on page 8-9, crude oil is a non-renewable

resource. And, without significant new discoveries to offset the oil that is being extracted, world proved reserves could start to decline. In 2003, the Oil and Gas Journal served up notice that it was raising its estimate of world proved reserves sharply, as it recognized 175 billion barrels of Alberta oil sands deposits, boosting Canada's reserves which before were placed at less than 5 billion. This was great news for Canada. But, this accounting revision does little to address the underlying worry that the rate of new discoveries worldwide has been lagging behind production in recent years, raising the spectre that depletion could ultimately set in.

Data on global capital spending is hard to come by, but what is available are consistent with the dearth of new discoveries. In the 1990s, investment trends in both development and exploration fell off, partly in response to low crude oil prices. As the chart on page 11 shows, while total capital expenditures have subsequently picked up – in concert with rising prices and producer bottom lines – outlays have been concentrated on the development side. In contrast, exploration has been flat in absolute terms, and declining as a share of total spending. The data from John S. Herold Inc. & Harrison Lovegrove Co. that were used for the chart are corroborated by another consulting firm – Wood Mackenzie – that reveal exploration spending to have declined by nearly 30 per cent, from over \$11 billion a year to around \$8 billion, since 1998. At the same time, development spending has increased by 40 per cent.

A simple explanation for the lack of attention paid to exploration may be the lagged nature of such an expendi-





ture. As prices begin to rise, capital investment by energy producers tends to be held back until confidence increases that the higher price environment will stick. Even then, firms are more inclined to first invest in development rather than exploration in light of the fact that it is less risky and delivers a quicker payback to investors. It is only after a year or two that firms usually begin to shift some of their focus to exploring for new opportunities. And, indeed – some five years after prices started to climb – anecdotal evidence has started to emerge that exploration spending may be on the cusp of strengthening. Both drilling rig counts looking for crude outside North America have been on the rise over the past year, while a growing number of exploratory licenses have been issued in several areas of the world, including the Norwegian shelf, Russia, Turkey and the United Kingdom. As well, the Mexican government had doubled its exploration budget this year compared to five years ago.

Despite this glimmer of hope, there are a number of roadblocks that may be keeping interest in exploration below levels experienced during past oil-price spikes, especially that of the early 1980s:

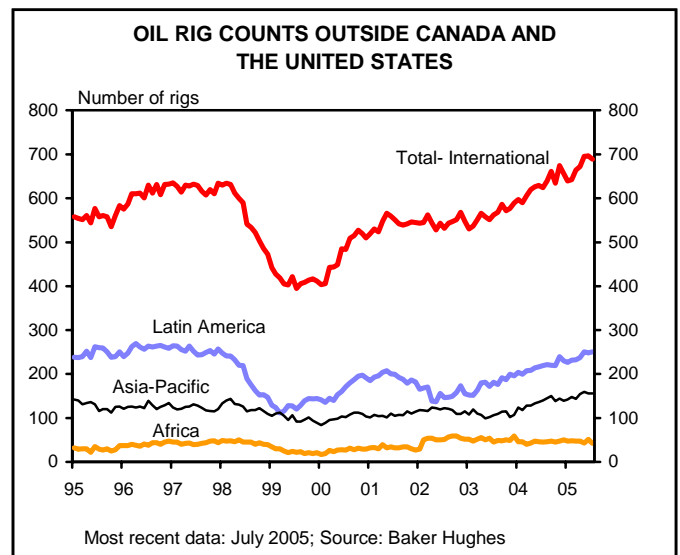
- Compared to the 1980s, publically-traded firms appear to be more focused on maintaining returns to shareholders through dividend payouts and share repurchases.
- Companies have continued to favour mergers and acquisitions (M&A) as a more expedient way of raising reserve counts.
- As noted, oil exploration can be a risky game and it

may be becoming riskier. Exploring for conventional oil is getting increasingly difficult in most regions of the world, as most of the more lucrative fields have already been discovered. As a result, oil and gas companies have been shifting their attention to exploring for more-expensive offshore and unconventional deposits and for natural gas. In addition, heightened volatility in crude oil prices and demand have made it additionally difficult to make investment decisions.

- Within OPEC, there are still significant barriers to participation of international oil companies, as some countries (i.e., Saudi Arabia and Kuwait) have remained largely closed to foreign investment in upstream activities (oil exploration and development) while others (such as Iran) require complex production-sharing and buyback deals that discourage their involvement.
- In some countries, changes in host government taxes and royalty rates implemented after companies committed investment dollars have discouraged further outlays. For example, Venezuela recently increased its royalty and tax rates.
- Political instability and/or turmoil in countries such as Iraq, Venezuela and Nigeria have been major impediments to investment.

Supply Factor 4: Refining capacity inadequate

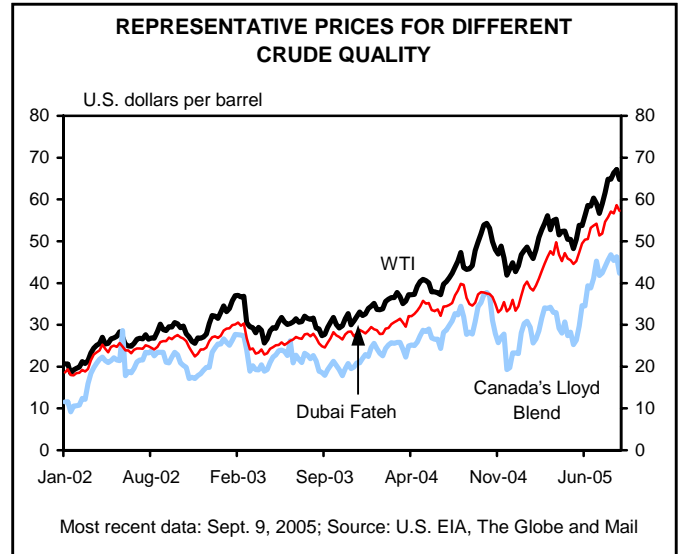
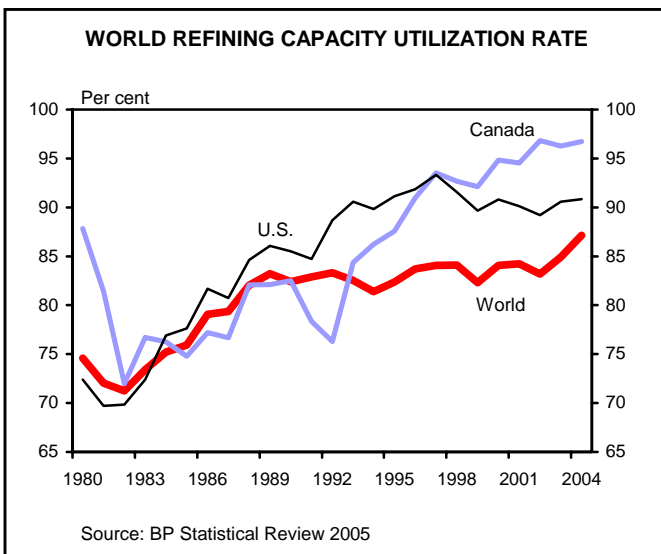
As experts debate the issue of peak oil, arguably the biggest challenge facing the market over the next several years – and one that has increasingly gained attention – actually resides further downstream in the production proc-



ess. More specifically, there has been a growing shortage of capacity available to refine crude output into useful products such as gasoline, jet fuel and diesel fuel. Figures show that refiners have been running flat out in an attempt to meet growing demand. In the U.S., for example, refineries operated at more than 90 per cent of capacity in 2004 while in Canada, the rate was even higher at 97 per cent, certainly not leaving much wiggle room.

Yet, these numbers don't capture the true extent of the problem. This is because these often-quoted capacity utilization numbers refer to "distillation", which is the first and most basic refining procedure. The real crunch is further along at the more complex processes of conversion and desulphurization. Conversion technologies are required to refine relatively-dense heavy oil, while the removal of sulphur has become increasingly important as countries around the world have issued product specifications to achieve environmental objectives. More stringent regulations in Canada came into effect in early 2005. In the U.S., even tougher restrictions will kick in next year. And virtually every area of the globe is undergoing changes in petroleum product specifications. According to Hart's World Refining and Fuels Service, 60 per cent of the global market for gasoline and diesel will require ultra low sulfur by 2010, and this percentage will rise to more than 80 per cent by 2015.

In light of the current global refining capacity constraints, which are superimposed on record high crude oil prices, it is hardly surprising that prices of gasoline and other refined products have soared in many parts of the

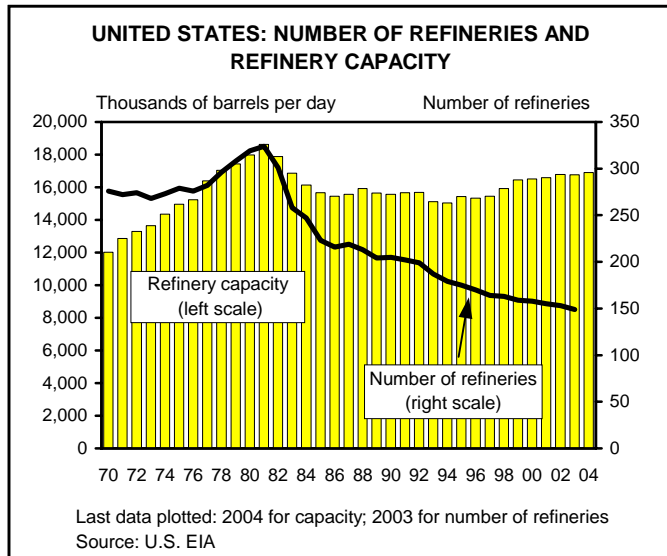


world in the past few months. Indeed, immediately following Hurricane Katrina in late August, which threatened to cut off about 10 per cent of U.S. refinery capacity, gasoline prices jumped to new record highs in both the U.S. and Canada, before pulling back slightly. What is less apparent, however, is why the lack of refining capacity that has been observed in recent years has acted to boost crude oil prices. If anything, shouldn't the increasing inability to refine crude oil into end-use products lead to a glut in oil supply, which in turn should weigh on crude prices?

The answer to this question lies in the fact that there has been greater demand for lighter and sweeter crude varieties such as WTI, because they are easier to process. Interestingly, as we show in the accompanying chart, prices for lower quality crudes – such as Dubai Fateh (medium sour) and Canada's Lloyd Blend (heavy and sour) have risen in lockstep, albeit not quite to the same extent. This is a classic situation where the rising tide of WTI has lifted all boats. However, differentials are still very wide – more than US\$20 between Lloyd Blend and WTI in early September 2005. Nonetheless, demand for the more heavy varieties of crude oil has continued to be well supported by refineries that have the conversion capacity in place to process them.

Weak investment in refining capacity the main culprit

There is no denying the fact that the robust demand for gasoline and other refined products is partly behind the global refinery squeeze. However, a lack of investment in refining capacity has been an even bigger culprit holding



back supply, and most notably in the United States. While some capacity expansions have occurred, no new refinery has been built south of the border since 1976. This is largely due to economics, as margins – the key driver of investment in refining – have remained too low to attract investment, at least until very recently. In addition, new refinery construction is at least three times more expensive than expanding existing capacity, given the difficulties in getting new sites (i.e., not in my backyard or NIMBY mentality) and long time lags in obtaining the necessary air and zoning permits to build a new facility. U.S. government regulators at federal, state, and local levels require stringent environmental standards before issuing a permit.

Similar to the capital-investment picture further upstream, the improved outlook for margins and cash flows in the refining business is spurring interest in building additional capacity. Significant investments are expected in India, Kuwait, Saudi Arabia, Venezuela, China and Qatar over the next few years. In the United States, desulphurization capacity is expected to rise by about 4 per cent per year over the next few years, building on last year's gain of about 13 per cent. Moreover, there is a possibility that a new refining plant will be constructed in Arizona. If remaining hurdles are overcome – including those related to financing and land transfer – the refinery could be up and running by late 2009.

In spite of the recent upturn, the new projects being considered remain few and far between, and are unlikely to relieve tightness for refined products to any meaningful

degree. As a result, price spreads between sweet light crude and those of lower quality are likely to remain hefty over the next few years. On a more encouraging note, tightness in another part of the global supply chain – notably the world transportation system for both crude and refined products – which was evident in 2004, appears to have eased significantly in 2005.

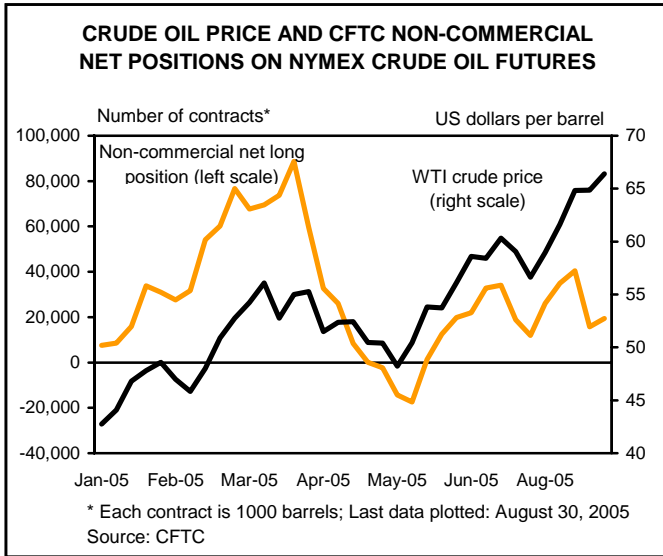
The risk premium also driving up price

The price rally over the past few years can only have been partly attributed to the tight supply-demand fundamentals in the crude oil market. In an uncertain world – and one in which demand for crude oil and refined products is bumping up against supply constraints – investors are undeniably building in a significant risk or “fear” premium into the price to account for future unanticipated events. To be sure, geopolitical uncertainty is nothing new in the crude oil market, given the fact that less stable areas of the world have always been in control of the bulk of global production and reserves. At the same time, there is a good argument that the risk associated with geopolitics has been on the rise in recent years, particularly after 9/11.

- The large misalignment between countries that consume energy products and those that produce it has been growing even larger, as the United States and China, the two largest consumers in the world, and India, to a lesser extent, have become increasingly dependent on imports. Recently, China has been considering new acquisitions to reduce its risk exposure while India is on a similar trail to push ahead its ambition to be a refining centre in Asia.
- The September 11th terrorist attacks marked the end of a relatively calm period after the breakup of the Soviet Union and the end of the cold war in the early 1990s. The resulting War on Terror has led to renewed instability in the Middle East, where many OPEC countries are located.
- Political instability has been evident in some OPEC countries outside the Persian Gulf, namely, Nigeria and Venezuela.

Speculators have been active

In the short run, the size of the risk premium can be amplified by the buying and selling activity of speculators. This notion is shown clearly in the chart above, where



WTI prices have moved in sync with changes in speculative positions of the non-commercial traders on the New York Mercantile Exchange. As the speculators have increased their net long positions in recent months – a bet that crude oil prices will rise – this has pushed WTI prices higher. The converse is also true, with WTI prices slipping as speculators reduce their net long positions, either to realize their profit or for some other reasons.

It should be pointed out that speculators tend to be trend followers. And, with near-term forecasts of crude oil being marked up steadily since the spring of 2005, it should not come as any surprise that speculative buying has surged. Still, there are cases where speculative activity moves against the mood in the market. For example, while crude oil prices surged in the run-up to, and immediately following, Hurricane Katrina, speculators had lowered their net positions (refer back to chart). This may have reflected the view that the latest surge in crude oil prices would only be temporary.

Weather patterns becoming increasingly volatile

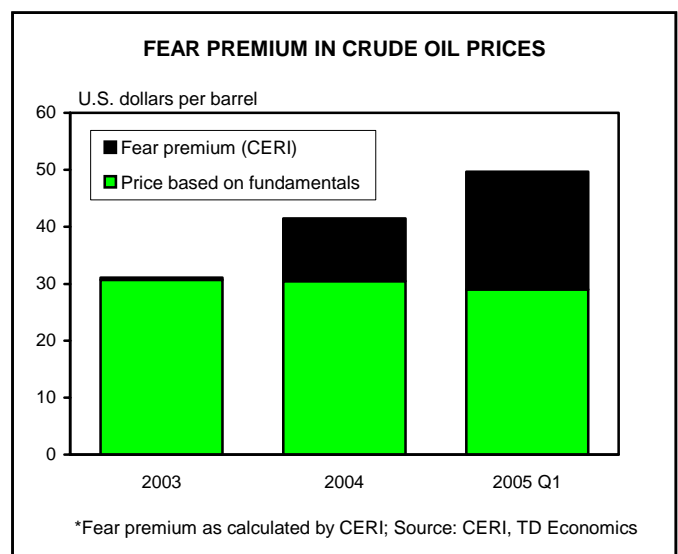
Although the debate remains heated among scientists on the impacts of global warming, the perception in the market, in any event, appears to be that rising temperatures may be making the world more vulnerable to unpredictable weather patterns and natural disasters. The past few years have witnessed some of the most devastating natural events in human history, including the Tsunami in southeast Asia and Hurricane Katrina in the southern United States. And, while the impact of these large-scale developments on oil supply and demand is normally tem-

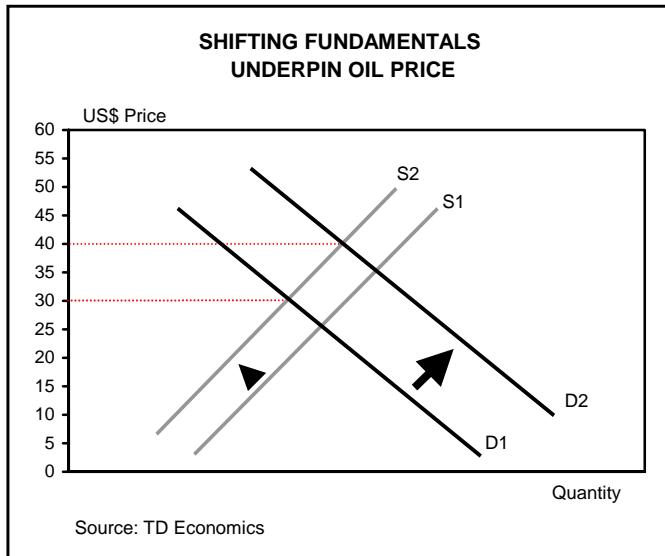
porary in nature – for example, most of the facilities damaged by Katrina are expected to be back up and running by year-end – they can have a lasting effect on market psychology. Indeed, environmental experts are predicting that up to three more hurricanes may occur this year, although it is unlikely that they will carry the same destructive power as Katrina.

Risk premium could be as much as \$20 per barrel

There have been attempts made to dissect the current spot price of oil into its main components, notably the fundamental price and the so-called “fear premium”. This is important, since supply-demand fundamentals are the primary drivers of crude oil prices over the longer term, while a risk premium is more influential in the short run. Given that markets have been ultra-sensitive to any hint of interrupted supplies in a very tight market, there is no doubt that fear has been an important and growing factor in recent months. The question is how much?

Like so many other aspects of the volatile oil market, calculating the “fear premium” is far from a precise science. When prices were hovering in the US\$40-50 per barrel, there were a number of estimates released – notably one made by the secretary general of OPEC – that placed the premium between US\$10-\$20 per barrel. A more detailed analysis was conducted by CERI, which estimated the premium at US\$20 per barrel in the first quarter of 2005, when spot prices were running at US\$50. In addition, that outfit estimated that the fear premium has shot up by leaps and bounds over the past few years, beginning from a starting point of less than US\$1 in 2003





(see chart). In their analysis, the fundamental price of WTI was argued to be relatively constant at US\$30 per barrel.

In our view, the fundamental price is likely to be higher than the US\$30-per-barrel level referred to in the CERI analysis, which, incidentally, is a figure that corresponds to the long-term average of crude prices over the past five decades (in 2005 constant-dollar terms). This increase in the fundamental price is a simple story of structural changes in supply and demand, as we have illustrated in the graph above. The demand curve appears to have shifted upward compared to past decades, fuelled by booming demand in the developing economies. At the same time, all other things equal, the supply curve has likely moved slightly to the left to reflect the increasing costs of extracting con-

ventional supplies and the gradual trend towards developing non-conventional crude oil. Put another way, producers will only be willing to supply a given quantity of crude oil if the price is higher than that recorded historically in light of the increasing costs of operations, capital and technologies. Accordingly, TD Economics estimates the fundamental price to be closer to US\$40 per barrel. Although there is a good case to be made that at least part of the massive US\$25-odd gap between current spot prices and the fundamental price reflects the tightness of supply-demand conditions, we believe that most of this residual – as much as US\$20 per barrel – is owing to the fear premium.

TD Economics' 5-year outlook for crude oil prices

While estimates of the long-term fundamental price provide a benchmark for where the price of crude oil will converge to over the long term, they may say little about the medium-term direction of spot prices. Indeed, as we show in the TD Economics' 5-year forecast table below, crude oil prices are likely to slip significantly from current levels of more than US\$60 per barrel over the next 4-5 years, but remain above this fundamental price.

TD 2005 year-end target set at US\$60

In recent weeks, the price of crude oil has been on a particularly wild ride. Prices surged to as high as US\$70 per barrel in the wake of Hurricane Katrina, then fell back to pre-storm levels of US\$65 per barrel in subsequent days, as the market reacted to news that strategic oil and refined product reserves of several industrialized economies would be tapped and that some of the temporarily disabled ca-

WORLD OIL SUPPLY-DEMAND BALANCE AND AVERAGE WTI PRICES

| | Level, 2004 Million b/d | % Change Year/Year (unless otherwise indicated) | | | | | | |
|---|----------------------------|---|-------|-------|-------|-------|-------|-------|
| | | 2004 | 2005E | 2006F | 2007F | 2008F | 2009F | 2010F |
| World Production | 82.97 | 4.4 | 2.2 | 1.5 | 1.4 | 1.5 | 1.4 | 0.8 |
| OPEC ex-Iraq | 28.16 | 5.5 | 6.0 | 1.7 | 1.5 | 1.6 | 1.5 | 0.9 |
| Non-OPEC | 42.34 | 2.4 | 0.5 | 1.4 | 1.4 | 1.4 | 1.3 | 0.8 |
| Iraq | 2.00 | 52.5 | -9.5 | -1.0 | 0.1 | 0.3 | 0.5 | 0.6 |
| World Consumption | 82.46 | 3.2 | 2.4 | 0.9 | 1.3 | 1.9 | 2.0 | 1.5 |
| Supply-Demand Balance (mn b/d) | 0.51 | 0.51 | 0.36 | 0.87 | 0.97 | 0.64 | 0.12 | -0.51 |
| WTI Price (nominal, annual avg, US\$/b) | 41.42 | 41.42 | 56.87 | 55.83 | 45.79 | 46.82 | 50.02 | 52.19 |

E: Estimate, F: Forecast by TD Economics; Source: U.S. EIA

| CRUDE OIL FORECAST | | | |
|--------------------|-------------------------|-------|-------|
| | U.S. dollars per barrel | | |
| Quarterly | 2005* | 2006 | 2007 |
| Q1 | 49.65 | 59.00 | 45.00 |
| Q2 | 53.05 | 58.00 | 45.00 |
| Q3 | 62.79 | 54.00 | 48.00 |
| Q4 | 60.00 | 50.00 | 50.00 |

*Actual for Q1 and Q2; estimated for Q3
 Quarterly forecasts are for the end of the quarter.
 Source: The Globe and Mail, TD Economics

capacity in the U.S. Gulf of Mexico region would be brought on stream more quickly than many had feared. Still, the recent easing in market fears is not likely to be the beginning of a new trend, at least over the short run. As we argued earlier, global demand growth has yet to show any meaningful signs of waning. And, although rising production by OPEC this year has helped to prevent a further tightening in the market, already-nervous investors will continue to be on tender hooks about the potential of weather-related or other unanticipated events to throw another wrench into the mix. Above all, the refining crunch in the United States and other countries will continue to keep investors on edge. As a result, we have set our year-end target at US\$60 per barrel, but don't rule out the price setting new highs in the months to come.

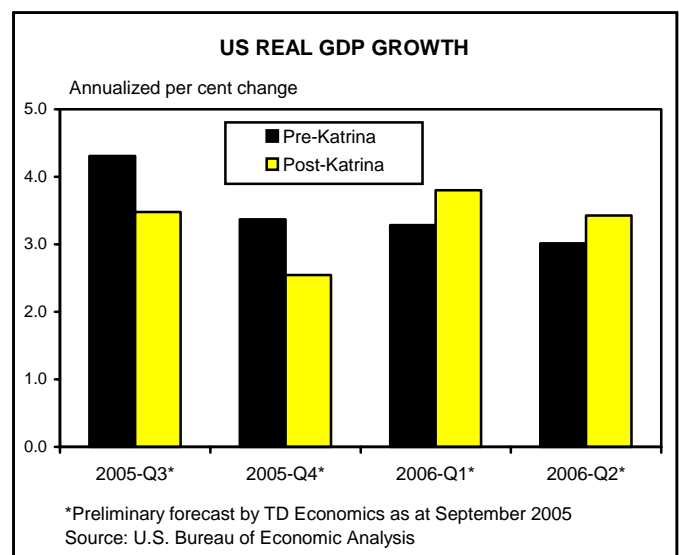
Weaker consumption picture in 2006-07 to halt rally

A year from now, however, the story is likely to be dramatically different, as the bullish sentiment underpinning crude prices currently begins to sour, which in turn will bring the four-year uninterrupted rally to a halt. Although the outlook for additions in new supply is tepid at best, world consumption growth is poised to slow by an even greater extent in tandem with global economic activity.

The pace of expansion in the world's primary economic engine – the United States – is projected to slacken from its recent 4-per-cent clip to a rate of about 2.5 per cent in the second half of 2006 and into 2007. This mid-cycle moderation is likely to be revealed once the distortionary economic impacts of Hurricane Katrina – notably, the storm's near-term dampening and subsequent boosting effects – wash out of the data. In addition to the drag exerted by current high levels of energy prices, the U.S. economy is expected to fall victim to a combination of

past interest rate hikes by the U.S. Federal Reserve, a long-awaited slowdown in the housing market, and a softer pace of consumer spending. Weaker U.S. import demand will likely take a bite out of rapid rates of expansion that have been recorded by China, India and other developing economies, which are also confronting similar pressures from high energy prices. Accordingly, world real GDP growth will continue to trend down gradually from last year's sizzling 5 per cent turnout closer toward the long-term average of 3.5 per cent by 2007.

At first glance, TD Economics' projected consumption growth of about 1 per cent per year in 2006-07 – roughly one-half of the current rate – might appear to be pessimistic in view of the outlook for still-moderate growth in the world economy. However, keep in mind that in 2002, amid the last world economic slowdown, consumption growth slumped to only 0.4 per cent. Moreover, while there may be only limited scope for conservation efforts over the next few years – largely given the fact that demand for crude oil has proved to be inelastic in the short run – we expect to nevertheless witness more compelling evidence of behavioural changes taking shape. And, not just in the major industrialized countries. Notably, costs to public treasuries of subsidizing gasoline and other energy products in a number of Asian developing economies is proving to be increasingly unsustainable and these countries have embarked on reducing those subsidies. As a result, in addition to more moderate GDP growth, look for oil consumption-to-GDP ratios to edge down globally over the next few years.



Supply to edge up in 2006-07

At the same time, output of crude oil is expected to rise by a slightly faster rate than consumption over the next few years, led by improved turnouts by non-OPEC countries. Canada, the former Soviet Union, Brazil and Western African countries will manage to ramp up output

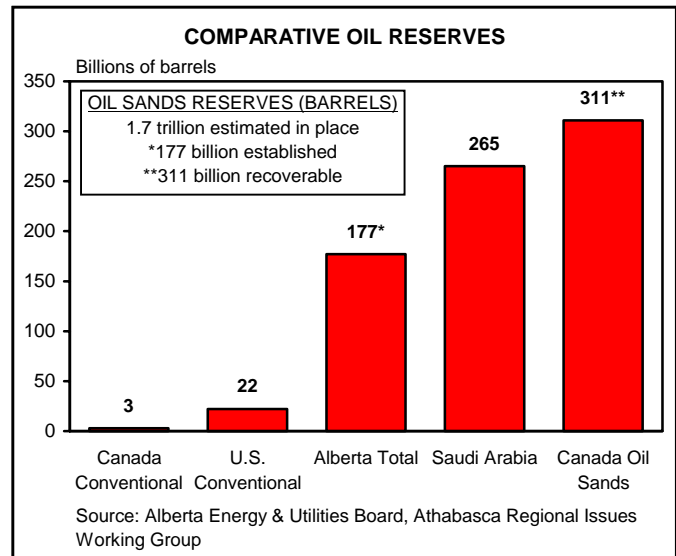
steadily. And, while OPEC has limited wiggle room to ramp up production significantly further, gains will be driven in part by plans announced by Saudi Arabia to raise its spare capacity over the next few years by 1.5-2 million barrels per day. Although Iraq remains a wildcard within OPEC, given its high level of instability, the 35-per cent

Canada's oil sands – a world class resource

With the recent surge in oil prices, Canada's vast reserves situated in the Alberta oil sands – ranked next only to Saudi Arabia – have been capturing growing global attention. The oil sands are located in three regions of northern Alberta, with the city of Fort McMurray at the heart. Oil sands deposits are distinct from those of conventional sources. For one, unlike conventional oil, which can be tapped relatively easily, the oil sands have been more difficult to exploit. Notably, they comprise a mixture of sand, clay, water and crude resource, bitumen, which is a black, asphalt-like hydrocarbon as thick as molasses. As a result, oil sands bitumen cannot be pumped without being heated or diluted, and is hence more expensive to mine, requires significant upgrading and sells at a considerable discount to light/sweet crude.

Even then, not all oil sands resources can be developed in the same way and or at the same cost. Easier-to-reach deposits can be extracted using a mining approach, which exposes the oil sands by stripping the overburden, then removing the sands using truck and shovel mining methods. Deposits that are deeper require an in-situ approach, where the bitumen is often removed by adding heat, thus making it more fluid and paving the way for the substance to be pumped to the surface. The second method is significantly more energy-intensive than the first one, and is carried out at a higher price tag.

As technology has emerged in recent years, production in the region has taken off. At the same time, trends in both conventional production and reserve counts in Canada have shifted into reverse. Accordingly, the share of oil sands in total Canadian production jumped from 20 per cent in 1999 to 40 per cent in 2004. And, this proportion is expected to rise to two-thirds by 2011, especially in view of the \$80 billion in either completed or announced projects slated for the next five years. To put this in perspective, the 3 million barrels per day of oil sands output will move Canada from 11th to a tie for 7th spot with Norway in terms of annual production.



At the same time, the long-term outlook for the oil sands is not free of potential potholes. Notably, the industry is facing rising cost pressures for natural gas, labour and equipment. But, while cost pressures are unlikely to abate to any meaningful degree going forward, the still solid environment for oil demand and prices over the medium term should keep the momentum in the oil sands flowing. At the same time, highly innovative oil sands producers will continue to look for cheaper ways to tap into the area's vast reserves.

The bright outlook for the oil sands has generated significant excitement among global investors of late, as evidenced by the massive inflows of capital into Canadian equity markets. So far this year, the S&P TSX energy sub-index has surged by about 60 per cent, driving up its share of the total index to about one-quarter. And, there have been a number of high profile deals in the oil patch, as international firms jump for the piece of the action. Above all, the Canadian dollar has been strengthening rapidly, as a growing number of investors are looking at the loonie as a "petrocurrency".

plunge in output recorded in that country in 2003 or the near 10-per-cent drop so far this year is unlikely to be repeated.

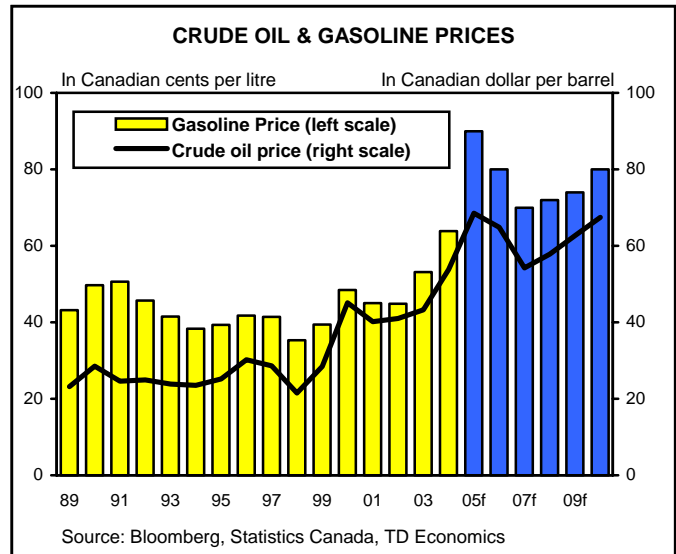
Still, growth in global output is expected to slip to a lower plane than what has been recorded in recent years, despite evidence of rising investment spending. This is because new supply additions in most regions are likely to just offset the impact of declining productivity in existing reservoirs. Even in Canada, where the outlook for the Alberta oil sands production has been capturing considerable worldwide attention, rising non-conventional output will be counterbalanced by declining production from conventional sources (see text box on page 17).

Prices to touch US\$45 in 2007

With investors expected to witness rising inventories of crude and start to fret about a continued increase in excess supply down the road, crude oil prices are projected to head lower during 2006 and into 2007. This shift in sentiment is likely to lead to net selling of speculative positions and a significant narrowing in the fear premium embedded in oil prices. As a result, the price of crude is projected to move toward the US\$45 per barrel level in early 2007. While the downdraft in 2006-07 is likely to be significant, keep in mind that there are some limits on how far and fast prices can drop. Notably, while not carved into stone, OPEC officials have indicated that a WTI price of US\$50 per barrel is a desired target, and hence would likely step in and cut production if prices fell too far below that level.

Resumption in tight markets by 2008

In 2008-10, TD Economics' forecast calls for crude oil prices to bounce back above US\$50 per barrel. By then, both the U.S. and world economies are expected to have snapped out of their sub-par period of growth, driving up consumption growth back closer to the recent annual trend rate of 2 per cent. And, with world production continuing to plod along at only about 1-1.5 per cent per year, the supply-demand balance is likely to shift back into a deficit position. In this environment, nervousness about supply shortages for crude oil and refined products is likely to move back to the forefront, elevating the level of the risk premium. *Hence, look for crude oil prices to follow a U-shape over the next half decade.* On the plus side, in spite of the increased non-conventional output contribution from Canada and ongoing shortage of refining capac-



ity, most of the incremental oil coming on stream over the next half decade is expected to be light and medium sweet crudes. This should lead to a narrowing in the current lofty price spreads between the different grades.

Implications for gasoline and natural gas prices

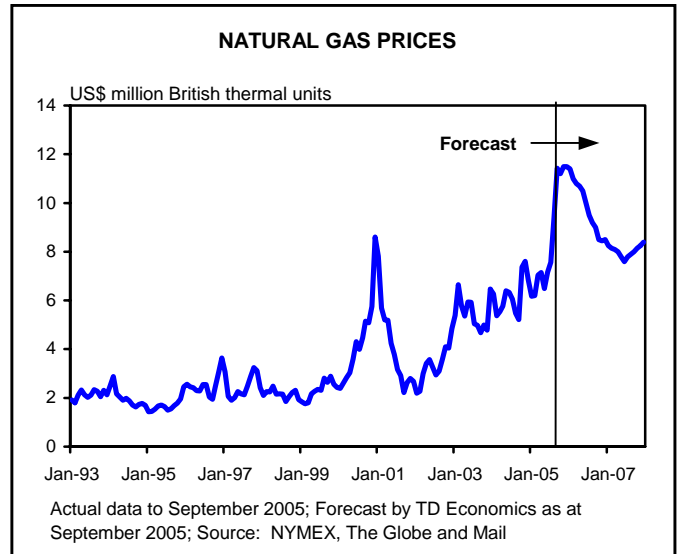
Consistent with TD Economics' crude oil price forecast, there is likely to be some relief at the pump in both Canada and the United States over the next year or two. Still, gasoline prices are projected to remain well above the levels that consumers have been accustomed to. For one, while refiners' margins are likely to further fall back from the current elevated levels post-Katrina, there is a good case to be made that the spread will remain somewhat higher than has traditionally been the case to reflect ongoing refining shortages over the next several years. And, second, we don't expect any change in gasoline excise taxation rates. Although Federal Finance Minister Goodale has been facing increased pressure to lower rates, he appears to be steadfast in his opposition to cutting them. We agree with this approach, preferring instead to see any tax relief directed at reducing still-high income-tax burdens in Canada. Accordingly, Canadian gasoline prices are projected to drop within the range of 70-80 cents per litre by the latter part of 2006 and to remain there over the medium term.

Likewise, the expected decline in crude oil prices in 2006 and 2007 is likely to translate into a downward move in natural gas prices. The accompanying chart, which plots crude oil and natural gas prices on an annual average basis and includes TD Economics' forecasts, reveals the tight

fit between the two prices. This close link should come as little surprise. Compared to crude oil, natural gas is much less important as a transportation fuel, and given the difficulty in transporting gas, tends to be priced on a regional basis. However, in several uses – such as heating homes and offices and powering utilities – the two fuels are substitutes. In the case of Canada’s oil sands, natural gas is even a major input into the production process. Accordingly, we expect natural gas prices, which are currently at record levels, to fall back in tandem with its crude oil counterpart. In 2007, we expect natural gas prices to average US\$8 per MMBtu.

Other implications

The projected decline in crude oil prices in 2006-07 is no doubt likely to temper at least some of the enthusiasm that is currently evident within the crude oil and natural gas sector. In today’s red-hot market, all new plays appear to receive considerable attention. But, as we explain in the text box on oil sands, not all projects are created equally. And, in an environment of US\$50 per barrel prices, some lower quality projects are likely to be looked at with increasing scrutiny. At the same time, however, with the new era of relatively lofty prices likely to stick,



there is unlikely to be any major fallout either. Above all, the next five years are likely to witness exciting new developments, as significant amounts continue to be poured into exploration and development. And, while crude oil is unlikely to go the way of the dodo bird any time soon, heightened efforts to developing alternative energy sources in response to high prices could bring that day closer.

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