Are high oil prices here to stay?

Introduction

The huge escalation of oil prices in 2007 and so far in 2008 has shattered any remaining doubts about the end of cheap oil. The real (inflation-adjusted) price of oil began this year at around $90 per barrel but surged throughout the year to hit a peak of over $140 in July.[1] Although prices have since moderated, the average price for the year as a whole is still expected to be about $120 per barrel, up 70% from the 2007 average. Yet amid the worldwide anxiety over oil prices, it is easy to forget that oil prices have been rising for some time. Although real average annual prices stagnated at under $25 for much of 1986–2003, they rose sharply from $27 in 2003 to $70 in 2007. What is remarkable about the recent movement of oil prices is not the direction but the speed. The alarm over oil prices has subsided in recent weeks along with the oil prices themselves. It is therefore a good time to take a dispassionate look at why oil has become so dear and whether it will remain so.

The runup in oil prices since the second half of 2007 has prompted questions over the role of financial speculation in oil. Financial institutions betting on higher prices have come under intense criticism for allegedly driving up prices to levels far above those resulting from the supply and demand position. While speculation may play some role in determining oil prices over short periods, it cannot explain the inexorable rise of oil prices since 2003.

The more plausible explanations are likely to be found in the fundamentals of supply and demand. Some drivers of demand, such as the state of the world economy, are cyclical while others, such as the economic transformation of the People's Republic of China (PRC) and India, are structural. Likewise, some supply drivers, such as disruptions stemming from geopolitical tensions, are temporary while others, such as the growing share of global oil reserves held by members of the Organization of the Petroleum Exporting Countries (OPEC), are more long run. The relative importance of structural versus cyclical fundamentals will shape the future outlook for oil prices. More specifically, to the extent that the underlying fundamentals of high oil prices are structural, oil prices will remain elevated for years to come.

This chapter was written by Donghyun Park of the Economics and Research Department, ADB, Manila. It draws on a background paper prepared by Jeff Brown, FACTS Global Energy Group. The box on retail fuel prices in Asia was prepared by Gemma Estrada.

The future trajectory of oil prices is of enormous interest for developing Asia. As a net importer of primary energy, the region will be hit hard by a prolonged increase in the price of oil. Cheap oil has contributed to developing Asia's rapid economic growth in the past. For example, it lowered transportation costs and hence the cost of internal and foreign trade. It also helped satisfy the region's growing appetite for electricity. It is unlikely that the PRC and India could have grown as fast as they have done in a world of more expensive oil.

Looking ahead, a prolonged elevation of oil prices would almost certainly have an adverse impact on developing Asia's future growth. The past few years of robust growth in the face of rising oil prices should not delude people into believing that developing Asia's growth prospects will be immune from the effects of dear oil. Intuitively, for oil-importing developing Asia, higher oil prices amount to an increase in the cost of a core input in the production process. They also represent a loss of income and transfer of income to oil-exporting countries.

The oil price outlook has implications not only for developing Asia's macroeconomic prospects but also for its energy markets. Soaring oil prices test the fiscal capacity of governments to provide subsidies on refined final products such as gasoline and kerosene. Indeed, many Asian economies have already begun to modify their policies so as to align their prices more closely with world market prices. Demand-side policies designed to encourage firms and consumers to use energy more efficiently will mitigate the impact of higher oil prices on energy consumption. Countries with hydrocarbon potential can facilitate investment in exploration and production to take advantage of higher prices. Furthermore, those same higher prices will make alternative energy sources such as nuclear, wind, and solar power more commercially attractive.

The rest of this chapter is organized as follows. The next section, *The role of Asia in the global oil market and the role of oil in Asia's energy mix*, explores the impact of developing Asia on global oil prices and the relative importance of oil as a source of energy in the region. The region's hunger for energy has grown rapidly in tandem with its robust economic growth, and oil plays a big part in satisfying that hunger. Given its limited oil reserves, developing Asia's impact on global oil markets is felt primarily through its fast-rising demand. Developing Asia's strong growth prospects suggest that its impact on global oil demand will continue to grow. At the same time, developing Asia's dependence on oil to drive its growth is unlikely to ease soon.

The section, *Why have oil prices soared since 2003?* looks at recent trends in oil prices and the underlying causes of those trends. The recent spike in prices marks an acceleration of a secular price increase since 2003. Previous oil shocks were caused by temporary supply disruptions but the current price surge has been driven by sustained demand growth. Notwithstanding the media spotlight on the role of financial speculation, the price runup is largely a consequence of imbalances between global supply and demand. More precisely, the failure of supply to keep up with fast-growing demand has fueled inexorable upward price pressures.

What will drive oil prices in the future? examines the main drivers of future global oil demand and supply. Demand will increasingly be driven by developing countries, especially in developing Asia and the

Middle East. Of particular significance is those countries' demand for transportation fuels. On the supply side, the peaking of production from non-OPEC countries in the near future means that OPEC will have to meet the bulk of the incremental demand but there are good reasons to doubt its ability to do so. This section also classifies the main demand and supply drivers into structural versus cyclical, and assesses their relative importance in determining oil prices.

The following section, *Oil price outlook in the short, medium, and long run,* follows from and is guided by the above analysis of supply and demand drivers. In the short term, the oil price is likely to soften on higher output and weaker demand. Around the middle of next decade, however, sustained upward pressure will reappear due to a sustained gap between supply and demand. In the still longer run, the restoration of equilibrium will require a decisive adjustment of consumer behavior, which would sharply curtail demand growth. This explains why the long-run oil price outlook is a prolonged period of prices well above $100 per barrel.

The section, *Policy options for developing Asia in an era of expensive oil,* discusses the government's role in helping the region adapt to a less favorable oil-related environment. Above all, Asian governments should use a carrot-and-stick approach of subsidies and taxes to encourage firms and consumers to use oil more efficiently. A particularly welcome trend in this context is the phaseout of price controls and subsidies under way in many countries. Liberalizing the market for oil products will limit the impact of higher crude oil prices on end users. Governments also have a vital role to play in minimizing temporary supply disruptions by establishing strategic oil reserves.

Concluding observations underlines the central messages that emerge from the analysis. The biggest message is that high oil prices are here to stay, and the sooner that developing Asia wakes up to this reality, the better. Painful but necessary adjustments will have to be made in the areas of macroeconomic policy as well as energy policy. Failure to act today will lead to larger costs tomorrow. Given the central role of transportation fuel in oil demand, there is a need to coordinate transportation policy and energy policy. High oil prices may, though, be a "blessing in disguise," which encourages developing Asia to embark on a more sustainable course of economic growth.

The role of Asia in the global oil market and the role of oil in Asia's energy mix

The price of oil is determined by global demand and supply. The market for oil is truly global in the sense that events in one part of the world, whether related to supply or demand, have repercussions on the rest of the world. A basic but often ignored point is that the end users of oil—consumers and firms—do not buy crude oil but refined oil products. Refined products are sometimes consumed directly and sometimes used as inputs in the production of other goods such as electricity. An interesting feature of the Asian oil market is that although the region is poorly endowed with crude oil, it has ample oil refining capacity and

is home to seven of the world's top 20 countries in terms of refining capacity. The price of refined oil products facing firms and consumers depends not only on direct production costs but also on transportation costs as well as taxes and subsidies. The price facing the end users is not the only determinant of the demand for oil products. Their demand also depends on a number of other factors, in particular income, energy efficiency, and availability of affordable substitutes. The demand for oil products reverberates in the opposite direction to influence the market for crude oil. In short, the oil market has two defining structural features—a high degree of interdependence across countries and a long, complex supply chain—both of which work to amplify the impact of shocks erupting in any part of the world or at any stage in the supply chain.

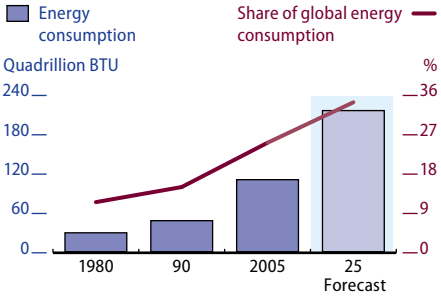
Developing Asia has been the most dynamic component of the global economy for quite some time now. One symptom of the region's breakneck growth is its large and growing appetite for energy. Energy consumption is both a cause and consequence of economic growth. For example, an ample and reliable supply of electricity contributes to growth by promoting a viable manufacturing sector. At the same time, growth gives rise to a mass consumption society in which large numbers of people buy and use personal computers, refrigerators, and other electrical appliances.

Quite predictably, massive industrialization and growing consumer affluence have combined to sharply ramp up Asian energy consumption. More precisely, the consumption of energy by countries in Asia outside the Organisation of Economic Development and Co-operation (non-OECD Asia) grew by about 64% between 1980 and 1990, more than doubled between 1990 and 2005, and is set to double again between 2005 and 2025 (Figure 2.1.1). Asia's energy consumption accounted for only 10.2% of global energy consumption in 1980 but its share rose to 13.6% by 1990 and 23.8% by 2005, and is set to rise further to 33% by 2025.

Developing Asia's surging oil consumption reflects its soaring energy consumption. Firms and consumers do not demand oil in itself but the energy generated by refined oil products. For example, oil-powered electricity plants provide energy for factories, homes, and commercial buildings although power generation is a relatively minor use of oil. More significantly, gasoline and diesel generate the energy which propels motor vehicles. Just like energy consumption in general, oil consumption is both a cause and consequence of developing Asia's rapid growth. In particular, transportation has been a key driver of higher oil consumption in the region. Transportation promotes growth by facilitating the flow of goods and services within a country and across borders. Growth has also created large middle classes with a growing appetite for automobiles and air travel in the PRC, India, and elsewhere. Inevitably, these trends have combined to sharply ramp up oil consumption throughout developing Asia (Figure 2.1.2). For developing Asia as a whole, oil consumption jumped by 82.5% between 1990 and 2007. The expansion of the PRC's oil consumption is even more striking, more than tripling in the same period.

Developing Asia's oil consumption is growing not only in absolute terms but also in relative terms. The region's share of global oil consumption has risen substantially in recent years, from 19.9% in 1990 to 28% in 2007 (Figure 2.1.3). Another visible sign of the region's growing

2.1.1 Non-OECD Asia's total primary energy consumption



BTU = British thermal unit.

Note: Total primary energy consumption includes consumption of petroleum, dry natural gas, coal, and net hydroelectric, nuclear, and geothermal, solar, wind, and wood and waste electric power.

Source: Energy Information Administration, available: http://www.eia.doe.gov/pub/international/iealf/tablee1.xls, downloaded 25 August 2008.

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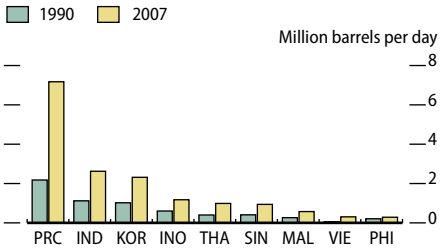
2.1.2 Oil consumption in selected countries



PRC = People's Republic of China; IND = India; INO = Indonesia; KOR = Republic of Korea; MAL = Malaysia; PHI = Philippines; SIN = Singapore; THA = Thailand; VIE = Viet Nam.

Source: FACTS Global Energy Group, *Oil Price Outlook*, August 2008.

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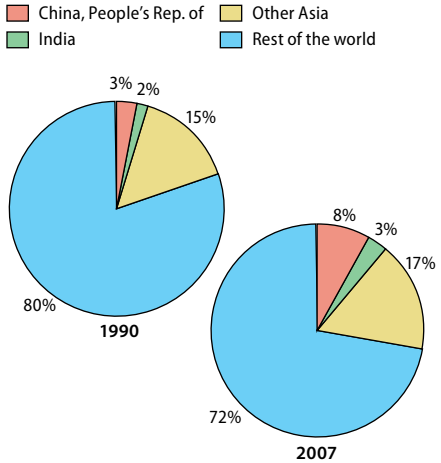
2.1.3 Share of oil demand



Source: FACTS Global Energy Group, *Oil Price Outlook*, August 2008.

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importance in the global oil market is that it has accounted for around half the increase in total world oil demand since 1990 (Figure 2.1.4).

Asia is not completely without oil reserves but it only produces enough to cover one third of its needs. As a result, the region suffers from a growing dependence on imported oil (Figure 2.1.5). The Middle East supplies the bulk of Asia's imports, which means that Asia remains especially vulnerable to disruptions of Middle Eastern oil. The regional imbalance between burgeoning demand and stagnant supply is epitomized by the turnaround of Indonesia from an OPEC member to an importer of oil products. A fast-growing region poorly endowed with oil, developing Asia's primary impact on the global oil market has been to boost demand.

Developing Asia's heavy dependence on imported oil suggests that surging oil prices will have a major impact on its energy markets. How hard this impact is will depend on the relative importance of oil in the region's overall energy mix. Although oil is an important source of energy, it is by no means the only source.

Alternative energy sources include coal, natural gas, hydroelectricity, nuclear energy, solar, wind, geothermal, and biomass. The higher the share of non-oil energy sources in the energy mix, the smaller the effect of oil prices on energy consumption. Coal and oil accounted for 50% and 31% of Asia's total energy consumption in 2007 (Figure 2.1.6). This implies that Asia is less dependent on oil than the rest of the world. However, if the PRC and India are excluded, the share of coal falls to 25% and the share of oil rises to 45%.

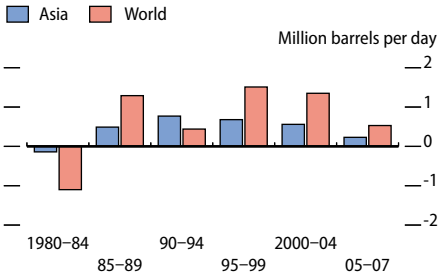
Furthermore, Asia is much more dependent on imports of oil than of the other major energy sources. The region's oil consumption is three times as high as its oil production. However, for coal, natural gas, hydroelectric power, and nuclear energy, the region produces about enough to satisfy its needs. The region's overall energy deficit is due largely to its huge oil deficit.

Looking ahead, the key question is whether developing Asia's role in the global oil market will continue to grow in the future. The answer is yes.

On the supply side, the potential for a substantial expansion of oil output from the region is virtually nonexistent. The region currently accounts for a mere 3.4% of total world oil reserves and geology suggests that this share is unlikely to rise.

On the demand side, the generally robust growth prospects of the PRC, India, and Asia as a whole suggest that the region will continue to be a key driver of global demand for energy and oil for years to come—see, for example, IEA (2007). In principle, a prolonged elevation of oil prices on a higher plateau would encourage substitution toward other fuels. In practice, economic and technological factors constrain the scope and speed of such substitution. For one thing, the price of one close substitute—natural gas—tends to move in tandem with the price of oil. For another, it takes a long time to bring some alternative energy sources into operation, such as hydroelectric or nuclear power plants. Above all, oil will continue to be the dominant fuel for transportation due to limited substitutability, and developing Asia's demand for transportation is set to expand rapidly along with economic growth.

2.1.4 Incremental oil demand



Source: FACTS Global Energy Group, *Oil Price Outlook*, August 2008.

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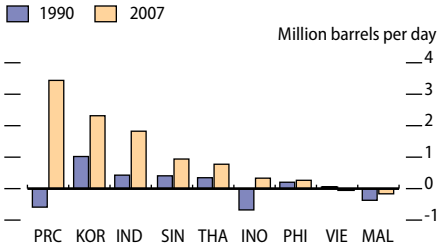
2.1.5 Import dependence on oil of selected countries



PRC = People's Republic of China; IND = India; INO = Indonesia; KOR = Republic of Korea; MAL = Malaysia; PHI = Philippines; SIN = Singapore; THA = Thailand; VIE = Viet Nam.

Note: Import dependence is computed as a country's oil product consumption less it's oil production.

Source: FACTS Global Energy Group, *Oil Price Outlook*, August 2008.

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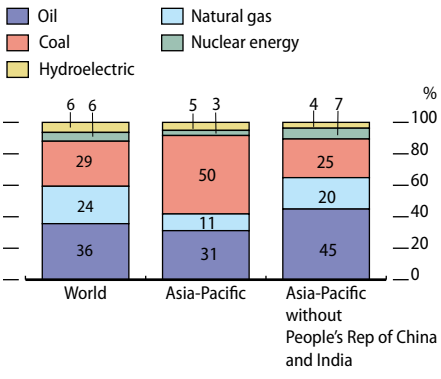
2.1.6 Energy consumption by fuel type, 2007



Source: FACTS Global Energy Group, *Oil Price Outlook*, August 2008.

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Why have oil prices soared since 2003?

Given the dramatic nature of the increase in oil prices since the second half of 2007, it is easy to forget that inflation-adjusted oil prices have been rising for some time now. In fact, they have been rising on a secular basis for about 5 years, since the latter part of 2003 (Figure 2.1.7). The recent price surge should thus be viewed not in isolation but as an integral part of a prolonged upward price trend. Furthermore, the oil boom is very much part of a broader commodity boom, which has pushed up the price of many primary commodities since 2003. The general nature of the commodities boom was underlined more recently by the simultaneous runup of oil and food prices (see the chapter, *Causes of high food prices*, also in Part 2) over the past year. The post-2003 surge of oil prices had been immediately preceded by an extended period of cheap oil between 1986 and 2003. The real price of oil rarely rose above $25 in this period. However, upward price pressures were already building by 1999, when prices began to nudge up.

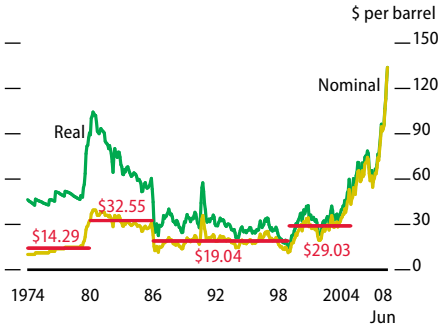
Over a longer period, what is striking about the post-2003 oil price surge is its continuity. Although real prices have ebbed and flowed over short sub-periods, the period as a whole has been marked by a continual increase in prices. The world experienced two earlier price spikes, in 1973–74 and 1979–80, but these were short-lived. A more fundamental difference is the impact on global economic growth. The two earlier oil price spikes hurt global economic growth to the extent that they were oil shocks. In contrast, the current oil price spike has had no perceptible impact on the world economy, which was in robust health in 2003–2007. What is even more surprising, and contrary to conventional wisdom, the oil price's breaking the psychological barrier of $100 per barrel has not led to a global economic meltdown. To say the least, the apparent irrelevance of skyrocketing oil prices on economic performance is at first sight puzzling, especially in light of their big impact in the past.

Much of the puzzle can be explained by differences between the underlying causes of the current and earlier price shocks. The two oil crises of the 1970s were caused by negative supply shocks which involved short-lived geopolitical disruptions of Middle Eastern oil supply. In both cases, oil prices rose swiftly to reduce demand in line with supply and restore market equilibrium (Figure 2.1.8). In contrast, the immediate catalyst of the post-2003 surge in oil prices was a positive demand shock rather than a negative supply shock.

More specifically, demand from developing countries, in Asia in particular, took off in 2004, when global oil demand rose by almost 3 million barrels per day. An exceptionally buoyant world economy and robust expansion of world trade also supported demand. Since the demand for oil was propelled by rapid growth, the muted impact of dear oil on growth was no surprise at all. A further contributing factor was an earlier negative supply shock emanating from the Asian financial crisis of 1997–98. The collapse in oil demand led to a collapse in oil prices and a sharp drop-off in investments in new production capacity. This subsequently constrained the ability of oil producers to accommodate incremental demand.

In light of the central role of demand growth in the post-2003 oil price surge, a legitimate question to ask is whether the higher prices

2.1.7 Prices of West Texas Intermediate crude



Note: Red lines are average nominal prices.

Source: FACTS Global Energy Group, *Oil Price Outlook*, August 2008.

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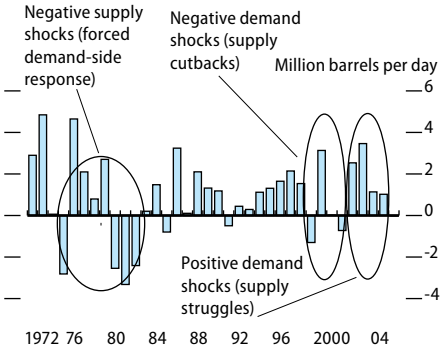
2.1.8 Global incremental crude oil supply, year on year



Source: FACTS Global Energy Group, *Oil Price Outlook*, August 2008.

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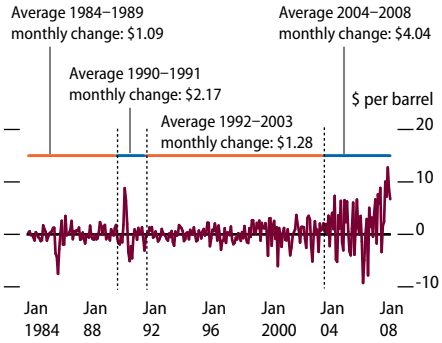
resulting from stronger demand have, in turn, damped demand. A comparison of world gross domestic product (GDP) growth and oil consumption growth indicates that rising oil prices have in fact destroyed some demand. Historically, when world GDP grows by 10%, world oil consumption grows by 5%. This rule of thumb has broken down since 2004 when oil consumption has grown by less than the expected amount. The lack of available supply to accommodate the incremental demand due to growth has driven up prices, destroyed demand, and restored the supply-demand balance.

It has just been seen that there are sound economic reasons for why oil prices have surged since 2003. Nevertheless, there is a widespread tendency to blame financial speculators. It is conceivable that in the short run financial speculators betting disproportionately on price rises rather than price falls can cause market prices to disconnect from the fundamentals of supply and demand. However, over a longer time frame, if prices move too high, supply will exceed demand and inventories will start to build up toward unacceptable levels. The liquidation of inventories will increase supply and drive market prices down, inflicting losses on speculators who cling to their upward bets. Therefore, given the long time period of the post-2003 oil price surge, financial speculation may at best explain short-lived price spikes within that surge but not the surge itself. Unsurprisingly, empirical research on this issue generally fails to find any clear evidence of causality running from speculation to oil prices—see, for example, IEA (2008) and ITF (2008).

Greater price volatility has accompanied the secular increase in real oil prices since 2003. Price volatility, measured as dollars per barrel month on month, has increased markedly (Figure 2.1.9). The failure of supply to match soaring demand has brought about market tightness that leaves very little surplus capacity to cushion supply or demand shocks. As a result, even small market disruptions, such as localized armed conflict in Nigeria or perceptions of rising tension in the Middle East, are amplified into large swings in price. Lack of timely and accurate market data also contributes to the heightened price volatility by forcing oil market participants to make ill-informed guesses about the actual impact of shocks on the markets. In particular, oil market data from developing countries, which are increasingly driving global demand, are available only after a long time lag. Volatility matters because it creates a lot of uncertainty about the direction of future prices. Uncertainty leaves Asian firms and consumers wondering whether they should make costly investments to improve energy efficiency. It also makes governments dither about taking painful but necessary anti-inflationary measures.

Although the oil price surge has been driven largely by the fundamentals of supply and demand, bad government policy must bear part of the blame. Governments often subsidize the price of refined oil products, such as diesel and kerosene, for social and political reasons. Such subsidies prevent the full pass-through of international oil prices to domestic fuel prices (see the chapter, *Inflation in developing Asia: Demand-pull or cost-push?,* also in Part 2). In doing so, they artificially lower the prices of refined oil products and encourage overconsumption. Fuel subsidies are to a large extent the legacy of the era of cheap oil when they allowed governments, driven by populist political motives, to

2.1.9 West Texas Intermediate crude price volatility, month-on-month change



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

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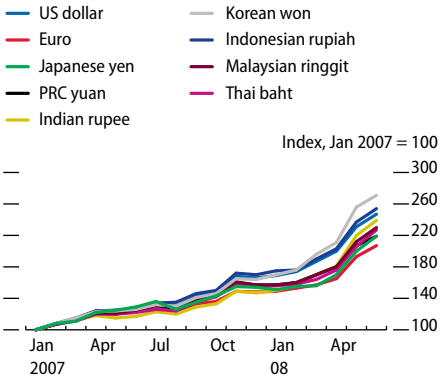
score "political points" at manageable fiscal costs. Subsidies have largely shielded consumers from the post-2003 surge in oil prices. In so doing, they have artificially bolstered demand and contributed to the price surge. Developing Asian economies also provided socially and politically motivated fuel subsidies but the extent of those subsidies varied widely across countries. For example, subsidies were extensive in Indonesia and Malaysia but limited or nonexistent in Korea, Philippines, and Thailand, with the two regional giants—the PRC and India—falling in between. Gasoline and to a lesser extent diesel prices for the region as a whole are now more or less aligned with international market prices, partly as a result of reductions in subsidies (Box 2.1.1).

In addition to financial speculation and subsidies, another non-fundamental factor which may have contributed to higher oil prices is the depreciation of the United States (US) dollar—see, for example, Cheng and Mercer-Blackman (2007). Oil is bought and sold in dollars in international markets. Therefore, when the US dollar suffers a general decline, as it had until recently, the yuan price of oil (among others) will fall. Other things being equal, a 10% depreciation of the dollar against the Korean won implies a 10% fall in the won price of oil, which will have a positive effect on Korean oil consumption. Of course, other things are not equal and oil prices have taken off. In theory, the decline of the dollar offsets the rise of oil prices to some extent and thus restricts the pass-through of international prices to domestic prices. In practice, the sheer magnitude of the increase in the dollar price of oil means that the offsetting effect of the weakening dollar is likely to be limited at best. For the region as a whole, the slide of the dollar has helped hold down oil prices and thus support demand, but this dollar effect has been overwhelmed by the higher dollar prices (Figure 2.1.10).

2.1.10 Dubai crude price index



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

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What will drive oil prices in the future?

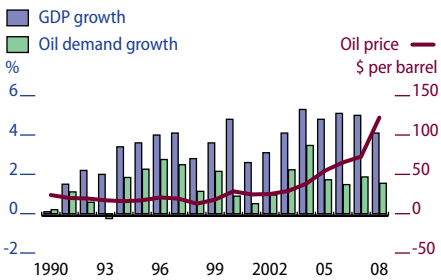
It is likely that supply and demand will continue to play the central role in the determination of prices in the future. As in the past, non-fundamentals such as financial speculation and exchange rate movements will have some impact but their impact is likely to be short-lived and uncertain. This section first explores the factors that are likely to have the biggest impact on global oil demand. It then looks at the factors that are likely to drive global oil supply. The paths of those underlying factors will determine the paths of global supply and demand, which, in turn, will determine the path of oil prices, an issue that is explored in the next section.

Future drivers of global oil demand

Global economic growth

Global oil consumption depends heavily on global economic growth. As noted earlier, the income elasticity of oil consumption has historically been about 0.5, so that 1% economic growth translates into 0.5% growth in oil consumption. The robust growth of oil consumption since 2003 mirrored an exceptionally robust global economy (Figure 2.1.11). The current deterioration of the global economic outlook will have a negative

2.1.11 World GDP, oil demand and price



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

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impact on demand in the short run. In particular, the sharp slowdown of growth in the US, Europe, and Japan will curtail demand growth. However, even in the short run, the slower but still healthy growth of developing countries will help prop up demand. Also in the short run, the growth of oil consumption depends on the ups and downs of the business cycle but in the long run, the growth of oil consumption will depend on the long-run trajectory of economic growth. Any sharp deterioration or improvement of long-run global economic prospects would have a major impact on long-run oil demand. Since less fuel-efficient developing countries are accounting for a larger share of world output, the same level of global growth can be expected to have a bigger impact on oil demand.

Demand from developing countries

Global oil demand growth will increasingly come from two regions—developing Asia, in particular the PRC and India, and the Middle East. Developing Asia accounted for about 40% of the positive demand shock in 2004 and is likely to account for up to one half of global demand growth in the future. In the PRC and India, rapid growth and structural transformation will fuel rapid growth of oil consumption for some time to come. The PRC and India are at a stage in their economic development in which oil consumption has just taken off and will not decelerate in the foreseeable future. The positive income effect associated with robust economic growth is overwhelming the negative effect of higher oil prices. For example, in the gasoline market, the rise in demand due to large numbers of first-time car buyers is dominating the fall in demand due to higher prices. The uncertain global economic environment may slow the two Asian giants in the short run but their remarkable economic transformation is a long-run trend that will not have run its course soon. Oil consumption in developing Asian economies other than the PRC and India will also continue to grow rapidly and thus support global oil demand. Economic growth will underpin much of that growth throughout the region, as it has in the past (Figure 2.1.12).

An often overlooked but increasingly important center of oil demand growth is the Middle East. Soaring oil revenues have delivered an economic boom that has sharply raised the demand for oil products. Those same revenues also enable Middle Eastern governments to heavily subsidize the price of oil products. For example, in the Islamic Republic of Iran, the retail price of gasoline is a mere $0.11 per liter, far below international prices. Saudi Arabia has actually *reduced* the price of gasoline in the oil price surge. In fact, the incremental demand from the Middle East up to 2015 will equal that of the PRC, which has 10 times as many people and one of the world's fastest-growing economies. A combination of strong growth coupled with high international oil prices and artificially low domestic prices has transformed the Middle East into one of the two main engines of demand growth in the developing world (Table 2.1.1).

Demand for transportation fuel

A large part of the growth in oil consumption in developing countries will come from a growth in transportation fuel consumption. In the case of developing Asia, transport fuels will account for about one half of the growth in the demand for all oil products through 2019 (Figure 2.1.13).

2.1.12 Average annual growth rates of GDP and oil consumption, selected countries, 1980–2007

Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

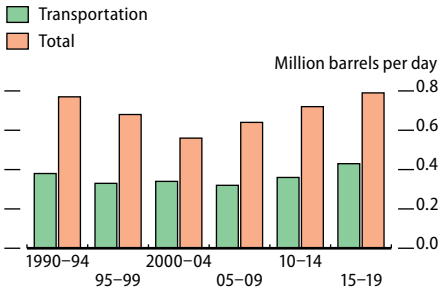
Click here for figure data

2.1.1 Average annual oil demand growth, million barrels per day

	2007–2015
China, People's Rep. of	0.410
India	0.125
Other Asia	0.165
Middle East	0.380
Total	1.0–1.1

Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

2.1.13 Incremental oil demand in developing Asia



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

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2.1.1 Retail fuel prices in Asia

Fuel prices have surged in 2008. The Brent crude oil price went through $100 per barrel in March and peaked at over $140 in July. Although it went down to less than $120 in August, the average price for the first 8 months was still much higher (by 70%) than in the same period last year. The surge in crude oil prices has pushed up retail fuel prices. Although these are heavily influenced by refining, distribution, and marketing costs, as well as taxes, crude oil still accounts for over one half of retail fuel prices (EIA 2008a, 2008b).

The box figure illustrates retail fuel price data for gasoline and diesel across developing Asia, surveyed by the Asian Development Bank mainly during the period 9–13 June 2008. For comparison purposes, three benchmark prices are also shown.

The first benchmark is the Brent crude oil price (84 cents per liter), marked by red vertical lines. In six out of 34 economies, retail prices of gasoline are below crude oil costs and are thus considered to be subsidized. More economies (11) provide subsidized retail prices for diesel than gasoline, since diesel is commonly used to fuel public transport for low-income households.

The second benchmark shows retail fuel prices in the United States (US), of $1.14 per liter for gasoline and $1.24 per liter for diesel, and are marked by green lines. The US price incorporates fuel tax and an industry margin, and therefore represents an unsubsidized or cost recovery price. Countries that price up to the green line are assumed to recover their crude and refining costs.

Fuel prices of some countries that do not provide direct subsidies may, however, deviate considerably from the US price. This stems from differences in refining and distribution costs, taxes, and other costs. Ten economies reported diesel prices above the US price (fewer than the last time that the Asian Development Bank conducted an oil price survey, as published in *Asian Development Outlook 2007 Update*). For gasoline, 19 economies reported prices higher than US prices (close to the number in last year's *Update)*.

The third benchmark marks Luxembourg fuel prices ($2.03 per liter for gasoline and $1.94 per liter for diesel), shown as purple lines. Luxembourg fuel prices are higher than US prices and include taxes as well as environmental costs, and prevail across much of the European Union. In developing Asia, only the two economies of Hong Kong, China and the Republic of Korea price gasoline around the Luxembourg price. For diesel, only the Republic of Korea and Singapore have prices similar to those in Luxembourg.

Comparing oil prices between June 2008 and August 2007, the average diesel price rose more sharply (52.3%) than the gasoline price (36.4%). Still, diesel and gasoline price increases in the region were less steep than those in the US (61.9% for diesel and 40.9% for gasoline). In the case of diesel, the average price increase was higher for countries that provided subsidies than those that did not, reflecting price adjustments that lowered the amount of subsidies.

In 21 economies, the authorities still regulate retail fuel prices. However, since world crude prices have jumped, costly oil subsidies have become unsustainable and some countries have been forced to raise fuel prices. In Bangladesh for example, the retail price of diesel was raised by 37.5% and that of gasoline by 34% in July. In the People's Republic of China (PRC) they were increased by 18.1% and 16.7%, respectively, in June. In India, fuel prices were raised twice, once in February and again in June. Even oil-producing countries such as Indonesia and Malaysia have reduced fuel subsidies. At least 13 countries that regulated fuel prices pushed through fuel price increases in the first half of 2008.

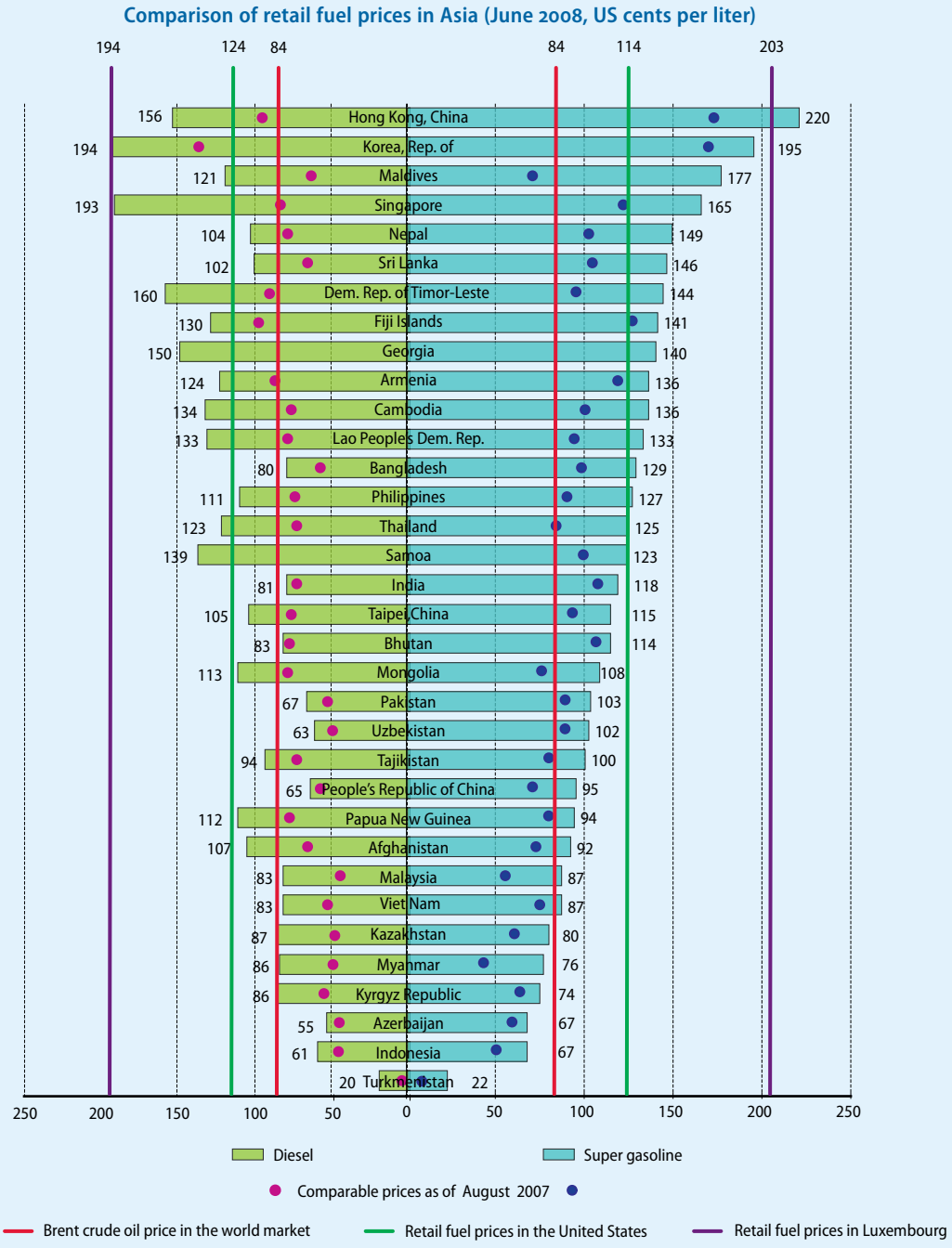
Very few countries introduced new or additional fuel subsidies. Maldives initiated fuel subsidies for farmers and fishermen. The authorities in Thailand temporarily reinstated a small subsidy on diesel during March–July. While the authorities in Turkmenistan hiked fuel prices, they have also provided monthly allocations of free diesel and gasoline since February.

In addition, eight countries have resorted to various tax measures in response to rising fuel prices. India and the Philippines lowered their import duties on oil products. Pakistan, Papua New Guinea, Sri Lanka, and Viet Nam reduced or eliminated excise taxes on oil. The PRC and the Republic of Korea have provided tax rebates.

Several economies offer incentives to encourage a shift to alternative sources of fuel. Authorities in Taipei,China have started to compensate motorists who modify their vehicles to run on both gasoline and liquefied petroleum gas (LPG). In Uzbekistan, the Government plans to draw vehicle owners away from gasoline consumption to LPG by expanding the network of LPG stations. In the Philippines, authorities have promoted biofuels (ethanol-blended fuels); they also support conversion of vehicles to LPG through zero-interest loans for "jeepney" operators.

Clearly, Asian economies have changed their pricing policies in response to rising fuel prices. What is particularly revealing in this context is a comparison of prices in August 2007 and June 2008 (Box figure). The June 2008 prices are almost invariably higher for both gasoline and diesel. Over one half of the economies in the oil price survey had higher gasoline prices than the US. In general, over the past 3 years, average fuel prices in the region have closely followed US fuel prices, especially in the case of gasoline. For diesel, the regionwide

2.1.1 Retail fuel prices in Asia *(continued)*



Sources: ADB resident missions; national press reports; Datastream; Energy Information Administration, available: http://www.eia.doe.gov/, downloaded 15 July 2008.

Click here for figure data

reduction in subsidies has substantially closed the gap between the US price and prices in many countries. With the planned additional reductions in subsidies within the year, fuel prices in the region should become aligned even more closely with US market prices.

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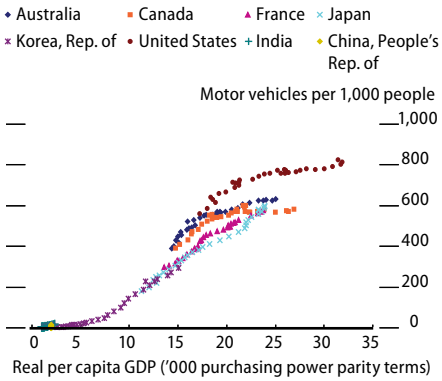
Energy Information Administration (EIA). 2008a. "A Primer on Gasoline Prices." Brochure No. DOE/EIA-X040. Washington, DC. May.

———. 2008b. "Diesel Fuel Prices: What Consumers Should Know." Brochure No. DOE/EIA-X045. Washington, DC. June.

The underlying factor is a sharp increase in motor vehicle ownership. Nowhere is the dramatic nature of the ongoing revolution in personal transportation more evident than in the PRC, which has already surpassed Japan to become the second-biggest national vehicle market after the US. Indeed, it is projected that the PRC will overtake the US as the world's biggest market for cars in around 2015. It is also projected that the total number of vehicles in the PRC will jump by a staggering 20 times between now and 2030.

Developing Asia's growing demand for transportation fuel will have a tangible impact on the global market for oil products in the medium and long run. In fact, Asian demand for gasoline and diesel is expected to account for a quarter of the growth in global demand for all oil products through 2025. More generally, an unusually large group of developing countries in Asia and beyond are reaching the "sweet spot" of oil demand—a per capita purchasing power parity income range of $3,000–9,000—where stylized evidence suggests that vehicle ownership grows twice as fast as income (Figure 2.1.14). Crucially, the substitutability between oil and other energy sources is much more limited for transportation fuel than for power generation and other uses—see, for example, Small and Van Dender (2007). Therefore, the dominant role of transportation fuel in Asian oil demand growth will reinforce Asian oil demand in the future.

2.1.14 Vehicle ownership and per capita income, 1971–2002



Source: International Monetary Fund, *World Economic Outlook*, April 2005, available: http://www.imf.org.

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Subsidies

Subsidies shield consumers from market prices, encourage them to overconsume, and thus contribute to higher prices—see, for example, Baig et al. (2007). The sharp jump in oil prices since 2003 has rendered fuel subsidies fiscally unsustainable and forced governments throughout developing Asia to reduce them, resulting in higher retail fuel prices (Box 2.1.1 above). For example, the PRC raised the retail prices of gasoline and diesel by nearly one fifth in mid-June 2008. This represents the largest one-off increase in the PRC's prices for those products in at least a decade. Similarly, India raised the retail price of fuel by about 10% in recognition of the ballooning fiscal burden of government oil subsidies. Malaysia increased gasoline prices by more than 40% in early June while Indonesia put up the price of subsidized fuels by at least 28.7% in late May.

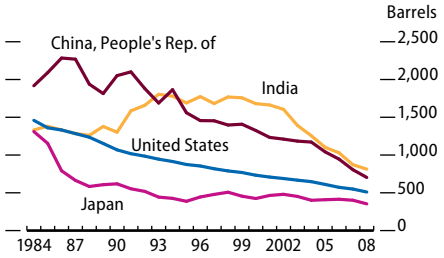
The trend toward lower fuel subsidies in developing Asia is part of a worldwide trend although some countries, especially in the Middle East, continue to heavily subsidize oil products. The worldwide reduction of subsidies suggests that subsidies will play a progressively smaller role in supporting global demand in the future.

Improving efficiency of oil use

Given the jump in oil prices, it is only natural to expect oil-importing countries to redouble their efforts to reduce their dependence on imported oil. Governments often take the lead in such efforts by implementing policies aimed at restricting demand and encouraging more efficient use of oil products. For example, governments may subsidize smaller fuel-efficient cars or heavily tax bigger, fuel-inefficient cars to induce consumers to economize on fuel consumption. Consumers and firms will also respond to higher oil prices by adjusting their

behavior on their own. More commuters may choose to take public transport to work rather than drive in the face of soaring fuel prices. Anecdotal evidence suggests that the PRC and India have accelerated their efforts to improve the efficiency with which they use oil. The amount of oil required to produce one dollar of output has been falling in both countries, even though they—and the whole of developing Asia—still has a lot of catching up with Japan and Western Europe in energy efficiency (Figure 2.1.15). Improvements in the efficiency of oil use will have a negative impact on global oil demand in the future. However, the intensity of the efforts of governments, consumers, and firms to improve efficiency will very much depend on the future path of oil prices.

2.1.15 Evolving efficiency: Barrels of oil consumed per $1 million GDP



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

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Alternative fuels

If the supply of an oil substitute increases and pushes down its own price in the process, firms and consumers will move away from oil toward the oil substitute. If the oil substitute becomes available in large commercial quantities at competitive prices, the global demand for oil could fall substantially. At the moment, the only commercially viable alternative fuels are derived from the conversion of organic matter into liquids—biofuels—or the conversion of solids and gases into liquids—coal-to-liquids or gas-to-liquids. (UN ESCAP 2008 examines the current state of biofuel production in selected Asian countries.)

The initial euphoria over biofuels, which was seen as the solution to everything from climate change to dependence on imported oil to the hollowing out of rural communities, has largely faded. It has recently emerged that the economic and environmental costs of biofuels are significantly larger than previously thought—see, for example, Fargione et al. (2008) and Searchinger et al. (2008). In fact, biofuel production would not be economically sustainable in most countries without government subsidies. Even with technological improvements, it is unlikely that the production of biofuels will reach sufficient levels to exert downward substantial pressure on the price of oil before 2020. It is equally unlikely that the output of gas-to-liquids or coal-to-liquids will reach such levels.

Other demand drivers

The preceding list of drivers of future oil demand is by no means exhaustive. As noted earlier, the depreciation of the US dollar has helped prop up demand and will continue to do so. However, the future trajectory of the dollar is highly uncertain, as evident in its recent rebound, and is beyond the scope of this chapter. In any case, if the weakness of the dollar were to persist, it is conceivable that oil would be priced in other major currencies, such as the euro. Financial speculation may also play some part in pushing up demand but its role will be limited and temporary at the most. The recent softening of oil prices destroys the notion that investing in oil futures is a one-way bet.

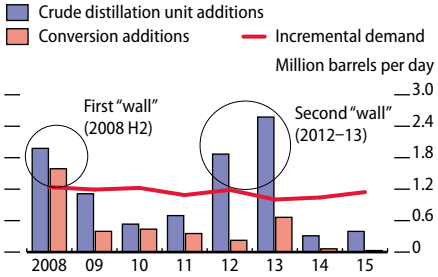
Somewhat counterintuitively, refining capacity and upgrading can influence the price of crude oil. For example, current limitations in refining capacity limit the ability of refineries to process lower quality heavy crude, thus driving up their demand for higher quality light crude. In the near future, the buildup of new capacity, in the form of the construction of more advanced refineries as well as upgrading of existing

refineries, will expand industry capacity for processing heavy crude and thus moderate the demand for light crude.[2] Most of the new capacity will be located in the PRC, India, and the Middle East, and come on stream by 2013 (Figure 2.1.16).

Technologies to improve the efficiency of vehicle engines already exist but their incorporation into vehicles has been limited so far. Adoption of such technologies on a large scale in the future can be expected to have some negative impact on oil demand. Government policy aimed at reducing demand can further promote the adoption of efficiency-enhancing technologies. Existing hybrid technology uses both conventional fuel and electricity to power vehicles. It thus helps curb the demand for oil but economies of scale and further technological development are required to make the prices of hybrid vehicles more competitive with conventional vehicles. Fully electricity-powered vehicles and fuel-cell vehicles hold out the promise of much bigger fuel savings but even on the most optimistic assumptions they will not have a tangible market presence until at least 2025.

Finally, in developing countries with energy shortages, oil products are sometimes substituted for other energy sources to quickly alleviate energy shortages. The effect on oil demand can be quite substantial. For example, consumers' shifting to oil-powered generators in response to blackouts caused the PRC's oil demand to jump by almost 1 million barrels per day in 2004.

2.1.16 New refining capacity in Asia-Pacific and the Middle East



Notes: "Crude distillation unit" refers to conventional refining capacity. "Conversion additions" are new refinery units aimed at converting relatively low-value fuel oil to higher-value oil products. "1st wall" and "2nd wall" refer to two episodes of a surge in refinery construction.

Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

Click here for figure data

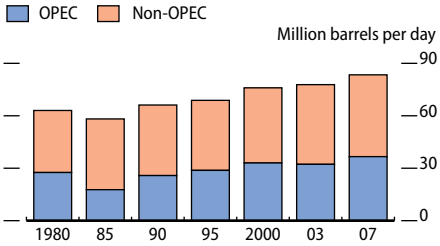
Future drivers of global oil supply

Non-OPEC production

The share of non-OPEC countries in global oil production was generally above 55% in 1980–2007 (Figure 2.1.17). Furthermore, non-OPEC production has accounted for more than half the growth in total global production since the early 1980s. A brief surge in non-OPEC production is expected in 2009–2010 when newly developed reserves will come on stream. Non-OPEC production may peak around 2012 and then enter a decline (Figure 2.1.18). The pace of decline is likely to be gentle rather than steep. The development of new production capacity in geologically promising new areas will be offset by declining output in more mature fields.

The diminishing growth prospects of non-OPEC production are due to a declining reserve base, heavy dependence on mature fields, and the small size of prospective new reserves. They are also a legacy of a historical preference for developing new reserves outside OPEC, which restricted production to maintain high prices. This means that in non-OPEC countries most "easy" reserves have already been developed and those which remain are more challenging—a good example being Canada's vast oil sands reserves.

2.1.17 OPEC and non-OPEC oil production



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

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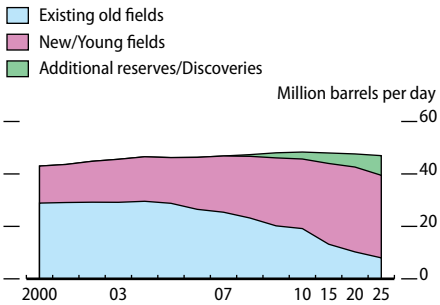
OPEC production

Given the likely future path of non-OPEC production, OPEC countries will have to supply the bulk of any incremental oil demand beyond 2010. A detailed analysis of known oil development projects indicates that in the very short run the increase in OPEC's production can comfortably

2.1.18 Non-OPEC oil production



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

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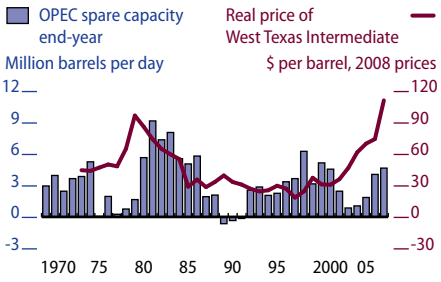
accommodate the expected increase in demand. In fact, surplus capacity is likely to grow substantially.

Beyond 2010, however, the combination of growing demand and peaking non-OPEC production will erode much of OPEC's spare capacity. History suggests that inadequate spare capacity can cause large price jumps (Figure 2.1.19). As discussed earlier, it can also magnify the price impact of shocks and thus cause greater price volatility. Maintaining a comfortable cushion of spare capacity beyond 2010 would require continuous and systematic additional investments in new production capacity, yet there are good reasons to suspect that those investments are unlikely to materialize in a timely manner. For one, uncertainty over future demand and prices may discourage OPEC members from making them. Furthermore, OPEC members often restrict foreign investors with valuable capital, technology, and know-how. Some governments may decide to allocate oil revenues to financial investment abroad or to domestic priorities such as infrastructure. An additional cause for skepticism is that actual reserves may fall short of official reserves, which are sometimes exaggerated for political reasons.

2.1.19 OPEC spare capacity vs real price of West Texas Intermediate



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

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OPEC policy and cohesion

Since OPEC is a cartel that seeks to control prices by controlling output, OPEC's production levels are determined by OPEC's output and pricing policies and the degree of its internal cohesion. OPEC's disproportionate influence on global oil prices in the past stemmed not only from its control of vast reserves but also its ability to coordinate output and prices among its members.

Coordination involved assigning production quotas to individual members and thus preventing them from "cheating" by boosting output for short-run gain in periods of high prices. This type of structured quota-based price management system, which ensured higher prices and profits in the long run, disappeared in 2004. Even so, OPEC is expected to be cohesive enough to cut collective output in temporary market weakness through informal coordination.[3] The absence of an explicit quota system will complicate collective output reduction in more sustained market weaknesses. However, more fundamentally, OPEC's spare capacity is increasingly in the hands of a few dominant producers—Saudi Arabia, Kuwait, United Arab Emirates, and Iraq—and this will enable the organization to maintain a tight market in the future.

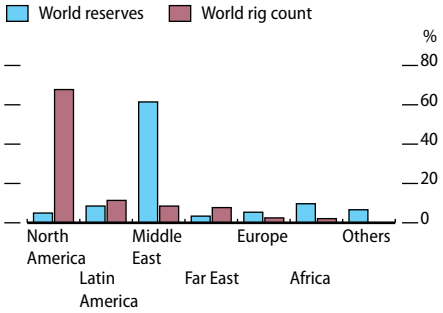
Resource nationalism

In both OPEC and non-OPEC countries, resource nationalism can discourage foreign investments in exploration, development, and production—see, for example, *International Herald Tribune* (2008b) and *Financial Times* (2008a). Yet it is often foreign investors, especially large international oil companies (IOCs), such as Shell, that have the greatest capacity, in terms of capital, technology, and know-how, to find and exploit new reserves. The shift of power from IOCs to national oil companies (NOCs), such as Saudi Arabia's Aramco, will have lasting adverse repercussions on future oil production. Due to nationalization and less favorable contractual terms, the IOCs have suffered a drastic

decline in access to global oil reserves. This lack of access is emphatically illustrated by the fact that North America, which holds less than 10% of global oil reserves, is home to almost 70% of oil rigs (Figure 2.1.20). That is, IOCs are drilling where they can rather than where the oil is. Furthermore, rising oil prices since 2003 have given NOCs the wherewithal to pursue expansion at home and abroad.

The shift of power from IOCs to NOCs matters because the NOCs pursue more diverse objectives than just profit maximization. For example, relative to IOCs, NOCs may deliberately keep more oil in the ground for future generations even in the face of rising prices. The upshot is that oil production will become less responsive to price signals. The constraints on expanding oil production are as much geopolitical as geological.

2.1.20 Share of world oil reserves and rig count, 2007



Note: Of the 3,100 oil rigs globally, approximately 30% are in Texas.

Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

Click here for figure data

Escalation of exploration and production costs

Oil exploration, development, and production are costly and time-consuming activities. There is a long time lag and a great deal of investment between prospecting for oil in an area and producing the first barrel. The cost of looking for and producing oil has escalated sharply in recent years.[4] One underlying cause is the commodities boom which has ramped up the price of physical inputs such as steel for pipelines. A growing shortage of skilled human resources such as petroleum geology and engineering graduates is also contributing to higher costs. The current high engineering, procurement, and construction cost environment increases the risks and reduces the profitability of new projects for oil companies. If these high costs persist, they will have an adverse impact on future oil production.

Other supply drivers

What is interesting is that the above list of supply drivers all point in one direction—that there are serious constraints to ramping up production to meet the rising global demand for oil. Nevertheless, a number of factors may cause output to rise rather than fall in the future. For example, given the geological uncertainties of oil exploration, there may still be vast yet to be discovered oil reserves in some remote corner of the earth. More realistically, mundane efforts such as improved recovery from existing reserves and more intensive exploitation of smaller deposits as well as of older fields hold out the promise of less dramatic output gains. Future advances in oil exploration technology will also have a positive impact on supply by enabling exploration in new areas. Such advances, for example in seismic technology, reservoir modeling, and horizontal drilling, also extend the life span of existing fields. However, the impact of the new technologies on production will be gradual and limited.

Relative importance of demand and supply drivers: Structural versus cyclical

Whether the future impact of the various drivers of global oil demand and supply will be short-lived or long-lived depends to a large extent on whether they are structural or cyclical. More precisely, the impact of structural drivers rather than cyclical drivers is more likely to persist for the simple reason that the structural drivers themselves will persist

for longer. This does not mean that the impact of cyclical drivers will necessarily diminish as the period under review is extended. For example, global economic growth is, by definition, a cyclical variable that ebbs and flows with the state of the world economy. At the same time, its impact on global oil consumption is huge at *any* point in time, not just today or in the near future.

However, it is also true there is no clear-cut distinction between structural and cyclical. For example, whether the substitution of oil products for other energy sources is cyclical or structural depends on whether the underlying energy shortage is cyclical or structural. Furthermore, it is impossible to know beforehand whether a particular demand or supply driver is structural or cyclical. For example, it is impossible to know whether the dollar's depreciation will continue and for how long. Yet despite these qualifications, the cyclical versus structural approach is still conceptually useful because it gives a clearer picture of the main forces underlying the future course of supply and demand.

Table 2.1.2 classifies the main drivers of oil supply and demand into structural, cyclical, mixed, or uncertain. The table also ranks the drivers in terms of their relative importance in the determination of oil price. Both supply and demand drivers will affect the price but the direction and magnitude of their effect will differ across drivers. The relative ranking is based on the above discussion of the supply and demand drivers. However, the table does not include some drivers that are difficult to disentangle from other drivers. For example, while resource nationalism is a major determinant of oil supply, its effects are embodied in two other drivers—non-OPEC supply and OPEC capacity.

The drivers are ranked on a scale of minus 10 to plus 10, where a negative number indicates a negative impact on the price of oil, and vice versa. The relative rankings are provided for four different time periods, from 2004–2008 up to 2016–2020, to reflect that they can change over time. The table indicates, for example, that robust global economic growth had a strong positive impact on oil price in 2004–2008 but that

2.1.2 Relative ranking of crude oil price drivers, 2004–2020

Factor	Structural/Cyclical	2004–2008	2009–2010	2011–2015	2016–2020
Global economic growth	Cyclical	7	-4	6	6
Emerging market demand	Structural	10	8	9	7
Non-OPEC supply	Structural	9	0	8	7
OPEC capacity	Structural	7	0	7	8
OPEC cohesion	Mixed	1	3	5	5
Natural gas liquids	Mixed	5	-2	4	4
Refinery capacity	Cyclical	5	-4	-2	0
Refinery upgrading	Cyclical	9	-5	-4	0
US dollar weakness	Uncertain	6	0	0	0
Interfuel substitution	Mixed	6	2	-2	-1
Fixed prices/price subsidies	Structural	6	4	2	0
Alternative fuels	Structural	-6	-4	-4	-8
Efficiency/conservation	Structural	-2	-4	-6	-8

Note: Scale: -10 to 10, where zero is neutral/uncertain, and positive/negative numbers indicate positive/negative price impact.
Source: FACTS Global Energy Group, *Oil Price Outlook*, August 2008.

the current global slowdown will have a moderate negative impact in 2009–2010. The relative rankings are necessarily qualitative and based on judgment but they do represent an effort to separate out the more influential drivers of oil prices.

Table 2.1.2 indicates that emerging market demand will remain the most influential price driver through 2020. The PRC's and India's large and growing appetite for oil mirrors their rapid economic rise and structural transformation, which is set to continue for at least two decades, if not longer. In conjunction with the demand from other developing countries, their demand will serve as a powerful engine of demand growth in both the short and long run.

Global economic growth, which to a degree reflects emerging market demand, also has a generally positive and large impact on oil demand. The effects of global economic growth and emerging market demand will diverge in 2009–2010, reflecting the sharper slowdown in industrial countries. On the supply side, serious limitations on non-OPEC production and OPEC capacity are the most influential price drivers. The influence of subsidies on demand and price is bound to decline as fiscally constrained governments phase them out. Alternative fuels and fuel efficiency improvements are the main sources of negative price pressures and those pressures will intensify in the future.

The above analysis of supply and demand drivers enables one to make a more educated guess about the future trajectory of oil prices. In short, factors that push up prices will continue to outweigh factors that pull down prices. The big picture that emerges for 2009–2020 is very similar to that of 2004–2008: robust global demand for oil, powered by emerging market demand, will continue to severely strain the ability of OPEC and non-OPEC producers to satisfy incremental demand.

Therefore, the overall price pressure will remain strongly positive, although not as intensely positive as in 2004–2008. Oil prices are likely to remain elevated at above $100 per barrel in real prices through 2020. The next section provides a more detailed projection of the price outlook for oil, in the short, medium, and long run.

Oil price outlook in the short, medium, and long run

The preceding section analyzed the relative importance of the various supply and demand drivers which will determine the price of oil in the future. That analysis provides the background information for making projections about the future path of oil prices in this section. This chapter's projections are thus ultimately based on subjective but informed judgments about the likely future course of supply and demand. Given the heightened volatility and uncertainty surrounding the behavior of oil prices in recent times, the margin for error is inevitably large. Nevertheless, it is hoped that the projections presented here—and perhaps more important, the underlying rationales for those projections—will give the reader a better picture of where prices may be heading, as well as why they may be heading that way. All the projected oil prices in this section are real (inflation-adjusted) prices.

Short-term oil price outlook (2008–2009)

The defining characteristics of the oil market in 2008–2009 are as follows: continued robust growth of oil demand in developing countries; slowdown of oil demand growth in industrial countries; further expansion of non-OPEC output; increase in OPEC's production capacity; some increase in OPEC's surplus capacity; and substantial easing of bottlenecks in refining capacity. The above constellation of factors suggests a relaxation of the relentless upward price pressures of the past few years and possibly a moderate price decline. However, demand from developing countries will continue to maintain much of its momentum, which suggests that any marked fall in price is unlikely. Based on these considerations, the projected real price of oil per barrel is $120 in 2008 and $105 in 2009 (Table 2.1.3).

The sharp runup in the price of oil to July 2008, when the price of Brent crude hit an all-time peak of $147.50 per barrel, was due to a "perfect storm" of factors that all pushed up prices. These included a noticeable fall in oil inventory levels held by industry in OECD countries in the first half of 2008, unexpectedly fast oil demand growth in the Middle East and South America, persistent supply disruptions in Nigeria, mounting geopolitical concerns over the Iranian nuclear issue, and a more general concern over production capacity constraints.

Much of the storm has now cleared and prices are likely to be about $120 per barrel by the end of the year. The price decline is due to a combination of higher OPEC output, new production capacity coming on stream within and outside OPEC by year-end, higher Iraqi exports, new refining capacity coming on stream in the PRC and India, and weakening demand in response to higher prices, especially in the US. World oil demand growth will slow further in 2009, due to the economic slowdown in industrial countries, and this will put further downward pressures on price.

2.1.3 Base-case Brent crude prices

	$ per barrel
2007	72.52
Q1	57.75
Q2	68.76
Q3	74.87
Q4	88.69
2008	120.06
Q1	96.86
Q2	121.36
Q3	136.00
Q4	126.00
2009	105.00
Q1	120.00
Q2	110.00
Q3	100.00
Q4	90.00
2010	106.63
2011	108.25
2012	113.30
2013	123.40
2014	128.50
2115	128.40
2016	128.35
2017	126.30
2018	126.25
2019	113.25
2020	103.20

Note: Actual prices up to Q2 2008, forecast prices (in 2008 $) thereafter.

Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

Medium-term oil price outlook

Sustained upward price pressures may reappear in the global oil market around the early to middle part of the next decade. Real prices are likely to be high as well as volatile. The catalyst of the change in the market environment will be a tight demand-supply balance arising from stagnant non-OPEC production and relatively robust global demand. Such tightness will clearly push up prices but it will also cause greater volatility. This is because tightness implies a reduction in the surplus capacity that is required to cushion the effects of supply and demand shocks. Peaking of non-OPEC output means that OPEC will have to satisfy most of the incremental global oil demand. Until the early part of the next decade, OPEC's production capacity is projected to rise sufficiently to meet much of that demand, but additional investments will be required to boost output from around the middle of the next decade. The critical issue is whether the NOCs within OPEC are willing and able to make those investments.

There are solid grounds for doubting that they will. As state-owned companies, Middle Eastern NOCs may behave differently from IOCs in the private sector. The government of an oil-producing state might hesitate to expand production capacity in a high-price oil market

environment (such as now) in order to prevent price weakness in the future. Some oil producers, such as the Islamic Republic of Iran and Venezuela, seem to consistently favor restricting OPEC output to raise prices. It is not clear if such policies are profit-maximizing in the long run since they would help to destroy demand and encourage conservation. Yet it may be in the self-interest of some governments to maximize short-term profits in order to finance its own popularity. Resource nationalism could induce NOCs to defer development to maintain reserves for future domestic consumption. It could also deter them from mutually beneficial partnerships with well-established IOCs that have greater capacity to look for and develop new reserves. Furthermore, NOCs tend to be far removed from the final consumers, unlike vertically integrated IOCs, which operate both upstream and downstream. This puts NOCs at a disadvantage in spotting and responding to new opportunities through appropriate investments.

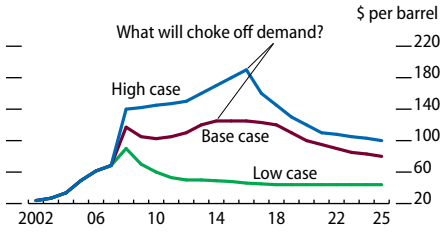
Long-term oil price outlook

Greater uncertainty over price prevails in the long term, which is characterized by two countervailing features. First, government policies aimed at curtailing demand and improving efficiency will have a bigger impact on oil demand in the long term as firms and consumers have more time to adjust their behavior in response to the incentives. The probability of technological breakthroughs resulting in alternative fuels that could be produced on a commercial scale at competitive prices also rises, since the stock of technological knowledge builds up over time. For example, a new technology may sharply reduce the economic and environmental costs of biofuels. Second, the production of oil may run into severe physical and geological constraints. After all, oil is a finite resource that will eventually be depleted. The first feature reduces the price of oil while the second feature has the opposite effect.

There are three different possible scenarios for the future course of real oil prices. The probabilities of the base-, high-, and low-case scenarios are estimated to be 60%, 30%, and 10%, respectively (Figure 2.1.21). According to the base-case scenario, the real price of oil will rise until the middle of the next decade, after which high prices begin to take a toll on demand growth. Government policies and technological progress also contribute to demand erosion. However, even in the face of weakening demand, the real oil price is unlikely to fall below the $70–80 range.

Looking at the projected base-case price trajectory in greater detail, the price will fall until around 2010 as a result of higher non-OPEC output and increased OPEC capacity. After 2010, additional supply tapers off but the key demand centers—PRC, India, and the Middle East—continue to add to global demand. The only possible outcome is that prices must rise. The tightening of the supply-demand balance and the consequent erosion of spare capacity will also magnify the effects of the slightest shocks on prices, thus increasing price volatility. If real prices remain above $120 per barrel for an extended period, firms and consumers are likely to decisively adjust their use of oil products. Those adjustments are likely to take place around 2015–2017. Once demand is destroyed, alternative fuels will emerge and push back prices to the

2.1.21 High, base, and low price forecasts for Dubai crude, annual



Note: Actual up to 2007 and forecasts in 2008$ thereafter.
Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.
Click here for figure data

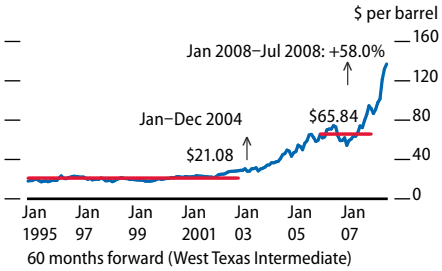
baseline plateau of $70–80, which corresponds to the estimated marginal cost of alternative fuels in 2020–2025.

There is, however, a great deal of uncertainty over the real price that will destroy oil demand and bring about substantial changes in the behavior of economic agents. In the US, it may take a real price as high as $180 per barrel to induce changes among consumers long used to a gasoline-intensive lifestyle. The primary difference between the base- and high-case scenarios is the price level which provokes decisive behavioral adjustments by economic agents. The low-case scenario assumes either a prolonged global slowdown or a combination of various positive supply shocks and negative demand shocks. It should be emphasized that the low-case scenario is by far the least probable of the three scenarios and it would take an unlikely constellation of forces to bring prices down to the levels it envisages.

Market perceptions of the long-term price outlook seem to support this chapter's own long-term price outlook—namely, a prolonged elevation on a higher plateau along with increased volatility. In the recent price runup, spot prices initially rose faster than long-dated futures prices due to uncertainty over whether high prices would persist. Subsequently, however, long-dated prices have risen and fluctuated widely in line with spot prices (Figure 2.1.22). The volatility reflects a high degree of uncertainty among market players over the level of the long-run marginal cost of oil. More recently, the market seems to have accepted the notion that there are serious long-term constraints to oil production, which will prevent supply from keeping up with demand.

Restoration of long-run equilibrium requires a radical shift in consumer behavior, which will sharply curtail demand growth. A radical shift in consumer behavior, in turn, requires an extended period of high real prices well above $100 per barrel, which will slow demand growth in developing countries and reduce demand in industrial countries. Mirroring such market sentiments, the back end of the forward curve rose more quickly than spot prices in March–July 2008, to over $130 per barrel (Figure 2.1.23).

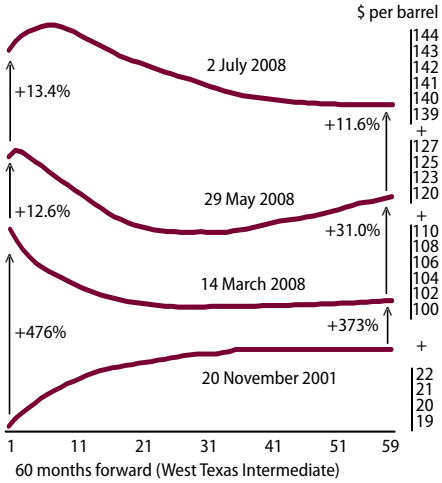
2.1.22 Long-dated oil futures



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

Click here for figure data

2.1.23 Oil futures: Shift in market perception



Source: FACTS Global Energy Group, *Oil Price Outlook,* August 2008.

Policy options for developing Asia in a world of expensive oil

The projections of the preceding section indicate that the most likely future scenario is a prolonged period of high real prices and pronounced price volatility. One possible policy response to higher oil prices is to promote expansion of regional output by creating a more conducive environment for investments in oil exploration and development. However, given developing Asia's small reserve base and its large and growing appetite for oil products, especially transportation fuel, the region will stay heavily dependent on imported oil for years to come. Despite developing Asia's growing influence on oil prices, the fact remains that oil prices are determined by global oil supply and demand. As such, higher and more volatile prices represent an exogenous external shock that is largely beyond developing Asia's control. What is within its control is how well it adjusts to the shock and minimizes its adverse effects.

Sound government policies can facilitate and accelerate the region's adjustment to a world of expensive oil. Such policies should give priority to promoting more efficient oil use, limiting short-run supply disruptions, and encouraging price transparency and risk mitigation.

Continuing to remove price controls and subsidies

Although Asian oil consumption has been driven primarily by economic expansion, subsidies and price controls have played an important supporting role. Such policies prevent the pass-through of rising international oil prices to the domestic prices of oil products such as gasoline, diesel, and kerosene (see the chapter, *Inflation in developing Asia: Demand-pull or cost-push?,* also in Part 2). The upshot is that firms and consumers do not face the true cost of oil products and overconsume those products. Some Asian governments are phasing out price controls and subsidies, and this will bring the market prices of oil products more into line with their true costs. Facing more accurate price signals, Asian firms and consumers can be expected to use oil products more efficiently.

Yet despite this encouraging policy development, much more needs to be done throughout the region to reduce artificial price distortions that increase the demand for oil products. Highly targeted subsidies with minimum leakages and that are linked to income rather than consumption can help soften the blow for poor consumers. More generally, Asian governments should use a carrot-and-stick approach of subsidies that encourage efficient oil use, such as driving small, fuel-efficient cars, and taxes that discourage inefficient oil use, such as driving large, fuel-inefficient cars.

Liberalizing and deregulating markets for oil products

Firms and consumers do not use oil but refined oil products. Oil is not a final consumption good but an input in the production of final consumption goods. This distinction highlights the fact that the relevant prices for firms and consumers are the prices of gasoline, diesel, and kerosene rather than the price of crude oil. The extent of competition in the market for, say, gasoline helps determine the price of gasoline. Government policy can influence the extent of competition and thus the level of prices. For example, a government may grant a monopoly position to a state-owned refining company and protect it from foreign and private sector competition.

The liberalization and deregulation of oil product markets will benefit end users—households and companies—by limiting the price impact of any given increase in the price of crude oil. More competitive markets are also conducive to the more efficient use of oil. In general, liberalizing and promoting competition in the market for oil products will force refiners to use crude oil more efficiently. Competition can also promote technological progress in the oil refining industry by encouraging refiners to maximize the product yield from crude oil. Such progress can also be promoted by government subsidies.

Promoting investments in public and rail transportation

Public transportation is more fuel-efficient than personal transportation, and rail transportation is more fuel-efficient than the main alternative

form of freight transportation—trucks. The demand for transportation fuel has been growing at a furious pace in PRC, India, and elsewhere in the region. In fact, this demand, which is fueled by the demand for personal transportation among a fast-expanding middle class, accounts for much of the growth in Asian oil consumption. The choice between personal transportation and public transportation is ultimately a personal choice of the individual consumer but government policy can influence that choice. Improving the quantity and quality of public transportation can help to tilt that choice in favor of public transportation. There is no fundamental reason why Asian commuters would necessarily choose driving over efficient subways. By the same token, enhancing railroad infrastructure, which is woefully inadequate in many developing Asian economies, will help shift freight transportation demand from trucks to trains.

Creating an enabling environment for alternative technologies

In the long term, alternative energy technologies and fuels will emerge as viable substitutes for oil. In fact, in response to the runup in oil prices and its likely persistence into the future, technological research for alternatives has intensified. The reality is that developing Asia is not at the frontier of this research and major technological breakthroughs are likely to emerge from industrial countries. Therefore, the more relevant policy challenge for the region is to establish an environment that would enable firms and consumers to adopt alternative technologies on a widespread basis when those breakthroughs materialize.

For example, opening up the domestic energy markets to foreign energy companies can facilitate the introduction of new technologies and products. Similarly, liberalizing domestic energy markets and fostering a more competitive market environment will incentivize domestic energy companies to look for and import promising new technologies and products.

Setting up strategic oil stocks

Strategic oil stocks provide critical protection in the event of a temporary supply disruption. (UN ESCAP 2008 describes the strategic oil reserves programs of selected Asian countries.) For example, geopolitically related disruptions of oil from the Middle East, by far developing Asia's biggest supplier, would have dire consequences for the region. Within developing Asia, the Republic of Korea, as a member of the International Energy Agency, must maintain oil inventories equivalent to 90 days of net imports. Taipei,China also holds substantial inventories, and the PRC has recently started to substantially expand its inventories. Other countries also have plans for strategic oil stocks but have moved more slowly.

Oil stockpiling facilities are costly to build, which suggests that Asian economies may consider sharing costs and jointly operating sites. In this case, countries would have to coordinate decisions on financing, sites, timing of oil buildup, optimum inventory size, and decision criteria and mechanisms for release. In fact, some economies in the region have already begun preliminary discussions on joint stockpiling through the Asia-Pacific Economic Cooperation grouping—discussed in greater detail in Fesharaki et al. (2007).

Monitoring transportation bottlenecks

Developing Asia transports over 90% of its crude oil imports, the bulk of which originate from the Middle East, by tanker through the narrow Malacca Strait between Indonesia and Malaysia. This vital sea lane is becoming increasingly congested and subject to an ever-present risk of piracy or terrorist attack. There is thus a high and growing risk of supply disruptions due to a bottleneck in the main transportation route for Asia's oil imports.

The sourcing of oil through the Malacca Strait is a geographic reality about which Asia cannot do much. Alternative transportation modes have been proposed to reduce the Malacca Strait risk but all those risks have substantial shortcomings of their own. For example, oil pipelines crossing Malaysia and Thailand would not be commercially viable. And while pipelines from Kazakhstan and the Russian Federation would diversify supply sources as well as transportation routes, the disruptions of Russian gas to European countries in the past shows that this alternative carries serious risks of its own. Perhaps the most practical and feasible policy option is for all Asian economies to work together to improve security in the Malacca Strait. After all, a secure Malacca Strait is a regional public good that benefits a large number of Asian economies.

Encouraging the development of a regional futures market

Unlike the US and Europe, developing Asia does not yet have a mature and well-developed oil futures market—an issue treated more comprehensively in Fesharaki et al. (2007). In developing Asia and elsewhere, the oil futures market is often associated with financial speculation and its potential role in the oil price surge.

What tends to be forgotten is that a futures market would deliver some substantial benefits for the oil market, as it does for any other market. In particular, a well-functioning futures market would enhance price transparency and thus enable both buyers and sellers to hedge risks more easily. More precisely, the timely availability of futures prices, which are continuously updated and disseminated to the public, promotes price transparency. Futures prices are determined by actual futures trades rather than price assessments by oil-reporting agencies. Furthermore, large numbers of traders—"speculators"—render the futures market highly liquid relative to the spot market for oil, and thus less susceptible to distortions.

There is no compelling reason why hedging against oil price fluctuations is inherently more "speculative" than hedging against, say, exchange rate fluctuations. In both cases, a future market mitigates risks for companies and thus encourages greater investment. For example, airlines concerned about fuel costs are more likely to buy new airplanes if they are protected to some extent against increases in those costs.

More generally, protection against future oil price fluctuations is as much of a valuable good for economic agents as protection against future exchange rate fluctuations, especially in light of the prospects of more volatile oil prices discussed earlier. Due to the lack of a futures exchange, market participants in developing Asia have been forced to turn to informal, less transparent hedging mechanisms, such as the over-the-counter swaps market. Governments should encourage companies

to support initiatives to establish a regional oil futures exchange, such as that of the Dubai Mercantile Exchange.

Concluding observations

The answer to the question in the title of this chapter—Are high oil prices here to stay?—is a loud and clear yes. The fundamental underlying reason is that supply will fail to keep pace with fast-growing demand for quite some time. While there will be short-term fluctuations, the unmistakable long-run trend is a prolonged period of high real oil prices and pronounced price volatility.

The more interesting and relevant issue concerns the implications of this new oil price environment for developing Asia. Perhaps the most immediate implication is that the governments, households, and companies of the region should finally wake up to the new realities. For far too long, developing Asia and the rest of the world were in a state of collective denial about the sea change in the global oil landscape. The implicit assumption was that a return to the days of cheap oil was just around the corner. What helped along this massive bout of wishful thinking was the exceptionally robust health of the world economy. While the sharp surge of prices in 2007 brought about a much-needed dose of reality, the projected softening of prices in the near term threatens to breathe new life into the long-entrenched wishful thinking camp. But the long-running charade has to stop and it has to stop now.

The sooner the realization that high oil prices are here to stay, the sooner the necessary adjustments will be made. One area where painful but necessary adjustments will have to be made is in the area of macroeconomic policy. Higher oil prices will have adverse effects on developing Asia's growth, inflation, and current account balance (see the chapter, *Macroeconomic effects of high oil prices*, also in Part 2). The impact will be felt most directly on inflation since oil remains the dominant fuel for transportation, which is required for the production of virtually all goods and services. The fundamental policy dilemma confronting Asian policy makers is that between slower growth and higher inflation. Tightening monetary policy to fight inflation will carry the cost of slowing growth. Alternatively, a failure to tighten will entrench inflation expectations and cause inflation to persist. Given the generally healthy state of developing Asia's economies, the growth-inflation tradeoff decisively favors giving priority to fighting inflation. There is insufficient appreciation that higher inflation today will have serious growth consequences tomorrow. The stagflation of the industrial countries in the 1970s, which was initiated by a short-lived oil shock, should disabuse everyone from any illusion that growth is independent of inflation.

The long-run elevation of real oil prices to a higher plateau also calls for microeconomic policy adjustments. In particular, government policies pertaining to the energy market will have to change. The soaring fiscal costs of fuel subsidies in the oil price surge of the past year or so have compelled many Asian governments to pare down their fuel subsidy programs. Whether forced or not, such moves are a welcome development, which will bring the market price of oil more closely into line with the true cost of oil. In a sense, the oil price surge has induced

the region's governments to reckon with the true costs of their fuel subsidy programs. A not insignificant risk is that governments may backtrack on their phaseout of subsidies in response to the prospective softening of prices in the short term. The broader point is that the long-term elevation of oil price represents a long-term increase in its relative price. It would be perverse enough to artificially encourage the consumption of a good whose relative price has risen temporarily, but it would be monstrous to do so for a long-term price rise.

On the contrary, Asian governments should make every effort to discourage oil consumption by adopting appropriating price policies, facilitating the introduction of energy-efficient and environmentally sound technologies, promoting public transportation, and taking other suitable measures. These policy efforts should be intensified when the economy hits the "sweet spot" for oil demand—per capita purchasing power parity GDP of $3,000–9,000. Demand-curbing adjustments are fundamentally in the enlightened self-interest of Asia since the region has been, and will continue to be, a leading source of the growth in global oil demand. Given the inherently interdependent nature of the global oil market, fast-growing developing Asia's failure to rein in its oil demand will have harmful repercussions not only for itself but also for the rest of the world. By the same logic, developing Asia would help both itself and the world at large by taking more decisive action to learn to live in a world of more expensive oil.

The key driver of the increase in the demand for oil in developing countries is the demand for transportation fuel. Unlike other uses of oil, there are currently few commercially viable substitutes for transportation fuel. The one promising candidate to emerge in recent years—biofuels—has lost much of its luster due to mounting commercial and environmental concerns. Therefore, oil will remain the dominant transportation fuel until at least the medium term. This suggests a need to coordinate transportation policy with energy policy. More specifically, governments should pay more attention to the oil requirements of different transportation systems. An extended period of high oil prices increases the relative attractiveness of oil-efficient transportation systems. For example, given limited fiscal resources and the allocative choices that have to be made, the new oil price environment favors investments in public transportation and rail transportation. Improvement of the public transportation infrastructure has the added promise of affordable and reliable transportation for the urban poor, precisely the group that will be hardest hit by higher fuel prices.

It was earlier pointed out that the current oil price surge may be a "blessing in disguise." One reason is that it quickens the realization among governments and economic agents that the days of cheap oil are gone for good. There is another reason, too: In addition to subsidies, another source of the gap between the market price and true cost of oil is environmental costs. The release of carbon dioxide and other pollutants into the air is often not adequately factored into the price of transportation fuels. The long-term increase in the relative price of oil will accelerate the search for alternative fuels, which may be environmentally cleaner. The initial euphoria over biofuels was partly driven by their claimed environmental benefits, although these are

now very much in doubt. Second-generation biofuels still hold out the promise of an environmentally superior alternative to conventional fuel. Commuters switching from personal transportation to public transportation also help to reduce pollution. This suggests that a prolonged period of high oil prices may act as an implicit carbon tax and thus contribute to a cleaner environment.

The last point leads to a related but broader point. The fact that high oil prices are here to stay drives home a basic but uncomfortable truth—the world has finite resources. The sooner policy makers (and others) remember this and make the necessary adjustments, the higher the chances of making a successful transition to a more sustainable path of development and growth. This path may involve some real pain, in the form of lower conventional growth rates for example (i.e., excluding environmental costs), but in the long run it will enable countries to better cope with the constraints that are bound to emerge from the finiteness of resources. The millions of citizens of the PRC and India who are joining the middle classes each year may feel that it is unfair for them to make sacrifices that were not required of the millions of middle-class Americans a few decades earlier. They may resent having to take public transportation when they aspire to private transportation, and having to drive small cars when they aspire to larger cars. But the harsh reality is that an American middle-class lifestyle circa 1965 is no longer sustainable today—not for today's PRC, not for today's India, and not for today's America either, for that matter.

Endnotes

1 Real, as opposed to nominal, prices are used throughout this chapter, and are deflated by the United States consumer price index. The base year is 2008.

2 Berkmen et al. (2005) argue that this effect on crude prices will be limited; Oxford Analytica (2005) suggests that this effect may be quite substantial.

3 There are nevertheless tangible differences of views between Saudi Arabia, which takes a more long-term view of its self-interest, and countries such as the Islamic Republic of Iran and Venezuela, which consistently push for restricting output and raising prices. See, for example, *International Herald Tribune* (2008a).

4 According to the *Financial Times* (2008b), the latest IHS/Cambridge Energy Research Associates (Cera) Upstream Capital Cost Index—the consumer price index for the oil field—shows that costs for developing a new oil or natural gas field have more than doubled in the past 4 years.

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