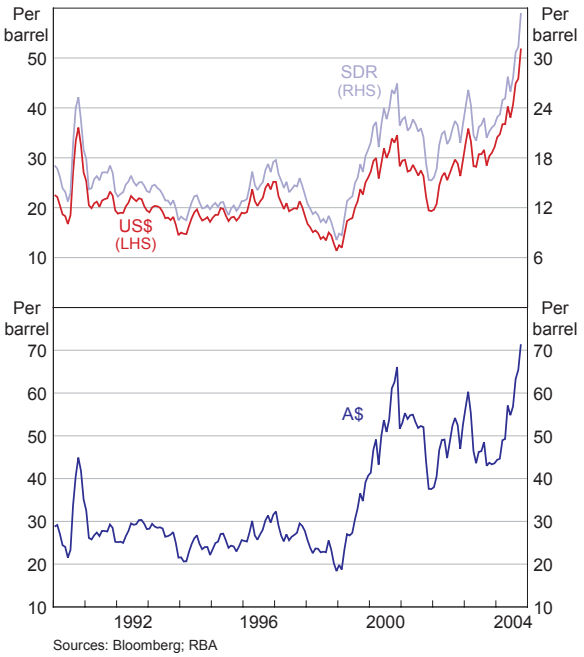
# OIL MARKET DEVELOPMENTS AND MACROECONOMIC IMPLICATIONS[1]

## Introduction

Oil prices have increased substantially over the past two years, with the price of a barrel of West Texas Intermediate (WTI) crude oil rising above US$50 in early October, compared with an average of around US$28 during late 2002. Part of the increase in oil prices reflects the depreciation of the US dollar over this period, but prices are also at record levels in currency-neutral SDR terms (Graph 1). In Australian dollar terms, the increase over the past two years has been more moderate, owing to the appreciation of the Australian dollar from 2002 to early 2004; thus prices in domestic currency terms are only slightly above the peak seen in 2000.

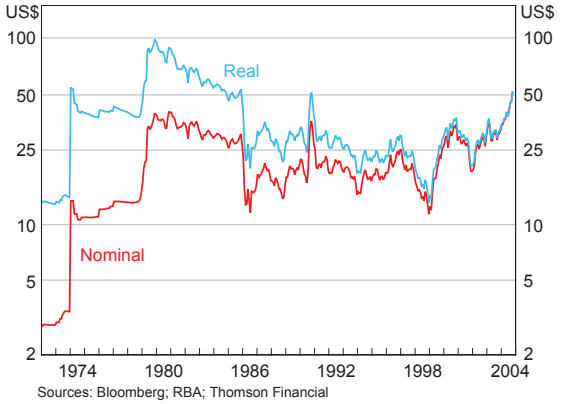
US dollar oil prices are now at the highest level on record in nominal terms, but in real (US dollar) terms oil prices are well below the high levels observed following the second OPEC oil shock of 1979. For example, the peak of almost US$40 per barrel seen in late 1979 is equivalent to a level of nearly US$100 in today's dollars (Graph 2). Nevertheless, oil prices in real terms are currently around the same level reached following the first oil shock in late 1973 and the price spike at the time of the Gulf War in 1990. This

**Graph 1**
**WTI Crude Oil Price**




Sources: Bloomberg; RBA

**Graph 2**
**WTI Crude Oil Price**
2004 prices, log scale




Sources: Bloomberg; RBA; Thomson Financial

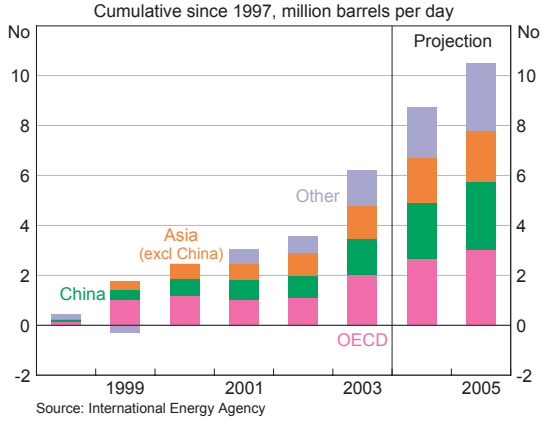
1 *This article was prepared by Anthony Dickman and James Holloway of Economic Analysis Department. It is based on information available as at 12 October 2004.*

article discusses the reasons behind the latest step-up in oil prices and provides an assessment of the possible macroeconomic implications for the world economy and for Australia.

## Why Have Prices Risen So Much?

Demand for oil has increased strongly in recent years in line with rising global economic activity. Global demand for oil in 2004 is currently estimated at around 82 million barrels per day (bpd), an increase of around 4.3 million bpd, or 5.5 per cent, in the past two years (Graph 3).[2] The strength of recent increases in demand has been something of a surprise to oil market observers: over the course of 2004 thus far, estimates of annual demand have been progressively revised upwards by 2.6 million bpd. Much of the increase in demand has come from China and other economies in Asia. China itself has accounted for around 1.4 million bpd, or close to one-third of the increase in demand in the past two years. Further expansion of the Chinese economy will place ongoing pressure on oil demand, with per capita oil consumption likely to rise significantly from current low levels as Chinese incomes rise.

**Graph 3**
**Increase in Global Oil Demand**
Cumulative since 1997, million barrels per day




Source: International Energy Agency

Although global supply capacity has also expanded in recent years, this has not occurred at the same rate as global demand. Historically, OPEC[3] has had significant excess capacity and has adjusted its supply to reduce swings in market prices. However, OPEC now accounts for less than 40 per cent of global supply, down from more than 50 per cent in the mid 1970s. Also, OPEC is currently producing very close to its capacity: in August, OPEC–10 (OPEC excluding Iraq) produced 27.5 million bpd, only 0.3 million bpd short of its estimated sustainable capacity of 27.8 million bpd (Graph 4). The current estimated level of spare capacity among the OPEC–10 is the lowest level for several decades at less than ½ per cent of current demand. Production of oil in non-OPEC countries has been increasing in recent years, and is expected to rise by 1.3 million bpd overall in 2004, with Russia the largest contributor to growth. In 2005, production is expected to grow by a similar amount, with production from new fields expected to more than offset declines from more mature fields. There is also evidence that higher prices are leading to increased capital spending. Nonetheless, markets remain concerned as to whether total supply capacity will be able to increase sufficiently should demand continue to grow at its current pace.

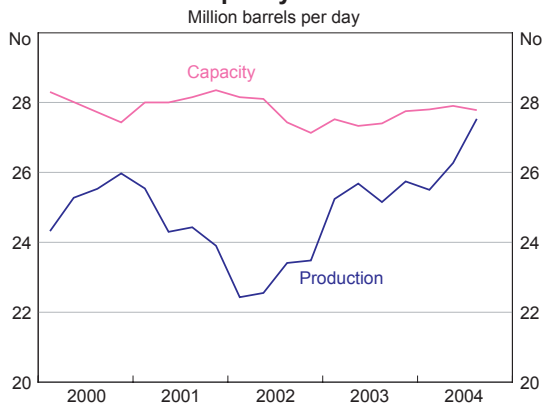
2 *Data for global demand and supply are taken mostly from the September 2004 issue of the* Oil Market Report *from the International Energy Agency.*

3 *The Organisation of Petroleum Exporting Countries (OPEC) was formed in 1960. OPEC members are Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela. Iraq has been exempt from quota restrictions since early 1998. Ecuador and Gabon were formerly members of OPEC but withdrew in 1992 and 1995 respectively.*

Concerns about longer-term supply have recently coincided with considerable market anxiety about the potential for short-term supply disruptions. Markets have focused on a number of threats to short-term oil supply in recent months:

- Post-war Iraqi oil production has been limited by the dilapidated condition of its infrastructure, as well as constant interruptions to supply owing to sabotage. Iraq produced 1.8 million bpd in August, 0.7 million bpd short of its estimated capacity.

**Graph 4**
**OPEC-10* Capacity and Production**

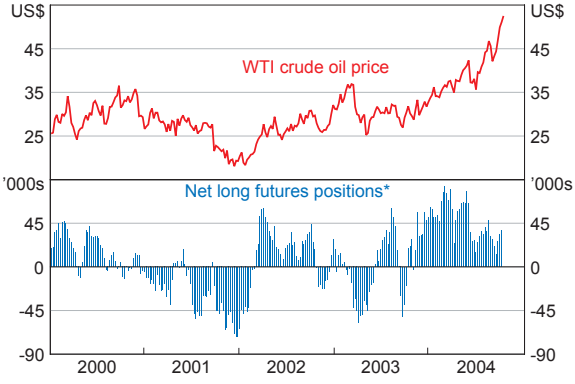



* OPEC excluding Iraq
Source: International Energy Agency

- Terrorist activity in Saudi Arabia, including attacks on personnel connected with oil companies, has led to market concerns over the security of oil supply from the world's largest oil exporter.
- The financial difficulties of the largest Russian oil company, Yukos, which produces around 1.7 million bpd and faces bankruptcy because of unpaid taxes, have put pressure on prices. However, the Russian government has made assurances about maintaining production by Yukos.
- Various other factors have also heightened concerns about oil supplies in recent months; these have included political tensions in Nigeria and Venezuela and hurricanes in the vicinity of the Gulf of Mexico.

Market analysts have estimated that these short-term threats to oil supply, plus the current low level of commercial stocks of oil, have resulted in a significant risk premium in prices. However, part of the run-up in prices may have been due to the usual 'momentum' dynamics in financial and commodity markets, whereby increases in prices frequently lead to additional price pressures before the longer-term market fundamentals reassert themselves. This is consistent with evidence of speculative activity by hedge funds and other traders taking long positions in oil futures markets (Graph 5).

**Graph 5**
**Speculative Positions and the Oil Price**

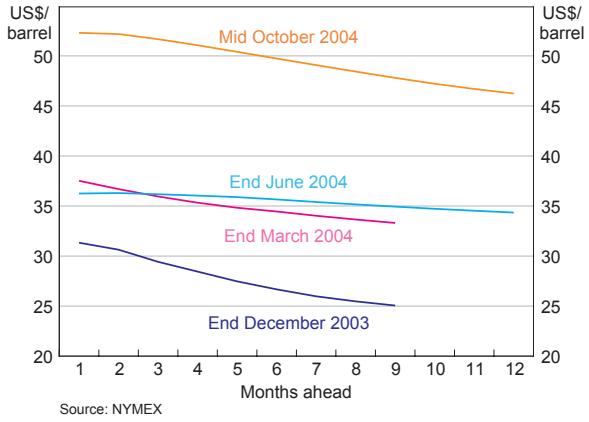



* Number of contracts
Sources: Bloomberg; Commodity Futures Trading Commission

An additional factor contributing to the run-up in US dollar oil prices has been the depreciation of the US dollar over the past few years. For any given US dollar oil price, a depreciation of the US dollar reduces the effective price of oil for many oil-consuming countries, and also reduces the purchasing power of the revenue of oil-exporting countries. Hence, some rise in price in US dollar terms is not surprising given the 24 per cent fall in the value of the US dollar since early 2002 (based on the major currencies index produced by the Federal Reserve).[4]

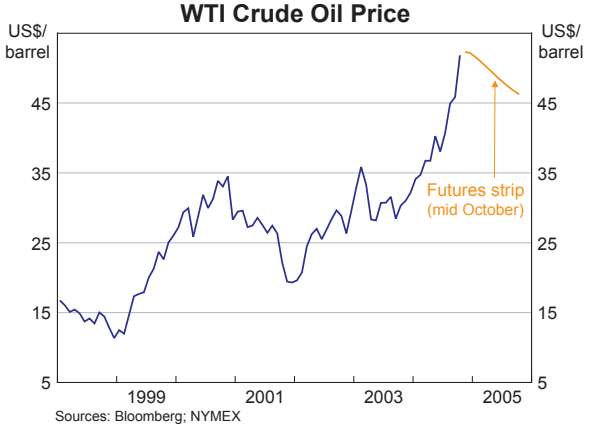
Overall, the recent increase in prices appears to reflect a combination of demand and supply factors. Although some of these may be transitory and scope exists for some degree of substitution to other energy sources, the long-run growth in demand – especially from China – and relatively modest capacity increases suggest that a good part of the increase in prices could persist. Hence, even if the prevailing short-term supply uncertainties were to dissipate, it seems unlikely that the per-barrel oil price will return to OPEC's earlier US$22–US$28 target band (which corresponded to a range of around US$25–US$31 for WTI crude) in the foreseeable future. This assessment appears to be consistent with recent developments in oil futures prices, which have also risen in line with the spot price. Although the prices in the oil futures market are currently pointing to some fall in the price of oil over the next year, the 12-month futures contract for WTI crude is currently at around US$46 per barrel (Graphs 6 and 7).[5]

**Graph 6**
**WTI Crude Oil Futures**




Source: NYMEX

**Graph 7**
**WTI Crude Oil Price**




Sources: Bloomberg; NYMEX

## Macroeconomic Implications

The sharp increases in oil prices in the 1970s had significant adverse effects on the world economy, putting

4 *Research by the Federal Reserve Bank of Dallas has estimated that a 10 per cent fall in the US dollar exchange rate leads to a 7.5 per cent increase in the US dollar price (cited in Stephen PA Brown, 'Do energy prices threaten the recovery?', Federal Reserve Bank of Dallas,* Southwest Economy, *Issue 3, May/June 2004).*

5 *The current downward slope in the oil futures curve may be partly attributable to the 'backwardation' that is commonly seen in the oil market and similar commodity markets. However, the downward slope of the curve is larger than usual (indeed, at times when oil prices have been substantially below the OPEC target band it has tended to be upward-sloping), and therefore appears consistent with expectations of a decline in the spot price.*

upward pressure on inflation rates and lowering economic growth.[6] These price increases were 'supply shocks', where the effects on activity arise because higher oil prices increase the costs of production across the economy, representing a reduction in the aggregate supply of goods and services that can be sustained at any given price level. In addition, the rise in oil prices represents a loss of real income to oil consumers, which implies that aggregate demand in net oil-consuming countries will be weaker than otherwise. This income is transferred to oil producers and if there is no equivalent boost to aggregate demand in those countries, there will be a net negative effect on world economic growth.

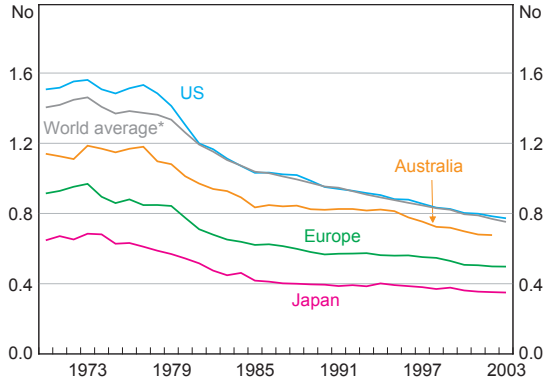
However, several factors suggest that the output implications of the most recent rise in oil prices, if they are sustained for a reasonable period, will be less serious than was the case in the two oil crises that occurred in the 1970s:

- The current level of oil prices is not as high in real terms as at the peak after the second OPEC oil shock, as noted above, and nor has the latest rise been as rapid or pronounced as in the earlier episodes. In addition, the growth of hedging instruments and greater experience with price volatility should help to alleviate the short-term effect of higher oil prices on those parts of the economy that are heavily exposed to oil as a cost of production.
- The energy intensity of aggregate world output is markedly lower than it was in the 1970s (Graph 8).
- The macroeconomic environment in which the oil price increases are occurring at present is one where inflation expectations in the industrial economies are anchored at low levels. Hence, policy-makers may have more freedom to allow once-off increases in the aggregate price level without the same risk of second-round inflationary consequences that was faced in the 1970s.

**Graph 8**

**Oil Consumption – Share of Output**

Millions of barrels per US$1 billion of output




* World average includes non-OECD countries

Sources: IMF; Thomson Financial; US Energy Information Administration

- Perhaps most importantly, the latest episode of higher oil prices reflects significant demand-side pressures, being associated with growth in the world economy at around the highest rates in nearly 30 years, and the emergence of China and other Asian economies as major consumers of oil. In contrast, the price increases in the 1970s were akin to pure supply-side shocks, with entirely unfavourable implications for output. Of course, to the extent that the current shock is demand-driven and has fewer adverse implications for global output, it may have more potential for adverse implications for global inflation.

6 *The classic reference on the effect of oil prices on the macroeconomy is work on the US economy by James D Hamilton, 'Oil and the macroeconomy since World War II',* Journal of Political Economy, *91(2), 1983, pp 228–248. However, some more recent analysis has tended to find a somewhat smaller role for oil prices in influencing the US economy; see for example Robert Barsky and Lutz Kilian, 'Oil and the macroeconomy since the 1970s', CEPR Discussion Paper No 4496 (forthcoming in* Journal of Economic Perspectives*).*

The International Energy Agency (IEA), in collaboration with the OECD and IMF, has recently estimated that a US$10 per barrel increase in oil prices reduces global GDP by around 0.5 per cent in the following year, and boosts consumer prices by a slightly larger amount.[7] These results do not take into account the flow-on effects of higher oil prices, for example, to other energy prices, or through reduced consumer and business confidence, nor do they take account of policy responses. However, a more important caveat regarding these results is that the analysis does not really distinguish between supply and demand shocks. To the extent that large swings in oil prices in the past were typically dominated by supply shocks, results based on such historical experience will tend to overstate the likely effect of oil prices on GDP growth in circumstances such as the present.

The effects of higher oil prices on different economies will vary considerably depending on the oil intensity of consumption and production and the extent to which the economies are net importers of oil. As noted above, oil intensity in aggregate has declined over time, as measured by the quantity of oil consumed per unit of real GDP, though there are significant differences across countries. In this regard, the east Asian region is likely to be more adversely affected than other regions by the latest rise in oil prices. Countries such as Korea, Taiwan, Thailand and the Philippines use oil more intensively and are also heavily reliant on oil imports (Table 1). Indeed, as a result of rapid industrialisation in recent years a number of countries in the region have shown some increase in their reliance on oil. The IEA estimates that a US$10 per barrel increase in oil prices lowers GDP by around 0.3 per cent in the US, 0.4 per cent in Japan (with its relatively low oil intensity somewhat offsetting its high import dependence), 0.5 per cent in the euro area, and 0.8 per cent in Asia.

**Table 1: Oil Self-sufficiency**
Production as a share of consumption, per cent

| | |
|---|---|
| Australia | 78 |
| Canada | 144 |
| China | 64 |
| Germany | 5 |
| Japan | 1 |
| Russia | 262* |
| Saudi Arabia | 617* |
| South Korea | 0* |
| Taiwan | 0* |
| United Kingdom | 135 |
| United States | 44 |

Sources: Australian Petroleum Statistics; US Energy Information Administration, 2003 (* 2001)

**Table 2: Australia's Trade in Energy Resources**
2003/04, $ billion

| | Exports | Imports |
|---|---|---|
| Petroleum | 6.6 | 10.0 |
| Gas | 2.8 | 0.2 |
| Coal | 11.0 | 0.0 |

Source: ABS Cat No 5368

For Australia, the direct effects of rising oil prices are likely to be less contractionary than for most other industrial countries and our trading partners. While Australia is a small net importer of oil, it is a substantial and growing net exporter of natural gas (Table 2), the price of which is partly linked to the price of oil. Further, if the price of oil were to remain high for an extended period, it could be expected that prices for other energy sources such as coal

7 *'Analysis of the impact of high oil prices on the global economy', International Energy Agency, May 2004.*

would also increase, as has tended to occur in the past. Since Australia is a substantial net energy exporter, the overall effect of higher energy prices would be to boost Australia's terms of trade, representing a net transfer of income to Australia from abroad.

While this terms-of-trade effect would impart a stimulus to the Australian economy, there are offsetting effects of higher oil prices on consumption, which would tend to reduce demand and output in the short term. For example, a US$10 increase in per-barrel WTI crude oil prices would imply an increase in Australian petrol prices of about 9 cents per litre at an A$/US$ exchange rate of around 0.70. Assuming no reduction in the quantity of petrol purchased (i.e. assuming that demand is quite inelastic with respect to price), this would absorb an additional 0.3 per cent of household disposable income, leaving less available for other expenditure. In addition to this effect, it is also likely that demand for Australia's exports would slow if global growth was adversely affected by higher oil prices, with a consequent dampening of Australian GDP growth. Overall then, the likely effect of higher global oil prices would be to reduce Australian GDP growth in the short run compared with what it would otherwise have been, though less so than in most other countries.

## Effect of Higher Oil Prices on Inflation in Australia

Movements in petrol prices have had a significant effect on inflation over the past year, contributing 0.4 percentage points to CPI inflation over the year to the June quarter 2004. This primarily reflects the increase in world oil prices over this period, but it also incorporates the effects of changes in the exchange rate and refiner and retail margins. Given the additional increases in world oil prices since the June quarter, CPI inflation on a four-quarter-ended basis will continue to be significantly affected by changes in petrol prices over the year ahead.

The sensitivity of inflation to oil price movements can be calculated using information about the share of crude oil prices in final petrol prices and the weight of petrol in the CPI basket. In recent quarters, oil prices have represented around 35–40 per cent of the final cost of petrol, with taxes and refiner and retail margins accounting for the remainder. Thus, starting from a level of around US$40 per barrel, an increase of US$10 (or 25 per cent) in oil prices would increase Australian dollar petrol prices by 9–10 per cent. Given that petrol currently has a weight of 4.3 per cent in the CPI, such an increase in domestic petrol prices would translate to a contribution to CPI inflation of almost ½ percentage point. This represents the direct impact of higher petrol prices on the CPI, assuming no second-round effects on inflation and abstracting from any impact on output. Under that assumption, higher oil prices would imply only a temporary boost to CPI inflation, and the annual inflation rate would return to its previous path once the direct effect of the higher petrol price dropped out.

The crucial issue from an inflation-forecasting perspective, therefore, is the extent to which significant second-round effects are likely to occur. There has been some evidence of second-round price effects in the recent period, but, to date, they have been quite limited. For example, recent increases in ticket prices for international and domestic air travel will add marginally to CPI inflation. Further indirect effects could come from a range of industries that use oil in the production of goods (e.g. plastics) and services (e.g. transportation of goods to retailers). The experience of the 1970s was that these indirect effects were significant and contributed

to the pick-up in inflationary expectations and wage inflation. However, the intensity of oil usage in Australia is now substantially lower than in the 1970s. More importantly, inflation expectations are well anchored, and thus should be much less affected by an oil price increase of the magnitude that has been seen to date. At this stage, therefore, any second-round effects appear likely to be contained, though the risk of more significant effects on wage and price expectations would obviously increase if oil prices continue to rise. ✠