

Oil prices and the New Zealand economy

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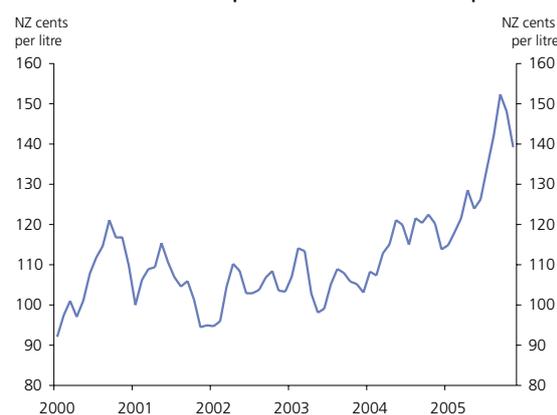
This article looks at New Zealand's oil consumption at a disaggregated level and discusses the consequences of movements in international oil prices for inflation, taking into account New Zealand's industry structure as well as the tax treatment of different fuel types. Relative to the size of its economy, New Zealand uses a comparatively large amount of oil as transport fuel. The evidence suggests that the indirect (cost-push) effects of higher oil prices on consumer prices could be quite large, substantially driven by higher transport services costs. How large they turn out to be, and whether they matter for medium-term inflation and monetary policy, will depend on factors such as the state of the economic cycle, the degree of competition in particular industries, and the extent to which inflation expectations are anchored.

1 Introduction

Since 1999, US dollar oil prices have more than tripled, rising from under US\$20 a barrel to over US\$60 a barrel. Since 2003 alone they have more than doubled, driven up by growing world demand, by tight production capacity, particularly in refining, and, more recently, by the disruptions caused by Hurricane Katrina in the southern US. In inflation-adjusted terms, US dollar oil prices are at levels last seen after the second oil shock in the early 1980s (see figure 1 below). In New Zealand dollar terms, the current level of world oil prices is not quite as high relative to history. When adjusted for inflation, New Zealand dollar oil prices have only very recently exceeded their previous highs in 2000, when they were pushed up by a cyclically low exchange rate, and remain well below levels seen in the first half of the 1980s. Nevertheless, the rate of increase since 2004 has

been considerable, and local petrol prices have also risen sharply from just over \$1 per litre in 2003 to as high as \$1.50 per litre in 2005 (see figure 2 below).

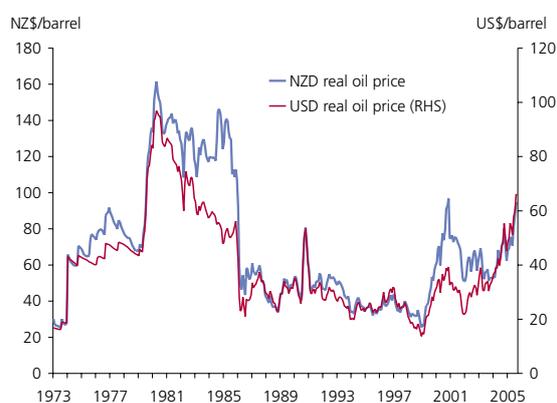
Figure 2
New Zealand retail price of 91 unleaded petrol



Source: Ministry of Economic Development

Figure 1
Real oil prices in 2005 US and New Zealand dollars

(West Texas Intermediate price)



Source: Bloomberg, Datastream, RBNZ estimates

These recent price increases make it timely to examine the importance of oil to the New Zealand economy and the way in which changes in world oil prices affect us. In this article, we look at New Zealand's oil consumption across different sectors and compare it with consumption patterns in other OECD economies. We then examine how changes in the behaviour of international oil prices can influence prices here in New Zealand, taking into accounts factors such as the use of fuel in different industries and the tax treatment of petrol and other types of fuel.

We find that, relative to the size of its economy, New Zealand consumes a comparatively large amount of oil as transport fuel. A relatively large part of New Zealand's transport fuel use consists of diesel and jet fuel, rather than the petrol

predominantly used to fuel private cars. Consistently with this, we calculate that the indirect effect of a change in oil prices on consumer prices (through higher costs of transport services and other goods and services, as opposed to the cost of petrol itself) could be quite large. However, how large these indirect effects turn out to be will depend very much on how persistent the higher fuel prices are expected to be, the state of the economic cycle, and the degree of competition in individual industries. The effect on medium-term inflation will also depend on how higher international fuel prices affect domestic and external demand, and on how anchored expectations of medium-term inflation are by the monetary policy framework.

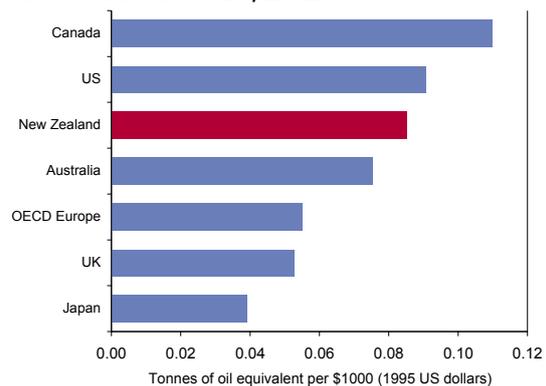
2. NZ's oil dependency in international comparison

To begin, we look at how sensitive the New Zealand economy is to high oil prices compared with other OECD countries - how much oil (in the form of petrol, diesel, jet fuel, and other refined petroleum products) we consume, for what purpose, and what this suggests for the ease with which consumption can adjust.¹ The comparison suggests that while one cannot unambiguously say that New Zealand's total use of oil is unusually large relative to the size of the economy - it depends on how one measures the size of the economy - we do seem to use a relatively large amount of oil for transport fuel. When we break down the source of our oil use for transport purposes, a relatively large part is attributable to diesel and aviation fuel, which are mainly used by businesses. Diesel has also been the main contributor to increases in our oil use over the last decade and a half. While it is not immediately clear what is behind our relatively heavy use of fuel other than petrol, it does suggest that the indirect effects of higher fuel prices - through an increase in

the costs of providing public transport and other goods and services - may be more important than in other countries.²

Figures 3 and 4 show how New Zealand ranked in terms of the intensity of its oil consumption in 2002, relative to GDP and per capita. The results are clearly somewhat sensitive to how the size of the economy is measured. Relative to GDP, New Zealand oil use is relatively high, closer to oil use in North America than to that in Europe or Japan. Per head of population, on the other hand, there is a clear gap between North America and other OECD countries, with New Zealand falling somewhere between Japan and Europe. Evidently, the fact that Japan and Europe use so much less oil relative to their GDP is partly due to the higher per capita GDP in those countries, rather than to a lower per capita use of oil.³

Figure 3
Oil use relative to GDP, 2002



Source: International Energy Agency

If we dig a little deeper into the sources of our oil use, however, it turns out that the reason why New Zealand appears to use so much less oil per capita than the North American countries is that, like Australia, it uses relatively little for purposes other than transport (for example, for heating, power generation, or in manufacturing of plastics). In terms of per capita use of transport fuel, by contrast, New

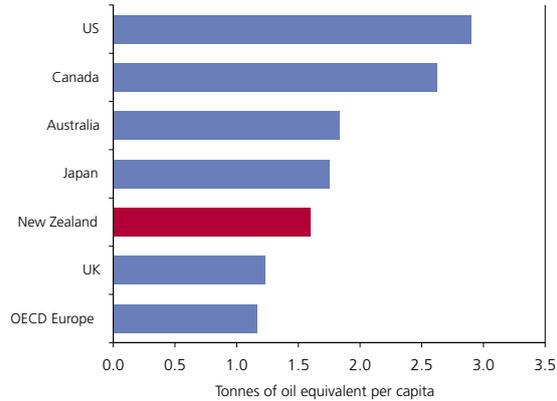
¹ Most of this section makes use of internationally comparable data from the International Energy Agency for 2002. For comparability of energy sources, physical use is given in tons of oil equivalent. One ton of oil equivalent corresponds to 41.868 gigajoules.

² While not directly relevant to the question of how exposed New Zealand is to oil-related cost shocks, another potentially important dimension of our dependence on international oil markets - one which matters for third-round effects through the current account - is the amount of crude oil and refined petroleum that we import

and export. New Zealand's net imports of both crude oil and refined petroleum (relative to total supply) are comparatively high, but not as high as in Japan or some European countries.

³ The GDP data are expressed in US dollars at market exchange rates. If they are adjusted for differences in purchasing power across countries, New Zealand's relative oil intensity falls relative to that of Japan and Europe - expenditure on oil there is high, but other domestic production inputs can also command a higher value than in New Zealand.

Figure 4
Oil use per capita, 2002

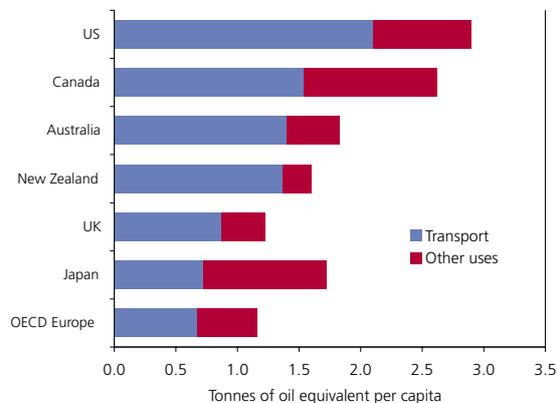


Source: International Energy Agency

Zealand is clearly part of a group of higher-use countries, with the US leading the way (figure 5).⁴

In part, New Zealand's low use of oil for purposes other than transport is likely to reflect our relatively small manufacturing sector. To that extent it may be a misleading indicator of our oil dependency: we rely on imports from countries like Japan which use more oil in industry, and are therefore indirectly dependent on the oil that we are not using in our own manufacturing processes. However, figure 6 shows that non-transport use of oil by households (presumably mainly for heating) is also unusually low in New Zealand.

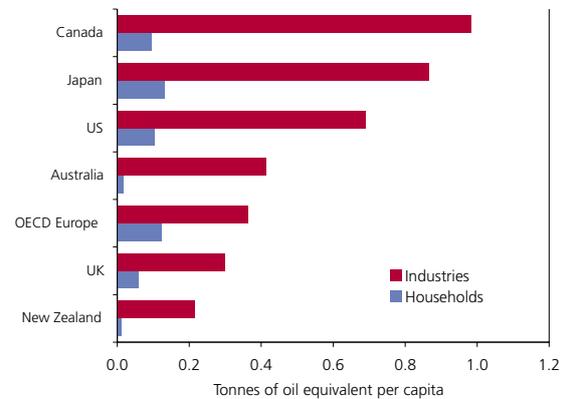
Figure 5
Oil use per capita for transport and other purposes, 2002



Source: International Energy Agency

⁴ Unlike for total oil intensity, here the story is substantially the same if oil use is measured relative to different GDP measures. Our effective transport use is probably somewhat higher still, since the IEA's 'transport' category does not include fuel used for fishing boats and tractors.

Figure 6
Oil use per capita for non-transport purposes by households and industries, 2002

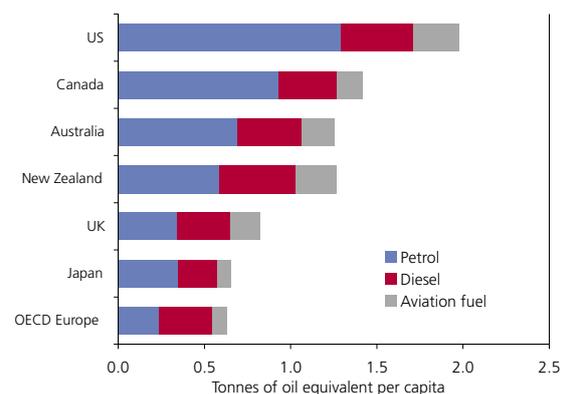


Source: International Energy Agency

It is not possible to break down the use of transport fuel shown in figure 5 by sector. However, breaking it down by fuel type (as in figure 7) is suggestive: use of petrol per capita, while clearly higher than in Japan or Europe, is lower than in North America or Australia, whereas use of diesel and aviation fuel is comparatively high (more strikingly so when measured relative to GDP). Because little diesel is used to fuel private cars in New Zealand, this suggests that our relatively heavy use of transport fuel is partly due to relatively high use of fuel by businesses (or public transport providers) rather than by private households.

It is also instructive to look at how New Zealand's oil use has changed over time. From 1986, when the price of oil fell sharply, oil use per capita in most OECD countries increased.

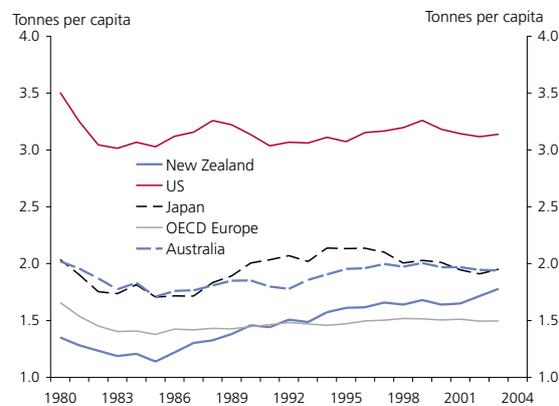
Figure 7
Oil use per capita for transport purposes, by fuel type, 2002



Source: International Energy Agency

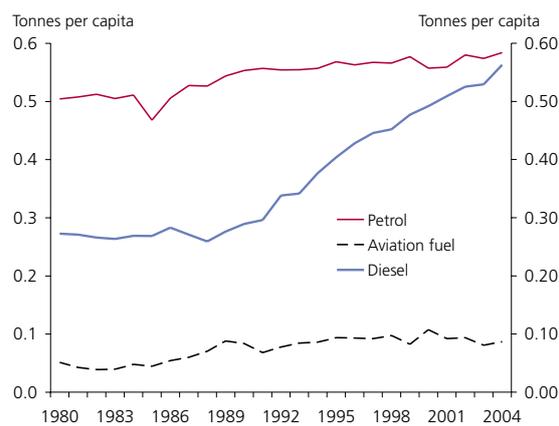
In New Zealand, however, oil use has risen more steeply, increasing by roughly 50 per cent since the late 1980s (Figure 8). Figure 9 shows that although petrol use per capita increased in the late 1980s (reflecting a reduction in car import barriers and an end to subsidies of alternative motor fuels such as CNG), the bulk of the increase is attributable to diesel fuel, and has continued through the 1990s. Data on New Zealand's energy use suggest that by far the main use of diesel is for transport, so this probably reflects an increase in the number of tractors and trucks.

Figure 8
Oil use per capita, 1980–2003



Source: US Department of Energy

Figure 9
New Zealand's oil use per capita, by fuel type, 1980–2003



Source: Ministry of Economic Development, US Department of Energy

It is not immediately clear why the use of fuels other than petrol is relatively high in New Zealand, and what this means for the ease with which the economy could adjust to higher oil prices. New Zealand's relatively heavy use of transport fuel by public transport providers and other businesses may

indicate that our use of oil is dependent on factors such as the combination of a small population and geographical length, or New Zealand's isolation as an island from larger population centres. This may make it more costly to adjust in the face of higher prices than if, say, we had simply chosen to drive big cars.⁵ On the other hand, it may reflect the fact that diesel-powered vehicles are taxed via road user charges which make the tax bill dependent on factors such as vehicle weight and distance travelled, rather than the amount of fuel used. In any case, however, this feature of the data suggests that any indirect effects of higher fuel prices on inflation and economic activity (through higher production costs, rather than through the direct effect of higher petrol prices on consumption costs) may be relatively large in New Zealand.

3 International oil prices and inflation

From the point of view of the Reserve Bank, changes in oil prices are of particular interest in terms of how they affect medium-term inflation pressures. The transmission mechanism linking an increase in international oil prices to CPI inflation is complex and the strength and timing of the different channels depends on the circumstances. Nevertheless it can be conceptually useful to categorise the linkages into first-round, second-round and third-round effects, as shown in figure 10 opposite:

- First-round effects. Changes in international oil prices are passed through to domestic petrol prices almost immediately. Petrol prices are a component of the CPI and so an increase in petrol prices will have a direct and immediate effect on inflation. In addition, oil products such as petrol, diesel and aviation fuel are an input in the production process of many firms, either directly or through their use of transport services such as air freight. Hence an increase in fuel prices will put immediate pressure on the costs faced by those firms. An increase

⁵ The MED's Energy Data File and Statistics New Zealand's Energy Flow accounts together suggest that much of our high use of aviation fuel is due to refuelling on international flights.

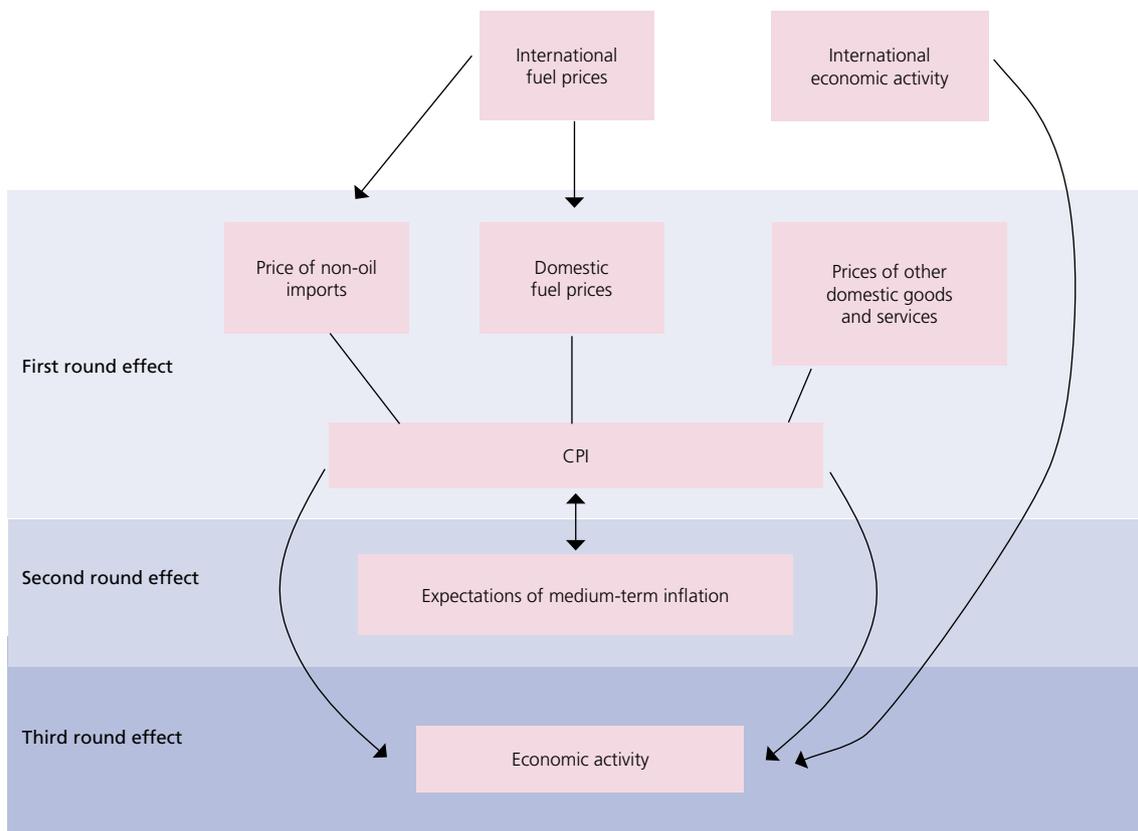
in international fuel prices may also raise the prices of imported goods, by raising international production and freight costs. Even if oil price permanently move to a higher or lower level, these first-round effects on inflation should be temporary.

- Second-round effects. Second-round effects occur if there are compensatory increases in prices and wages as firms and households each attempt to pass on increases in fuel and transport costs, and the first-round effects ‘spill over’ into public perceptions of medium-term inflation. It is through these second-round effects that higher oil prices can lead to higher medium-term inflation.
- Third-round effects. Higher oil prices may also have adverse effects on economic activity, which would tend to reduce medium-term inflation pressure. For example, higher oil prices could cause weaker economic activity if households reduce their non-oil consumption in response to their higher expenditure on petrol, or if firms

reduce investment and employment as a result of lower profitability. New Zealand is also a net importer of oil, so unless non-oil imports fall, an increase in oil prices will mean a decline in the current account balance, implying a higher net foreign debt and lower consumption later. Finally, higher oil prices may also reduce economic activity in many of our trading partners that are also net importers of oil (such as Europe, the US and most of Asia), reducing demand for our exports.

In what follows, we review how international crude oil prices affect domestic fuel prices. We then look in more detail at what the consequences of a given change in domestic fuel prices might be for inflation. We give special attention to quantifying the (direct and indirect) first-round effects. Ultimately, what matters for monetary policy is how these increases in costs feed through to medium-term inflation pressures. However, this depends on numerous factors and is considerably harder to quantify.

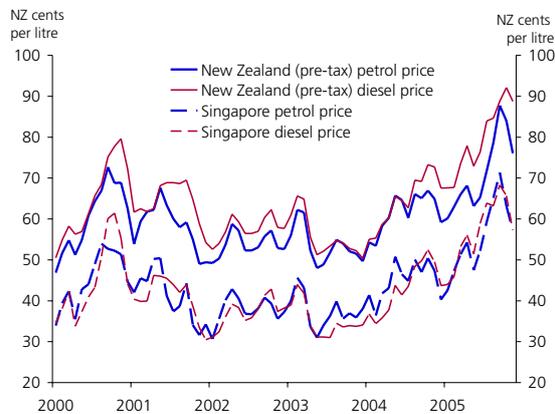
Figure 10
The transmission mechanism between oil prices and consumer prices



The price of crude oil and the price of fuel at the pump

As figure 11 shows for petrol and diesel,⁶ New Zealand prices of refined oil products are fairly closely correlated with the corresponding Singapore spot prices (in New Zealand cents per litre): New Zealand's imports of petrol and other oil products are largely sourced from Singapore (a major refinery centre) and Australia, which in turn imports from Singapore.

Figure 11
The Singapore and domestic (pre-tax) price of petrol and diesel



Source: Ministry of Economic Development

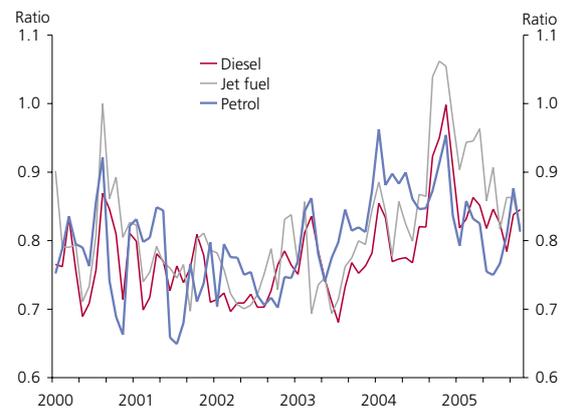
How then do Singapore refined product prices respond to a given increase in international crude oil prices? Under a given refining process, a barrel of crude oil of a given grade yields a certain quantity of a variety of refined products, some higher in energy content and economic value than others. Given the yield of each refined product, once adjustments for quality variations and the like are made and refining and shipping costs are subtracted, the prices of the refined products will imply a breakeven or 'netback' value to the refinery of this particular grade of crude oil. Refining will not be a profitable business if the price of a barrel of crude oil exceeds its netback value. Hence the economics suggest that there should be a long-run relationship between the price of crude oil and the various refined prices.

However, this need not imply a stable relationship between the price of any one refined product and the crude oil

price. The relationship between the crude oil price and the Singapore petrol or diesel price will change as a result of changes in relative refining yields or demands for the different products (for instance, a shift in demand towards 'cleaner' fuels will raise their prices relative to the crude oil price). The relationship may also be non-linear: for large shocks to the crude oil price, differences in the elasticities of demand for the various refined products may become more significant.⁷ Finally, the relationship will vary in the short term as yields, relative demands, and refinery costs fluctuate.

Nevertheless, on the basis of relationships in recent years we believe that, as a rough rule of thumb, we can assume an approximately multiplicative relationship between the crude oil price and the prices of Singapore refined products, at least over the longer term. First, any refining costs that may not vary with the crude oil price (and hence disturb such a proportional relationship) appear to be small.⁸ Secondly, figure 12 below shows the ratio between the Singapore

Figure 12
Ratio of the Singapore petrol, diesel and jet fuel price (in NZ cents per litre) to the Dubai crude oil price (in NZ dollars per barrel)



Source: Ministry of Economic Development, Datastream

⁷ For example, in many situations one would expect the demand for transport fuels to be less elastic than the demand for heating oil. As a result, a substantial increase in the crude oil price would lead to a relatively greater increase in the price of petrol or diesel.

⁸ Indicative estimates by the Australian Department of Industry, Tourism and Resources in 1999 of the costs faced by a representative Singapore Refinery suggest that at the time, operating and freight costs constituted less than 10 per cent of the total refinery price; to the extent that these costs have not risen since with the crude oil price, they would be a substantially smaller component of the total refined price now.

⁶ Comparable data is not readily available for jet fuel.

petrol, diesel and jet fuel price (in NZ cents per litre) and the Dubai crude oil price (in NZ dollars per barrel) since 2000. Although the ratio has been quite volatile over much of that time – highlighting the fact that the relationship between the crude oil price and each refined price is subject to numerous influences – it has not shown obvious trends, it does appear to have increased slightly in the last year or two. A shift up in the refining margin would be consistent with growing demand for refined oil products (especially from China) having absorbed excess refining capacity in Asia as a result of growing demand for refined petroleum. One might expect it to persist for some time, at least until new refining capacity comes on line. The average ratio since 2000 suggests that, on average, an increase in the Dubai crude oil price of NZ\$10 per barrel can be associated with a fairly uniform increase in Singapore petrol, diesel and jet kerosene of about 8 cents per litre; the average ratio since 2004 suggests an increase in the refined prices of 8.5 to 9 cents per litre.

The relationship between the domestic retail petrol price that enters the CPI and the Singapore petrol price is more straightforward. As we have seen from figure 11, the (pre-tax) domestic diesel and petrol price have tended to move fairly closely together with the corresponding Singapore price in recent years. Although the spread between the domestic and Singapore refined prices fluctuates – reflecting freight, insurance and distribution costs as well as retailers' profit margins – over the last six years it has remained fairly stable at about 15 cents per litre for petrol and 20 cents per litre for diesel. This is despite an increase in the Singapore price of 50 per cent or more.⁹

The remainder of the domestic fuel price is made up of excise taxes and GST. Excise taxes are negligible for diesel and aviation fuel, but, at 48 cents per litre, they currently constitute roughly two fifths of the ex-GST domestic petrol price. (See Box 1 for a comparison of New Zealand's fuel taxes with those in other OECD countries; the comparison suggests that our petrol taxes are relatively low.)

⁹ Petrol margins fell sharply between 1997 and 2000 and are at low levels compared to the 1990s (see the MED's July 2005 Energy Data File, Chart I.9b).

The table below summarises the different components of the retail petrol and diesel price (with GST included in each component). Based on the average relationship between the Singapore petrol and diesel price and the crude oil price over the last six years, we might roughly expect to see an 8 cents per litre increase in the Singapore price for every NZ\$10/bbl increase in the Dubai crude oil price (perhaps 9 cents per litre if the refining margin has increased). And if we assume that petrol and diesel importer margins and excise taxes do not change in response to a change in international fuel prices, we can expect this increase in the Singapore price to translate into a 9 or 10 cents per litre increase in the domestic retail petrol and diesel price (including GST). This would represent a 0.6 per cent increase for a NZ\$1.40 per litre petrol price, and a 1 per cent increase for a NZ\$0.95 per litre diesel price.

Table 1
Components of domestic petrol and diesel prices
(NZ c/L, each component includes GST)

	Petrol	Diesel
Singapore refined price	0.9 to 1 times the Dubai crude oil price (in NZ\$/bbl)	
Import, transport and trade costs and margins (average 1999 - 2005)	18	23.6
Excise taxes	53.7	0.3

Domestic fuel prices and inflation

As noted at the beginning of this section, the first-round effect of higher fuel prices on consumer prices can be separated into a 'direct' and an 'indirect' effect. The direct effect reflects the fact that households find themselves having to spend more on petrol; the indirect effect reflects an increase in the cost of public transport and of other goods and services which use petroleum products as a production input.

The direct effect is easy to quantify if we assume no substitution towards or away from oil in response to a

Box 1

New Zealand's fuel taxes in international comparison

The table below compares New Zealand fuel tax rates to those in other countries. These numbers include any GST component, which would move in proportion to changes in the ex-GST fuel price. Nevertheless, the GST component will be comparatively small, and the table suggests that while taxes in New Zealand make petrol and diesel prices less sensitive to movements in international oil prices in New Zealand than in the US or Canada, New Zealand prices are considerably more exposed than in Japan or some European countries. We are also unusual in imposing a much higher charge on petrol use than on diesel use. Diesel-fueled vehicles in New Zealand face road user charges that are not directly linked to the amount of fuel used. Given that diesel is used almost exclusively for commercial purposes, this suggests that commercial users in New Zealand may on average be fairly exposed to oil price movements, in international comparison.

Proportion of total petrol and diesel price paid as tax (as at September 2005)

	Petrol	Diesel
UK	65%	57%
France	62%	45%
Germany	62%	48%
Italy	60%	42%
Spain	51%	35%
Japan	44%	34%
NZ	42%	11%
Canada	29%	24%
US	14%	17%

Source: International Energy Agency, Ministry of Economic Development

change in prices (this is a reasonable approximation in the short run at least). Suppose that international oil price developments led to a 10 cents per litre increase in the local price of petrol. In the current CPI regimen (last re-weighted in the June quarter of 2002), petrol has a weight of 3.12 per cent. This implies that in 2002, when the petrol price was about 100 c/L, a 10 c/L increase in the petrol price would have led to an increase in the average household's living cost of about 0.3 per cent. Because the total CPI has increased by about 8 per cent since then, however, the impact today would be closer to 0.28 per cent.

As we shall discuss, the size of the indirect effect is harder to estimate. However, to get a sense of how large it might be, we use data from the Energy Flow Accounts and the Input-Output tables produced by Statistics New Zealand for the 1995/1996 year (the latest for which the Input-Output tables are available). These contain information about the share of refined oil products in the production costs of different industries in 1996, as well as the weight of each industry's output both in other industries' production costs and in total household consumption expenditure (see Box 2 for a summary of the industries that, according to the data, are likely to face the biggest increases in production costs as a result of higher fuel and domestic transport services prices). The expenditure data strip out taxes on products (including fuel excise taxes),¹⁰ and so automatically account for the fact that users of diesel or aviation fuel are, other things being equal, more sensitive to a given dollar increase in the price of those fuels than users of petrol. They therefore allow the calculation of indirect flow-on effects on consumer prices corresponding to a given increase in the petrol price, under the following assumptions:

- The pre-tax prices of diesel and aviation fuel increase in proportion to the pre-tax petrol price;
- firms fully pass any increase in costs on to each other and to households;
- there are no changes in wages or other factor prices.

¹⁰ The input-output data for expenditure on a given industry's output do not include taxes in the first place. The Energy Flow Account figures include the excise tax on petrol, but we have adjusted the expenditure numbers on petrol accordingly.

Of course, just as the 2002 weight of petrol in the CPI would overstate the direct inflation effect of a 10 cents per litre increase in the petrol price today (given the drift in the CPI since then) these industry expenditure weights are likely to overstate the corresponding indirect effects. However, it turns out that the relative size of the direct and indirect effects that we calculate for 1996 should remain valid today, provided we make the additional assumptions that

- there have been no material changes in real consumption patterns since 1996;
- relative producer prices have moved in the same proportion as the corresponding consumer prices.

Under these assumptions, the data suggest the indirect effect of an oil price shock on consumer prices might be quite large - about as large as the direct effect. In other words, for a 10 cents per litre increase in the petrol price, the calculated indirect effect would add another 0.2 to 0.3 per cent on to the direct effect of 0.27 per cent. Roughly one third of this can be attributed to the effect of higher domestic transport prices on the CPI, reflecting the fact that households indirectly consume petroleum as taxi, bus or airplane passengers. Most of the remainder is due to firms passing on either higher fuel or transport costs onto consumers (for instance, transport costs would raise the retail price of food). In fact, the first-round effect might be even larger. We have seen from figure 9 that the physical use of diesel (mostly used by firms) has increased significantly relative to petrol since 1996.¹¹ Also, the calculations do not account for the effect of international fuel prices on the price of non-oil imports (due to higher international transport

costs and to the fact that oil is a production input overseas as well, for example in the manufacture of plastics).¹²

However, the assumption that industries fully pass on their higher costs is crucial to these numbers, and is undoubtedly an overstatement. The degree to which higher fuel and transport costs are passed on will depend on the state of the economic cycle and the amount of competitive pressure in a particular industry. It will also depend on how long the higher costs are expected to persist. In many cases – for example, for export-oriented industries taking world prices as given – the higher fuel costs may simply lower profitability and reduce competitiveness relative to exporters located closer to overseas customers and suppliers.

To the extent that both output and factor prices rise to compensate for the higher fuel costs, an increase in oil prices will lead to a more widespread and persistent increase in prices. At the extreme, there could be a series of compensatory wage and price adjustments that end up affecting expectations of medium-term inflation. The likelihood and size of such ‘second-round’ effects on medium-term inflation is very difficult to quantify, but it will again depend on how persistent the increase in fuel costs is expected to be and on the degree of competition in labour and product markets. It will also be influenced by how anchored inflation expectations are. On the whole, we can be fairly confident that second-round effects have become less likely than in the 1970s: labour and product markets have become more competitive, inflation expectations are likely to be more tied down by the current monetary policy framework, and higher oil prices have also been offset in recent years by lower prices of other imported goods as a result of low production costs in countries such as China.

On the other hand, if consumers or firms do not adjust wages and prices, then higher oil prices will mean less spending on other consumer goods by households and lower value added (profits and wage payments) by businesses. For example, if households reduced their spending on other goods and services by a dollar for every dollar increase in expenditure on petrol, then for a 10 cents per litre increase in the price of petrol we would expect to a roughly 0.3 per cent fall in non-oil consumption (given the weight of petrol in the CPI). Alternatively, if domestic non-oil spending does not fall,

¹¹ Also, because of tax differentials, the prices of diesel and jet fuel – mainly used by firms – have been more sensitive to increases in international fuel prices than petrol prices. However, because the input-output tables give expenditure on fuel excluding taxes, they strip out this effect.

¹² There is also the possibility of a direct link between oil prices and other energy costs such as natural gas (and hence electricity) or coal, which is not captured in the input-output framework, but the case for this looks less compelling. International coal prices are largely divorced from international oil prices, and natural gas markets are fairly segmented as a result of transportation costs. (This would change as the world LNG market develops, and as New Zealand develops the infrastructure to import LNG. However, the degree of linkage between international oil and LNG prices is not fully clear.)

Box 2***Which industries' costs are sensitive to higher oil prices?***

The table below shows those industries for which petroleum products and domestic transport services (such as air freight and trucking services) made up a relatively large proportion of their total output in 1996. The table suggests that petroleum products are a fairly large cost component of domestic transport services and agriculture. In 1996, a uniform 10 per cent increase in the pre-tax price of refined oil products would, if fully passed on by those industries, have directly led to a 1 per cent increase

in prices in the domestic transport industry, to a 0.5 per cent increase in prices in agriculture, hunting and fishing, and to a 0.2 per cent increase in prices in wholesale and retail trade. Transport services have a larger share in many industries' production costs than petroleum products do directly. Industries for which domestic transport services costs (before taxes and margins) made up more than 2 per cent of their output price in 1996 include forestry, meat processing, construction-related manufacture, extractive industries, and most manufacturing industries.

Expenditure on refined petroleum and domestic transport services (excluding taxes) as a share of various industries' gross output in 1996

Refined oil products		Domestic transport services	
Domestic Transport and Storage	10.4%	Forestry and Logging	10.5%
Agriculture, Fishing and hunting	4.6%	Slaughtering and Meat Processing	6.6%
Central Government and Defence	2.2%	Concrete, Clay, Glass and Related Minerals Manufacture	4.9%
Wholesale and Retail Trade	2.0%	Extraction, Mining, Quarrying and Exploration - including gas distribution and supply	4.2%
Extraction, Mining, Quarrying and Exploration - including gas distribution and supply	2.0%	Basic Metal Industries	4.1%
Forestry and Logging	1.3%	Beverages, Tobacco, Confectionery and Sugar, and Other Food	4.0%
Basic Metal Industries	1.2%	Wholesale and Retail Trade	3.9%
Construction	1.1%	Petroleum Product Refining, Distribution and Supply	3.8%
Chemicals, Related Products and Plastics	1.1%	Wood Processing and Wood Products	3.8%
Beverages, Tobacco, Confectionery and Sugar, and Other Food	1.1%	Paper and Paper Products, Printing and Publishing	3.3%

Source: Statistics New Zealand, Reserve Bank calculations

higher oil prices imply an increase in New Zealand's import bill and net foreign debt, which will need to be paid for by lower consumption and investment later on. Expenditure on imports of oil and refined oil products makes up roughly 2 per cent of nominal GDP, so if expenditure on crude oil and imported petroleum products increased by 10 per cent and there was no reduction in other imports, the trade balance would decline by about 0.2 per cent of GDP (although exports of petroleum products would provide a small offset). The impact of higher oil prices on New Zealand growth also depends on how they affect trading partner growth. IMF estimates suggest that as a rule of thumb, a persistent 20 per cent increase in the price of oil reduces growth in our major trading partners by 0.4 per cent after one year. Such 'third-round' effects of higher fuel prices on demand could dampen domestic inflation pressure in the medium term.

4 Summary and conclusion

In view of recent sharp increases in oil prices, this article has taken a closer look at how oil prices matter for the New Zealand economy. We compared New Zealand's oil consumption with that of other countries and found that New Zealand is a relatively heavy user of transport fuel, but a light user of oil products for residential heating and other non-transport purposes. More than in other OECD

countries, our use of transport fuel is weighted towards diesel and jet fuel, which play only a minor role in fuelling private transport. This – as well as the fact that diesel and jet fuel are much more lightly taxed than petrol in New Zealand – suggests that the indirect effects of higher oil prices on inflation and the economy, through an increase in the cost of providing transport services and other goods and services, may be relatively large. We then reviewed how higher oil prices are likely to feed through to CPI inflation in the short term and the medium term.

Examining the cost-push effects of higher fuel prices on inflation more closely using an input-output framework, we found that the indirect effects on the CPI could potentially be quite sizeable – mostly as a result of higher costs of transport services. However, the result crucially assumes that firms are fully able to pass on any higher costs, which is undoubtedly an overstatement. While higher fuel prices will lead to higher inflation in the short term, they may reduce inflation pressure in the medium term by dampening non-oil consumption. On the other hand, they may also lead to higher medium-term inflation expectations, which would otherwise boost inflation. The balance of these various effects is likely to depend on the degree of competitive pressures across different industries, other inflation developments, and on the state of the economic cycle.