

A PERSPECTIVE ON IMPACTS OF FUEL PRICE RISES
ON TRANSPORT

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ABSTRACT: *The paper provides a perspective on a range of impacts of fuel price rises on Australian transport since the introduction of full import parity pricing (IPP) of indigenous crude oil in August 1978. It compares movements in fuel prices with changes in fuel consumption, freight and passenger transport costs (including operating costs, freight rates and passenger fares), transport activity and modal choice, shippers' physical distribution costs, the private motor vehicle stock and household expenditure on transport.*

The paper concludes that, with the exception of the air passenger and freight sector, the impacts of the rapid fuel price increases on transport demand in the post-IPP period have been relatively small. However, there have been significant direct and indirect impacts on petrol and aviation fuel consumption, on long distance non-bulk road freight operating costs, on private vehicle operating expenditure by households, especially those in outer urban areas, and on the size, composition and fuel efficiency of the private motor vehicle stock.

The demand for road freight services has remained strong despite increases in operating costs because of quality of service factors and economies by shippers in non-transport physical distribution costs. There is no evidence of significant modal shifts in non-bulk freight since IPP was introduced.

The main impact of IPP has been on air transport, with fuel price rises being passed on through higher fares and freight rates which have reduced the growth of demand for passenger and freight services and contributed to some modal shifts on shorter-haul routes. Fuel price increases have also been a contributing factor in increased fares and freight rates in surface modes of public transport. However, other factors, such as action to reduce operating deficits, appear to have had an important influence.

1. INTRODUCTION

Over the last two years, there has been a flood of research papers and articles in the popular press about the impact of energy prices on freight and passenger transport. Many of these writings have failed to put current trends into perspective and painted dubious, if not wholly misleading, pictures of developments.

This paper does not attempt to provide a complete review of the impact of rising energy prices across all transport modes or transport tasks. It focuses mainly on urban passenger transport and long distance non-bulk freight, although there is some discussion of intercity passenger movements. Much of the data used is drawn from the quarterly "Transport Indicators" bulletins published by the Department of Transport, Australia (DoTA) and from case studies undertaken within the Intermodal Strategic Planning Branch of DoTA⁽¹⁾. These studies have been carried out primarily in the context of investigations concerning transport energy use, the scope for energy conservation and contingency planning for possible fuel shortages.

The paper aims to give two perspectives. First, it endeavours to highlight the relative magnitudes involved. Secondly, it attempts to put fuel costs in the context of the total costs of operators and users. Some commentators have fallen into the trap of focusing on fuel costs and potential energy conservation alone and have largely ignored interactions with other resource costs and total transport costs.

The body of the paper is structured into nine sections:

- Section 2 discusses the problems of measurement
- Section 3 describes the context in terms of the changes in fuel prices and the economic environment in the period 1974 to 1981
- In Section 4 changes in fuel prices and consumption are compared
- Section 5 discusses the impact of fuel price rises on transport costs
- The effects on transport activity and modal choice are analysed in Section 6
- In Section 7 the results of an industry survey are used to assess the impact on shippers of long distance non-bulk freight
- Section 8 examines changes in the private motor vehicle stock
- The impacts on private motorists are examined in Section 9
- Section 10 summarises the main conclusions

(1) Details of the sources and definitions of data used in this paper are provided in the Indicators bulletins, or otherwise acknowledged in the references set out in Section 11.

2. THE PROBLEM OF MEASUREMENT

There is a general lack of comprehensive and detailed time series data on transport demand and supply which can be used for analyses of this kind. The transport analyst requires disaggregated time series. The data should cover activity levels measured in terms of both tonnes consigned/passenger journeys and tonne-kilometres/passenger -kilometres performed for the various freight and passenger tasks. Ideally, the information should embrace all modes, by area of operation, by route, by type of operator, by class of vehicle employed and so on. It should also include data on the costs of all resources employed, including labour and capital, and on other variables affecting transport activity and resource use.

In practice measures of transport demand and supply available in time series are very limited. The principal measures available include tonnes carried, passenger journeys, truck movements, traffic counts, fuel sales, fuel prices and new vehicle registrations.

The main data source for this paper is the quarterly "Transport Indicators" bulletins (DoTA), published since August 1980. These bulletins, which draw on a wide range of sources, aim to provide an up to date guide to the direction and order of magnitude of short and long term trends in transport and to monitor the impact of general economic developments, policy changes and other variables. The time series published measure overall changes in relatively broad areas of activity or facets of transport and, as such, represent only the aggregate or average situation. As a result, the changes identified may not necessarily reflect significant developments on particular routes or in specific types of operations.

It is emphasised that conclusions reached on the basis of aggregate or average measures may be far removed from the actual experience of particular operators or users.

3. THE CONTEXT

The Commonwealth Government's policy of import parity pricing (IPP) for indigenous crude oil, coupled with developments in Iran and other changes in the world energy scene in the late 1970s, resulted in marked increases in nominal prices and lower but still significant increases in real⁽²⁾ prices of petroleum fuels used in public and private transport.

The IPP policy was initiated in August 1977 when the Government decided that the price of domestically produced crude oil would be increased gradually towards world parity (50% by 1980 for existing reserves and no target date for full IPP). The policy was modified in August 1978 with the immediate introduction of full IPP. The purpose of the revised policy was fivefold: to promote fuel conservation, to encourage fuel substitution, to stimulate development of new energy projects, to provide incentives for oil exploration and to prolong the life of existing oil fields.

(2) Throughout the paper, "real" relates to time series published in constant prices or to time series in nominal dollars deflated by the CPI.

IMPACTS OF FUEL PRICE RISES

At the same time, the Government introduced a number of measures to complement the IPP policy and encourage fuel savings. These included:

- a National Energy Conservation Programme (NECP)
- a system of voluntary fuel economy goals for new passenger vehicles
- the establishment of the National Energy Research, Development and Demonstration Council (NERDDC)
- encouragement of automotive use of LPG and the use of other alternatives to conventional petroleum fuels

The National Energy Conservation Programme, which is a joint Commonwealth/State/Northern Territory initiative, commenced in October 1979. Its main emphasis has been to encourage private motorists to conserve petrol by improved driving practices, careful planning of journeys, car pooling, better car maintenance, the greater use of public transport and increased use of smaller, more fuel efficient vehicles.

Because of the lack of data it is not possible to analyse in detail the impacts of these non-price initiatives and their interaction with price effects. This paper focuses on price effects but it is recognised that, for some areas of transport, the non-price initiatives referred to above could have had significant impacts.

The impacts of fuel price rises are analysed in respect of four periods, of which two are pre-IPP and two post-IPP:

Pre-IPP

- (1) 1973-74 to 1977-78 (four years)
- (2) 1975-76 to 1977-78 (two years)

Post-IPP

- (3) 1977-78 to 1979-80 (two years)
- (4) 1979-80 to 1980-81 (one year)

All annual percentage changes are expressed in compound rates.

During the above periods there were, of course, changes in general economic conditions which affected the nature and degree of fuel price impacts. The changing rates of growth in GDP, real retail sales, population, general price levels and real household disposable income all played a role in influencing travel behaviour and the demand for freight transport.

Table 3.1 shows trends in macro-economic variables for the pre-IPP and post-IPP periods.

TABLE 3.1: GROWTH IN MACRO-ECONOMIC VARIABLES 1973-74 to 1980-81
(Annual Compound Growth Rates %)

	Pre-IPP		Post-IPP	
	1973-74 to 1977-78 (4 years)	1975-76 to 1977-78 (2 years)	1977-78 to 1979-80 (2 years)	1979-80 to 1980-81 (1 year)
Real Gross Domestic Product	1.9	1.7	3.2	3.1
Real Retail Sales	2.2	1.8	1.4	4.6
Population	1.2	1.2	1.3	1.6
Consumer Price Index	12.6	10.6	9.8	8.8
Real Average Weekly Earnings	1.0	-1.0	-0.3	3.9
Real Household Disposable Income	2.2	0.4	2.1	2.5

Source: ABS (see detailed sources in DoTA, September 1981)

It can be seen from Table 3.1 that real GDP, retail sales, average weekly earnings and population have grown strongly in the post-IPP period compared with the pre-IPP period. Real household disposable income has grown significantly faster in the post-IPP period compared with the two years immediately prior to IPP. Other things being equal, one would expect, therefore, the dampening effects of IPP fuel price rises to be offset to some extent by the stimulating effects of increases in production and disposable income.

Table 3.2 shows nominal prices of crude oil and the major petroleum products used in transport. It should be noted that the differences between road and rail prices for automotive distillate reflect the excise of 5.155 c/l paid by road users. Rail authorities also benefit from their ability to negotiate lower bulk contract rates. Automotive LPG is not included because of its limited penetration of the market (estimated 0.7% of petrol displacement in 1980) and the lack of time series data on its use for automotive purposes.

Table 3.3 shows annual rates of increase in nominal prices.

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TABLE 3.2: NOMINAL PRICES OF CRUDE OIL AND TRANSPORT FUELS
(cents per litre - June Quarters)

	Pre - IPP			Post - IPP	
	1974	1976	1978	1980	1981
Crude oil	1.3	2.7	4.2	15.6	19.0
Super petrol (a)	10.5	13.8	17.2	32.1	35.9
Auto distillate (a)	10.1	13.4	16.7	32.5	36.7
- road use)	2.6	4.6	6.7	18.0 (c)	20.7 (c)
- govt rail) (b)					
Avtur (a)	10.3	13.0	16.2	32.0	36.7
Avgas (a)	12.1	15.4	21.0	41.8	49.3
Marine fuel oil (d)	5.0	6.7	8.5	18.2	20.1

Source: Price Justification Tribunal (PJT) and Petroleum Products Pricing Authority (PPPA); see also DoTA.

- (a) Maximum approved wholesale (including excise where levied)
 (b) Note that rail figures are estimates of average prices over the financial year 1973-74 etc, due to lack of June quarter data.
 (c) No published data available - authors' estimates.
 (d) Scheduled price to users.

TABLE 3.3: NOMINAL PRICES OF CRUDE OIL AND TRANSPORT FUELS (a)
(Annual Compound Growth Rates %) (a)

	Pre - IPP		Post - IPP	
	June 74 to June 78 (4 years)	June 76 to June 78 (2 years)	June 78 to June 80 (2 years)	June 80 to June 81 (1 year)
Crude oil	33.9	24.4	92.4	22.0
Super petrol	13.1	11.6	36.6	11.8
Auto distillate	13.4	11.6	39.5	12.9
- road use)	26.7	20.7	63.9	15.0
- govt rail) (b)				
Avtur	12.0	11.6	40.5	14.7
Avgas	14.8	16.8	41.1	17.9
Marine fuel oil	14.2	12.6	46.3	10.4

Source: See Table 3.2

- (a) Growth rates from Table 3.2
 (b) See footnotes (b) and (c) to Table 3.2

When fuel prices are expressed in real terms (i.e. deflated by the CPI), the increases in the two year post-IPP period 1977-78 to 1979-80 are less dramatic but nevertheless very significant (Table 3.4). It will be noted that the highest increases were for crude oil and auto distillate for rail use, which reflect their lower bases in the pre-IPP period (Table 3.2)

TABLE 3.4 REAL PRICES OF CRUDE OIL AND TRANSPORT FUELS (a)

(Annual Compound Growth Rates %)

	Pre - IPP		Post - IPP	
	June 1974 to June 1978 (4 years)	June 1976 to June 1978 (2 years)	June 1978 to June 1980 (2 years)	June 1980 to June 1981 (1 year)
Crude oil	18.9	12.3	75.2	12.2
Super petrol	0.5	1.0	24.4	2.8
Auto distillate				
- road use)	0.7	1.0	26.2	5.1
- govt rail)	12.5	9.1	49.3	5.7
Avtur	- 0.5	1.0	27.9	5.4
Avgas	1.9	5.5	28.7	8.4
Marine fuel oil	1.4	1.8	33.5	1.3

Source: As for Table 3.2

(a) See footnotes in relation to Tables 3.2 and 3.3

4. IMPACTS ON FUEL CONSUMPTION

The demand for transport fuel is affected by many interacting factors of which the price of fuel is only one. Key variables include the relative costs of other resources used, the level of economic activity, real income, the size and composition of the vehicle fleet, the availability and cost of competing services and so on. It is very difficult to identify clear-cut relationships between all these factors and fuel consumption. The aim in this section is simply to compare the changes in fuel prices and fuel consumption. Later sections examine other impacts which interact with fuel consumption.

The data used here are described as sales of transport fuels. It should be noted that it relates to releases from bulk storage, particularly from refineries. No aggregate time series data are available on actual transport fuel consumption net of variations in stocks held by distributors and operators.

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Table 4.1 compares changes in the volume of fuel sales with changes in real fuel prices.

TABLE 4.1: CHANGES IN REAL FUEL PRICES AND FUEL SALES
(Annual Compound Growth Rates %)

	Pre - IPP		Post - IPP	
	1973-74 to 1977-78 (4 years)	1975-76 to 1977-78 (2 years)	1977-78 to 1979-80 (2 years)	1979-80 to 1980-81 (1 year)
Petrol				
Real price	0.5	1.0	24.4	2.8
Sales (a)	4.3	4.2	1.2	0.4
Auto distillate - road use				
Real price	0.7	1.0	26.2	5.1
Sales (a)	10.8	11.7	12.4	8.4
- government rail				
Real price	12.5	9.1	49.3	5.7
Sales(a)	4.1	2.5	n.a.	n.a.
Avtur				
Real price	-0.5	1.0	27.9	5.4
Sales (a)	5.3	4.8	1.3	-0.3
Avgas				
Real price	1.9	5.5	28.7	8.4
Sales (a)	2.2	4.6	- 0.1	0.4
Bunker fuels				
Real price	1.4	1.8	33.5	1.3
Sales (a)	-1.5	9.1	-8.4	- 0.1

Source: DoTA; Department of National Development and Energy, various issues.

(a) Litres

n.a. = not available

It can be seen from Table 4.1 that:

- (a) the rate of growth in petrol sales fell in the post-IPP period with the greatest absolute change occurring in the period 1977-78 to 1979-80.

- (b) the rate of growth in sales of auto distillate for road use has remained high, although there was a decline in this rate during 1980-81. The continuing high growth rate appears to be related to a number of factors. These include the on-going dieselisation of the truck fleet, the use of larger vehicles, an increase in the average distance travelled by the truck fleet and the strong demand for road freight services;
- (c) there has been a dramatic change in sales of AVTUR used by jet aircraft and AVGAS used for general aviation from strong increases in the pre-IPP period to virtually no growth in 1980-81;
- (d) sales of bunker fuels have declined in absolute terms since the introduction of IPP. This is partly due to higher domestic prices relative to overseas prices resulting in a greater proportion of overseas bunkering.

Table 4.1 suggests the existence of lagged impacts of the post-IPP fuel price rises. It is obvious that the speed with which impacts occurred differed between modes and specific transport tasks depending, for example, on the rate at which vehicles or equipment were turned over (i.e. capital substitution for fuel costs) and the timing of the introduction of fuel conservation or substitution measures. It should be noted that industrial disputes influenced fuel sales in some instances (for example, Avtur sales in 1980-81) and that disruptions to imports substantially reduced sales of Avgas in 1979.

5. IMPACTS ON TRANSPORT COSTS

Movements in costs incurred by operators and users of freight and passenger transport are influenced by variables such as:

- general domestic and international economic conditions
- developments in market conditions within the transport sector affecting all resource inputs, loadings etc.
- changes in technology and operating practices, including the use of more fuel efficient engines and vehicles, and greater operating efficiencies generally.

It is not possible to undertake a comprehensive analysis of these factors because of inadequate data. In this section the available data are used simply to compare movements in fuel costs with selected measures of transport costs.

Freight Transport Costs

Despite the adoption of fuel saving practices and switches to more fuel efficient engines, fuel costs have increased sharply as a proportion of direct operating costs for all modes. Air operations have been particularly affected. Table 5.1 presents estimates of the ratio of fuel costs to total costs for inter-regional transport.

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TABLE 5.1: RATIO OF FUEL COSTS TO TOTAL COSTS FOR INTER-REGIONAL MOVEMENTS (%)

PERIOD	ROAD (a) FREIGHT (calendar yrs)	RAIL FREIGHT	SRA (b) FREIGHT	AIR (c) MOVEMENTS
<u>Pre-IPP</u>				
1972-73	18.7	less than 5.0 (d)	3.7	
1973-74	18.5			
1974-75	20.2		8.3	
1975-76	19.1		8.2	14.0
1976-77	20.7		8.9	15.0
1977-78	22.5		9.1	16.0
<u>Post-IPP</u>				
1978-79	23.1	about 5.5 (e)	8.5	18.0
1979-80	29.0		13.9	25.0
1980-81	32.1		14.2	24.0
		n.a.		

Sources:

- (a) Professional Transport Drivers Association of Australia (1980); Long Distance Road Transport Association (1981)
- (b) ANL Annual Reports (coastal and overseas operations combined)
- (c) TAA Annual Reports (to 1979-80) plus DoTA estimates. Figures refer to both passenger and freight operations
- (d) ATAC (1979)
- (e) Authors' estimate

The figures in Table 5.1 are not exactly comparable, as the accounting base for each mode is different. Data for rail are particularly difficult to obtain and the air data include both passenger and freight operations. Nevertheless, the Table provides an indication of the relative change in proportions over time, the more significant trends being:

- (a) the relative stability in the ratios of fuel to total costs until 1978-79;
- (b) the marked increase in the ratios in 1979-80;
- (c) the fact that, even for the relatively "fuel efficient" modes, fuel is now a significant component.

Freight Rates

With the marked increases in the real price of fuels shown in Table 3.4 and in the ratio of fuel to total costs shown in Table 5.1, one would expect to see significant increases in freight rates. This generally has not been the case. Table 5.2 and Figures 5.1-5.3 compare changes in real rates for non-bulk freight for all modes.

TABLE 5.2: CHANGES IN REAL FUEL PRICES AND REAL NON-BULK FREIGHT RATES

(Annual Compound Growth Rates %)

MODE/FUEL	Pre - IPP		Post - IPP	
	June 74- June 78	June 76- June 78	June 78- June 80	June 80- June 81
<u>Road</u>				
Auto distillate prices	0.7	1.0	26.2	5.1
Freight rates (a)	-6.0	-4.8	-0.5	6.5
Freight rates (b)	1.6	-2.2	15.1	49.6
<u>Government Rail</u>				
Auto distillate prices	12.5	9.1	49.3	5.7
Freight interstate	-1.5(c)	-5.8	-2.1	4.7
Freight intrastate	0.3(c)	-1.8	0.3	4.9
<u>Sea</u>				
Marine fuel oil prices	1.4	1.8	33.5	1.3
Export freight rates	6.2(c)	4.8	0.9	-1.5
Coastal rates	11.4	18.7	1.6	2.1
<u>Air</u>				
AVTUR prices	-1.0	1.0	27.9	5.4
Domestic freight rates	-5.2(c)	-5.9	8.2	6.2
International freight rates	-1.9	-1.7	2.4	7.7

- (a) Subcontractors' recommended minimum rates
- (b) Freight forwarders' scheduled rates, for irregular consignments as specified in DoTA (1981)
- (c) Growth rates based on last 3 years of period, due to lack of data.

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It can be seen from Figure 5.1 that from mid 1975 to mid 1980 the rail and road (sub-contractors) indicators declined in real terms, reflecting partial absorption of fuel cost increases through improved operating procedures, technological changes and other productivity gains. The air indicators in Figures 5.2 and 5.3 show a general decline, with domestic rates falling until mid 1978 and international rates falling until mid 1979. Thereafter both increased at an average annual rate of around 7.5%. In contrast, the non-bulk sea indicators (Figures 5.2 and 5.3) both increased steadily from mid 1975, but with reduced rates of growth after the introduction of full IPP.

The greatest increases in freight rates in the post-IPP period have been in the published or scheduled rates of road freight forwarders which apply mainly to small, irregular shipments. There are, however, no aggregate data available on freight rates actually paid by shippers to freight forwarders. Changes in the published freight rates for given shipments are not necessarily a measure of actual outlays by shippers because of substantial discounting for large regular shipments, changes in loadings, deliveries, trip patterns and other variables.

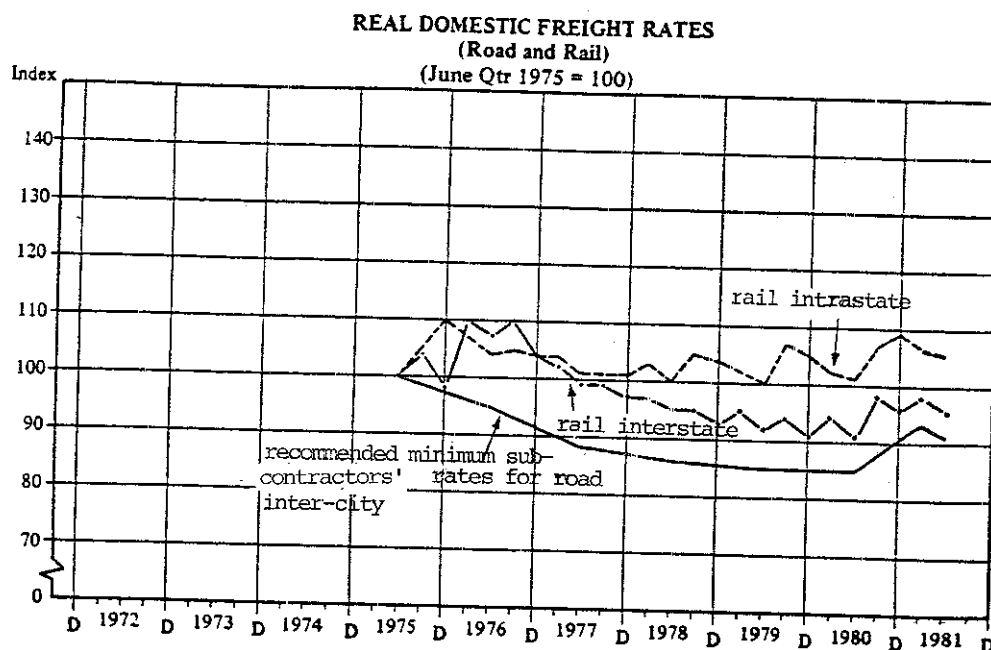


FIGURE 5.1

REAL DOMESTIC FREIGHT RATES
(SEA, AIR AND ROAD)

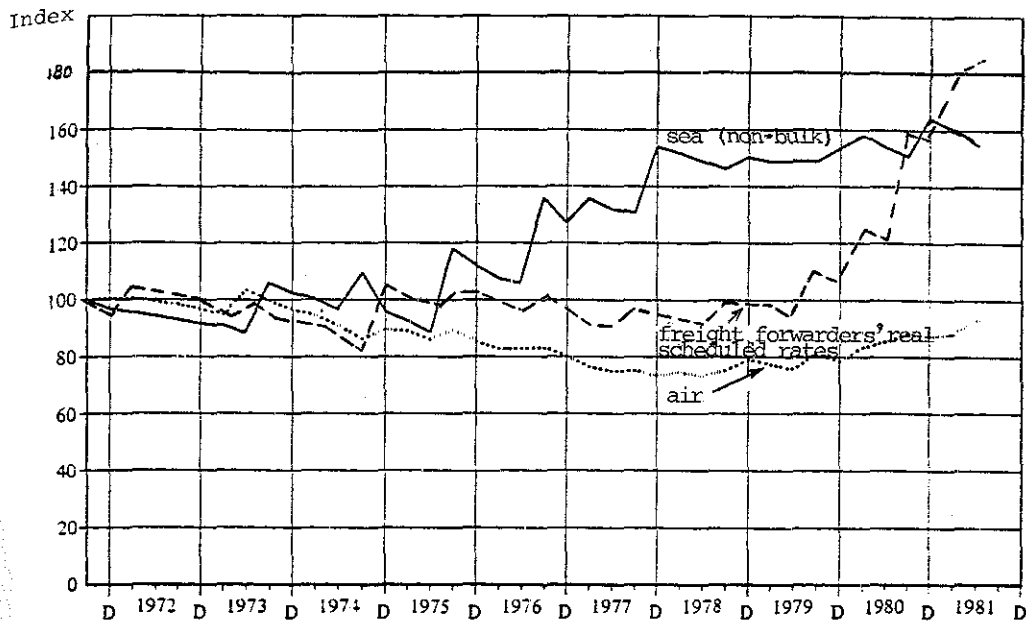


FIGURE 5.2

REAL INTERNATIONAL FREIGHT RATES
(JUNE QTR 1975 = 100)

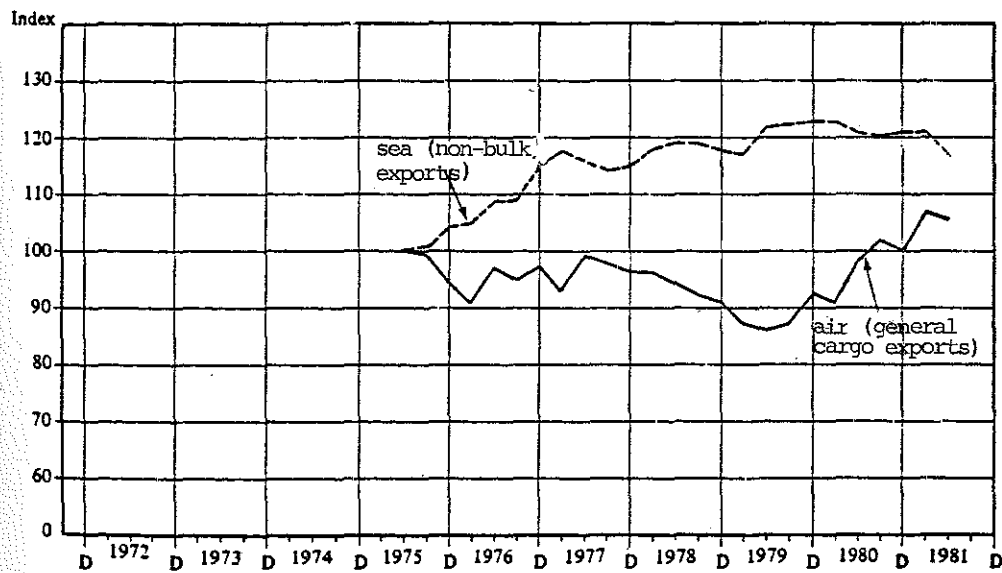


FIGURE 5.3

IMPACTS OF FUEL PRICE RISES

Since 1979 the trend in road sub-contractors' recommended minimum rates has changed. After a long period of significant decline in real terms, the rates fell only slightly in the period June 1978 to June 1980 and rose 6.5% in 1980-81. Increased fuel prices appear to have been a contributing factor in these changes.

With regard to Government non-bulk rail, it appears that freight rates in 1980-81 may have been influenced by fuel price rises since IPP.

Respondents to the recent survey of non-bulk freight shippers, reported in detail in Section 7, commented on movements in freight rates for the calendar year 1980. They indicated that average road freight rates actually paid by major shippers of long distance non-bulk freight increased only slightly in real terms during 1980. They also suggested that a number of the rail systems took the opportunity to increase rates in order to contain or reduce their deficits. Some respondents indicated that for intrastate traffic they had experienced selective increases in rail rates, which were much higher than normal cost escalation. In the case of sea coastal non-bulk freight, increases in nominal freight rates of the order of 5-20% in calendar year 1980 were reported.

Private Motoring Costs

Direct measures of average private motoring costs are not available as a time series. However, some indication of the order of change is evident from movements in the private motoring components of the Consumer Price Index. These changes are shown in Table 5.3.

TABLE 5.3 CHANGES IN THE PRICE OF PETROL AND OTHER COMPONENTS OF PRIVATE MOTORING

(Annual Compound Growth Rates %)

PRIVATE MOTORING PRICE INDICES (a) (In real terms)	Pre - IPP		Post - IPP	
	1973-74 to 1977-78 (4 years)	1975-76 to 1977-78 (2 years)	1977-78 to 1979-80 (2 years)	1979-80 to 1980-81 (1 year)
Petrol	-2.0	-3.2	23.3	6.6
Motor vehicle operation	0.5	-2.5	6.2	1.9
Motor vehicle purchase	1.9	-0.5	-4.8	-2.7
Motor vehicle purchase and operation	1.1	-4.1	2.4	0.5

(a) Components of the Consumer Price Index (ABS).

Contrary to most people's expectations, there has been very little increase in the overall real costs of motoring since the IPP policy was introduced. While the real price of petrol has risen quite considerably, the "motor vehicle operation" price index has risen to a much lesser extent. The reason for this is that fuel currently accounts for only about 40% of car operating costs and that non-fuel components of operating costs (such as registration charges, tyres, maintenance and servicing costs) have not risen at the same rate as fuel prices and actually fell in real terms by an average 3.5% per annum in the period 1978-80. Furthermore, the price increases have been largely offset by a substantial decline in the real purchase price of motor vehicles, so that overall private motoring costs have remained relatively stable since 1979.

Urban Public Transport Costs

It is difficult to ascertain precisely what proportion fuel is of total operating costs in urban public transport. The rising price of fuel has certainly affected bus and coach operators, although fuel tends to be a relatively small proportion of operating costs because of the very high labour component (labour accounted for about 75% of total costs in 1977).

The information available indicates that between June 1977 and June 1980 fuel costs for a typical medium-sized bus operation have risen from about 6% of total operating costs to nearly 10% (Bus and Coach Association of NSW - 1981).

Other data derived for the NSW government's urban bus systems are presented in Table 5.4.

TABLE 5.4 URBAN PUBLIC TRANSPORT ENERGY COSTS (BUS) - NSW

Year	Diesel Bus Fuel Costs per Vehicle Kilometre	
	Cents in Current Prices	Index in Real Terms
<u>Pre - IPP</u>		
1973-74	2.87	100.0
1974-75	3.68	109.7
1975-76	4.78	126.8
1976-77	4.23	99.0
1977-78	4.96	107.6
<u>Post - IPP</u>		
1978-79	6.02	120.0
1979-80	8.33	159.8

Source: Bus and Coach Association of NSW (1981)

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From 1973-74 to 1977-78 there was an increase of 73% in bus diesel fuel costs per vehicle kilometre, in current prices, which was equivalent to a 7.6% increase in real terms over the period. However, in the two year period after the introduction of IPP there was a 68% increase in fuel costs per vehicle kilometre in nominal terms, which is equivalent to a very significant increase of 48.5% in real terms.

The picture is somewhat different for the urban rail system in NSW as it is largely dependent on electric power for a substantial part of the network. It is not possible to obtain a breakdown of oil-based energy costs for both the urban and non-urban components of the NSW system. Table 5.5 provides a comparison of total network energy costs for both electricity and oil.

TABLE 5.5: RAIL ENERGY EXPENDITURE - NSW

	Oil based fuels		Electricity	
	Current \$m	Index in Real Terms	Current \$m	Index in Real Terms
<u>Pre - IPP</u>				
1973-74	3.85	100.0	5.63	100.0
1974-75	7.18	159.5	6.29	95.6
1975-76	9.65	190.9	6.72	90.8
1976-77	11.59	202.2	7.20	85.9
1977-78	15.50	250.6	8.48	93.7
<u>Post - IPP</u>				
1978-79	17.22	255.8	9.26	94.1
1979-80	30.40	407.8	10.47	96.0

Source: NSW Public Transport Commission : Annual Reports, various years.

It may be concluded from Table 5.4 that in the post - IPP period, the energy cost of operating the NSW urban public bus fleet in real terms increased considerably, due to the rising price of fuel. From Table 5.5, however, it can be seen that energy costs for the urban rail system increased only marginally in this period, reflecting the modest increase in expenditure on electricity, the major energy source.

With regard to taxi operations, the limited information available indicates that rising fuel prices have not been a significant factor in movements in taxi operating costs. The main contributory factor appears to have been labour costs, because of the high labour component in taxi operations. Some urban taxi fleets, e.g. in Melbourne, have been able to contain fuel costs by switching to LPG.

passenger Transport Fares

Table 5.6 shows the changes in real fuel prices and real passenger fares for the pre- and post - IPP periods. Over the four pre-IPP years, all fares (in real terms) were declining. In the first two post-IPP years, the indicators of taxi and rail, bus and tram fares remained relatively stable. The taxi fare indicator declined in the following year by 6.3% while the rail, bus and tram indicator rose a substantial 11.2%. Domestic non-urban and air international economy fares have generally increased throughout the post-IPP period, with higher rates of increase in the last year in all but the intercity bus mode. The air international minimum fare indicator continued a declining pre-IPP trend until the end of the first post-IPP year. A moderate increase has been recorded since then.

In general, the impact of fuel price rises has been greatest on air fares, reflecting a higher proportion of fuel costs in direct operating costs than in the other modes. The fuel price effects are less visible in the air international minimum fare indicator since there have been major changes to the fare structure with the introduction of promotional fares (such as APEX) on a progressively increasing number of routes.

TABLE 5.6: CHANGES IN REAL FUEL PRICES AND REAL FARES
(Annual Compound Growth Rates %)

FUEL PRICES/FARES	PRE - IPP		POST - IPP	
	June 74- June 78	June 76- June 78	June 78- June 80	June 80- June 81
<u>URBAN</u>				
Petrol prices	0.5	1.0	24.4	2.8
LPG prices	0.2	-14.8	63.7	6.1
Road auto distillate prices	0.7	1.0	26.1	5.1
Govt rail auto distillate prices	12.5	9.1	49.3	5.7
Taxi fares	2.5	-2.5	4.1	- 6.3
Rail, bus, tram fares	-3.8	-7.5	-0.2	11.2
<u>NON-URBAN - Surface Modes:</u>				
Road auto distillate prices	0.7	1.0	26.1	5.1
Bus intercity fares	(a)	2.1(b)	5.0	2.5
Govt rail auto distillate prices	12.5	9.1	49.3	5.7
Rail intrastate fares	(a)	- 0.3(b)	0.2	16.2
Rail interstate fares	(a)	- 6.4(b)	1.8	10.8
<u>Air Mode:</u>				
Avtur prices	-0.5	1.0	27.9	5.4
Domestic air economy fares	1.9	-4.3	8.0	10.8
<u>INTERNATIONAL AIR MODE</u>				
Avtur prices	-0.5	1.0	27.9	5.4
International air economy fares	-3.7	-5.2	4.3	5.2
International air minimum fares	-4.7	-7.4	-13.3	8.3

(a) Data not available

(b) Growth rates based on last year of period, due to lack of data.

IMPACTS OF FUEL PRICE RISES

6. IMPACTS ON ACTIVITY AND MODAL CHOICE

Freight Activity

The demand for freight transport is of course derived from the demand for raw materials, semi-finished and finished goods. Fuel prices can be expected to have an impact via operating costs and/or freight rates paid by shippers, especially where fuel costs are a relatively high percentage of total costs.

Table 6.1 shows that there does not appear to have been any significant effect on levels of long distance non-bulk freight activity, except with respect to air freight. Some shift from air to road freight may have occurred, but the available evidence suggests that there has been little or no overall shift from road freight to rail and sea freight, despite the significantly higher ratio of fuel cost to total operating costs in road transport. The importance of quality of service factors in road freight and of non-transport costs in the total physical distribution costs of shippers of non-bulk freight is described in Section 7.

TABLE 6.1 CHANGES IN REAL FUEL PRICES AND LONG DISTANCE NON-BULK FREIGHT ACTIVITY

(Annual Compound Growth Rates %)

FUEL PRICES/ACTIVITY	Pre - IPP		Post - IPP	
	1973-74 to 1977-78 (4 years)	1975-76 to 1977-78 (2 years)	1977-78 to 1979-80 (2 years)	1979-80 to 1980-81 (1 year)
<u>Real fuel prices</u>				
Auto distillate				
- Road use	0.7	1.0	26.2	5.1
- Govt rail	12.5	9.1	49.3	5.7
Avtur	-0.5	1.0	27.9	5.4
Marine fuel oil	1.4	1.8	33.5	1.3
<u>Non-bulk activity (a)</u>				
Truck movements	2.4	2.4	4.1	8.1
Government rail	n.a.	n.a.	5.4	-1.7
Sea domestic	-3.5	0.7	1.9	-11.8
Sea international	0.0	-4.3	5.6	-3.7
Air domestic	0.4	4.2	2.9	-2.7
Air international	11.6	14.7	17.3	5.8

Source: DoTA

n.a. = not available

(a) Except for truck counts, activity measure is tonnes consigned

Passenger Activity

The level of activity and modal choice in urban passenger transport are affected by the quality of public transport services available, fares, the cost of private motoring, the level of real household disposable income and many other economic and social factors. The only time series data available relate to traffic counts on major roads in the capital cities and passenger journeys on urban public transport. Table 6.2 compares the changes in the pre- and post-IPP periods.

TABLE 6.2. CHANGES IN REAL FUEL PRICES AND URBAN PASSENGER TRANSPORT ACTIVITY
(Annual Compound Growth Rates %)

FUEL PRICES/ACTIVITY	Pre - IPP		Post - IPP	
	1973-74 to 1977-78 (4 years)	1975-76 to 1977-78 (2 years)	1977-78 to 1979-80 (2 years)	1979-80 to 1980-81 (1 year)
<u>Real fuel prices</u>				
Super petrol	0.5	1.0	24.4	2.8
Auto distillate				
- road use	0.7	1.0	26.2	5.1
- Government rail	2.5	9.1	49.3	5.7
<u>Activity</u>				
Traffic counts	4.3 (a)	3.4 (a)	0.7	2.5
Urban public transport (b)				
- rail	-4.3	-4.0	5.5	2.7
- bus & tram	n.a.	n.a.	0.4	3.0

Source: DoTA

n.a. = not available

(a) Aggregate data not available; estimates based on a sample of Adelaide count stations.

(b) Passenger journeys.

Table 6.2 shows an upward shift in urban public transport patronage in the post-IPP period.

In order to identify more closely the shifts in the period 1978-80, the Department of Transport, Australia examined detailed time of day data from 37 traffic counting stations on arterial roads in all State capitals and the A.C.T. together with data on public transport patronage. These data are summarised in Table 6.3.

IMPACTS OF FUEL PRICE RISES

TABLE 6.3: CHANGES IN ROAD TRAFFIC AND PUBLIC TRANSPORT ACTIVITY

Period	Change over corresponding period in previous year			
	Road Traffic (a)			(b) Public Transport
	Peak (%)	Off-Peak (%)	Weekend (%)	
2nd half 1978	n.a.	n.a.	n.a.	+0.4
1st half 1979	n.a.	n.a.	n.a.	-0.7
2nd half 1979	+0.3	+1.8	+1.0	+1.8
1st half 1980	-1.8	-0.8	-1.2	+4.0

(a) Results are a weighted average of traffic count samples from all State capitals

(b) All State capitals and ACT - passenger journeys

n.a. = not available.

Table 6.3 shows that traffic counts in the capital cities declined during the first half of 1980. The growth in the second half of 1979 was below the trend of 3 to 4% between 1973-74 and 1977-78 (Table 6.2). In off-peak periods and weekends when alternative transport is not readily available the reduction in traffic was not as pronounced.

While for some traffic count stations the reduction in traffic can be attributed to local factors such as altered road arrangements, it is significant that reductions occurred in most capital cities. This is shown in Table 6.4. This table also shows that as road traffic was declining public transport patronage increased in all but one capital city.

TABLE 6.4: MAJOR CITIES: CHANGES IN ROAD TRAFFIC COUNTS BY TIME PERIOD AND AGGREGATE PUBLIC TRANSPORT PATRONAGE

CITIES (a)	% Change 2nd half 1979 2nd half 1978				% Change 1st half 1980 1st half 1979			
	Road Traffic Counts			Total Public Transport Patronage	Road Traffic Counts			Total Public Transport Patronage
	Peak	Off-Peak	Weekend		Peak	Off-Peak	Weekend	
A	-1.8	-0.9	-2.3	-2.6	-2.3	-1.6	-2.6	-3.0
B	+0.3	+3.2	+3.5	+5.6	-2.6	-0.9	-1.5	+8.9
C	+3.8	+2.2	-0.9	+0.8	+0.9	-1.0	+0.9	+1.0
D	+4.1	+6.6	+7.7	-6.9	+0.2	-2.2	+0.9	+2.4
E	-1.1	-2.8	+0.1	-	-	-	-	-
F	-1.2	-0.3	+0.5	+0.7	-5.5	-3.7	-3.4	+6.0
G				0.0	-3.6	+0.8	-4.0	+5.7
TOTAL	+0.3	+1.8	+1.0	+1.8	-1.8	-0.8	-1.2	+4.0

Source: DoTA

(a) Alphabetic designation of cities as data are currently unpublished.

These changes took place in a period when the maximum approved wholesale price of petrol rose in nominal terms from about 23c/litre to about 32c/litre (an increase of 42% or 28% in real terms).

However, during this period the price index of "motor vehicle operation" increased by only 4.9% and the impact on activity was very much less. The estimated average decline in urban traffic levels was of the order of 1%.

It is also noteworthy, that, apart from city A, those cities showing the greatest fall in traffic levels for the peak hour (i.e. the journey to work) also demonstrated the greatest increase in public transport patronage. This implies the possibility of a modal shift from private motoring for journeys to work in these cities. For a number of cities, improved infrastructure and services appear to have attracted increased patronage. The opening of the Eastern Suburbs Railway in Sydney, the introduction of electrification to the Brisbane rail system and the opening of the new Merivale River Crossing in Brisbane would have been important contributing factors to the growth in patronage.

Since June 1980 public transport patronage has continued to increase, although at a lower rate, and it is estimated that in June 1981 patronage was about 1% higher than in the previous year. On a per capita basis this amounted to a negligible change.

In contrast to the period 1977-78 to 1979-80 there has been a modest increase of 2.5% in traffic levels over the period 1979-80 to 1980-81. This increase appears to be related to the stabilisation of fuel prices and an increase in real household disposable income.

Changes in activity in non-urban passenger transport are summarised in Table 6.5.

TABLE 6.5: CHANGES IN REAL FUEL PRICES AND NON-URBAN PASSENGER ACTIVITY

(Annual Compound Growth Rates %)

FUEL PRICES/ ACTIVITY	Pre - IPP		Post - IPP	
	1973-74 to 1977-78 (4 years)	1975-76 to 1977-78 (2 years)	1977-78 to 1979-80 (2 years)	1979-80 to 1980-81 (1 year)
<u>Real fuel prices</u>				
Super petrol	0.5	1.0	24.4	2.8
Auto distillate				
- road use	0.7	1.0	26.2	5.1
- govt rail	12.5	9.1	49.3	5.7
Avtur	-1.0	1.0	27.9	5.4
<u>Activity</u>				
Bus interstate	n.a.	n.a.	1.4	6.1
Rail interstate	-8.4	+2.1	-1.0	11.7
Domestic airlines	0.4	4.2	2.8	-2.7

Source: DoTA

n.a. = not available

IMPACTS OF FUEL PRICE RISES

Table 6.5 suggests:

- (a) a relationship between fuel prices and domestic air passenger activity via increased fare levels, notwithstanding increases in real household disposable income and the introduction of innovative air fares;
- (b) some modal shift from air to rail, bus and private motor cars, probably as a result of higher air fares. Higher fuel prices appear to have been a contributing factor, although the main factor since April 1981 on shorter hauls (e.g. Sydney-Canberra) has been the change in fare structures resulting from the Holcroft enquiry.

7. IMPACTS ON SHIPPERS

It is often assumed that increased fuel costs will lead to higher freight rates and directly impact on the distribution costs of users of freight transport.

In April-May 1981 the Department of Transport, Australia undertook a small survey of shippers, most of whom were medium to large consignors of long distance non-bulk freight (i.e. freight not requiring specialised handling or transport equipment). Respondents to the survey were asked questions concerning trends in transport costs and other components of physical distribution costs from 1979-80 through to 1981-82 and were also invited to comment on factors affecting these trends. Table 7.1 indicates the relative importance of elements of physical distribution costs, as revealed by the survey.

TABLE 7.1: PHYSICAL DISTRIBUTION COSTS (% of sales revenue)

Components of physical distribution (PD) cost	73-74 Survey (a)	79-80 Survey (b)
Transport (c)	2.5	5.9
Administration (d)	4.5	2.5
Warehousing	1.8	1.2
Inventory	3.6	3.3
Packaging	1.7	1.1
Total	14.1	14.0

(a) 80 respondents. Estimates by Gilmour and Rimmer (1976) from survey conducted by Stephenson (1975).

(b) 33 respondents. DoTA survey conducted in April-May 1981. Individual company responses were weighted according to 1979-80 sales revenue. See Mansfield et al (1981).

(c) In most cases goods arrive FIS (free into store) but all companies pay outwards freight, occasionally only to the customer's nearest State Capital.

(d) Also includes order processing, receipt and despatch.

It was clear from the replies that physical distribution costs varied considerably according to factors such as the nature of the shipper's product, the location of its production units and its policy on the level of customer service. Respondents' total distribution costs varied from 2.1% to 33.5% of sales revenue while most were in the 10-15% range. While no precise figures are available, transport fuel cost as a percentage of sales revenue of the companies surveyed would be relatively small, and generally in the range of 1% to 3%. For survey respondents, transport fuel price considerations per se did not loom large in trade-offs between, for example, transport service levels and inventory costs.

The total physical distribution cost figure of 14% in Table 7.1 compares with the 1973-74 figure of 14.1% estimated by Gilmour and Rimmer (1976). This suggests in broad terms that companies may have been able to control their distribution costs to a fairly constant proportion of sales revenue despite the sharp increases in the fuel costs involved in transport operations. However, the relative proportions of the components of physical distribution costs appear to have changed. The survey indicated that transport's share of physical distribution costs has increased markedly. Significant economies appear to have been made in the labour intensive areas of administration, order processing, receipt and despatch. This may reflect the trend towards rationalisation of warehouses and improvements in materials handling techniques.

The survey also revealed a consensus that the percentage of sales revenue devoted to transport will increase further in the period to 1981-82. It is probable that this view was based on an expectation of continuing real increases in diesel fuel prices as well as attempts by rail authorities to increase freight rates to reduce deficits. Opinion was divided on trends in the other components of physical distribution costs.

Shippers indicated a range of actions they intended to take to minimise distribution costs. These included introduction of computerised ordering, warehousing and inventory control systems, and action to reduce expensive bottlenecks at their own warehouses by scheduling receipts and deliveries. Significant savings were expected to be achieved (as in the past) by the minimising and fine tuning of inventories. There was considerable emphasis on reliability of transport services. Other non-price factors in modal choice were also regarded as important.

Two-thirds of the survey respondents claimed that they had taken or were contemplating action to contain or reduce transport costs by altering their 'modal-mix' and in fact over half of all respondents indicated 'less road, more rail'. These same companies indicated, however, that they would like to see improvements in rail's service reliability, rate setting practices and terminal operations.

IMPACTS OF FUEL PRICE RISES

It can be concluded that:

- (a) fuel costs appear to have contributed to the significant increase in the transport component of physical distribution costs in recent years
- (b) firms have been generally successful in containing overall physical distribution costs as a result of economies in administration and other non-transport distribution costs
- (c) there is further scope for containing overall physical distribution costs despite an expected increase in transport costs as a result of higher real fuel prices, including the greater use of computers for ordering and inventory control
- (d) the direct impact of expected higher real fuel prices on medium to large shippers is likely to be small.

8. IMPACTS ON PRIVATE VEHICLE STOCK

There has been a number of changes since 1977-78 in the composition and rate of growth of the vehicle stock. However, it is difficult to separate out and identify the factors causing these changes. It is likely that the level of real household disposable income, passenger activity and expectations, and vehicle characteristics have all had a bearing. Nevertheless, it seems clear that the increase in fuel prices, especially from 1978 to 1980, had significant direct and indirect impacts. These impacts included a downsizing of vehicles, both in terms of engine size and vehicle weight, an increase in registrations of motor cycles and a reduced rate of growth of the total private motor vehicle stock.

Rate of Growth of the Vehicle Stock

Table 8.1 provides estimates of the rate of growth of the 'private' vehicle stock (i.e., cars, station wagons, motor cycles, utilities and panel vans) both before and after the introduction of the IPP policy.

TABLE 8.1: RATES OF GROWTH OF THE PRIVATE VEHICLE STOCK

(Annual Compound Growth Rates %)

Vehicle Type	Pre - IPP		Post - IPP	
	1973-74 to 1977-78	1975-76 to 1977-78	1977-78 to 1979-80	1979-80 to 1980-81
Cars & Station Wagons	4.7	3.8	3.1	3.2
Motor Cycles	3.3	-0.1	3.1	11.4
Utilities & Panel Vans	6.7	6.9	3.9	2.7
Total	5.0	4.0	3.2	3.5

Source: ABS, ADAPS and authors' estimates.

It can be seen that there has been a reduction in the rate of growth of cars and station wagons and utilities and panel vans, but an increase in the rate of growth of motor cycles. The decline in the rate of growth of the vehicle stock appears to be due largely to a higher rate of exit from the vehicle fleet rather than from a reduced rate of new vehicle registrations. The vehicle fleet is currently growing at about 3.5% compared to about 5% for the period 1973-74 to 1977-78.

Perhaps the most significant feature of Table 8.1 is the very strong growth in the stock of motor cycles. For the period 1975-76 to 1977-78 it actually declined, but in the first two years following the introduction of the IPP policy, growth of around 3.1% occurred. It is estimated that during 1980-81 there was very strong growth in this category (over 11%) due to the very high number of new registrations. In March quarter 1981 new registrations were at a higher level than any time since March quarter 1974 and in 1980-81 70,461 new motor cycles were registered, an increase of 31.2% over the previous year.

Composition of the Vehicle Stock

In addition to the reduced rate of growth of the total private vehicle stock, there have been some significant changes in its composition, including a shift to smaller engined vehicles and improved fuel efficiency through changing vehicle technology. Figure 8.1 below shows new vehicle registrations by engine size, small (up to 2 litres), medium (2-4 litres) and large (over 4 litres). It can be seen that there has been a gradual increase in the percentage of "small" new vehicle registrations. They increased from 54% in June quarter 1978 to 65% in March quarter 1980. However, since that time the real price of fuel began to stabilise, the proportion of "small" vehicles in new car registrations has grown at a reduced rate, and in June quarter 1981 was about 66%.

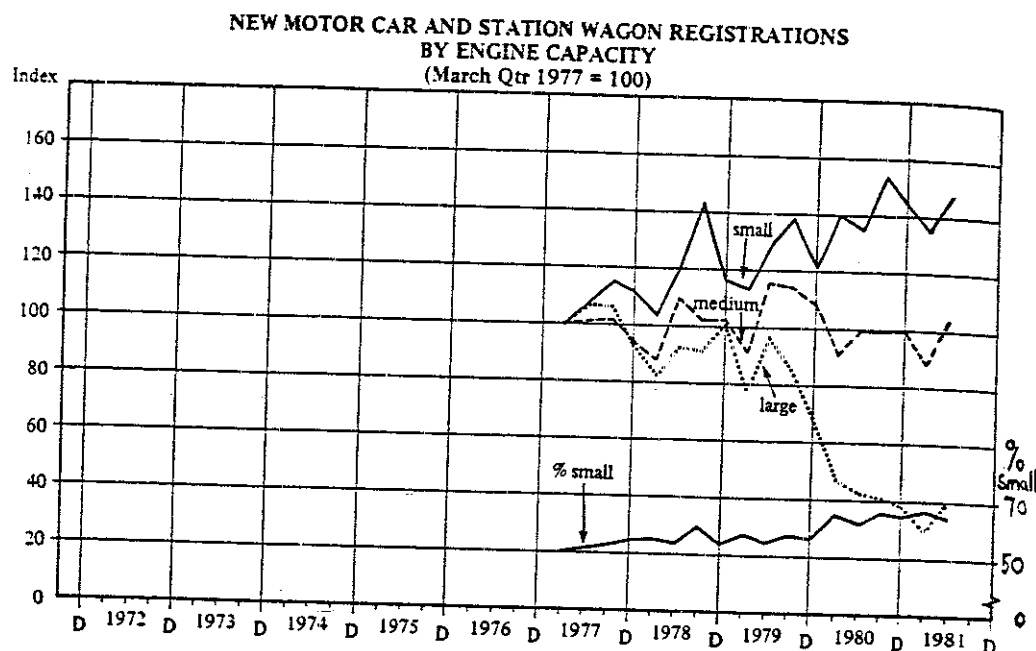


FIGURE 8.1

There has been a major impact on the number of new large cars registered, which has fallen to about 30% of the level in 1977. Conversely, new small car registrations have increased by 40%, and sales of medium sized cars (2-4 litres) have remained largely unchanged over the last 3 years. It can also be seen that whereas sales of small vehicles (predominantly 4 cylinder cars) peak in September quarters, sales of medium sized cars (predominantly 6 cylinders) peak in the June quarters. It appears that, for a range of reasons, companies re-equip their vehicle fleets at the end of the financial year, and have continued to buy the larger 6 cylinder vehicles.

Fleet Average Fuel Consumption

In addition to the general switch to smaller engined vehicles, there have been various technological changes which have reduced the fleet average fuel consumption of new vehicles from an estimated 11.8L/100km in 1978 to 10.2L/100km in 1980. Since the introduction of IPP manufacturers have made several technological improvements in vehicles resulting in improved fuel efficiency. The 1.6L/100km improvement is due to reduced enginesizes, reduced vehicle weights and changes in the emission technology of local manufacturers. In particular, significant gains have been made by the introduction of improved six cylinder engines in the top selling Commodore and Falcon models.

9. IMPACTS ON HOUSEHOLD COSTS

Section 5 described general impacts of higher fuel prices on private motoring and public transport.

This section examines changes in

- (a) the proportion of household expenditure on private motor vehicle operation and purchase;
- (b) the petrol cost of the journey to work.

Private Motor Vehicle Expenditure

Table 9.1 shows changes in the price index components of private motor vehicle "operation" and "purchase" and in private motor vehicle expenditure as a proportion of household disposable income (HDI).

TABLE 9.1: CHANGES IN PRIVATE MOTOR VEHICLE "OPERATION" AND "PURCHASE" PRICE INDICES AND EXPENDITURE PROPORTIONS OF HDI .

PERIOD	PRIVATE MOTORING PRICE INDICES			Private Motor Vehicle Expenditure as a Proportion of Household Disposable Income		
	Operation	Purchase	Operation and Purchase	(b)		
	(Annual Compound Increase %)		(a)	Operation %	Purchase %	Operation & Purchase %
<u>Pre-IPP</u>						
1974-75	7.3	0.0	5.3	5.4	3.9	9.3
1975-76	0.0	9.1	3.1	5.7	3.7	9.4
1976-77	-3.9	-2.1	-4.0	5.7	3.6	9.2
1977-78	-1.0	6.4	0.0	5.7	3.5	9.2
<u>Post-IPP</u>						
1978-79	7.4	-5.3	3.1	5.9	3.4	9.3
1979-80	4.9	-4.3	1.7	6.8	3.3	10.1
1980-81	1.9	-2.7	0.5	n.a.	n.a.	n.a.

Source: DoTA, based on ABS series

- (a) Derived from components of Consumer Price Index (ABS)
- (b) National Accounts (ABS)

n.a. = not available

Table 9.1 shows that :

- (a) while private motor vehicle operation expenditure as a proportion of HDI rose from 1974-75 to 1979-80 this increase, until 1978-79, was offset by a fall in the proportion devoted to motor vehicle purchase
- (b) the proportion of HDI expended on private motor vehicle operation rose significantly in 1979-80. This increase was only slightly offset by a marginal fall in the proportion spent on purchase, so that the proportion for total motor vehicle expenditure rose for the first time in the period examined.

Journey to Work

It is often asserted that the residents on the urban fringe have incurred considerable increases in journey to work costs as a result of the rising price of fuel. In order to test this hypothesis, DoTA undertook an analysis of the increase in the costs of the journey to work in Sydney as a function of residential location, and compared the results for the outer areas with those for the inner areas. The analysis used 1976 census data providing work location and mode of journey to work disaggregated to local government area (LGA) level. Fuel consumption data were derived from the results of research on fuel consumption as a function of operating speed for various traffic conditions. Combining this information and the census origin/destination data, a mean journey-to-work fuel consumption figure was calculated for each LGA.

Assuming no change in trip behaviour and on the basis of the change in the price of petrol since the introduction of import parity pricing, it was possible to estimate the average increase in journey to work motoring costs for each LGA. The analysis estimated that average weekly fuel costs for the journey to work in the outer regions of Sydney such as Gosford and Blue Mountains LGAs would have increased by about \$8 per week as a result of petrol price rises from June 1978 to June 1980. For middle range LGAs, where a considerable proportion of Sydney's population live, such as Fairfield, Blacktown, Liverpool and Sutherland, the increases were in the range \$4 to \$5 per week. In the inner areas, rises of less than \$2 per week were estimated.

These estimates should be put in perspective. While from June quarter 1978 to June quarter 1980 the retail price of super petrol increased by 15 cents/litre, or about 87% in nominal terms, household disposable income rose by 24% in nominal terms. Expenditure on petrol increased from an estimated 2.4% of household disposable income in 1978/79 to 3.5% in 1979/80.

Despite the differences in the socio-economic status of some of the LGAs (and consequently possible differences in patterns of journey to work) the impact of petrol price rises was more dependent on distance from the Sydney Central Business District (CBD) than the socio-economic status of the LGA.

It was not possible in the analysis to identify particular groups of households that were most affected. In general, both high and low income earners in the outer LGAs have been more disadvantaged than those of the inner areas. More disaggregated data, which are not available from the census, would be needed to clearly identify affected groups and the extent of the impacts of higher fuel prices on them.

10. CONCLUSIONS

The main conclusions from the analysis in the paper are:

- (a) The overall direct impacts of the marked increase in the real prices of transport fuels in the period from June quarter 1978 to June quarter 1980 were small compared with the magnitude of the average annual price rises (24% for petrol, 26% for auto distillate used in road transport, 49% for rail distillate, 28% for Avtur and 34% for marine fuel oil)
- (b) The rate of growth of consumption of petrol (as measured by releases from bulk storage) fell from an annual rate of over 4% in the four years to 1977-78 to 1.2% in the two years from 1977-78 to 1979-80 and only 0.4% in 1980-81. However, the consumption of auto distillate for road use appeared to be unaffected by price rises due primarily to the strong demand for road freight services and continuing dieselisation of the truck fleet.

Consumption of Avtur fell from an annual growth rate of 5.3% in the four years to 1977-78, to 1.3% in the two years from 1977-78 to 1979-80. This change reflected decreased demand for air services caused mainly by air fare rises which were affected by increased fuel costs.

- (c) While the post-IPP price rises increased air and road transport operating costs to a significant extent, these increases were offset to some degree in the road mode by other factors. Increased real operating costs of private motoring have been offset by a decline in the real purchase price index of vehicles. On the freight side, road transport operating costs have been contained, particularly by the use of more fuel efficient vehicles and by improved operating practices. The main impact of IPP has clearly been on air transport, with fuel price rises being passed on through higher fares and freight rates. Fuel price rises have also been a contributing factor in increased fares and freight rates in surface modes of public transport. However, other factors, such as action to reduce operating deficits, appear to have had an important influence.

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- (d) The direct impact of fuel price rises on activity levels in surface freight transport urban public transport and private motoring in urban areas appears to have been small. In the two year period 1977-78 to 1979-80 there were marginal shifts from private motoring to public transport in urban areas, but it is not possible to separate fuel price impacts from the effects of improvements in public transport services. In surface freight transport there has been increased interest in rail freight, but in practice road transport has more than held its share of long distance non-bulk traffic, notwithstanding the significantly greater impact of fuel price rises on road operating costs. The strong position maintained by road transport is related to the nature of services provided by road transport and the importance of such factors as reliability of delivery time in minimising non-transport distribution costs, especially inventory and warehousing costs.

There appears to have been some shift from air passenger transport to rail, bus and private car on some routes as a consequence of air fare rises which have resulted from fuel cost increases and changes flowing from the Holcroft enquiry on air fares. The latter factor has been particularly important in reduced air passenger activity on the shorter routes (e.g. Sydney-Canberra).

The decrease in air domestic freight activity since 1979 appears to be partly related to significant increases in air freight rates which have resulted from increased fuel costs.

- (e) In long distance non-bulk freight transport, increased fuel costs have had a significant impact on the transport cost component of physical distribution costs, but the increase in this component appears to have been offset on average by shippers economising in non-transport distribution costs, especially in administration (order processing, receipt and despatch) and to a lesser extent warehousing.
- (f) The impacts of fuel price rises on the size, composition and fuel efficiency of the private motor vehicle stock appear to have been significant. There has been a marked shift to smaller and lighter vehicles in new registrations of cars and station wagons (CSW) and also a notable increase in new registrations of motor cycles. The proportion of new registrations of CSW with less than 2 litre engine capacity rose from 54% in June quarter 1978 to 60% in June quarter 1980 and nearly 66% in June quarter 1981.

- (g) Real urban passenger fares have risen since 1978 but an important contributing factor has been action by public transport authorities to reduce their high deficits. Real taxi fares have not increased greatly since 1978. This is probably because labour accounts for a high proportion of total costs in the taxi industry.
- (h) The main impacts of fuel price rises on households have been on those in outer urban areas which have not been able to use alternatives to their private motor vehicles for journeys to work. Using 1976 census data for the journey to work in Sydney, it has been estimated that the increase in cost (due to fuel price rises) of the average journey to work in the period 1977-78 to 1979-80 was more than 4 times greater for households in outer LGAs (e.g. Blue Mountains) than for households in inner LGAs in the Sydney area.

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