

BTE Road Construction Price Indexes 1971/72 to 1981/82

Information Paper

This Information Paper presents input-price indexes for national road construction activity for the period 1971-72 to 1981-82. This is part of a series which commenced in 1969-70.

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BTE Road Construction Price Indexes: 1971-72 to 1981-82



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FOREWORD

This Information Paper presents input-price indexes for national road construction activity for the period 1971-72 to 1981-82. This is part of a series which commenced in 1969-70.

The BTE has compiled these indexes for use in its current study of the Australian road system, and to assist others interested in road construction activity who require up-to-date information on price movements for inputs to road construction.

The work involved in preparing this paper was carried out under the direction of Dr R.W. Mellor.

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SUMMARY

The Bureau of Transport Economics (BTE) reviewed various road construction price indexes and produced new input-price indexes for the road construction industry for the period 1969-70 to 1980-81 in BTE Report No 49 *Road Construction Price Indexes: 1969-70 to 1980-81*. This Information Paper contains an update of the BTE input-price indexes for the financial year 1981-82 and also sets out minor revisions to the indexes for 1980-81. Preliminary data which were used in compiling the indexes for 1980-81 have now been updated, and this has resulted in minor amendments to the 1980-81 figures. In addition, a new index to measure movements in fuel prices has been devised, and is introduced for the 1981-82 update of the BTE indexes.

The BTE Road Construction Price Indexes are designed for use in the BTE's current study of the Australian road system and, in particular, for the analysis of trends in road expenditure at constant prices. However, they also provide a general guide to trends in road construction costs in Australia. Important considerations in devising the indexes were that they should be statistically robust, timely, readily capable of being updated and easily interpreted.

The BTE price index for overall road construction activity rose sharply in 1979-80 and 1980-81, with increases of 15.9 per cent and 15.5 per cent respectively. The rate of increase declined in 1981-82, with the index showing a 12.5 per cent increase. This decline was due principally to substantial reductions in rises in fuel and bitumen prices, which more than offset some rise in labour costs.

CHAPTER 1—INTRODUCTION

Road construction indexes are important tools for assessing the impact of changes in funding levels on the physical level of the provision of road infrastructure. Such indexes have been developed in Australia by a number of agencies and for a variety of purposes.

BTE Report No 49 *Road Construction Price Indexes: 1969-70 to 1980-81* (BTE 1981) sets out details of a number of Australian road construction price indexes:

- national indexes compiled previously by the BTE and by the former Commonwealth Bureau of Roads (CBR);
- State indexes produced by individual State road authorities (SRAs); and
- implicit price indexes derived from the Australian Bureau of Statistics (ABS) National Accounts (which have sometimes been used as a proxy for price changes in the road construction industry).

In addition, new BTE input-price indexes for the road construction segment of the Australian economy were presented for the period 1969-70 to 1980-81 in that Report. The reader is referred to the Report for a full explanation of the indexes, and the reasons for choosing the form of the new indexes. The new BTE indexes have the following features:

- they are input-price indexes, and employ input components closely related to road authorities' actual expenditure items;
- the overall index relates to Australia as a whole, and is composed of three sub-indexes relating to maintenance, SRA construction and local government authority (LGA) construction; and
- each of the sub-indexes contains the following input components—salaried and other labour; fuel, bitumen and other materials; and plant acquisition and replacement.

The paper is organised in the following manner. Chapter 2 presents an outline of how the BTE Road Construction Price Indexes are constructed. These indexes, and their component indexes, are set out on an annual basis for the period 1971-72 to 1981-82 in Chapter 3. Some concluding remarks are presented in Chapter 4.

CHAPTER 2—OUTLINE OF BTE INDEXES

TYPE OF INDEX

BTE Road Construction Price Indexes are input-price indexes. That is, they measure changes in the prices of inputs to road construction on the basis of general national price indexes. No adjustment for productivity is made. BTE Report No 49 examined the issues involved in measuring productivity changes (and associated changes in the quality and composition of both inputs and outputs), with a view to deriving an output-cost index which reflects changes in input prices and productivity. The report concluded that further substantial work on obtaining comparable data on unit cost movements in the road construction industry would be necessary to estimate productivity changes and output costs in a robust manner.

The BTE index for overall road construction activity relates to Australia as a whole, and no disaggregation by State was attempted. It is made up of three sub-indexes:

- construction by State road authorities (SRAs);
- construction by local government authorities (LGAs); and
- total maintenance.

INPUT COMPONENT INDEXES

The six major input categories to the road construction industry were identified as:

- Labour
 - Salaried
 - Other
- Materials
 - Fuel
 - Bitumen
 - Other
- Plant acquisition and replacement

The component indexes considered appropriate to measure price movements in these input categories are set out in Table 2.1.

REVISION TO FUEL COMPONENT INDEX

The choice of an index to measure movements in fuel prices has proved difficult, and no readily available index is felt to be entirely satisfactory. This is a result of the role of excise duty and franchise fees in regard to fuel prices. Some of the principal characteristics of this role are as follows.

- Prior to the 1982-83 Commonwealth Budget there was an exemption from the Commonwealth excise on diesel fuel for off-road end use (fuel used in road construction activity is predominantly in the off-road category).
- Following the termination of road maintenance charges by State governments, State franchise fees on fuel sales started to be introduced from July 1979; by June 1982 there were franchise fees in Victoria, Western Australia, South Australia and Tasmania. There was an off-road exemption from these fees in each State except South Australia, although with the termination of the Commonwealth off-road

TABLE 2.1—INPUT COMPONENT INDEXES

<i>Component</i>	<i>Price indexes</i>	<i>Source</i>
Labour		
Salaried	Average weekly earnings, males, Australia	ABS, Average weekly earnings, Australia (No 6302.0), various issues
Other	Weighted average minimum weekly wage rates, male, all industry groups, Australia	ABS, Wage rates, Australia, (No 6312.0), various issues
Materials		
Fuel	Price index of automotive distillate	Petroleum Products Pricing Authority: 'Typical Maximum Justified Price' ^{a, b}
Bitumen	Price of bitumen index	The Shell Company of Australia's Melbourne price of road making grade of bitumen
Other materials and stores items	Price index of materials used in building (other than house building), Australia	ABS, Price index of materials used in building other than house building, six State capital cities, (No 6407.0), various issues
Plant acquisition and replacement	Price index of construction and earth moving machinery and equipment	ABS unpublished ^c

a. Prior to 1981-82 fuel prices were measured by an index of automotive distillate prices, which is an unpublished component of ABS *Price Indexes of Articles Produced by Manufacturing Industry* (No 6412.0).

b. The Commonwealth excise duty on automotive distillate is deducted from this price due to the exemption of off-road activity from this duty. Note that the off-road excise exemption was recently terminated and hence, the excise will be included in the price of automotive distillate in future years.

c. The index for Australian Standard Industrial Classification (ASIC) Class 3332 is an unpublished component of ABS *Price Indexes of Articles Produced by Manufacturing Industry* (No 6412.0), and is available on request from the ABS.

excise exemption, it is understood that this exemption is being reviewed in Victoria and Tasmania.

- Revenue collected from State franchise fees is predominantly channelled into road construction and maintenance.

In Report No 49 (BTE 1981) fuel prices were measured by an automotive distillate index which is an unpublished component of the ABS *Price Indexes of Articles Produced by Manufacturing Industry*. Prices used by the ABS in compiling these indexes are manufacturers' selling prices exclusive of excise and sales tax. However, because of the changes noted above in excise duty and franchise fees on automotive distillate in recent times, BTE has decided to measure fuel prices (from 1981-82 onwards) by means of a specially-constructed index which measures wholesale prices to dealers inclusive of excise tax and franchise fees.

The new fuel component index is derived by calculating an average price (over all companies) of automotive distillate for each of the six capital cities based on the

Petroleum Pricing Authority (PPA)¹ 'Typical Maximum Justified Prices'² at 31 December of each year. The Commonwealth excise duty on automotive distillate is deducted from this price in 1981-82 since fuel used in off-road activities was then exempt from the duty³ but will be included in the price of automotive distillate in 1982-83 and subsequent years assuming no change in tax policy. These average prices are weighted by the population proportion relating to each city; ABS population estimates for 1979-80 are used so that these weights have the same base as other weights in the indexes.

In summary, the ABS series based on the manufacturers' selling price of automotive distillate was used to measure changes in fuel prices from 1969-70 to 1980-81, and the new fuel component index described above is used from 1981-82 onwards. The two series have been spliced together to provide comparable movements in fuel prices over the longer term.

The new fuel component index shows a slightly larger increase than the old series in 1981-82 (see Chapter 3). It is expected that the new series will more accurately reflect future changes in fuel prices as it will take into account the termination of the Commonwealth off-road excise exemption on diesel fuel, and will reflect any changes in Commonwealth excise tax and State franchise fees.

COMPONENT WEIGHTINGS

The BTE index for overall road construction activity is made up of three sub-indexes which have the following weights attributed to them:

	<i>(per cent)</i>
SRA construction	35
LGA construction	31
Maintenance	34
	<hr/> 100

TABLE 2.2—COMPONENT WEIGHTS, ESTIMATED FOR BASE YEAR 1979-80

	<i>(per cent)</i>			
	<i>Sub-indexes</i>			
<i>Component</i>	<i>SRA construction</i>	<i>LGA construction</i>	<i>Maintenance</i>	<i>Overall activity</i>
Labour				
Salaried	22.8	20.4	15.9	19.7
Other	32.1	32.1	44.1	36.1
Total	54.9	52.5	60.0	55.8
Materials				
Fuel	9.1	10.3	11.7	10.4
Bitumen	9.3	9.4	6.2	8.3
Other	20.9	18.2	14.6	17.9
Plant acquisition and replacement	5.8	9.6	7.5	7.6
	100.0	100.0	100.0	100.0

1. The Prices Justification Tribunal prior to the creation of the PPA.

2. These are the maximum approved wholesale prices and include excise charges and State franchise fees.

3. The off-road excise exemption was terminated in the 1982-83 Commonwealth Budget.

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The weights relating to the six input components for each of the sub-indexes and the overall activity index, are set out in Table 2.2. Estimated expenditure on the input components in the base year 1979-80 was used to determine the weights employed. Further details of the derivation of the weights is given in BTE (1981, pp22-25).

CHAPTER 3—BTE ROAD CONSTRUCTION PRICE INDEXES

In the first part of this chapter the input component indexes are tabulated for the period 1971-72 to 1981-82, and some key aspects of them discussed. These component indexes are then combined with the component weights to produce the sub-indexes and the index for overall road construction activity for 1971-72 to 1981-82; some observations on these indexes are made. The chapter concludes with some comparisons of the BTE input-price index for overall activity with SRA road construction indexes and the ABS implicit price deflator for private sector fixed capital expenditure on non-dwelling construction.

INPUT COMPONENTS

The six input component indexes are set out in Table 3.1 and are presented in diagrammatic form in Figure 3.1. It can be observed that:

- the rate of growth in labour costs was very high in the period 1973-74 to 1975-76 and then tapered off, but has accelerated again in the past two years;
- fuel prices rose substantially in 1974-75 and 1975-76, and also increased markedly after the Government's announcement of import parity pricing for domestically produced crude oil in July 1978; there was a relatively small rise in fuel prices in 1981-82¹;
- bitumen prices showed a substantial rise in 1974-75 and again in 1979-80 and 1980-81, following the Government's new policy on crude oil pricing; this component registered a further significant increase in 1981-82 although this rise was well below that of the preceding two years; and
- prices of 'other materials' and of 'plant acquisition and replacement' have moved much in line with general increases in prices in the economy over the ten-year period. Both these component indexes recorded a slightly smaller increase in 1981-82 than in the preceding year.

RESULTANT INDEXES

Combining the component weights (Table 2.2) with the component indexes (Table 3.1) yields the input-price indexes set out in Table 3.2. The indexes were computed for the base year 1979-80, but have been scale-adjusted so that 1969-70 = 100.0 for easier analysis. The major conclusions to be drawn from Table 3.2 are:

- price movements in the three sectors examined (SRA construction, LGA construction and maintenance) were very similar over the period 1971-72 to 1981-82;
- the indexes showed large increases in 1974-75, due principally to substantial increases in labour costs, although all components did rise significantly;
- the substantial growth in the indexes in 1975-76 came about because of significant increases in all components;
- the indexes displayed significant increases again in 1979-80 and 1980-81, but this time due principally to substantial growth in fuel and bitumen prices; and

1. Note that the previous fuel component index based on the ABS automotive distillate series would have shown a smaller rise (6.8 per cent) in 1981-82 than that given by the new (PPA based) fuel component index (10.4 per cent)

TABLE 3.1—COMPONENT INDEXES OF BTE ROAD CONSTRUCTION PRICE INDEXES^a

(Base year 1979-80, adjusted so that 1969-70 = 100.0)

Year ended 30 June	Labour				Fuel ^c		Bitumen		Other materials		Plant acquisition and replacement	
	Salaried ^b		Other		Index	Per-centage change	Index	Per-centage change	Index	Per-centage change	Index	Per-centage change
	Index	Per-centage change	Index	Per-centage change								
1972	122.4	—	120.4	—	110.5	—	109.8	—	111.3	—	111.2	—
1973	133.4	9.0	133.2	10.6	110.5	0.0	109.8	0.0	116.7	4.9	114.2	2.7
1974	155.0	16.2	157.6	18.3	110.2	-0.3	109.8	0.0	131.9	13.0	120.1	5.2
1975	194.4	25.4	205.7	30.5	125.9	14.2	189.3	72.4	162.2	23.0	144.4	20.2
1976	222.3	14.4	236.0	14.7	169.3	34.5	212.6	12.3	186.6	15.0	169.4	17.3
1977	249.9	12.4	266.2	12.8	192.4	13.6	254.5	19.7	208.4	11.7	198.2	17.0
1978	274.6	9.9	290.6	9.1	232.9	21.0	272.8	7.2	226.0	8.4	215.8	8.9
1979	295.7	7.7	309.7	6.6	308.7	32.5	274.7	0.7	242.6	7.3	228.1	5.7
1980	324.9	9.9	336.9	8.8	497.4	61.1	380.8	38.6	274.2	13.0	252.1	10.5
1981	369.1r	13.6	373.9r	11.0	631.8r	27.0	512.4	34.6	309.7r	12.9	281.5	11.7
1982	423.7p	14.8p	416.9p	11.5p	697.8	10.4	606.9	18.4	344.0p	11.1p	311.1p	10.5p

a. The indexes used to represent the component indexes are set out in Table 2.1.

b. The ABS Average Weekly Earnings series is used to measure Salaried Labour. From the September quarter 1981, this series was based on a new survey of employers which replaced the previous series based principally on information from payroll tax returns. It was necessary to link the new series to the old in order to provide an index on a comparable basis over the whole period.

c. An automotive distillate index (which is an unpublished component of ABS Price Indexes of Articles Produced by Manufacturing Industry) is used as the fuel component index until 1980-81; a new series based on the Petrol Pricing Authority's 'Typical Maximum Justified Price' of automotive distillate is used for 1981-82 (see Chapter 2 for details).

p provisional estimates.

r revisions to the index values presented in Report No 49 (BTE 1981) resulting from updated information.

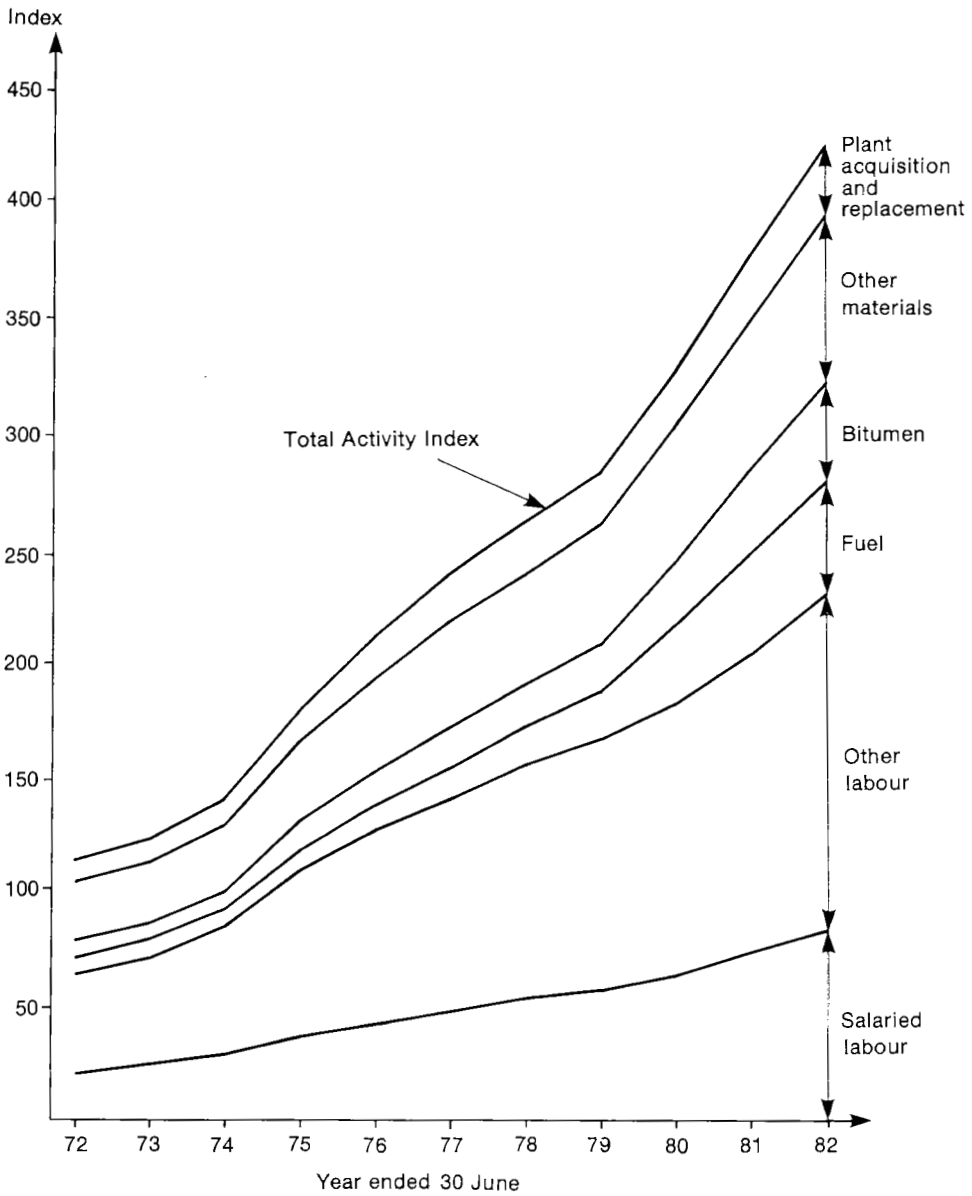


Figure 3.1. Component Indexes of BTE Road Construction Price Indexes^a

a. Note that the curve for each component index reflects its relative weight in the total activity index, as well as the growth in the price of that component.

TABLE 3.2—BTE ROAD CONSTRUCTION INPUT-PRICE INDEXES

(Base year 1979-80, adjusted so that 1969-70 = 100.0)^a

Year ended 30 June	SRA construction		LGA construction		Maintenance		Overall activity	
	Index	Percentage change	Index	Percentage change	Index	Percentage change	Index	Percentage change
1972	116.4	—	116.1	—	116.8	—	116.4	—
1973	124.4	6.9	123.9	6.7	125.3	7.3	124.5	7.0
1974	141.1	13.4	139.8	12.8	142.6	13.8	141.2	13.4
1975	181.6	28.7	179.7	28.5	183.1	28.4	181.5	28.5
1976	209.7	15.5	207.9	15.7	212.1	15.8	209.9	15.6
1977	237.4	13.2	235.9	13.5	240.2	13.2	237.9	13.3
1978	260.3	9.6	258.7	9.7	263.7	9.8	260.9	9.7
1979	280.7	7.8	279.2	7.9	285.5	8.3	281.8	8.0
1980	325.1	15.8	324.6	16.3	330.3	15.7	326.7	15.9
1981	376.1r	15.7	375.9r	15.8	380.1r	15.1	377.4r	15.5r
1982	423.9p	12.7p	423.3p	12.6p	426.5p	12.2p	424.7p	12.5p

a. The overall activity index and the sub-indices were derived for the base year 1979-80, and then scale-adjusted to give 1969-70 = 100.0, to facilitate analysis. Note that the adjusted scale (1969-70 = 100.0) version of the overall activity index cannot be derived simply from the three sub-indices (SRA construction, LGA construction and maintenance) by using the weights given in the text. Similarly, in the adjusted scale, the three sub-indices cannot be derived simply from the component indexes in Table 3.1. Each of the required indexes must be constructed from the component indexes at their base year (ie 1979-80 = 100.0).

p provisional estimates.

r revisions to the index values presented in Report No 49 (BTE 1981) resulting from updated information.

TABLE 3.3—COMPARISONS WITH BTE ROAD CONSTRUCTION PRICE INDEX

(1969-70 = 100.0)

Year ended 30 June	BTE input-price index (overall activity)		SRA input-price index		SRA input-cost indexes						ABS implicit price deflector; gross fixed capital expenditure, non-dwelling construction Private Sector ^b	
					MRD (QLD)		DMR (NSW)		CRB (VIC) ^a			
	Index	Per- centage change	Index	Per- centage change	Index	Per- centage change	Index	Per- centage change	Index	Per- centage change		
1972	116.4	—	117.5	—	117.1	—	119.5	—	120.3	—	114.5	—
1973	124.5	7.0	127.4	8.4	128.4	9.6	134.3	12.4	136.3	13.3	123.3	7.7
1974	141.2	13.4	149.2	17.1	146.2	13.9	165.1	22.9	166.5	22.2	141.2	14.5
1975	181.5	28.5	192.6	29.1	187.5	28.2	193.7	17.3	196.9	18.3	180.6	27.9
1976	209.9	15.6	222.2	15.4	217.0	15.7	222.2	14.7	231.5	17.6	209.4	15.9
1977	237.9	13.3	248.5	11.8	244.4	12.6	241.4	8.6	260.0	12.3	234.5	12.0
1978	260.9	9.7	270.1	8.7	264.6	8.3	257.9	6.8	278.2	7.0	254.8	8.6
1979	281.8	8.0	287.0	6.3	281.4	6.3	273.5	6.0	302.9	8.9	274.2	7.6
1980	326.7	15.9	314.9	9.7	323.3	14.9	324.4	18.7	337.7	11.5	303.0	10.5
1981	377.4	15.5	353.9	12.4	373.5	15.5	367.5	13.3	377.6	11.8	340.0	12.2
1982	424.7p	12.5p	395.7	11.8	426.9p	14.3p	414.9	12.9	429.7p	13.8p	382.1p	12.4p

a. The CRB (VIC) and HD (SA) input-cost indexes relate to costs at 30 June of the designated year (not 'average' costs over the year).

b. This series has been revised since Report No 49; it is now based on average 1979-80 prices.

p provisional estimates.

Source: Table 3.2, BTE (1981) Table 3.1 and personal communication, ABS (1981), ABS (1982).

- the 1981-82 increase was less substantial, with the overall activity index rising by 12.5 per cent compared with a 15.5 per cent increase in 1980-81. This decline in the rate of growth was due principally to substantial reductions in the rises in fuel and bitumen prices, which more than offset some rise in labour costs.

In interpreting these BTE Road Construction Price Indexes, it must be remembered that the indexes are based on input prices, and therefore they do not reflect productivity gains. To the extent that such gains occur, the indexes will tend to overstate increases in output costs and output prices for the road construction industry.

COMPARISON WITH OTHER INDEXES

In Table 3.3, the *BTE input-price index* for overall road construction activity is compared with the *ABS implicit price deflator* for private sector gross fixed capital expenditure on non-dwelling construction (which has been used as a proxy for price changes in road construction), the Queensland Main Roads Department (*MRD*) *input-price index* and the *input-cost indexes*¹ of the NSW Department of Main Roads (*DMR*), the Country Roads Board (*CRB*) in Victoria and the South Australian Highways Department (*HD*).

On the basis of these comparisons the following points can be made.

- The BTE input-price index for overall activity showed a slightly larger increase in 1981-82 than the MRD (Qld) input-price index (12.5 per cent compared to 11.8 per cent), as it generally has done since 1975-76. In the two years 1979-80 and 1980-81, the BTE index had a much higher rate of growth due to the substantial rises in fuel and bitumen prices, which the BTE index takes into account explicitly.
- The SRA input-cost indexes (*DMR* (NSW), *CRB* (VIC), *HD* (SA)) all showed a higher rate of growth than the BTE index in 1981-82. Over the whole period 1971-72 to 1981-82, all four indexes increased at about the same rate with no definite pattern emerging. The different indexes assign different weighting patterns to the various components; the SRA indexes tend to have higher labour components while the BTE index gives greater weight to fuel and bitumen.
- In 1981-82, the *ABS implicit price deflator for private sector fixed capital expenditure on non-dwelling construction* and the BTE input-price index showed similar rates of growth, as they have done over the whole period 1971-72 to 1981-82 (except for the two years 1979-80 and 1980-81, when there were very substantial rises in fuel and bitumen prices).

1. Input-cost indexes measure the costs of representative units of inputs to the road construction industry, as indicated by actual costs incurred by road authorities.

CHAPTER 4—CONCLUDING REMARKS

The rate of growth of the BTE input-price index for overall road construction declined in 1981-82, with a rise of 12.5 per cent compared with rises of 15.9 per cent and 15.5 per cent in 1979-80 and 1980-81 respectively. This reduction in the rate of increase in the index is due principally to a substantial decline in the rate of growth of fuel and bitumen prices; both 'other materials' and 'plant acquisition and replacement' recorded a slightly smaller increase in 1981-82 than in the preceding year; decreases in the growth rates of these four components more than offset a rise in the rate of growth of labour costs in 1981-82.

Recent increases in the BTE Road Construction Price Index for overall activity of 12.5 per cent (1981-82), 15.5 per cent (1980-81) and 15.9 per cent (1979-80) can be compared with:

- corresponding increases for these three years in the Consumer Price Index (CPI) of 10.4 per cent, 9.4 per cent and 10.2 per cent; and
- comparable rises in the implicit price deflator for fixed capital expenditure on non-dwelling construction of 12.4 per cent, 12.2 per cent and 10.5 per cent.

The main reason for the faster growth in road construction prices has been the impact of rapid increases in fuel and bitumen prices. Also, road construction input prices have persistently increased faster than the CPI over the past decade, reflecting in part the relatively labour intensive nature of the road construction industry.

Finally, it must be remembered that the BTE Road Construction Price Indexes are based on input, and not output, prices. Therefore they do not reflect productivity gains.