TRACING PRICE CHANGES THROUGH STAGES OF PRODUCTION: AUSTRALIA, 1968 TO 1977[1]

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This study is concerned with an effort to analyze changes in costs and prices in the Australian economy by tracing the effects of changes in wages and import prices through the stages of production, using a disaggregated input-output model with lags. The object of constructing the model was to improve, by introducing lags, the accuracy of predictions of the effect of cost changes on prices, and to show the lag structures. Data problems encountered are discussed, and the need for integration of price statistics to enhance their usefulness for analyses such as this is emphasized. Concepts and sources of data are discussed in some detail in an appendix.

1. INTRODUCTION

In recent years indexes of wholesale prices, which were compiled initially for other purposes, have increasingly been used to monitor the effects of changes in costs on final prices. Because wholesale price indexes measure changes in prices at an intermediate stage of production, they provide some indication of how quickly changes in costs are being passed through the economy and hence are a useful predictor of changes in retail prices.

This use of wholesale prices, however, leads to new problems in interpreting changes in price indexes, in addition to the traditional ones of appropriate formula, quality change, etc. The new problems result from differences in coverage of the price indexes and from difficulties in estimating the time it takes for changes in costs to affect prices at different stages of production. For example, a change in import prices will only affect domestic price indexes to the extent that import costs are a component of the cost of producing the items included in the indexes and also, of course, to the extent that they are fully passed on. Moreover, the full impact of changes in these costs on, say, manufacturers' selling prices will be felt over the period of time it takes for indirect as well as direct effects to filter through. Analysis of these problems obviously involves knowledge about the development of price changes over time.

It is the purpose of this paper to examine the relationship between changes in costs and prices in Australia from 1968 to 1977. We are concerned with describing the effects of changes in wages and import prices on the official indexes of wholesale prices and retail prices.

An input-output model is first constructed which allows for delays in passing on costs between industry sectors. The interrelationship between the indexes of costs and prices is then studied by simulating the model for assumed changes in

[1]With thanks to Neville Cain, Alan Hall and Weiner Teufelsbauer for comments and suggestions and to Terry Harlow of the Australian Bureau of Statistics for helpful advice concerning official figures.

items of costs, and recording the subsequent effects on the price indexes. We also test the reasonableness of the assumptions about price determination by contrasting the price changes calculated by the model with actual prices. The results of applying the model to explain the effect on domestic prices of the devaluation of the Australian dollar in November 1976, and of predicting movements in the retail price index, are also given.

The next section of this paper reviews briefly the main trends in prices and costs since 1970. Section 3 discusses the model. The main results are presented in sections 4 and 5, and section 6 briefly discusses data problems encountered in this study.

(Note: *WPI* is the official price index of articles produced by manufacturing industry. This is a *net* sector index of sales by manufacturing industries to other sectors. *RPI* is the official Consumer Price Index, slightly amended for recent quarters by the authors to remove some inconsistencies.)

2. Trends in Prices and Costs

Changes in retail prices and the main items of cost since 1970 are shown in Chart 1. Retail prices (the RPI) increased by 7 percent in 1970–71, by 6 percent in 1971–72, and have risen at an annual rate of between 10 and 12 percent since 1972–73. As in most other countries the recent inflation has been associated with large relative price adjustments. The main changes were a rapid rise in money *wages* in 1970–71; a sharp rise and a subsequent fall in costs of *locally produced materials* between 1972 and 1974; and a large rise in prices of *imports* in 1973 and 1974. In recent months import prices have again risen, following the devaluation in November 1976, while the rate of increase of money wages has fallen.

3. The Model of Price Formation

A. *General*

Changes in costs are traced through a disaggregated input-output model with lags. For most industries (comprising manufacturing and service industries) prices are based on unit costs of goods sold. Labour costs are "normal" labour costs: actual wages are divided by the trend in productivity. For the mining and agricultural industries, however, prices are assumed to be determined (in the short run) by supply and demand, and changes in these industry prices are treated as exogenous. Thus the economy is divided into "competitive" and "non-competitive" sectors, and we assume that in the competitive sector prices are insensitive to short run variations in demand.

The input-output coefficients are assumed constant, and they serve as fixed weights for combining the unit value of labour and materials. The coefficients are derived from the official input-output table, in which entries are at basic values, and imports are allocated directly to using industries or to final buyers.

The input-output coefficients and hence the indexes of prices and the weights are expressed in June 1962 prices. The model is started in 1962, although the results in this paper are given only from July 1968 which is the date at which the

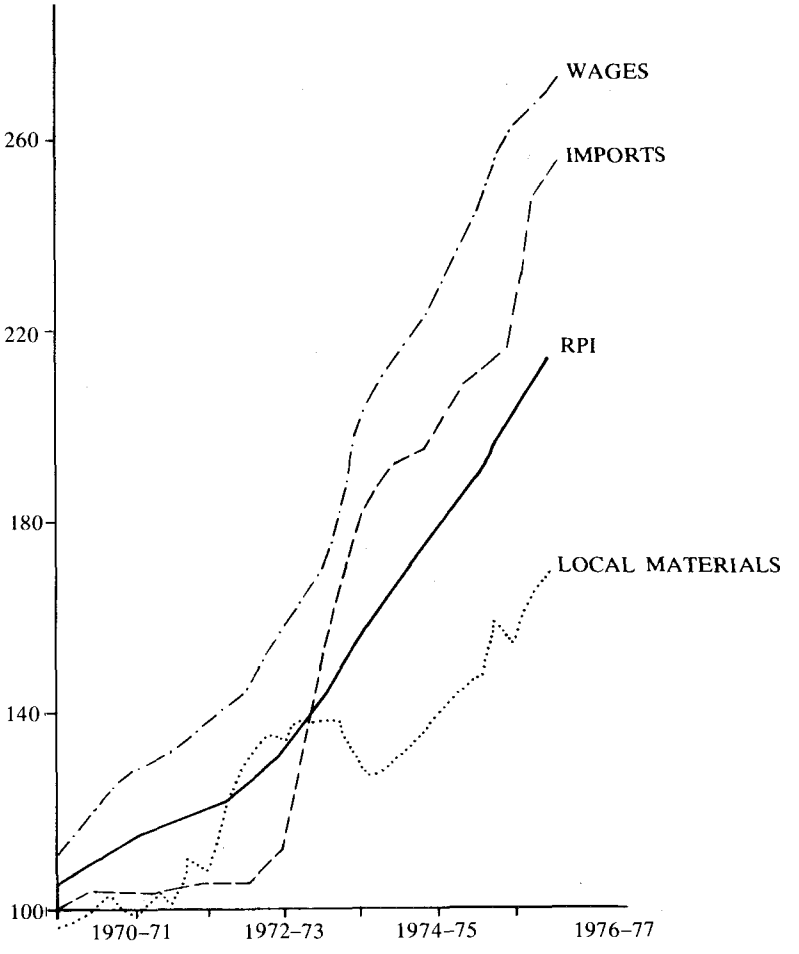


CHART 1: TRENDS IN PRICES AND COSTS

wholesale price index was first compiled. Running the model from 1962 serves to eliminate effects of initial values.

In addition to the input-output relations, the system also includes:

1. an import convertor, which translates changes in the price of imports of commodities and services to the price of imports used by industries;
2. a wholesale convertor which compiles the manufacturers' price index (WPI) by combining wholesale selling prices of individual industries using the weights of the official index;
3. a trading sector which converts changes in the price of output of industries from basic values to retail prices, and
4. a consumption convertor, which relates the retail selling prices of industries to categories of the retail price index (RPI).

Thus, an increase in the price of imports of a particular commodity affects retail prices by the following process. First, the price increase leads to an increase

in the costs of production of industries which use the commodity and these costs are then passed on to other industries and to wholesalers and are reflected in the manufacturers' price index. Then the wholesale selling prices of industries are marked up to retail prices as they pass through the trade sector. Finally, the changes in retail prices of products of different industries are translated into changes in the prices of components of the retail price index by the consumption convertor.

Changes in import prices may, of course, have further effects on local prices. An increase in the price of "competitive" imports may shift demand to local products and hence lead to some increase in these prices. High profits of domestic producers may induce them to expand output and this may lead to a rise in the price of labour and other primary inputs, which in time will affect domestic prices. Also, of course, changes in overseas prices may affect domestic prices through prices of exports. These and other indirect effects of changes in overseas prices are ignored and the model only reflects the direct effects of changes in import prices on costs of production.

Exogenous prices (or costs) include, in addition to the price of imports and the price of agricultural products, the "price" of duty, rates of indirect taxes, and the prices of some components of the retail price index (mainly rent) which are not based directly on costs of production.

B. *The Price of Goods Sold*

The price of sales of manufacturing and service industries (other than trade) is estimated by adding a mark-up to the price of items of prime cost, comprising wages (of operatives), purchases from industries at purchasers' prices, and the price of imports plus duty. The mark-up includes the value of purchases from the service industries and value added. The price of sales by trading industries is derived simply by adding a mark-up to the price of goods bought for resale. No allowance is made therefore for the effect of changes in productivity on trade margins.

C. *Estimation of the Lags*

The lag in passing on changes in prices of goods is estimated as the length of the period of turnover of stocks. For manufacturing industries, periods of turnover are calculated for each category of stock. The periods of turnover of raw materials, work-in-progress and finished goods were derived by relating the value of stocks to the annual cost of materials used, to the annual cost of materials used plus half the annual wages paid to operative workers, and to the annual value of materials used and the total annual wages paid to operative workers. The total lag was then derived by summing the length of the periods of turnover for each industry. The cost of wages of operative workers was assumed to be spread evenly over the period of production and the delay in passing on changes in average earnings is the sum of the period of turnover of finished goods plus half the period of turnover of work-in-progress.

For trading industries, the period of turnover of goods bought for resale is estimated by relating the value of stocks held to the annual value of purchases.

D. *The System of Equations*

The equations used in the model are as follows. In these equations the subscript i refers to the industries where selling prices are determined by the model, the subscript g to items of goods and services, the subscript h to categories of WPI and the subscript k to categories of RPI.

1. The model first calculates the price of imports used by each industry by combining the price of imports of commodities and services by the proportion of each commodity or service used (equation 1).

2. In the second step the cost prices of goods sold by each industry are determined (equations 2a to 2d), together with the manufacturing price index (equation 2e).

3. Then the price of sales is derived by adding a mark-up to the cost price of goods sold and adding on the price of imports sold directly to consumers. The periods of turnover and the distributive margins are adjusted for the proportion of output which passes through wholesalers (equations 3a and 3b).

4. The final step is to determine retail prices by functional categories from the retail prices of output of industries sold to consumers (equations 4a and 4b).

1. *The Price of Imports of Goods and Services Used by Industries*

$$\mathrm{IM}_i = \sum_{g=1}^{8} b_{gi}\,\mathrm{ICS}_g \qquad i = 1, 2, \ldots, 26$$

where IM = the price of imports used by each industry
ICS = the price of each item of goods and services
b = coefficients showing the proportion of imports of each commodity (g) used by each industry (i).

Note: The classification of imports by commodity group is given in Table A2.

2. *Equations Explaining the Price of Sales by Industries*

2a. $$\mathrm{CP}_i = (\mathrm{CM}_i)_{t-r} \times \mathrm{MU}_{(p)_i} + (\mathrm{CW}_i)_{t-s}$$

where CP = the price of purchases for sale (after allowing for changes in labour productivity)
CM = the price of materials used, including imports and duty, at basic values
$\mathrm{MU}_{(p)}$ = the mark-up on purchases of materials
CW = average earnings (after allowing for changes in labour productivity).

2b. $$\mathrm{CM}_i = \sum_{j=1}^{35} a_{ij}\mathrm{CP}_j + \mathrm{AG}_i + \mathrm{IM}_i + \mathrm{ID}_i$$

where AG = the price of purchases from agriculture, forestry and mining
IM = the price of imports
ID = the price of duty
a = coefficients showing the proportion of the output of each industry (j) used by other industries (i).

2c. $$CW_i = W_i \times 1/P_i$$

where W = average earnings
P = index of labour productivity (output/employment), 1968 = 100.

2d. $$CS_i = CP_i \times MU_{(s)_i}$$

where CS = the price of sales
$MU_{(s)}$ = the profit mark-up.

2e. $$CS = \sum_{h=1}^{30} d CS_h = WPI$$

where d = percentage contribution to WPI of articles produced by industry h at 1968 prices.

3. *Equations Explaining the Price of Purchases by Consumers of the Products of Industries*

3a. The price of purchases by wholesalers (buying from manufacturers)

$$WS_i = (WS_i)_{t-1} \times CS_i/(CS_i)_{t-1}$$

where WS = the price of purchases by wholesalers from manufacturers (at 1968 "quantity" weights)

3b. The price of items of consumption expenditure of products of industries.

$$CE_i = [WS_i + IMC_i]_{t-n} \times MU_{(rw)_i} \times PT_i + ED_i$$

where CE = the price of items of consumption expenditure
IMC = the price of imports of finished consumer goods (including the price of duty)
$MU_{(rw)}$ = the wholesale and retail mark-up
PT = the rate of sales tax
ED = the amount of excise duty.

4. *The price of items of consumption expenditure classified by Retail Price Index categories*

4a. $$CF_h = \sum_{i=1}^{26} c CE_i$$

where CF = the price of items of consumption expenditure
c = the proportion of expenditure on products of industry by expenditure category (1968 RPI weights).

4b. $$CF = \sum_{k=1}^{15} CF_k + CX = RPI$$

where CX = the price of exogenous items of the Consumer Price Index (at 1968 weights).

4. Prices and Costs

In this section we first test the reasonableness of our results by applying the model to predict prices from 1968 to 1977. We then examine the lag structures suggested by the model. Finally, we apply the results to analyse the effects on inflation of a recent devaluation of the Australian dollar.[2]

The model predicts monthly prices but the tables and charts given in the paper show the results for the mid-month of each quarter only. This is to facilitate comparison with the official index of retail prices which is only compiled on a quarterly basis.[3]

A. *Testing the Model*

The object of constructing the model was to improve, by introducing lags, the accuracy of predictions of the effects of cost changes on prices. One way of testing this is to compare the results with those obtained from methods which assume that costs are passed on instantaneously.

We first calculate the "control" or predicted prices by running the model through with actual values for average wages, prices of imports, and other exogenous prices (mainly the price of purchases from primary industry) and assuming that profit margins are constant. A second set of prices is obtained by weighting average wages, prices of imports, and prices of purchases from primary industries using values of costs from the latest input-output table as weights. The actual prices are then regressed on the two series of computed prices. The results are shown in Table 1, which also gives the standard tests of significance. The results show that the series predicted by the model gives a closer estimate of actual prices. There is also much less serial correlation in the residuals. As would be expected the alternative series over-estimates the effects of changes in prices.

A second way of assessing the reliability of the estimates is to derive a series for profit margins, by comparing actual prices with the "control" or predicted prices, and then to examine the reasonableness of the apparent changes in these margins.

The assumption made in the model that margins are constant does not rule out small fluctuations in the short run from changes in aggregate demand. However, we assert that over most industries prices are set in relation to costs of production, and that there is little response in the short run to changes in demand. Moreover, in Australia aggregate demand has been restrained over the past few years to reduce inflation. Some short run variation (from month to month, and perhaps quarter to quarter) will also occur due to errors in the data or discontinuity in price changes. There may be a delay before higher costs are passed on: for example, some manufacturers may determine selling prices by reference to

[2]For most of the simulations, the wholesale price of petroleum is treated as exogenous. The model did not satisfactorily predict the effect of the extraordinary rise in crude oil prices in recent years, and it seems that this had an effect on profit margins. In section 4(b), where the distributed lag pattern of changes in costs is discussed, the wholesale price of petroleum is endogenous, and this assumption also applies to some of the results reported in Table 4.

[3]The monthly results, including the comparison of actual and predicted wholesale prices, are available from the authors.

TABLE 1

ALTERNATIVE PREDICTIONS OF WPI AND RPI
(t-VALUES IN BRACKETS)

1. AWPI = 21.480 + 0.775 PWPI(1)
(13.8) (79.0)
Standard Error of residual 2.60
F-value 6,235 D.W. statistic 0.37

2. AWPI = −5.393 + 1.056 PWPI(2)
(5.6) (153.6)
Standard error of residual 1.34
F-value 23,584 D.W. statistic 1.78

3. ARPI = 27.887 + 1.157 PRPI(1)
(19.8) (88.1)
Standard error of residual 2.61
F-value 7,761 D.W. Statistic 0.52

4. ARPI = −16.359 + 1.145 PRPI(2)
(15.2) (154.5)
Standard error of residual 1.49
F-value 23,864 D.W. statistic 0.63

Where:

AWPI = actual WPI
PWPI(1) = WPI calculated from costs, assuming no lags
PWPI(2) = WPI calculated by the model
ARPI = actual RPI
PRPI(1) = RPI calculated from costs, assuming no lags
PRPI(2) = RPI calculated by the model.

"standard" costs, or an average of costs of several months. Retailers may seek to avoid frequent changes in selling prices, and for many items, such as newspapers and postal charges, the selling prices of these items are so small that given the unit of currency prices cannot be changed continuously.

The changes in margins of manufacturers, all industry and traders are shown in Charts 2 to 4. The margins are derived as the differences between the actual and predicted prices, and changes in the margins are interpreted as changes in apparent profit rates or profit margins. The margin in Chart 2 is the difference between the actual and predicted WPI, and the changes reflect changes in the apparent profit margins of manufacturers and of industries supplying manufacturing (apart from the primary industry where selling prices are assumed exogenous). In Chart 3 the changes in the margins reflect changes in profit margins in all industry (except primary). In Chart 4 we have treated wholesale prices as exogenous, thus eliminating the effect on our computed RPI of changes in profit margins of manufacturers. The changes in the margins depicted in Chart 4 therefore reflect changes in the apparent profit margins of traders and service industries producing consumer goods.

Profit margins in both manufacturing and trading appear to have been constant until 1973. In 1974 apparent profit margins in manufacturing rose sharply, and have since remained constant. Traders' margins, however, have increased fairly steadily since 1974. There is no evidence on these results of short-run demand effects. Moreover, any demand change would also have a

AUSTRALIA - INPUT-OUTPUT MODEL FOR ANALYSING PRICE CHANGES

ACTUAL ALLM.	SOLUTION ALLM.	RESIDUALS		RANGE 102.40 TO 210.90
102.900	102.900	.000	1968 7	
103.600	103.260	.660	1968 8	
103.700	103.129	.629	1968 9	
102.400	103.182	-.782	196810	
102.500	103.068	-.568	196811	
102.600	102.865	-.265	196812	
103.100	102.913	.187	1969 1	
103.300	102.649	.651	1969 2	
103.500	103.192	.308	1969 3	
104.000	103.486	.514	1969 4	
104.200	103.989	.211	1969 5	
104.500	104.342	.158	1969 6	
105.400	104.835	.565	1969 7	
105.800	104.880	.920	1969 8	
105.800	105.383	.417	1969 9	
106.000	106.125	-.125	196910	
106.000	106.210	-.210	196911	
106.100	106.552	-.452	196912	
107.000	106.561	.439	1970 1	
107.800	106.857	.943	1970 2	
108.400	107.337	1.063	1970 3	
108.700	107.912	.788	1970 4	
109.000	108.380	.620	1970 5	
109.300	108.871	.429	1970 6	
109.600	109.592	.008	1970 7	
110.000	109.847	.153	1970 8	
110.300	110.199	.101	1970 9	
110.600	110.279	.321	197010	
110.500	109.825	.675	197011	
110.700	110.311	.389	197012	
111.700	110.778	.922	1971 1	
112.900	111.231	1.669	1971 2	
113.400	112.335	1.065	1971 3	
113.900	112.834	1.066	1971 4	
114.300	113.366	.934	1971 5	
114.300	113.905	.195	1971 6	
115.000	114.286	.714	1971 7	
115.500	114.707	.793	1971 8	
116.100	115.570	.530	1971 9	
116.300	116.351	-.051	197110	
116.700	117.081	-.781	197111	
117.000	117.295	-.295	197112	
117.900	117.451	.449	1972 1	
118.500	117.325	1.175	1972 2	
119.000	117.646	1.354	1972 3	
119.200	118.049	1.151	1972 4	
119.500	118.460	1.040	1972 5	
119.900	118.795	1.105	1972 6	
120.700	119.610	1.090	1972 7	
121.100	119.894	1.206	1972 8	
121.600	120.522	1.078	1972 9	
121.900	121.830	.070	197210	
122.500	123.015	-.515	197211	
123.300	123.578	-.278	197212	
124.300	123.583	.717	1973 1	
125.400	123.916	1.484	1973 2	
127.200	124.521	2.679	1973 3	
128.200	124.888	3.312	1973 4	
128.800	128.091	.709	1973 5	
129.900	129.904	-.002	1973 6	
132.100	130.474	1.626	1973 7	
133.100	131.696	1.404	1973 8	
134.000	132.831	1.169	1973 9	
134.500	134.481	.019	197310	
135.300	136.414	-1.114	197311	
136.500	138.168	-1.668	197312	
138.900	138.288	.612	1974 1	
140.200	139.340	.860	1974 2	
141.600	140.621	1.179	1974 3	
143.900	141.562	2.338	1974 4	
146.400	142.939	3.461	1974 5	
149.500	143.585	5.915	1974 6	
153.200	145.628	7.572	1974 7	
155.200	148.070	7.130	1974 8	
157.500	149.513	7.987	1974 9	
159.600	153.320	6.280	197410	
160.200	155.476	4.724	197411	
164.000	156.425	7.575	197412	
165.700	158.573	7.127	1975 1	
166.400	160.155	6.245	1975 2	
168.800	162.791	6.009	1975 3	
169.400	164.221	5.179	1975 4	
170.300	165.265	5.035	1975 5	
172.300	167.182	5.118	1975 6	
174.300	168.750	5.550	1975 7	
176.800	169.972	6.828	1975 8	
178.800	171.866	6.934	1975 9	
180.900	173.660	7.240	197510	
182.100	175.342	6.758	197511	
183.300	177.220	6.080	197512	
185.000	179.662	5.338	1976 1	
186.600	181.062	5.538	1976 2	
188.600	182.391	6.209	1976 3	
190.800	184.959	6.841	1976 4	
192.400	185.303	7.097	1976 5	
193.800	187.013	6.787	1976 6	
194.100	188.532	5.568	1976 7	
195.600	190.489	5.111	1976 8	
196.500	192.384	4.116	1976 9	
197.700	194.455	3.245	197610	
198.900	196.772	2.128	197611	
202.200	198.120	4.080	197612	
204.700	199.030	5.670	1977 1	
207.000	199.913	7.087	1977 2	
208.900	201.660	7.240	1977 3	
210.700	204.158	6.542	1977 4	
210.900	206.741	4.159	1977 5	

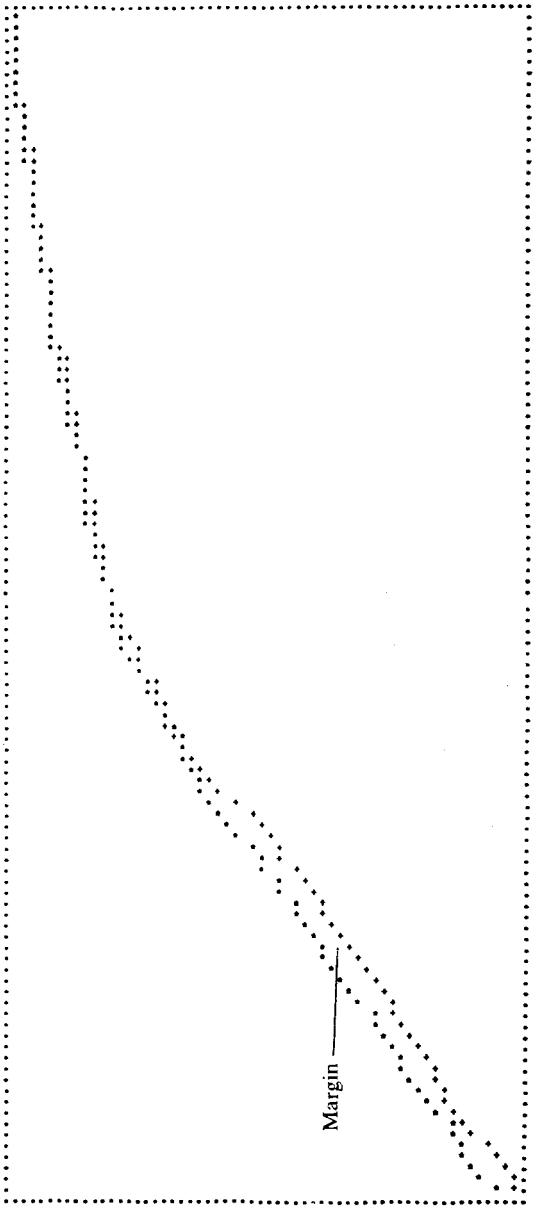


CHART 2. ACTUAL AND PREDICTED WHOLESALE PRICES (WPI)

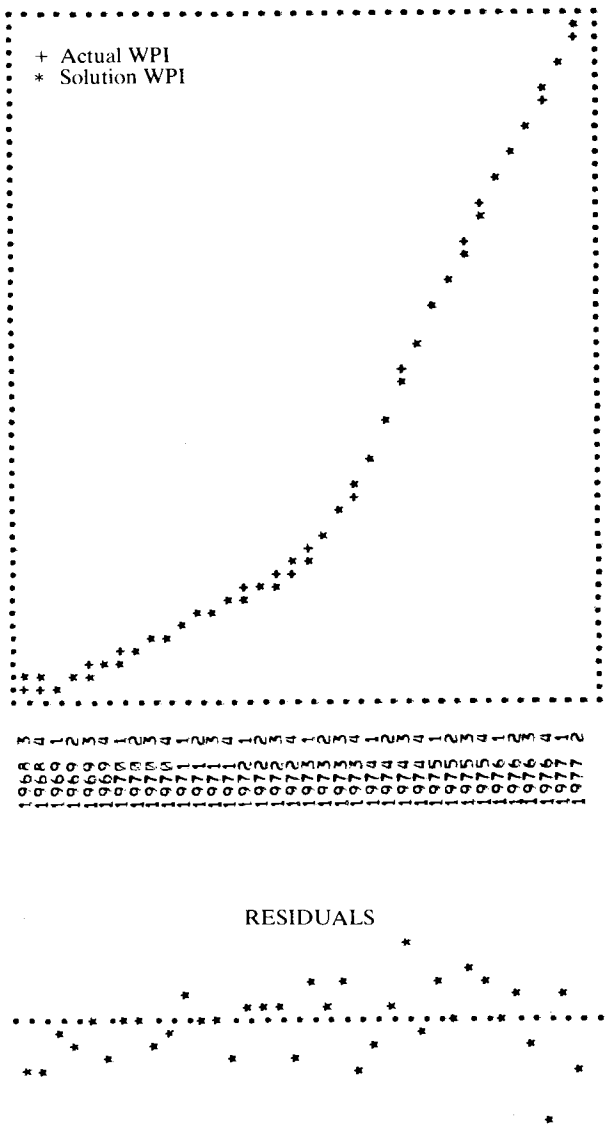
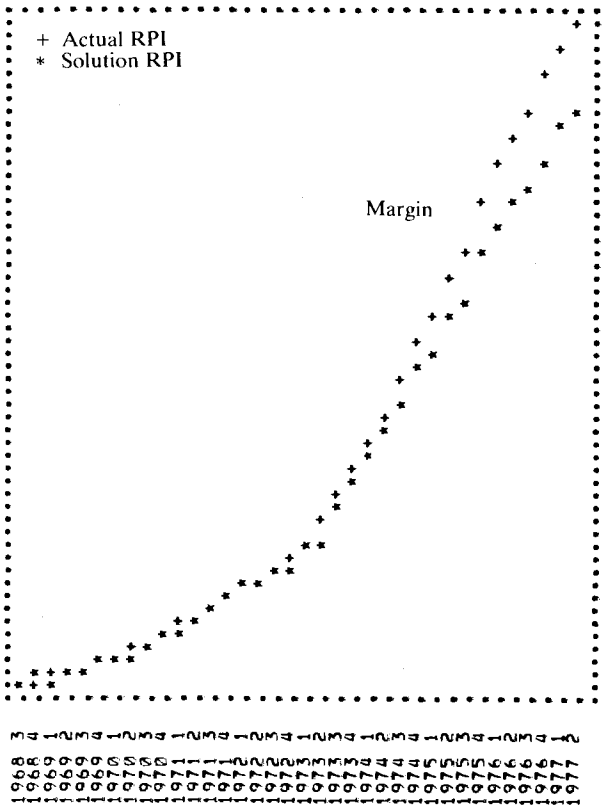


CHART 2(a): ACTUAL AND PREDICTED WHOLESALE PRICES (WPI) (including Eqn. 1, Table 2)



RESIDUALS

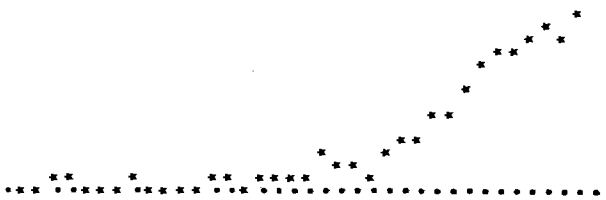
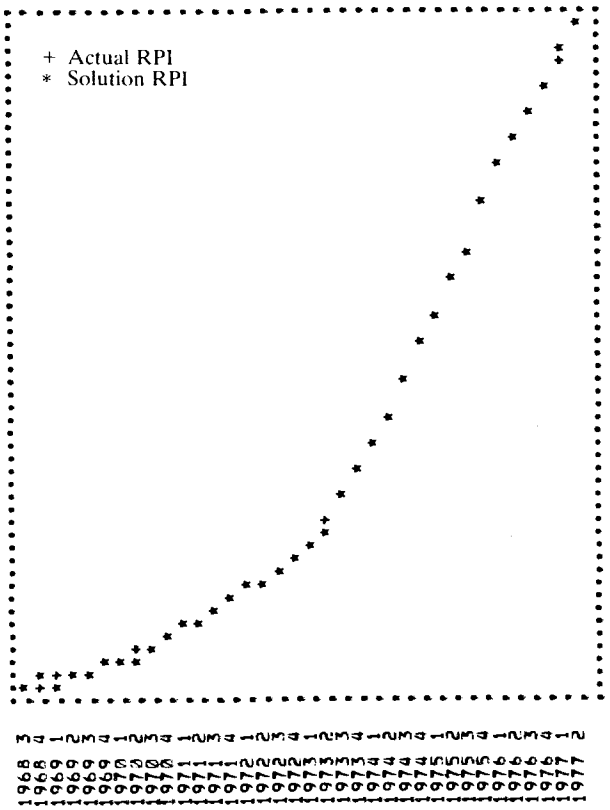


CHART 3: ACTUAL AND PREDICTED RETAIL PRICES (RPI)



RESIDUALS

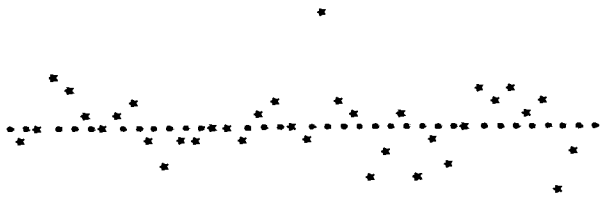
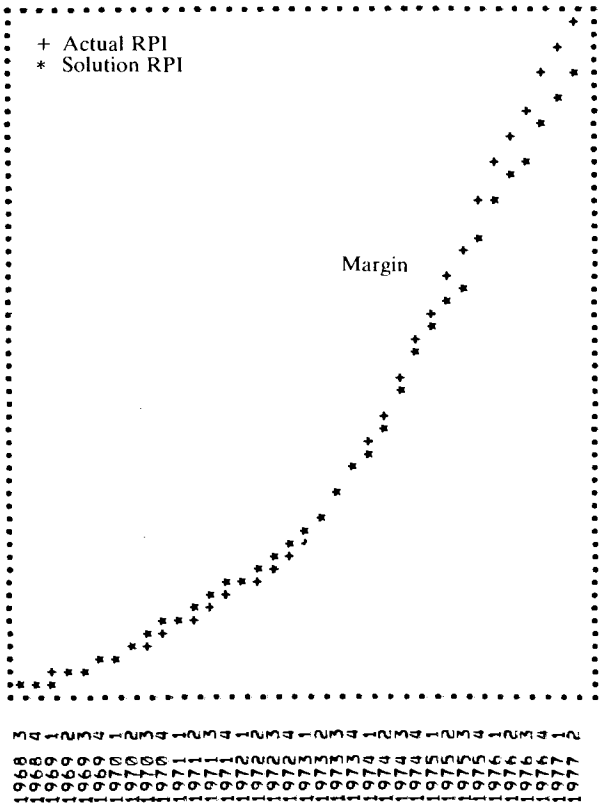


CHART 3(a): ACTUAL AND PREDICTED RETAIL PRICES (RPI) (including Eqn. 2, Table 2)



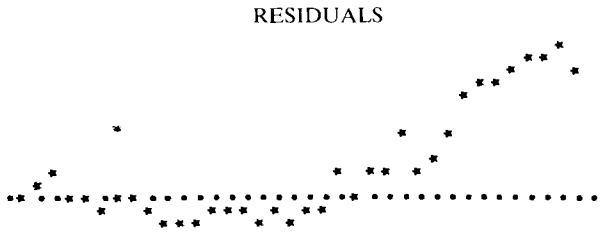


CHART 4: ACTUAL AND PREDICTED RETAIL PRICES (RPI) (WPI exogenous)

similar effect on profits of manufacturers and traders. The assumptions of the model therefore seem valid. On the other hand, even though they have little effect on the results of short-term analysis of price change, the longer term changes need to be explained.

These changes may have been due to the effect of variations in import prices on profitability of manufacturing (as a result of two main appreciations and two main depreciations of the dollar, and an across-the-board cut in tariffs) and the effects of accounting for inflation on profitability of both manufacturers and traders.

Australia is an open economy, with imports of manufactured products accounting for about 30 percent of the value of manufacturing output, and so the profitability of manufacturing is heavily dependent upon relative import prices. In 1972 and 1973 local costs rose faster than prices of imports, but in 1974 import prices rose by about 50 percent, or three times the increase in local prices. From 1973 to the end of 1976 import prices varied with domestic costs, but they moved ahead in the first six months of 1977 following devaluation in November 1976.

Changes in prices of imports affect both costs and selling price and the net effect on profits is not obvious. However, the bulk of Australian imports are competitive products and it is reasonable to assume that a fall in import prices relative to domestic costs would reduce the profitability of manufacturing. This result would be more likely under historical cost pricing where a fall in input costs (due to lower import prices) is passed on after a delay while selling prices may immediately reflect a fall in import prices. In the longer run, of course, adjustments to output and methods of production may cushion these effects, but in this paper we are chiefly concerned with short-run effects.

The profits of service industries and traders, included in the margin shown in Chart 4, are unaffected by import competition since output (value added in the case of traders) is naturally protected. However, changes in costs of imported goods may not be fully (or immediately) passed on, and thus in the short-term the margin may tend to vary inversely with prices of imports relative to domestic costs.

The general price rise may also have affected margins. Businesses appear to have encountered problems in financing stocks due to a higher interest rate and taxation of profits or stocks during the recent inflation. At least this was a finding of the Matthews Report on Inflation and Taxation which in 1974 recommended current value accounting. During most of the period of this study, manufacturers' profits were under pressure from import competition but being less constrained by import competition, traders presumably could raise prices to offset declining real profitability.

These hypotheses of trends in apparent profits are tested by regressions which relate actual wholesale and retail prices to the model predicted prices, the ratio of imported to local costs,[4] and an inflation variable. The results are given in Table 2.

[4]This variable is the ratio of import prices to the weighted sum of average earnings and the price of local materials. Prices of imports in this variable are the actual prices of imported materials used. This contrasts with the import price index used in the model in which the price of imports is the landed price. Various lags on this variable were tested and no significant lag effect was found.

TABLE 2

ADJUSTING PREDICTED PRICES FOR VARIATIONS IN PROFIT MARGINS
(t-VALUES IN BRACKETS)

1. AWPI = −9.204 + 1.043 WPI + 11.224 IP
(4.8) (125.0) (2.3)
Standard Error or Residual 1.26
F-Value 12,943 D.W. Statistic 2.00

2. ARPI = 4.724 + 1.013 PRPI(A) − 32.044 D + 0.230 IT − 12.994 IP
(1.2) (35.4) (6.7) (6.1) (2.8)
Standard Error of Residual 0.82
F-Value 19,789 D.W. Statistic 1.59

3. ARPI = 19.692 + 0.911 PRPI(B) − 34.494 D + 0.272 IT − 20.616 IP
(2.5) (25.6) (6.1) (6.0) (2.5)
Standard Error of Residual 1.02
F-Value 12,881 D.W. Statistic 1.06

Where:

PRPI(A) = RPI calculated by the model
PRPI(B) = RPI calculated by the model and with WPI exogenous
IP = import price index divided by the weighted sum of average earnings and the price index of home produced materials
D = dummy variable: 0 for 1963(3) to 1973(4)
1 for 1974(1) to 1977(2)
IT = interaction term, D × PRPI
(Other variables as in Table 1).

The very high F-values show that the predicted values were close to the actual values, and the value for the Durbin-Watson statistic suggests that serial correlation in the residuals is not a problem, except perhaps in equation (3).[5] The prediction of both wholesale prices and retail prices was improved by the term for relative import costs and the variable had the expected sign. The inflation variable was not, however, significant. But, in the case of retail prices, introducing a dummy variable, to alter the slope and intercept after 1972–73, produced a marked improvement in the predicted prices. The dummy variable has the value 0 to 1973(4), and 1 from 1974(1). These dates were based on observations of the residuals shown in Charts 3 and 4. As discussed in section 2 of this paper, the rate of price change has been about 10 to 12 percent since 1972–73 compared with rates of 4 to 7 percent in the two previous years, and with lower rates in 1968–69 and 1969–70.

B. *The Lag Structures*

The model can also be used to show the lag structures associated with the effects of changes in costs on wholesale and retail prices. The method involves first running the model through with actual values for import prices, average wages and other exogenous prices to obtain "control" solutions. Then costs are

[5]The residual errors are less in equation (2) than equation (1), which is perhaps surprising since equation (3) treats actual wholesale prices as exogenous. It may be that the official wholesale price index is slightly inconsistent (e.g. due to the weighting patterns) with the index of cost and the Retail Price Index.

increased (by 10 percent) in one month, and the effect of this on prices is obtained by subtracting the control series from the resulting series and expressing this difference as a percentage of the control series.

The results indicate the structure of the lags in passing on changes in costs. Chart 5 shows the lag structures for the effects of changes in import prices and average wages on WPI, and Chart 6 sets out their effects on the RPI.

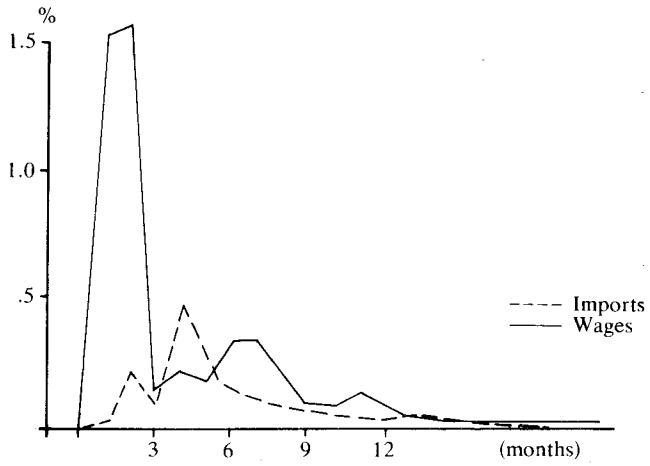


CHART 5: THE EFFECT OF A 10 PER CENT INCREASE IN IMPORT PRICES AND WAGES ON THE WPI

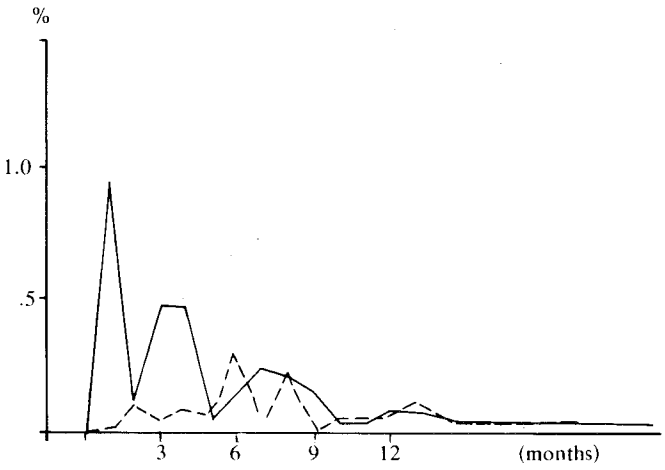


CHART 6: THE EFFECT OF A 10 PER CENT INCREASE IN IMPORT PRICES AND WAGES ON THE RPI

The lags are much longer and more complicated than those usually estimated from regression analysis. In Australia, econometric results usually estimate only one lag, or else impose a lag structure, typically of the Koyck type for both imports

and wages. The structure of the lag (on the RPI) for wages has one peak and two humps, associated presumably with the quick transmission of increases in wages costs through service industries, and then the delayed effects of increases in wages costs on manufacturing industries. The lag structure for imports is more regular, since there are no imports in service industries, and changes in prices of imports of consumer goods take some time to affect the RPI.

Table 3 shows the cumulative effect on the WPI and the RPI of a 10 percent increase in wages and import prices. Wages are passed on more quickly than

TABLE 3

THE CUMULATIVE EFFECT OF A 10 PERCENT INCREASE IN IMPORT PRICES AND WAGES ON THE WPI AND THE RPI

	WPI		RPI	
AFTER:	Import Prices	Wages	Import Prices	Wages
3 months	0.31	3.27	0.25	1.63
6 months	1.25	4.00	0.66	2.33
9 months	1.60	4.66	0.94	2.85
1 year	1.77	4.95	1.15	3.02
15 months	1.90	5.06	1.21	3.16
18 months	1.94	5.12	1.27	3.21
2 years	1.96	5.19	1.30	3.26

import prices: after 3 months one half of the total effect of a change in wages has been passed on to the RPI and 70 percent after 6 months, while the corresponding percentage for the import prices are one-fifth and 50 percent.

The length of lags and the lag structure vary markedly for different imports and average wages according to the stage at which they enter as costs of production. The effect on retail prices of "one-shot" increases in three items of imports and for average wages paid in the manufacturing and service industries are shown in Charts 7 and 8.

Finally, it is of interest to look at the way in which changes in wages affect manufacturing selling prices. One object is to see whether it is in fact possible to trace the flowing of prices through the manufacturing sector. The conclusions will

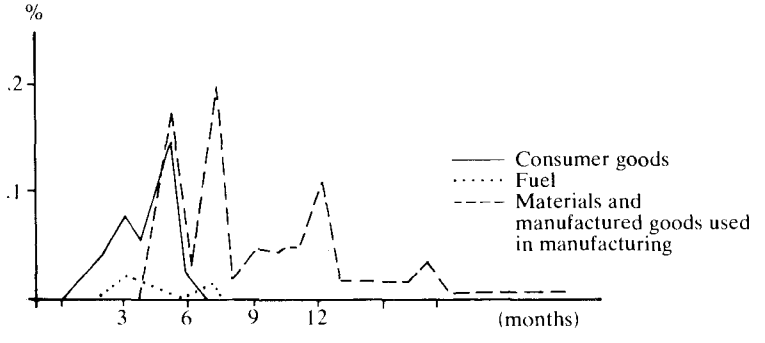


CHART 7: THE EFFECT OF A 10 PER CENT INCREASE IN ITEMS OF IMPORTS ON THE RPI

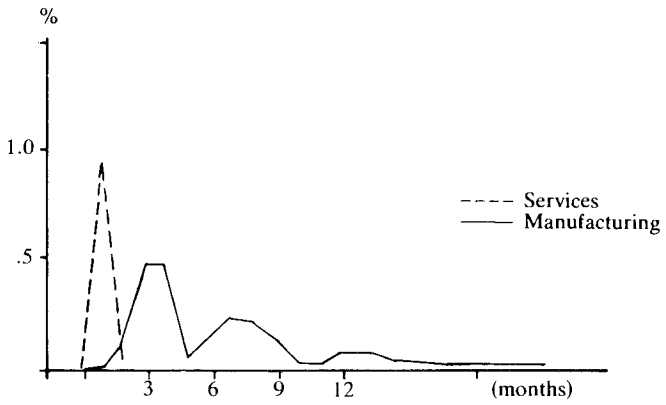


CHART 8: THE EFFECT OF A 10 PER CENT INCREASE IN WAGES BY SECTOR ON THE RPI

depend greatly of course upon the classification and degree of aggregation. Conceivably we could trace more easily flows between industries which were vertically integrated. Here we have relied on the classification used in the model (excluding petroleum).

We have graphed in Chart 9 the lag structures for only a sample of industries (choosing every second one in the order in which the results were printed). The blocks on the left hand side of the chart show the direct and indirect effects; the charts on the right hand side show the distribution of the indirect effects. Direct effects are more important than indirect effects, even after two years. After the first round of indirect effects subsequent repercussions become smoothed and difficult to identify. Finally, there seems to be no definite pattern in the sequence of the indirect effects on industries, and they nearly all occur about 13 to 15 months after the initial change in wages.

5. ANALYSIS OF PRICE CHANGES

A. *Effects of Devaluation in November* 1976

In November 1976 the Australian dollar was devalued by 18 percent; successive appreciations then reduced the effective devaluation to about 15 percent. Most economists opposed the devaluation on the grounds of its inflationary impact. Treasury economists asserted that the increase in import prices would be rapidly passed through in increased local prices, at a time when retail prices were already rising by 12 percent a year and wholesale prices by 10 percent. In fact, as Chart 1 shows, the rate of inflation did not increase in the subsequent 6 months. But interpretation of this has varied: it has been asserted that this shows the lags are longer than usually assumed; or that the increase in import prices has been absorbed in profits.

The full impact of the devaluation on the RPI and WPI can be assessed by comparing the predicted figures of price changes using actual values of import prices with estimated prices assuming no devaluation. This estimated series is

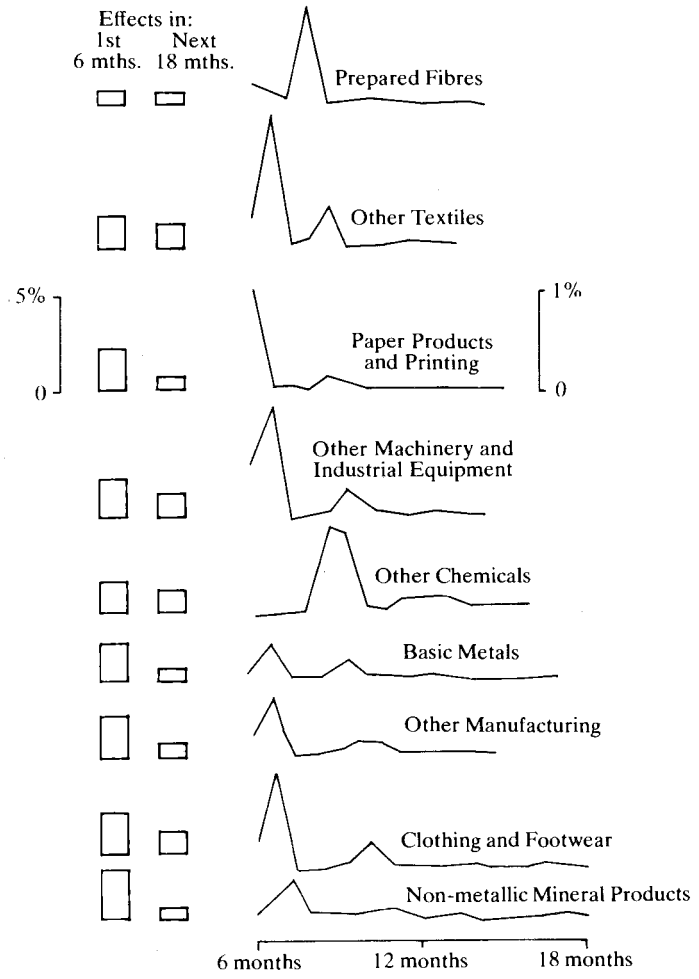


CHART 9: EFFECTS OF A 10 PER CENT INCREASE IN WAGES ON WHOLESALE PRICES OF INDUSTRIES

obtained by running the model through after adjusting the import price index for the effects of the devaluation. The results are shown in Table 4. The full effect of the devaluation would have been to raise wholesale prices by 0.9 percent in the first five months of 1977, and retail prices by about 0.4 percent. The results are also consistent with applications of the results of Charts 5 and 6, showing the lag structure associated with a change in import prices.

Table 4 also shows large variations in profit margins which to some extent reduced the effects of the revaluation (column 3). Thus, in the second half of 1977, when the revaluation should have added 0.9 points to the retail price index, profit margins fell by 1 point. Parts 2 and 3 of this Table suggest that the fall in margins was entirely concentrated in the trading and service sectors, and manufacturers' margins actually rose in the early part of 1977. However, margins of manufac-

TABLE 4

EFFECTS OF THE DEVALUATION, NOVEMBER 1976

	Actual (1)	Adjusted Model Prediction (2)	Implied Profit Margins (1)–(2) (3)	Model Prediction: Actual (4)	Model Prediction: Without Devaluation (5)	Difference (4)–(5) (6)
Retail Price Index (RPI)						
1976 1	200.6	199.5	1.1			
2	205.7	205.0	0.7			
3	210.3	209.4	0.9			
4	216.0	215.9	0.1	204.8	204.8	—
1977 1	220.7	221.0	−0.3	211.4	211.2	0.2
2	226.3	228.6	−2.3	215.6	214.6	1.0
Wholesale Price Index (WPI)						
1976–7	194.1	193.9	0.2			
8	195.6	195.9	−0.3			
9	196.5	197.8	−1.3			
10	197.7	200.0	−2.3			
11	198.9	202.6	−3.7			
12	202.2	204.6	−2.6			
1977–1	204.7	205.7	−1.0			
2	207.0	206.8	0.2	218.4	218.4	—
3	208.9	208.6	0.3	220.7	220.4	0.3
4	210.7	211.1	−0.4	223.9	222.5	1.4
5	210.9	213.8	−2.9	226.7	224.7	2.0

NOTE: The difference between figures in cols. 2 and 4 are due to:

1. In col. 2 wholesale price of petroleum is exogenous, and in col. 4 it is endogenous.
2. Figures in col. 2 are obtained by applying equations, given in Table 2, to figures in col. 4. Actual RPI is adjusted by Equation 2, and actual WPI is adjusted by Equation 1.

turers fell in the fourth and fifth months of 1977, and this fall will be passed on to retail prices in the second half of 1977, which will imply a further fall in overall margins later in 1977.[6]

B. *Prediction of Price Changes*

This method of tracing price changes can also be used to predict movements in indexes of wholesale and retail prices. At the time of writing this paper, data of costs of materials and imports were available to the fifth month of 1977, and wages costs to the second quarter of 1977. Changes in import prices and wages in the next two months would affect the RPI by only about 30 percent of the change. Basing changes in these items in the subsequent two months and predictions of other exogenous items on trend, we are able to use the model to predict the RPI. The remaining problem is the trend in profit margins. If we assume no change to

[6]The changes in margins are, of course, after allowing for the effects of the regression equations given in Table 2.

the third quarter of 1977, the model predicts a RPI number of 217.9, or an increase of 3.4 percent.[7]

If we assume that margins respond to inflation, as described in equation 2 in Table 2, the predicted RPI is 235.9, or a rise of 4.0 per cent over the prediction for the previous quarter.

6. Analysing Price Changes in a System of Accounts

Here we examine the usefulness of analysing price changes by stages of production, and the data problems involved. Our comments draw solely upon experience gained in the present study.

One main conclusion is the difficulty of tracing price changes by inspection. At most it would seem possible to do this only at a high degree of aggregation, as in this study. The main problems are the lengthy and complicated shape of the lag distributions, the big differences in the lag structures for particular items of cost, and the difficulty of tracing flows within manufacturing. Data problems and incorrect assumptions about the pricing policies of businesses would increase the hazard.

The Australian Statistician has measured the price indexes of individual industries on a net basis which would imply that they might be useful in tracing flows between sectors. We think this is optimistic. We think that there will be little use of these indexes for that purpose, and most uses of wholesale prices of individual industries would require gross indexes of prices of sales.

The main data deficiencies are the lack of sector indexes for import and wholesale prices. The Australian import price index (compiled by the Reserve Bank) gives details for several commodity groups and items of capital equipment, but does not identify prices of consumer goods or of items used in manufacturing. The wholesale price index provides separate (net) price indexes for industry of origin, but not for industry of use. Other important deficiencies which are probably peculiar to Australia are the lack of monthly figures of retail prices and average wages.

Writers have recently remarked on the tendency for different price indexes to be developed independently, and the lack of coordination in Australian price series is remarkable. In fact, while the wholesale price index was being developed changes were made to the retail price index (in coverage and weighting) which reduced its usefulness in using published information comparing changes in retail and wholesale prices by sectors. Despite Australia's large foreign trade the official index of import prices is based on wholesale price indexes of other countries and informed guesses about the effects of exchange rate changes, and ignores changes in transport costs. Much of the potential usefulness of the net index of wholesale prices is simply destroyed through an inadequate system of price statistics.

There are numerous inconsistencies in index number formulae and in the details of the indexes. But we think that these have very little effect on the

[7]Since the time of writing, the official retail price index for this quarter has been published, and it showed an increase of 2.2 percent over the value for the previous quarter. The difference between the official figure and our model predicted figure is apparently due to a fall in profit margins, as shown in the national income figures which are now available for this quarter.

reliability of the present results or more generally on studies of price changes by sector. In the main these differences do not affect the picture of transmission of price changes in the short period, and they are unlikely to bias comparison over the medium term. This is not to say that such problems are unimportant for other uses of price data, but only that there are more important deficiencies than inconsistencies of definition and form. One is the boundary point at which transactions are priced. In Australia, wholesale prices reflect industry selling prices, so that, for example, if costs such as handling and distribution are included in the manufacturers' selling price this is the price used in the index. Otherwise, when handling and distribution charges are paid separately by the purchaser, the prices used exclude such charges. Selling prices at any other point of sale are more difficult to collect. An unknown part of transport costs are included in manufacturers' prices and this could distort price comparisons.

Finally, the most important single deficiency is information about the formation of prices. This, in our opinion, should be provided at regular intervals by the Statistician, particularly when standards of accounting are in flux. But even if the information were out of date, it would be better than the compete gap now existing in knowledge of costing practices, mark-up policy and the time horizon in business planning.

APPENDIX A

TABLE A.1.

CLASSIFICATION OF INDUSTRIES

INDUSTRY GROUP	1962–63 INPUT-OUTPUT TABLE INDUSTRY No.
Selling prices determined by the model:	
1. Industrial Chemicals	C31
2. Other Chemical Products	C32–37
3. Petroleum Products	C38
4. Non-metallic Mine Products	C39–42
5. Basic Metals	C43–46
6. Fabricated Metal Products	C47–49
7. Motor Vehicles	C54
8. Other Transport and Industrial Equipment	C55–57, C62, C63
9. Other Machinery and Equipment	C58–61
10. Leather and Leather Products	C64, C65
11. Prepared Fibres	C14
12. Yarns	C15
13. Other Textile Products	C16–19
14. Clothing and Footwear	C20–22
15. Food Manufacturing	C1–9
16. Beverages	C10–12
17. Tobacco Products	C13
18. Pulp, Paper and Paperboard	C26
19. Paper Products and Printing	C27–30
20. Sawmilling	C23
21. Wood Products	C24, C25
22. Other Manufacturing	C66–69
23. Electricity	D1
24. Health, Entertainment and Personal Services	K1–3, L1, L2
25. Motor Vehicle Repairs and Service	F3
26. Transport, Storage and Communication	C1, H1
Selling prices assumed exogenous:	
1. Agriculture	A1–7
2. Forestry and Fishing	A8, A9
3. Coal Mining	B2
4. Metallic Mining	B1, B3, B4
5. Gas	D2
6. Rent	M1

TABLE A.2

EXOGENOUS PRICE SERIES

Purchases from Primary Industry and Mining
Food
Tobacco
Wool
Coal
Timber
Mine Products (other than coal)
Imports of Goods and Services
Food, Beverages and Tobacco
Fuel
Chemicals
Textiles
Transport Equipment
Other Manufacturers
Consumers' Goods
Duty
Average Earnings
Components of the CPI
Unprocessed Food
Rent
Radio and TV Licences
Natural Gas

APPENDIX B
CONCEPTS AND SOURCES OF DATA

1. The Basic Data

A. *Input-Output Relations*

The input-output coefficients used to distribute increases in costs and prices between industries are based on data given in Table 8, in the official national income publication for 1962–63. This Table is a 40-industry Table in which entries are at basic values and imports directly allocated to using industries. This is the latest Table available with imports allocated directly. The Table is slightly condensed by combining several industry groups together and estimates are made of intra-industry transactions, which are not shown in this Table, from other official data.

B. *Consumers' Expenditure by Industry and Commodity*

The changes in prices of outputs of industries sold to final consumers were converted into prices of components of the official retail price index by a "consumption convertor" or matrix of consumers' expenditure by industry and commodity. This cross-classification is taken from particulars of the weighting pattern of the CPI in 1966–67, at December 1968 prices.

2. Purchases from the Primary Industries and Mining

From 1968–69: Prices of all items (except tobacco) are either published or unpublished figures computed by ABS for the series of indices of home produced materials used in manufacturing. Price of *tobacco* is obtained by interpolation of an unpublished quarterly series compiled by BAE for the index of prices received by farmers.

From 1962–1968–69: Food is a derived series based on published and unpublished data compiled by BAE for the index of prices received by farmers. It comprises prices of local wheat, meat, dairy products, fruit and vegetables. The weights are taken from the 1962 Input-Output Table. *Tobacco* is the BAE index. Prices of other purchases are constructed series derived as the sum of the normal unit labour cost and the price of materials used.

Imports of Goods and Services

The Reserve Bank index of import prices gives details for 10 categories of items. These were re-grouped into six groups to obtain price indices of materials used by industry and prices of imports of consumers goods. Price indices of food, beverages and tobacco, mineral fuels and lubricants, chemicals and textiles are used as the price of imported materials for those industries which produced similar or comparable products, and a weighted index of prices of crude materials, manufactured goods, and miscellaneous manufactured articles as the price of imports used by other manufacturing industries. The price of imports of consumer

goods is a weighted average of prices of manufactured goods, miscellaneous manufactured articles and electrical machinery, apparatus and appliances.

The price of duty is estimated by multiplying the price of imports by the value of duty divided by the value of imports. This is derived from the relation:

$$\frac{\text{Price D}}{\text{Price I}} = \frac{\text{Value D}}{\text{Quantity D}} \Big/ \frac{\text{Value I}}{\text{Quantity I}}$$

and the assumption that Quantity D/Quantity I is constant.

Average Earnings

This is the seasonally adjusted index published in the *Monthly Review of Business Statistics.*

Components of the CPI

Prices of components of the CPI which are exogenous are taken from ABS publications. The official figures are for quarters and are interpolated to obtain monthly figures. Some details are not available for recent quarters and these are obtained by extrapolating the latest figures.

3. Period of Stock Turnover

The periods of stock turnover of manufacturers are calculated from data of stocks by stage of processing at the end of 1968–69, wages and purchases of materials, shown in the results of the census of production. For wholesalers and retailers the periods of turnover are calculated from data of stocks and purchases and sales shown in censuses of wholesale and retail trade. The estimated periods of stock turnover are shown in the following Tables.

4. Rate of Change of Output per Person Employed

There are difficulties in deriving estimates of productivity change in Australia due to the lack of data and inconsistencies in data available. The official index of industrial production is six years out of date, and it was necessary to rely on the unofficial index compiled by the ANZ Bank.[1] The coverage of this index is about 70 percent of total value added, but the coverage varies between individual industries. As well, the main index is compiled primarily for short-term analysis, and it uses only monthly series of output. The index is based on production in 1963–64.[2]

The main problem in estimating changes in labour productivity for individual industries arises from differences in the classification used in the Input-Output Table, in the ANZ Bank Index of Production and the available series of employment. The only consistent series of employment covering 1965–66 and 1972–73 are monthly figures issued by the Australian Bureau of Statistics. These figures are for broad industry groups which are not comparable with the industries in the

[1]The Statistician has recently published figures up to 1974.

[2]Details of the construction and weighting of this index are given in the *Review of Business*, ANZ Bank, October 1967.

TABLE B.1

NUMBERS OF MONTHS DELAY IN PASSING ON INCREASES IN COSTS—MANUFACTURING

Manufacturing	Materials				Wages
	Materials	Work In Progress	Finished Goods	Total	
Food	0.9	0.9	1.0	2.8	1.4
Beverages	2.5	0.7	3.5	6.7	3.8
Tobacco	11.7	0.3	0.9	12.9	1.0
Fibres	2.0	0.3	1.4	3.7	1.5
Yarns	2.3	1.2	1.5	5.0	2.1
Other textiles	2.3	1.2	1.4	4.9	2.0
Clothing	2.3	0.6	1.1	4.0	1.4
Sawmills	2.5	0.5	1.7	4.7	1.9
Wood and wood products	3.7	1.0	1.1	5.8	1.6
Pulp, paper and paperboard	2.4	0.1	1.3	3.8	1.3
Other paper and printing	2.8	0.6	0.8	4.0	1.1
Basic chemicals	2.8	0.2	2.2	5.2	2.3
Other chemicals	3.8	1.3	2.2	7.3	2.8
Petroleum products	1.7	0.1	0.3	2.1	0.3
Basic metals	1.3	1.1	1.4	3.8	1.9
Fabricated metal products	2.6	1.1	0.9	4.6	1.4
Motor vehicles	2.3	0.7	0.6	3.6	0.9
Other transport and industrial equipment	3.0	1.7	1.4	6.1	2.2
Other machinery and equipment	2.7	1.4	1.3	5.4	2.0
Non-metallic mine products	2.7	0.4	1.4	4.5	1.6
Leather and leather goods	1.8	1.2	1.3	4.3	1.9
Other manufacturing	2.0	0.4	1.2	3.6	1.4

input-output Table. In addition, there are deficiencies (for this study) in the classification of industrial production. For example, production is shown for one group of furniture and furnishings, which cover output of the textiles and wood products industries, and also for building fittings, which include output of a

TABLE B.2

NUMBERS OF MONTHS DELAY IN PASSING ON INCREASES IN COSTS—TRADE

	Wholesale	Retail
Food	0.9	0.8
Beverages	1.6	0.7
Tobacco	0.6	1.1
Textiles	2.2	3.2
Clothing	1.6	0.7
Wood	2.2	2.5
Paper and printing	2.4	2.1
Chemicals	2.2	3.0
Petroleum products	1.3	0.6
Fabricated metal products	1.9	2.5
Motor vehicles	—	1.4
Other machinery and equipment	1.9	2.5
Non-metallic mine products	2.6	3.4
Leather	2.2	3.2
Other manufacturing	3.5	5.0

number of industries. The most serious difficulty was encountered in estimating the changes in labour productivity for the metal using industries, and for these industries there are both gaps in the data and inconsistencies in the classification of input-output data, employment and production.

In estimating the figures needed for this study an attempt was made to reconcile the different classifications and in some cases, use was made of other data to obtain more consistent figures, including the results of the population censuses and annual data of employment and production.

Productivity change in the service industries is assumed to be one half of the rate for all manufacturing industries.

The estimated rates of change in labour productivity are set out in Table B.3. Footnotes to this Table show where assumptions are made about the changes in productivity for particular industries. The figures for other industries are, for the reasons set out above, also based on a degree of judgement.

TABLE B.3

PERCENT INCREASE IN OUTPUT PER PERSON EMPLOYED 1965–66 TO 1972–73

Chemicals	93.3
Petroleum products	75.6
Glass products	38.8
Basic metals	33.3
Fabricated metal products	13.6[a]
Transport equipment	1.7
Other machinery and equipment	13.6[a]
Heavy machinery	12.8
Leather and leather goods	37.6[b]
Textiles	37.6
Clothing and footwear	34.0
Food manufacturing	5.9
Beverages and tobacco products	5.9
Paper and paper products etc.	28.6
Wood and wood products	0.7
Other manufacturing	22.1[c]
Electricity	29.5
Services	11.0[d]

[a]Metals, excluding basic metals, transport industries and heavy machinery.
[b]Assumed the same as textiles.
[c]Average of all other manufacturing industries.
[d]Assumed one half of manufacturing.

5. MARK-UPS ON INTERMEDIATE TRANSACTIONS

The mark-up on purchases by individual manufacturing industries from other industries and on imports is estimated as the ratio of intermediate purchases from the trade and transport industries to the total purchases of goods, including imports. The mark-up differs for industries but the same mark-up is assumed to apply on purchases from all industries and imports.

Selling price is calculated by applying a constant mark-up to prime costs for each industry. Prime costs cover purchases of all goods and unit wage costs. These

mark-ups are calculated from data of inter-industry transactions given in Table 8 of the 1962–63 input-output publications.

6. Imports of Consumer Goods and Distributive Margins on Consumption Expenditure

Additional information is also needed for this study of commodity taxes by rates of tax, the imports and duty on imports of finished consumer goods by industry of origin and the wholesale and retail margins. These estimates were made in the following way.

The details of the composition of imports, commodity taxes and distributive margins were based as far as possible on 1968–69 data. Estimates were first made of the production (less exports) of the products of each industry and the imports and duty of competitive products of these industries, using official figures of production and imports cleared and duty.

Details of excise and sales tax payable on the supply of the products of these industries were then made by applying the rates of commodity tax by product and data of receipts of commodity taxes and excise available from the Commissioner of Taxation. Estimates were available of receipts of sales tax by rate of tax for a detailed breakdown by products, and this provided a check on the directly estimated amounts of sales tax by product and rate.

The values of each item, comprising the sum of production, imports and duty and commodity taxes, were then grouped into functional categories of expenditure, comparable as far as possible with the details of wholesale and retail sales in official collections. These collections provided data of wholesale and retail mark-ups by the functional categories of expenditure, which were then used to estimate the mark-ups on each of the groups of items of production plus imports. The mark-up on each item was then estimated by applying the mark-up for the functional group to each item in the group. The individual products were then reclassified into the original industry classifications.

Comparison of the derived mark-ups by industry with the combined wholesale and retail mark-up shown in the 1962–63 input-output table showed some significant (though not unduly large) differences. It was decided that the 1962–63 estimates were probably more reliable than the estimated mark-ups for 1968–69, and these were used in place of the calculated figures.[3] However, the total mark-ups, based on the 1962–63 data, were split between wholesale and retail margins using the estimates made for 1968–69.

The estimates of the production, imports and duty, commodity taxes and mark-ups of industries in 1968–69 are shown in Table B.4.

[3]Comparison of the margins in 1962–63 and the estimated margins in 1968–69 suggests, however, that there may, in fact, have been a general rise in margins for most commodities between these two dates. The distributive trades are labour intensive and costs may have risen more than costs in manufacturing industries. On the other hand, the distributive trades are highly competitive and any tendency towards increasing costs may have been absorbed, or offset by a fall in the quality of services provided. It is thought that, on balance, there may have been an increase in the margins. However, the 1968–69 data are provisional estimates and the 1962–63 figures have been used in this study. If they are too light this will lead to an understatement of the effect on prices of consumer goods of changes in costs. If margins did increase from 1969, the model will also understate the rise in final prices.

TABLE B.4

THE TRADE CONVERTORS 1968–69 ($mn.)

	Local Prodn.	Imports of Consumer Goods	Duty	Basic Value	Excise	Wholesale Margin	Sales Tax	Total	Retail Margin	Purchases Prices
Chemicals	277	40	5	322	—	84	33	439	110	549
Petroleum products	154	2	2	158	147	76	—	381	198	579
Non-metallic mine products	25	27	5	57	—	18	2	77	32	109
Fabricated metal products	39	18	4	61	—	16	4	81	36	117
Transport equipment	456	34	15	505	—	—	120	625	126	751
Other machinery and equipment	349	90	19	458	—	119	52	629	277	906
Leather and leather products	40	6	2	48	—	9	5	62	24	86
Textiles	203	64	9	276	—	52	3	331	129	460
Clothing, footwear	767	44	16	827	—	89	—	916	382	1,298
Food manufacturing	2,053	28	2	2,083	—	239	56	2,378	570	2,948
Beverages	227	16	25	268	380	61	15	724	376	1,100
Tobacco products	158	7	13	178	241	32	—	451	67	518
Paper products and printing	169	67	2	238	—	12	14	264	87	351
Wood and wood products	159	3	1	163	—	37	4	204	73	277
Other manufacturing	199	44	11	254	—	74	26	354	180	534