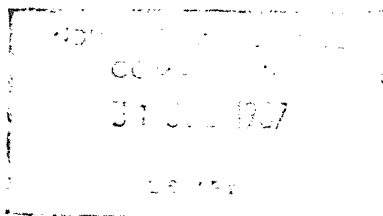


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An Analysis of the Effects of Recent Changes in the Exchange Rate and the Terms of Trade on the Level and Composition of Economic Activity

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Abstract

Over the eighteen-month period ending June 1986, the Australian economy experienced two major shocks: a nominal devaluation of the \$A of some 28 per cent and a terms of trade decline of some 16 per cent. The effects of these influences are examined using the ORANI model of the Australian economy. The effects of the devaluation on selected macroeconomic variables and key sectoral variables are presented for various degrees of wage indexation. Effects on quota rents are calculated and compared with actual outcomes. The terms of trade decline has an adverse impact on the balance of trade and in order to offset this impact while maintaining aggregate employment demand the model calculates that both real wages and real absorption would need to be around 4 per cent less than the values they would otherwise take.

1. Introduction

Over the eighteen-month period ending June 1986, the Australian economy experienced two major shocks. Firstly there was a substantial devaluation of the \$A of some 28 per cent, as measured against the trade weighted index (ABS, Catalogue No. 5301.0, 1986). Most of the devaluation occurred in the first six months of 1985. Secondly there was a significant decline in Australia's terms of trade of about 15 to 16 per cent (ABS, Catalogue No. 5332.0, 1986 and our estimates). Most of the decline in the terms of trade occurred in the twelve months ending June 1986. The immediate effects of a devaluation are to increase the \$A prices paid for imports and received for exports. As the prices of traded goods increase relative to the prices of non-traded goods there is an inducement to expand production in the traded sector of the economy relative to the non-traded sector. Relative price effects will be mitigated, however, by the degree to which money wages follow the initial effects of the devaluation on domestic prices. Over the period of the devaluation there was less than 100 per cent wage indexation, and adjusting the nominal devaluation for Australia's inflation rate relative to inflation rates of our major trading partners suggests that there was also a substantial real devaluation.

Despite the large real devaluation which occurred, there was, until

recently, little evidence of increased production in the export and import competing sectors of the economy and little or no improvement in the current account balance. Lags in the adjustment process, contracts written in \$A, high real interest rates and uncertainty about whether a real devaluation could be sustained all contributed to subdued activity in the economy. However, a major factor in restraining activity in the export sector in this period was the severe decline in the terms of trade.

In a recent article in this journal Lum and Parmenter (1985) used the ORANI model to explore the implications of the real devaluation, from June 1984 to June 1985, for the current account.¹ They concluded that a large part of the fall in the real exchange rate, in this period, was necessary to restore the current account balance to a historically more normal level. Our analysis examines the more recent devaluation and sharp decline in the terms of trade.

In Section 2 we simulate the effects of a devaluation, using the ORANI model, assuming various degrees of wage indexation. Effects on selected macroeconomic variables are presented along with effects on broad sectoral variables. A novel feature is an examination of the effects on quota rents in quota protected domestic activities. In Section 3 we explore the impact of the recent decline in the terms of trade on key macroeconomic variables. We also calculate the adjustments in real absorption and real wages required to offset the effect of the decline in the terms of trade on the balance of trade in goods and services and on aggregate employment. The devaluation and terms of trade

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shocks have been calculated to relate approximately to the eighteen-month period ending June 1986. The ORANI short term closure has been adopted in the analysis which usually entails a two-year adjustment period.

2. The Effects of the Devaluation on Economic Activity and Assistance Levels

In this section, the ORANI model is used to estimate the effects of a devaluation on selected macroeconomic and sectoral variables and on quota rents. The main features of the economic environment which was adopted are: a slack labour market, fixed real aggregate domestic expenditure (real absorption), fixed industry specific capital stocks, fixed production techniques, and full indexation of production and sales taxes.

In the ORANI model simulation of the devaluation, foreign import prices were treated as exogenous which corresponds to the assumption of perfectly elastic import supplies, but foreign export prices for major exports were treated as endogenous which corresponds to the assumption of less than perfectly elastic export demands. Thus, to the extent that the devaluation increases the prices of traded goods relative to non-traded goods, the increased production which is encouraged in the export sector is accommodated by increased export volumes being sold at lower foreign prices. This mechanism is assumed to operate to varying degrees for wool, sheep, grains, meat, other food products, coal, various minerals and non-ferrous metal products. The implication is that a devaluation will in itself produce some decline in the terms of trade.

In analysing the effects of the devaluation it is important to recognise that a devaluation will only have real effects to the extent that it changes relative prices,

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is the value assumed in this article.

In modelling exchange rate changes in this article, we also assume that importers fully pass on any price increase induced by the devaluation. This assumption is considered realistic given the two-year adjustment period implied by the ORANI short run closure and the evidence presented by Phillips and Rietmuller (1986). They found that about 90 per cent of the devaluation induced increase in prices had been passed on to importers' selling prices a year after the devaluation.

One aspect which has received little attention in the past is the modelling of import quotas in the context of a devaluation. Quota rents will be generally reduced following a devaluation. Therefore domestic selling prices of goods under quota will not reflect the full price effects of the devaluation and the subsequent effects on relative prices and domestic activity will be diminished.

The most highly assisted industries in Australia – the textile, clothing and footwear (TCF) and the passenger motor vehicle (PMV) industries – are protected by quotas. The quotas in these industries were modelled by holding constant the volume of imports of those commodities protected by quota. The implicit tariff rates for these commodities were then determined *endogenously*. No attempt was made to simulate the local content provisions of the PMV Plan.

The commodities to be protected by quotas were chosen by obtaining estimates of the proportion of the production of each ORANI commodity covered by quotas. Those commodities where more than 40 per cent of production was protected by quotas were chosen to be the quota protected commodities in the simulation. These commodities were: man-made fibres, yarns and broadwoven fabrics; cotton yarns, etc. and household textiles; knitting mills; clothing, footwear, and motor vehicles.

that is, to the extent that it involves a change in the real exchange rate.² The extent to which a nominal devaluation is sustained as a real devaluation is dependent on the degree of wage indexation present in the economy. Since ORANI is homogeneous in prices, full wage indexation would mean that a real devaluation would not be sustained.

It is unclear how much of the nominal devaluation since December 1984 has been and ultimately will be sustained as a real devaluation, and so results are reported below for a 25 per cent nominal devaluation under various degrees of wage indexation.³ Since the model is linear in percentage changes, the effects of a larger or smaller devaluation can be calculated by proportional adjustments to all the variables.

In analysing the impact of exchange rate changes, it should be noted that a 25 per cent devaluation of the \$A against a foreign currency is equivalent to a 33 per cent appreciation of the foreign currency against the \$A.⁴ Since the ORANI model exchange rate is defined in terms of \$A per foreign currency dollar, the correct shock to the exchange rate is therefore a 33 per cent increase. This

² In a model which contains a monetary sector, a devaluation can reflect the difference in growth rates between the domestic and rest of world money supplies adjusted for differences in real output growth rates. In such a model real effects will depend on the money transmission mechanism but if money neutrality is assumed there will be no real effects.

³ At the time this article was prepared, the devaluation was some 25 per cent as measured against the trade weighted index.

⁴ For example suppose that initially $\$1A = \$1F$. Then with a 25 per cent devaluation $\$1A = \$1.25F$ or $\$1F = \$1.33A$.

2.1 Macroeconomic Effects

The projected effects of a 25 per cent devaluation on several macroeconomic variables for various degrees of wage indexation are presented in Table 1.

With zero wage indexation (that is, fixed money wages) the 25 per cent devaluation is projected to result in an increase in the model's CPI of about 11.5 per cent above what it would otherwise have been.

In the ORANI model, the effect of a devaluation on the CPI occurs through a number of mechanisms. The devaluation increases the prices of imports and exportables and has a direct effect on the CPI for those imports and exportables that are consumed. The domestic price of exportables may not, however, rise by the whole amount of the devaluation if Australia has some market power on world markets. For the goods where this occurs Australian producers of exportables may lower their export price in order to expand export sales. In this situation, as long as the domestic market is not shielded from price movements in the export market, the domestic price of exportables will rise, but by less than the extent of the devaluation.

The indirect effects of the devaluation on the CPI (in the ORANI model) have several components. Firstly, increased prices of imported and exportable inputs raise the costs of domestic producers and thereby shift their supply curves upwards. Secondly, there is a movement along the supply curves for import-competing goods as demand switches from imports to the relatively cheaper domestic substitutes. Thirdly, there are significant indirect input effects as domestic producers find that the costs of both imported and domestically produced inputs have increased and these effects work their way through the economy.

The CPI projection should be interpreted in conjunction with the underlying

assumptions of the model. For example, if there are labour productivity increases and if taxes are less than fully indexed to the CPI then the inflationary effect of the devaluation will be moderated.

The price level results in Table 1 are a good deal larger than those generated by other model based analyses of the effects of the devaluation. For example, for a 15 per cent appreciation of the foreign currency against the \$A, the ORANI, in the Neville and Economic

Neville, Economic Summit and NIF 10 models imply an increase in the CPI of around 3.5 per cent when zero wage indexation is assumed (see Fallon and Thompson 1986 and *Business Council Bulletin* 1985).

This compares with an estimate of a 5.5 per cent increase in the CPI from ORANI. The difference can be largely explained by different treatment of the rental cost of capital in the ORANI. In the Neville and Economic

Table 1 Projections of the Short Term Effects of a 25 per cent Devaluation on Selected Macroeconomic Variables^a

Variable	Degree of wage indexation (per cent)				
	0	25	50	75	
Consumer price index	11.5	13.7	17.0	22.2	
Economy wide real wage	-11.5	-10.3	-8.5	-5.5	
Economy wide nominal wage	0.0	3.4	8.5	16.7	
Real exchange rate ^b	21.5	19.3	16.0	10.8	
Balance of trade	10.6	9.4	7.9	5.2	
Aggregate imports	-8.4	-7.4	-5.9	-3.5	
Aggregate exports	29.5	28.5	22.1	14.9	
Real GDP ^c	5.8	5.2	4.3	2.8	
Export contribution ^d	4.5	4.1	3.4	2.3	
Import contribution ^d	1.3	1.1	0.9	0.5	
Aggregate labour demand	9.4	8.4	6.9	4.5	

Notes: (a) All projections are in percentage changes, with the exception of the balance of trade which has as units billions of 1984-85 \$A, and the export and import contributions to GDP which are in percentage points.

(b) The real exchange rate is defined here as the nominal exchange rate change (33 per cent) minus the change in the consumer price index.

(c) The change in real GDP is adjusted for terms of trade effects.

(d) The export contribution to the change in real GDP is calculated as the product of the change in the foreign currency value of exports and the share of exports in GDP. The import contribution is calculated in a similar manner.

Source: Simulations with the ORANI model.

export sector is more sensitive to changes in its price/cost situation.

Under 75 per cent wage indexation the projected increase in the CPI is approximately double the increase for zero wage indexation and real wages fall by about half as much when comparing the two cases. The higher degree of wage indexation means that the real exchange rate now increases by 10.8 per cent compared with 21.5 per cent for zero wage indexation. The smaller increase in the real exchange rate means that relative prices of traded to non-traded goods are changing by less, providing a smaller stimulus to the traded goods sector of the economy. This is

2.2 Sectoral Effects

The estimated effects of the devaluation on components of the CPI, output and employment by sector for various degrees of wage indexation are presented in Table 2.

The projected sectoral effects can be

Table 2 Projections of the Short Term Effects of a 25 per cent Devaluation on Consumer Prices, Output and Employment by Sector^a

Variable	Weight	Degree of wage indexation (per cent)			
		0	25	50	75
Consumer price index					
Import competing	.1384	12.6	14.7	17.7	22.6
Export	.0514	25.6	26.4	27.6	29.4
Export related	.0097	22.6	23.9	25.5	28.0
Non-traded	.6647	8.2	10.7	14.5	22.4
Imports	.0687	33.3	33.3	33.3	33.3
Indirect taxes	.0672	11.5	13.7	17.0	22.2
Total		11.5	13.7	17.0	22.2
Output					
Import competing	.1431	9.7	8.3	7.1	4.2
Export	.0845	27.0	24.3	18.4	13.6
Export related	.0310	22.7	20.2	16.8	11.3
Non-traded	.7414	3.2	2.9	2.4	1.6
Total		6.7	6.0	4.9	3.3
Employment					
Import competing	.1658	10.9	10.0	8.0	4.9
Export	.0642	49.3	44.4	36.9	24.8
Export related	.0295	32.4	29.4	23.6	15.8
Non-traded	.7405	4.5	4.1	3.4	2.2
Total		9.4	8.4	6.9	4.5

Note: (a) All projections are in percentage changes.

Source: Simulations with the ORANI model.

better understood by distinguishing between the shifts in supply schedules and movements along these supply schedules. As a result of increased costs of production, supply schedules in the import competing sector are shifted upwards. However, the price changes for imported goods are larger than the price changes attributable to supply shifts for import competing goods so that there is also a demand shift in favour of import competing goods. This induces a movement up along the import competing supply schedules. With zero wage indexation the net result is an increase in prices in the import competing sector of around 1.3 per cent, and increases in output and employment of around 10 and 11 per cent respectively.

The exports referred to in Table 2 constitute those exports where Australia has some, albeit in many cases slight, influence over world prices (the commodities involved were listed at the beginning of Section 2). The extent to which increased export sales may be achieved depends on the responsiveness of overseas customers to a reduction in prices and the ability of producers to increase output. In the simulations with zero wage indexation the average price of exportables is projected to rise by around 26 per cent. Production is projected to expand by 27 per cent and labour demand by about 49 per cent on a wage bill basis.

The export related sector is closely linked to the export sector through its supply of basic rural and mineral products for processing prior to export. The price and production movements experienced in the export sector therefore tend to be reflected in price and production changes in this sector.

The non-traded sector experiences adverse relative price movements but a boost from increased sales to the export, export related and import competing sectors. Output and employment in this

sector are projected to increase by around 3 per cent and 4.5 per cent respectively, and prices are projected to increase by around 8 per cent.

As illustrated in the macro results, a higher degree of wage indexation reduces the real output gains which could occur from the devaluation. With 75 per cent wage indexation, domestic supply curves will be shifted up further, resulting in another round of price increases which erodes any improvements in international competitiveness and inhibits expansion in production.

It is of interest to calculate from the simulations the extent to which the real devaluation itself affects the terms of trade. With zero wage indexation, a 25 per cent nominal devaluation is equivalent to a 21.5 per cent real devaluation and implies a terms of trade decline of 5.8 per cent (see Tables 1 and 2; 125.6/133.3 - 1.0). This effect occurs because, as discussed earlier, for major exports in ORANI foreign demands are less than perfectly elastic.

2.3 Effects on Quota Rents

To the extent that a nominal devaluation is sustained as a real devaluation import competing industries will become more competitive. However, this effect is distinct from the effect of a real devaluation on the amount of assistance provided to local industries by current assistance arrangements.

The effect of a real devaluation on assistance to an industry depends on the form of that assistance and how the real devaluation occurs. Assistance can encompass tariffs, quotas, bounties, subsidies, two-price schemes, taxation concessions and others. A real devaluation can occur as a result of either a nominal devaluation or a rate of domestic inflation below that of our trading partners. Much assistance is in *ad valorem* terms and would be unaffected by a real

devaluation no matter how it occurs.⁵ The level of assistance provided by quotas, however, would be expected to change following a real devaluation.

To analyse the effect of a real devaluation on the assistance provided by quotas consider a simple partial equilibrium analysis.⁶ Assume that there is no change in domestic prices of import competing goods, that imported and domestically produced goods are perfect substitutes and that the quota restricts imports to less than they would otherwise be. Then a devaluation reduces the level of assistance, in nominal terms, provided by the quota. This occurs because, in this model, the devaluation raises the world price of imports in domestic currency without changing the domestic selling price, so that the percentage by which the domestic price exceeds the world price is reduced.

If the quotas are allocated, the rent accruing to importers falls. For quotas which are bought by tender, bids based on the expectation of no devaluation would be too high given the increase in the import price. Therefore the profits of importers caught in this position would be squeezed.

In a general equilibrium framework the above partial equilibrium story would be modified. A real devaluation will involve general increases in prices in the economy and an increase in the prices of traded goods relative to non-traded goods. In this situation, importers may be able to increase the domestic selling

⁵ For a discussion of the effects of exchange rate changes in relation to different forms of assistance see IAC (1981), pp 106-9.

⁶ In this explanation it is assumed that the real devaluation occurs through a nominal devaluation with no change in the prices of domestically produced commodities.

price of imports under quota depending on the degree of substitutability with domestic production. This would enable them to reduce their loss in rents. However, it is also possible that the demand for imports would fall sufficiently so that the quota would not be binding.

In the ORANI model simulation of a 25 per cent devaluation, when import volumes were fixed for each of the quota protected industries, quota rents in some industries were projected to fall by more than 100 per cent following a 25 per cent devaluation. This is implausible in reality and indicates the quota is not binding. In cases where quota rents were falling by more than 100 per cent the nominal tariff equivalent of the quota was reduced so that quota rents were eliminated, and import volumes were then treated as endogenous. The effects of the devaluation on quota rents, as simulated with the ORANI model, for various degrees of wage indexation are shown in Table 3.

The results suggest that irrespective of the degree of wage indexation, that is modelled, quota rents would be eliminated in man-made fibres and yarns. Reductions in quota rents absorb

cotton yarns and fabrics, and motor vehicles and parts; and fall severely in other quota protected industries. It is plausible for quotas to become non-binding if the relative price shocks are large enough. The relative price shocks used in the simulations are somewhat inaccurate because a 25 per cent devaluation is assumed for all imports, whereas the SA has depreciated more substantially against some currencies for example the Yen and Mark, which are relevant to motor vehicles and parts, and less against others, which are relevant to textiles, clothing and footwear.

Nevertheless the IAC *Annual Report* for 1985-86 (1986, pp. 46-7) provides evidence that the results in Table 3 are broadly consistent with actual experience. The report stated that in 1986 the available motor vehicle quota pool was not cleared by tender so that quota protection was redundant, while in textiles, clothing and footwear there were substantial reductions in tender premiums for most 1986 entitlements and some tender pools were not cleared at auction.

Reductions in quota rents absorb

Table 3 Projections of the Short Term Effects on Quota Rents of a 25 per cent Devaluation^a

Quota rents	Degree of wage indexation (per cent)				
	0	25	50	75	
Man-made fibres, yarns	-100.0	-100.0	-100.0	-100.0	-100.0
Cotton yarns and fabrics	-100.0	-100.0	-100.0	-100.0	-100.0
Knitting mills	-100.0	-100.0	-100.0	-100.0	-66.5
Clothing	-98.6	-86.1	-67.6	-37.6	
Footwear	-67.5	-57.2	-42.1	-17.6	
Motor vehicles and parts	-100.0	-100.0	-100.0	-100.0	-100.0

Note: (a) All projections are in percentage changes.

Source: Simulations with the ORANI model.

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some of the price increasing effect of the devaluation (on imports subject to quota) which would otherwise occur if protection was in the form of tariffs. Since the rise in import selling prices relative to selling prices of domestically produced products is restrained, relative to the situation of no quotas, output and employment expansion is also restrained in quota protected industries. As the degree of wage indexation is increased, output and employment expansion would be less since relative price effects would be further diminished.

3. The Effects of the Decline in the Terms of Trade

In response to the recent decline in the terms of trade, the Prime Minister has argued that there will be a need to achieve at least a temporary decline in real wages and general living standards (Hawke 1986). However, so far there has been little information available on the magnitude of the decline in real wages and the changes in other economic variables which might be required to offset the adverse impact of the terms of trade decline.

In this section we attempt to provide a quantitative assessment of the extent of the reduction in real wages and real expenditure required to accommodate the decline in Australia's terms of trade over the eighteen months to the end of June 1986. To achieve this the ORANI model was used to:

- simulate the effects of the terms of trade decline on various economic variables; and
- calculate the changes in real wages and real absorption which would be required to offset the deterioration in the balance of trade and maintain aggregate employment demand in the light of the terms of trade decline.

The reductions in real wages and real absorption which are required would in effect require a real devaluation. With the nominal exchange rate fixed and foreign and domestic prices changing, the real exchange rate is endogenous in the model. We could have constructed a measure of the real exchange rate from the ORANI results for comparison with realised outcomes. However, there are numerous problems in constructing real exchange rate measures and there is a timing problem in comparing the ORANI results which imply an adjustment period of two years with measures of the real exchange rate in the eighteen-month period ending June 1986.⁷ At the end of this section we do, however, attempt to place our calculations in context by combining the comparative static projections from ORANI with estimates of underlying growth rates in real absorption and real unit labour costs in the economy to estimate outcomes which would be consistent with addressing the adverse effects of the terms of trade decline. Our estimates are then compared with budget forecasts of relevant variables in 1986-87.

The ORANI model is well suited to the task of examining the effects of the terms of trade shock, since it contains a detailed specification of trade equations, and their linkages to the rest of the economy.

The terms of trade shock was modelled in ORANI by changing foreign currency import prices and by shifting export demand schedules by the amounts necessary to achieve the appropriate foreign currency price changes. The terms of trade shock was not uniform. It involved different price shocks for each imported and exported

commodity. Details of the estimated price changes are provided in Appendix A. The price changes were calculated in \$A at the disaggregated level indicated in Appendix A, and were constructed to represent the eighteen-month period ending June 1986. This article was prepared before the ABS released export and import price data on the June quarter of 1986 and so use was made of data from a number of other sources. The price changes in Appendix A represent a fall in Australia's terms of trade of 16 per cent.⁸

The estimates of the price changes are based on observed and expected price movements in \$A. They therefore incorporate the effect of the devaluation since late 1984 on the terms of trade. As discussed earlier, the devaluation itself is likely to have over time an adverse effect on the terms of trade because of the market power that Australia has in some of its export markets. However there is an additional effect because the sales of many of Australia's exports are denominated in \$A. The modest increase in the average price of export services shown in the appendix, of 7.4 per cent, illustrates this point.

Since the price estimates included the effects of the devaluation over the period

⁸ The change in the terms of trade can be calculated in a number of ways. The estimates presented here are calculated using the movements in \$A of export and import prices converted to index form. For these price changes the average increase in export prices over the eighteen months to June 1986 was 9.1 per cent and for import prices was 29.7 per cent. This yields a decline in the terms of trade of 16 per cent $(109.1/129.7 - 1)$. The percentage change in the terms of trade can also be approximated by the differences between the percentage changes in export and import prices. However, this approximation is only accurate for small changes in this case, it leads to a calculated change in the terms of trade of 21 per cent $(9.1 - 29.7)$. This is significantly larger than the 16 per cent calculated with the index approach.

examined, an adjustment for its average nominal impact was made. This involved subtracting 33 percentage points from each price change. As explained in Section 2 this figure represents the approximate appreciation of the trade weighted index of foreign currencies against the \$A over the period. Because ORANI is homogenous in prices, a uniform subtraction of 33 percentage points will have no real effects, and will not affect our calculations of the changes in real wages and real absorption required to offset the effect on the trade balance of the fall in the terms of trade. It would affect nominal magnitudes, however, and simply subtracting the average appreciation from each price change is not strictly appropriate because of differences in the extent of the devaluation of the \$A against other currencies. Thus we have attempted to simulate the actual terms of trade change which was observed in \$A terms, including any effects on relative commodity prices which might have arisen from the devaluation.

In an initial experiment with the model, the supply responses in the other food products (predominantly sugar) and cotton ginning and wool tops industries were excessive. Discussions with the Queensland Cane Growers Association and the Australian Wool Corporation indicated that supply responses in these industries were very low in the short run. Therefore, in the simulations reported, outputs in these industries were fixed.

In interpreting the results presented here it should be kept in mind that the price shocks are estimates of the order of magnitude of changes, the nominal exchange rate is fixed, and adjustment to these shocks would be expected to occur over the two years following the shocks since the ORANI short run closure is adopted (see Section 2).

Table 4 contains the results of the ORANI model simulations of the terms

of trade shock and the subsequent changes in real absorption and real wages which would be required to offset the implied deterioration in the balance of trade and maintain aggregate employment demand under the assumption of 100 per cent wage indexation.

Column 1 indicates the effects of the terms of trade decline on various macroeconomic variables holding constant real wages and real absorption. The results suggest that the terms of trade decline, by itself, has a substantial deflationary impact with the CPI falling by around 14 per cent.

This estimate of the fall in the CPI does not take into account the effect of the nominal devaluation on the prices of traded goods. In the absence of the devaluation, our estimates indicate that the prices of exportables have fallen on average by about 24 per cent and the prices of imports have fallen on average by about 3.5 per cent. On average, import prices fall because the increases in the \$A prices of many imports were less than the increase implied by the devaluation (33 per cent) with a very large price fall occurring for crude oil. The fall in import prices partially offsets

Table 4 Short Term Projections of the Effects on Macroeconomic Variables of the Change in Australia's Terms of Trade and Estimates of the Real Absorption and Real Wage Adjustments Required to Offset the Effect on the Balance of Trade and Maintain Aggregate Employment Demand (With 100 per cent Wage Indexation)^a

	TT ^b	RA ^c	Total (1+2)	RW ^d	Total (1+4)	RA and RW ^e (1+6)	Total (1+6)
Consumer price index	-14.1	-16.3	-30.4	-17.9	-32.0	-17.0	-31.1
Real GDP ^f	-4.1	-2.5	-6.6	4.1	0.0	0.2	-3.9
Aggregate employment	-1.3	-2.6	-3.9	6.9	5.6	1.3	0.0
Balance of trade	-7.5	7.5	0.0	7.5	0.0	7.5	0.0
Real absorption	0.0	-6.6	-6.6	0.0	0.0	-3.9	-3.9
Real wage	0.0	0.0	0.0	-9.8	-9.8	-4.1	-4.1

Notes: (a) All projections are in percentage changes except the balance of trade which is in billions of 1984-85 \$A.

(b) Terms of trade shock.

(c) Real absorption adjustment of -6.6 per cent to offset balance of trade effect.

(d) Real wage adjustment of -9.8 per cent to offset balance of trade effect.

(e) Real absorption and real wage adjustments of -3.9 and -4.1 per cent to offset balance of trade effect and aggregate employment effects.

(f) Adjusted for terms of trade effects.

Source: Simulations with the ORANI model.

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the effect of the drastic reduction in export prices on Australia's terms of trade.

The reductions in the prices of imports and exports lead to lower prices via numerous direct and indirect mechanisms in the ORANI model. Under 100 per cent wage indexation, this reduction in prices results in a substantial reduction in nominal wages which reduces costs and prices further. In a simulation with less than 100 per cent wage indexation, real wages were projected to increase slightly following the terms of trade shock and the CPI was projected to fall by less. When the terms of trade shock and a devaluation of 25 per cent were modelled together, under the assumption of 50 per cent wage indexation, the CPI was projected to increase by 9 per cent.

Since exports and imports are both around 15 per cent of GDP in ORANI, average falls in export and import prices of 24 and 4 per cent respectively would mean a first round effect on real GDP of around -3.0 per cent $(0.15 \times (24 - 4))$. This calculation assumes, however, that export and import volumes would be maintained. As a result of the relative price changes there would be some decreases in both. Since the export price changes are very large, and exports are more sensitive to changes in their price/cost situation than imports, export volumes fall by more and the final effect on real GDP is a projected decline of 4.1 per cent. The balance of trade deficit increases by \$A7.5 billion.

As a result of the terms of trade shock, employment gains associated with import replacement are not sufficient to offset losses associated with declines in export activity, and consequently aggregate employment is projected to decline by around 1.3 per cent.

Column 2 of Table 4 indicates the size of the reduction in real absorption

which would lead to a \$A7.5 billion increase in the balance of trade when real wages are held constant. This would offset the decline in the balance of trade implied by the terms of trade shock. The required decline in real absorption would be 6.6 per cent. Reducing aggregate demand leads to general price and cost decreases in the economy. Export oriented industries are induced to produce less for the domestic market and more for overseas markets. Although import competing industries suffer directly from the decline in aggregate demand they gain somewhat from the second round price effects and switch away from imports. However, in net terms the import competing sector experiences a decline in production and employment.

Column 3 of Table 4 contains the net results from the terms of trade shocks, and the reduction in real absorption required to offset the adverse impact on the balance of trade. As the decline in real absorption is large the net effect is to severely deflate the economy, leading to a projected decline in real GDP of 6.6 per cent and a projected decline in aggregate employment demand of 3.9 per cent.

Column 4 of Table 4 indicates the real wage adjustment required to offset the balance of trade decline, associated with the terms of trade shock, when real absorption is held fixed. The projected decline in real wages is 9.8 per cent. Wage cost reductions have favourable effects on export oriented and import competing sectors. With a slack labour market, lower real wages would lead to a very large increase in employment demand of 6.9 per cent thereby leading to a net increase in employment demand (in column 5) of 5.6 per cent. With fixed real absorption, the real wage decline of 9.8 per cent also has the effect of increasing real GDP so that the increase exactly offsets the decline associated with the terms of trade shock.

Our estimates of the adjustments required to offset the effect of the decline in the terms of trade on the balance of trade may be insufficient to correct Australia's current account imbalance for a number of reasons. Firstly, the adjustments, estimated here, only offset the impact of the measured terms of trade decline on the trade balance. They do not correct for the imbalance that was initially present as a result of other factors. Secondly, Australia's international indebtedness and debt service obligations have automatically increased as a result of the devaluation. This is because most of Australia's debt is denominated in foreign dollars and the current account was initially in deficit before the devaluation. The implication is that exports need to expand at an even greater rate than calculated here in order to service this debt. To achieve this expansion, a further improvement in Australia's competitiveness would be necessary. Finally, our calculations are predicated on the standard export demand elasticities in ORANI. These elasticities have often been criticised for their optimistic characterisation of prospects for the expansion of Australian exports. If these elasticities were lower, larger adjustments would be required to have the same impact on the balance of trade. This follows since foreign prices would have to be lowered by more which requires a larger reduction in domestic costs of exporters. Smaller adjustments would, however, be required when productivity gains are allowed for.

Assuming a constant real wage, reducing real absorption in order to offset the adverse impact of the terms of trade decline on the trade balance leads to a decline in aggregate employment demand. In contrast, assuming constant real absorption, reducing real wages to achieve this target leads to an increase in aggregate employment demand well in excess of the loss in employment

demand associated with the deterioration in the balance of trade. This suggests that it is possible to devise a combination of real wage and real absorption adjustments which will leave aggregate employment demand unchanged and not worsen the trade deficit. This combination is depicted in columns 6 and 7 of Table 4. The results suggest that in order to achieve these goals, in light of the terms of trade decline, would require offsetting reductions in real wages and real absorption of 4.1 and 3.9 per cent respectively. Such a combination of policies would be desirable when labour markets are not slack.⁹

The combination of policy responses would, however, lead to a reduction in real GDP of 3.9 per cent. As shown in Table 4, reducing real wages alone in order to address the deterioration in the balance of trade means that there is no decline in real GDP. The relative efficacy of reducing real wages compared with reducing real absorption, in order to address the balance of trade situation, is related to the nature of the shock and the principle that policy responses should be as closely directed to the shock as possible. The terms of trade decline has largely arisen as a result of a fall in export returns. The primary effect of a reduction in real absorption is a fall in demand and prices in the non-traded sector. The secondary effect is a reduction in the costs of exporters as the fall in prices of non-traded goods reduces costs generally. A reduction in real wages, on the other hand, reduces the

9. Although labour markets may be slack at the moment, we believe that this policy combination is nonetheless relevant because cutting real wages by around 10 per cent would not be politically acceptable by itself, and real restraint on both real wages and real absorption has been used in Australia to address the problem.

costs of exporters directly.

As mentioned earlier the degree of wage indexation also influences the net impact of the terms of trade shock. With a delationary shock, less than 100 per cent indexation would lead to an increase in real wages which in itself would have an adverse effect on overall competitiveness and lead to a larger decline in real GDP. This suggests that, in the absence of exchange rate changes and other policy responses, full wage indexation is useful in itself in minimising the adverse impact of the terms of trade decline on real GDP.

In contrast the ORANI simulations of a devaluation in Section 2 showed that less than 100 per cent wage indexation is necessary for the beneficial effects of a nominal devaluation to occur. In other words, if the nominal devaluation is to provide some offset to the effect of the decline in the terms of trade on the balance of trade less than full wage indexation is required.

The ORANI model provides projections of the effects of the shocks on a wide range of economic variables. These projections are deviations from the values that would otherwise have been observed (if the model is an accurate representation of what is going on in the economy). In other words, they are deviations from the underlying growth path of the economy.

To obtain an estimate of the actual changes required, the projected deviations should be combined with underlying movements in relevant variables. It is difficult to calculate the underlying growth rates of variables such as real absorption and real wages. However, we have attempted to provide some estimates using information from the *Budget Papers* (Treasury 1986).

From the *Budget Papers* we calculate an underlying growth rate, over two years, for real absorption of between 4 and 6 per cent, and for real unit labour

costs of about 0 per cent. Real unit labour costs are defined as real wages net of productivity changes or, equivalently as, the share of labour costs in the value of output. This share tends to be relatively stable in the long run (Treasury 1983, Table 1, Column C, p. 29).

These underlying trends can be combined with the projections from the ORANI model of the reductions in real absorption and real wages required to offset the impact of the fall in the terms of trade on the balance of trade, while maintaining aggregate employment. This yields an estimated net increase in real absorption of between 0 and 2 per cent and a reduction in real unit labour costs of about 4 per cent for a two-year period.

The budget forecasts are for an increase in real absorption of 0.5 per cent and a reduction in real unit labour costs of 1.0 per cent over 1986-87. Since we have not accounted for other influences, besides a terms of trade shock, on real wages and real absorption it is difficult to make any definite statements. It appears, however, that the adjustments inherent in the budget forecasts go a considerable way towards addressing the adverse impact of the terms of trade decline on the balance of trade.

4. Conclusions

The main conclusions to be drawn from the analysis reported here are that:

- (i) the recent devaluation itself will have strong adverse terms of trade effects, as a result of market power effects for major exports (there are additional effects through many export contracts and sales of export services being denominated in \$A);
- (ii) import quota rents for passenger motor vehicles, textiles, clothing,

and footwear have been severely reduced or eliminated as a result of the recent devaluation;

- (iii) with slack labour markets, reductions in real unit labour costs are more effective than reductions in real absorption as a response to the adverse price/cost situation which exporters face as a result of the recent terms of trade decline, and

- (iv) budget forecasts for real expenditure and real unit labour costs, for 1986-87, suggest that adjustments already in place will go a considerable way towards addressing the adverse impact of the terms of trade decline on the balance of trade.

Appendix A. Calculating the Terms of Trade Decline

All the data were constructed in terms of \$A as most of the data were provided in this form. The percentage changes in \$A prices of all the ORANI commodity exports and imports are shown in Table A1. This article was prepared before the ABS released data on export and import price changes for the June quarter 1986. So use was made of data from other sources and from the ABS to obtain actual and expected changes for the eighteen months ended June 1986. A detailed comparison of our estimates of import and export price movements with ABS estimates (on a Balance of Payments Basis, Catalogue No. 5332.0) to the March quarter 1986 revealed that they were very similar, although our estimates were generally a little higher given that they covered three more months than the ABS estimates. The release of ABS data to June 1986 indicated a terms of trade decline of some 15 per cent which compares with our estimate of some 16 per cent. Thus we did not judge it necessary to revise our numbers to incorporate the June quarter ABS estimates, and in any case these estimates are revised each quarter at least two months after the end of the quarter.

Mineral ore and alloy prices were obtained from the Australian Mining Industry Council (AMIC). Price increases from the December quarter of 1984 to an average 1986-87 forecast (provided by AMIC) were calculated for steaming coal, coking coal, iron ore, zinc, copper, nickel and lead. Since the December quarterly average for aluminium was uncharacteristically low the average price of aluminium for 1984 was used as a base. Alumina prices are confidential, but AMIC suggested that they follow similar trends to the aluminium prices. The aluminium price changes were therefore used to also represent alumina price

changes. Price data for the base metals and aluminium represent the London Metal Exchange daily cash price, averaged over the quarter and converted to \$A at quarterly average exchange rates.

Prices of iron ore and coal represent monthly export unit values, averaged for the quarter.

Coking coal and steaming coal prices were weighted by 1984-85 export value

Table A1 Estimates of Export and Import Price Increases in \$A for ORANI Commodities for the Eighteen Months to the End of June 1986

	Percentage change
Exports	
Wool	9.6
Sheep	-10.0
Wheat	1.6
Barley	-30.7
Other grains	0.0
Other rural exports	4.0
Ferrous metal ores	4.2
Non-ferrous metal ores	20.6
Coal	7.9
Meat products	5.0
Other food products	35.0
Cotton ginning, wool scouring	5.2
Basic non-ferrous metals	17.5
Other non-rural exports	12.0
Export services	7.4
Imports	
Rural imports	4.0
Food and beverages	28.5
Textiles	29.5
Clothing and footwear	26.4
Wood, wood products and furniture	28.5
Paper and paper products	35.9
Chemical products	33.5
Non-metallic mineral products	34.0
Basic metal products	26.8
Fabricated metal products	29.6
Transport equipment	57.8
Appliances and electrical equipment	30.1
Industrial machinery and equipment	56.3
Other manufacturing	40.8
Crude oil	-50.8
Petroleum products	-9.8
Other mineral imports	15.0
Import services	27.0

shares from ABS, *Foreign Trade, Australia, Part 1: Exports and Imports 1984-85*.

Non-ferrous metal prices were weighted by 1984-85 export values which related to the separate ORANI industries – non-ferrous metal ores and non-ferrous metal products. The export value data were obtained from ABS, *Exports of Major Commodities and Their Principal Markets, Australia*.

The percentage change in the price of wool was calculated from changes in the market indicator for wool (a weighted average of representative wool types) from the quarterly average for December 1984 to the average forecast price for 1986-87. The price data were provided by the Australian Wool Corporation.

The price change for scoured wool was calculated by multiplying the wool price change by the share of wool in the costs of production of scoured wool. The cost share was obtained from Bruce (1985).

The percentage change in the price of wheat represents the change from the December quarterly average to an average for the first five months of 1986 for Australian standard white. The data were provided by the Australian Wheat Board.

The price change for barley was obtained from the Queensland Barley Board and represents the percentage change in the average price of barley from the December 1984 season to the average price for May 1986.

The change in the price of sorghum was taken as representative of the price of other grains. The price change was calculated as the change in an average export unit value for the six months ended December 1984 to the six months ended February 1986. The export unit value data were obtained from ABS, *Exports of Major Commodities and Their Principal Markets*,

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The other food products industry in ORANI comprises mainly sugar. In 1984-85 exports of sugar were 61.3 per cent of total exports of this industry. Changes in the price of sugar from the December quarterly average for 1984 to the average for the first three months of 1986 were calculated from data provided by the Queensland Cane Growers Association. The prices represent averages of prices quoted in London markets for raw sugar and converted to \$A. The sugar price change of 53.5 per cent and an estimate of the price change for non-sugar food products exports of 7 per cent were weighted by export value shares for 1984-85 from ABS, *Foreign Trade, Australia, Part 1: Exports and Imports 1984-85*. The estimate of 7 per cent for other food products was based on changes in average export unit values for crustaceans and molluscs (the second largest component of other food products) from the six months ended December 1984 to the six months ended February 1986. The export unit value data were obtained from ABS, *Exports of Major Commodities and Their Principal Markets, Australia*. The figure of 7 per cent was also of a similar order of magnitude to changes in the implicit price index for other food products from ABS, *Exports and Imports (Balance of Payments Basis) at Constant Prices, Australia*.

The price change for meat products was calculated as a weighted average of prices representing cow, beef and ton trunks for export in \$A f.o.b. Prices were obtained from the Australian Meat and Livestock Corporation and were considered representative of prices of Australian meat for export. From December 1984 to December 1985 the price changes were found to be of the same order of magnitude as more comprehensive unpublished meat export

indexes from the ABS. The former indexes were preferred since they provided more recent information where price declines have occurred. The price data used represent the percentage changes from a December 1984 quarterly average to an average for the three months ended May 1986. The indexes were weighted by 1984-85 export value shares for boneless beef meat and sheep, lamb and goats, meat obtained from ABS, *Exports of Major Commodities and Their Principal Markets, Australia*.

The price change for live sheep was obtained from the Australian Meat and Livestock Corporation. It represents the price change from the December quarterly average for 1984 to the average for the three months ended May 1986 in \$A f.o.b. of live sheep exported from Perth.

The price change for other rural exports was based on movements in the implicit deflator for other rural exports from the December 1984 quarter to the March 1986 quarter. The data were obtained from ABS, *Exports and Imports (Balance of Payments Basis) at Constant Prices, Australia*.

The price change for other merchandise exports was obtained from considering the changes in the implicit deflators for exports of machinery and transport equipment and other non-rural exports from ABS, *Exports and Imports (Balance of Payments Basis) at Constant Prices, Australia*. From the December quarter of 1984 to the March quarter of 1986 the percentage increases were 11.7 per cent for transport and equipment and 8.5 per cent for other non-rural exports. An estimate of 12 per cent was therefore applied to all other non-rural exports in ORANI.

The price changes of imported goods were obtained from Table 1 of Johns (1986). They represent the changes in the \$A prices paid by importers to for-

foreign suppliers for the eighteen months ending June 1986 (including expected payments from December 1985 to June 1986) at the two-digit ASIC manufacturing level. These changes were applied to appropriate input-output industry categories in ORANI.

The price change for imported crude oil was obtained from data contained in press statements by the Minister for Resources and Energy. It represents the percentage change from 1 March 1985 to 1 May 1986 of the import parity price (\$A per barrel) for Bass Strait crude oil.

The price change for petroleum products was calculated by multiplying the crude oil price change by the share of crude oil used for producing petroleum products. The crude oil cost share was obtained from Bruce (1985).

The price change for rural imports was set to 4.0 per cent and the price change for other mineral imports was set to 15.0 per cent on the basis of the export price data and the general consensus that world primary commodity prices had fallen over the period.

Price changes for export and import services were obtained from ABS, *Exports and Imports (Balance of Payments Basis) at Constant Prices, Australia*, and with more recent information obtained from ABS unpublished data. They represent the price changes in the implicit deflators for export and import services from the December 1984 quarter to the March 1986 quarter. Estimates of 1 percentage point and 2 percentage points respectively were added to the export and import deflators for the June 1986 quarter.

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