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THE RELATIVE SIGNIFICANCE OF A RANGE OF ECONOMIC POLICIES FOR IMPROVING AUSTRALIA'S BALANCE OF TRADE*

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Australia faces a very serious trade problem. A large improvement in the balance of trade is required simply to stop its international debt from rising above levels which are already considered too high. In this paper, a range of economic policies are examined. Each generates a $A1 billion improvement (in 1985–86 prices) in the balance of trade after about 2 years. The following economic shocks are examined: an increase in world agricultural prices; a cut in real wages; a reduction in protection for manufacturing industries; a change in the tax mix in favour of indirect taxation; and a contraction in real domestic absorption. The impacts of these shocks are derived from simulations with ORANI, a computable general equilibrium model of the Australian economy. The effects of these shocks on the agricultural sector are studied in detail.

Australia has a major trade problem. At the end of June 1987, its net external debt was estimated to be around $80 billion, or roughly 30 per cent of gross domestic product (GDP).[1] This puts Australia, along with many Third World economies, among the highest debtor nations in the world.[2] Worsening terms of trade, causing a series of large current account deficits over the 1980s, were mainly responsible for the high rate of net capital inflow and deteriorating external debt position. This in turn led to a large real devaluation of the Australian dollar. Because Australia's debt is largely denominated in foreign currency, the external debt position has been exacerbated by this devaluation. Furthermore, the debt appears to have been used to finance consumption, as investment as a share of GDP has been declining over the 1980s.[3] With such a high debt, Australia is extremely vulnerable to additional adverse external events, such as further declines in the terms of trade, or a global economic recession.

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[1] See Fraser (1987, p. 5). Note that this estimate takes into account Australia's holdings of debt offshore and of foreign currency.

[2] See Fraser (1987, p. 16). Australia is the 6th most heavily indebted of the world's nations in terms of gross debt per capita. However, in terms of gross external debt as a percentage of GDP Australia is ranked as having only the 34th highest ratio.

[3] See Fraser (1987, p. 82).

How bad is Australia's debt problem? Dixon and Parmenter (1987) and EPAC (1986) have estimated the trade turnaround required to stop the net debt to GDP ratio from deteriorating. These studies have been contrasted by Fraser (1987). The extent of the trade turnaround required to stabilise the debt position varies greatly depending on the assumptions made regarding such things as the growth of the domestic economy, the outlook for commodity prices and the time frame for stabilisation.

Dixon and Parmenter (1987) assume that annual real GDP growth will be about 3 to 3.5 per cent and that international commodity prices will continue to fall until the end of 1990. Taking into account the dynamics of debt accumulation and the increased burden of debt that a real devaluation contributes, Dixon and Parmenter project that an annual average improvement in the balance of trade over the period end-1984 to end-1990 of between 0.75 and 1.5 per cent of GDP would be required to stabilise Australia's net debt position by 1990. To quote Dixon and Parmenter: 'A substantial surplus in 1990 will be required just to pay the interest bill on a net foreign debt, which by that time is likely to be in excess of 40% of GDP'.[4]

The EPAC paper assumes a different outlook for the economy and commodity prices. However, Whitelaw, its principal author, reaches similar conclusions: 'the key point to emerge from this analysis was that, given the high levels of real interest rates in world capital markets, debt stabilisation would require Australia to run a surplus on its trade account (rather than the substantial deficit of the mid-1980s)'.[5]

In this paper, it is taken as given that a large reduction in the deficit on current account is necessary and will take place. The focus here is on how this adjustment can be achieved. In particular, which policies could be expected to generate the greatest improvement in trade performance? This is one essential ingredient for allocating priority to these policy areas.

There are two classes of factors that have led to this trade problem: external and domestic. The main external factors are rising world protectionism (especially for agricultural products) and the slowdown in world economic growth over the 1980s. However, since it is possible to influence international trade policy to some extent these external factors are not entirely beyond Australia's control (see Stoeckel 1985). There are many domestic factors which influence Australia's trade performance. Some of the most obvious are those affecting wage costs, and taxes on trade (especially tariffs on manufactured imports). Aggregate demand also affects the size of the current account deficit.

In this paper, five options for actively improving Australia's trade performance are considered. These are: an improvement in the terms of trade, achieved via successful Australian attempts to bring about a measure of trade policy reform abroad; a reduction in unit labour costs to employers through continued wage restraint and/or a restructuring of the taxation system away from income taxes towards consumption taxes; a reduction in tariffs; and finally, a cut in real absorption (achieved, say, via fiscal restraint).

One way to estimate the relative importance of the above variables on the balance of trade is to use a comprehensive model of the Australian economy and test for the sort of changes in each that would be required

[4] Fraser (1987, p. 24).

[5] Fraser (1987, p. 31).

to generate an improvement in the balance of trade of, say, $1 billion. The ORANI model (developed by Dixon, Parmenter, Sutton and Vincent 1982) is well suited to such analysis as it explicitly captures the above economic influences and their effects on the ability of Australian exporters to compete on world markets and the switching that occurs between imported and domestic sources of supply when there is a change in relative prices.

The rest of the paper is organised as follows. In the second section the economic environment for the ORANI simulations is defined. The results are presented in the third section. The short-run (2-year) effects on key macroeconomic variables are first discussed. Then the effects on agricultural outputs and farm incomes are studied in detail. Some concluding remarks are offered in the final section.

Economic Environment

Certain features of the macroeconomy are not projected endogenously by the ORANI model. For these, the user of the model must specify an environment before computing a solution. The key features of the economic environment assumed for the ORANI simulations are as follows.[6]

The percentage change in the real exchange rate, ϕ_R, measured against the US dollar, for example, is defined as

$$\phi_R = \phi_{A/US} + \psi_{US} - \psi_A \tag{1}$$

where $\phi_{A/US}$ is the percentage change in the nominal exchange rate ($A/$US), and ψ_{US} and ψ_A are the percentage changes in price indexes in the United States and Australia, respectively. The ORANI model does not distinguish between changes in the relative prices of traded and non-traded goods brought about on the one hand by a change in the nominal exchange rate or on the other hand by a change in the domestic price level. Here it is assumed that induced changes in the real exchange rate appear as changes in domestic relative to foreign price indexes and not as changes in the nominal exchange rate. In all simulations the change in the nominal exchange rate was fixed exogenously at zero (that is, $\phi_{A/US} = 0$). It is also assumed that the domestic economic policies under consideration have a negligible effect on foreign price indexes (that is, $\psi_{US} = 0$). Thus, in the ORANI simulations, adjustments in the real exchange rate are reflected as adjustments in the relevant domestic price index.

It is assumed that induced changes in national income appear as changes in the balance of trade and not as changes in real aggregate absorption (that is, in the real value of consumption plus investment plus government spending) whose components are set exogenously. In other words, it is assumed that there is no increase in real absorption when there is, say, an improvement in Australia's terms of trade. This assumption is achieved implicitly by the imposition of, say, increased taxes on the private sector. (Note that it is shown in the appendix how this assumption can be relaxed.)

Next, it is assumed that there are no shortages of labour at the going real wage rates. In other words, the labour supply schedule is assumed to be flat and thus employment levels are demand-determined. (Note that it is also shown in the appendix how the results can be recomputed under an alternative closure rule where the labour supply schedule is assumed to be vertical and thus the real wage rate is demand-determined.)

[6] A complete list of the variables selected as exogenous is given in Higgs (1986, Table A1.3).

Finally, it is assumed that plant and equipment in use in every industry do not change (from the levels they otherwise would have reached) due to the shock under analysis (that is, industry capital stocks in use are exogenous). Note that the short-run time period simulated allows for revisions in all industries' investment plans, for orders for capital goods to be placed and met, and for the new plant and equipment to be installed (but not yet switched on). The length of the 'short run' in ORANI has been estimated by Cooper (1983) as 7.9 quarters. In policy work about 2 years is the appropriate level of precision for describing the ORANI short run.

Results

In this section, we will discuss the results of simulations of an increase in world agricultural prices, an across-the-board tariff cut, a change in the tax mix in favour of indirect taxation, a cut in the real wage rate and a cut in real absorption, each calibrated to generate a $A1 billion (1985–86 prices) improvement in the balance of trade after about 2 years. To put this in perspective, in 1986 Australia's current account was $A14.5 billion in deficit.[7]

Macroeconomic projections

The short-run effects of the above economic shocks on some key macroeconomic variables are shown in Table 1.[8] It can be seen from the table that to improve the balance of trade by $1 billion (1985–86 prices) world agricultural prices would have to increase by 6.28 per cent.[9] The increase in world agricultural prices stimulates aggregate exports by 4.75 per cent. The expansion in the export sector and the higher agricultural prices cause an increase in the consumer price index (CPI). The increase in the CPI feeds into wages and then back into prices, etc. The end result is a 1.86 per cent increase in the CPI. As this increase in domestic costs is passed on to the import-competing sectors, there will be some switching from domestically produced goods to imported goods such that there is a small increase in aggregate imports of 1.23 per cent. Note also that although not shown in the table, the increase in world agricultural prices causes a slight decline in Australia's non-agricultural exports such as mineral products. The net effect is an improvement in the balance of trade of $1 billion[10] and an increase in real GDP and aggregate employment of about 0.5 per cent.[11]

[7] Fraser (1987, p. vii).

[8] Note that most of the results reported in Table 1 were obtained by rescaling the projections contained in Higgs (1986). In particular: column 1 of Table 1 was largely derived from the projections in Higgs (1986, Table 5.1); columns 2 and 5 were obtained from Higgs (1986, Table 10.1); column 3 is a multiple of the results given in Higgs (1986, Table 6.1); column 4 was derived from Higgs (1986, Table 8.1).

[9] Note that we have reported our results to two decimal places to assist in tracing the mechanisms in the ORANI model. In policy work, however, the appropriate level of precision is, say, to round these projections to whole numbers.

[10] Note that it is possible to check for consistency between the foreign currency value export and import projections with the projection for the balance of trade measured in billions of Australian dollars at 1985–86 prices; see Higgs and Stoeckel (1987, pp. 6–8).

[11] It should be noted that two indices of real GDP are reported in Table 1. The index of real GDP used here accounts for changes in the terms of trade; see Higgs [1986, equation (A7.9), p. 268].

TABLE 1

Macroeconomic Impacts of a Range of Economic Shocks that Generate an Improvement in the Balance of Trade of $1 Billion (1985-86) (Australian) After About 2 Years[a]

Variable	Increase in world agricultural prices[b] of	Cut in real wage rate as cost to employers of	Across-the-board tariff cut[c] of	Imposition of consumption tax of 4.80 per cent accompanied by compensating cuts in income taxes[d]	Cut in real absorption[e]
	6.28 per cent	1.08 per cent	81.96 per cent		0.77 per cent
Consumer price index	1.86	−1.87	−7.64	3.04	−1.80
Aggregate exports (foreign currency value)	4.75	2.59	8.57	2.55	1.97
Aggregate imports (foreign currency value)	1.23	−0.92	5.03	−0.93	−1.52
Real gross domestic product	0.54[f]	0.64[g]	0.56[g]	0.64[g]	−0.15[g]
Aggregate employment[h]	0.43	0.94	0.92	0.95	−0.15
Balance of trade	1.00	1.00	1.00	1.00	1.00

[a] All projections, with the exception of the balance of trade, are percentage deviations from the value the variable in question would have taken in the absence of the shock at the head of the column. The balance of trade, while also a deviation from control, has the units billions of 1985-86 Australian dollars ($1 billion = $1000 million).
[b] The results presented in this column were generated by a 6.28 per cent increase in world prices (at initial Australian export levels) of the ORANI commodities wool, wheat, barley, other cereal grains, meat products, other food products, and a composite commodity consisting of cotton ginning, wool scouring and top making.
[c] Note that quantitative restrictions have been expressed in terms of tariff equivalents.
[d] It is assumed that post-tax wage rates are maintained in real terms and that the direct tax cuts in effective tax rates on labour are calculated to hold constant real private disposable income.
[e] Absorption is defined as the sum of household consumption, investment and government spending.
[f] Real GDP calculated here includes terms-of-trade effects; see Higgs [1986, equation (A7.10)].
[g] Real GDP is calculated here as a quantum index of domestic output; see Higgs [1986, equation (A7.9)].
[h] Aggregate employment is calculated using person weights. The seasonally adjusted number of persons employed in June 1985 was 6 637 900; Australian Bureau of Statistics (1985). Therefore, an increase of, say, 0.43 per cent is equivalent to the addition of 28 543 people in the total number of people employed.

The next economic shock to be studied is a cut in the real wage rate. The real wage is defined as the money wage deflated by some index of the general level of prices. For this simulation, the CPI will serve as a deflator. A distinction needs to be made between real wages as a cost to employers of labour, and real wages as take-home pay. The real wage as a cost to employers includes the gross wage, payroll taxes and other costs of employing labour, such as superannuation contributions. It can be seen from Table 1 that a 1.08 per cent cut in the real wage rate as a cost to employers would generate a $1 billion (1985–86 prices) improvement in the balance of trade after about 2 years.

A real wage cut is deflationary. The CPI is projected to fall by 1.87 per cent due to a 1.08 per cent real wage cut. As domestic costs fall, the international competitiveness of the traded sectors improves. This leads to an increase in exports of 2.59 per cent and a decline in imports of 0.92 per cent. Furthermore, the cut in the real wage rate as a cost to employers is projected to increase employment by 0.94 per cent and real GDP by 0.64 per cent.[12]

The detrimental effects of Australia's continuing high levels of protection for its manufacturing industries[13] are specifically concentrated on the export sector. This can be seen from the third column of Table 1 which shows that an 81.96 per cent across-the-board tariff cut would generate a $1 billion (1985–86 prices) improvement in the balance of trade after about 2 years. The direct impact of such a tariff cut is to cause a fall in purchasers' prices due to the now cheaper imported goods. In view of our assumption of fixed real wages, a fall in (or a moderation in the rate of increase of) domestic prices would lead to lower money wages. The lower wage demands would feed into domestic prices which in turn would generate lower wage demands, etc. The ORANI model captures these general equilibrium effects and an 81.96 per cent across-the-board tariff cut is projected to cause the CPI to be 7.64 per cent lower after about 2 years compared to what it would have been in the absence of the tariff cut (see Table 1, third column). As domestic costs fall, the international competitiveness of the traded sectors improves. Exports are projected to increase by 8.57 per cent while imports are projected to increase by only 5.03 per cent. Aggregate employment and real GDP are projected to increase in response to the across-the-board tariff cut.[14]

The next aspect of domestic economic management studied here concerns a change in Australia's tax mix in favour of indirect taxation. Reform of Australia's tax system is another policy option available to the Government. Prior to the tax summit in 1985 the preferred option of the Aus-

[12] Note that real GDP is calculated here as a quantum index of domestic output; see Higgs [1986, equation (A7.10), p. 269].

[13] See Chai and Dixon (1985).

[14] Note that the impact effect of an across-the-board tariff cut would be an increase in imports and a deterioration in the balance of trade. However, as domestic costs fall, the international competitiveness of the export sector improves, and, given the assumed closure, it is estimated that after about 2 years the net effect of such a tariff cut is for an improvement in the balance of trade. Here, a closure where absorption is maintained in real terms is assumed. This means that the benefits of removing the tariff distortion are realised as an improvement in the balance of trade. If, on the other hand, real absorption was allowed to increase, then the improvement in the balance of trade would be diminished. A diagrammatic exposition of the effect of a tariff cut on the balance of trade is given in Higgs (1986, Figure 6.1). Furthermore, it is shown in the appendix how the sensitivity of the balance of trade projections with respect to the assumed closure can be tested.

tralian Government involved a shift towards indirect taxation with compensating income tax cuts.[15] To trace the effects of such a shift in policy on the balance of trade the ORANI National and Government Accounts module, NAGA, as developed by Meagher and Parmenter (1985) was used. A compensating tax cut is defined here to be a tax cut which when combined with the household consumption tax leaves real private absorption (that is, real household consumption plus real private investment) unchanged.[16] The outcome of any tax package will depend crucially on the response of the labour movement. The response studied here is one where post-tax wage rates (that is, rates of take-home pay) are fully indexed to consumer prices.[17] The outcome also depends on the distribution of the compensating tax cuts between labour and capital income. Here it is assumed that only the effective tax rate[18] on labour income is cut.[19] Under the above conditions, the imposition of a consumption tax of 4.80 per cent would generate a $1 billion (1985–86 prices) improvement in the balance of trade after about 2 years (see Table 1, fourth column).

It is important to distinguish between wage rates as a cost and wage rates as an income. The wedge between these two largely consists of the income tax rate. In the ORANI data base, the initial effective tax rate on labour income is 21.73 per cent. Thus, if the average worker receives a pre-tax wage of $400 (that is, wages as a cost), then the take-home pay is $313.08 [that is, wages as an income = $400 × (1 − 0.2173)]. The imposition of the household consumption tax will increase the CPI by 3.04 per cent (see Table 1, fourth column). (The reason that the CPI rises by less than the 4.80 per cent of the consumer tax is that, as will be seen below, there is some saving of labour costs that feed into prices.) If an agreement is reached with the labour movement to fully index take-home pay, then the latter must increase by $9.52 (that is, 0.0304 × $313.08). If such a payment is made, then there will be no change in the purchasing power of an employed worker (that is, the real wage as an income will not have changed). The implicit bargain struck between employers and employees, through the interventions by the Government in the tax field, guarantees that such a payment will indeed be made. The bargain thus underwrites the interests of workers who retain employment after the implementation of the package.

The key question then is: will the real wage rate as a cost have risen, fallen, or not have changed? This depends on the extent to which the relativity between producers' costs and prices received by them changes in the aftermath of the imposition of the package. If the prices received by

[15] See Treasury (1985).

[16] Many alternative closures are possible. For example, the closure could have been one where the size of the direct tax cut was chosen so as to leave the public sector borrowing requirement unchanged. Different choices will have different implications for the size of the direct tax cut made possible by the given increase in sales tax. The implications of these different choices are studied in Meagher and Parmenter (1985).

[17] An alternative response is one where pre-tax wage rates are fully indexed to consumer prices. See, for example, Dixon (1985). Note however that Dixon concludes on p. 54 that 'the results are so bad I don't think we could get a change in the tax mix without labour market reform'.

[18] The effective tax rate is the ratio of income tax collected to income.

[19] For an analysis of the imposition of a new consumption tax under alternative assumptions with respect to the distribution of the offsetting tax cuts given to labour and capital income, see Higgs (1986).

producers increased by more than the percentage change in the pre-tax money wage rate, then the real wage rate as a cost will have fallen; in the contrary case, it will have risen.

Our calculations depend on what else is assumed about macroeconomic management when the package is implemented. Here it is assumed that the size of the direct tax cut is chosen in such a way that the sum of take-home labour income and post-tax returns to capital is held steady in real terms. This turns out to imply that the income tax rate paid by workers is reduced to 16.95 per cent. Under these conditions, the package entails some secondary deflation, leading to a fall in producers' prices of about 2 per cent.

Is the cut in income taxes described above enough to provide in full the $9.52 compensation needed to maintain the purchasing power of our hypothetical worker? If the pre-tax wage remained at $400, the tax saving is $19.12 [(0.2173 − 0.1695) × $400]. This would represent $9.60 of over-compensation (that is, $19.12 − $9.52). As employers are only required under the bargain to exactly compensate workers for the effects of the consumption tax, there is scope for the reduction of pre-tax wages. If take-home pay is required to be $322.60 (that is, $313.08 + $9.52), then the pre-tax wage, with the effective income tax rate now at 16.95 per cent, can be reduced to $388.44 [that is, $322.60/(1 − 0.1695)].

It is now possible to say what will have happened to the real wage rate as a cost. Nominal wages, as a cost, have fallen by $11.56 (that is, $388.44 − $400) or 2.89 per cent [that is, ($11.56/$400) × 100]. However, prices received by producers have fallen by 2.01 per cent.[20] Thus, the real wage rate as a cost has fallen by 0.88 per cent [= −2.89 − (−2.01)].

As the change in the tax mix is projected to cause a fall in the real wage as a cost, the international competitiveness of the traded sector improves. Exports are projected to increase by 2.55 per cent and imports are projected to fall by 0.93 per cent. Aggregate employment and real GDP are projected to increase due to the change in the tax mix.

The final economic shock to be studied is a change in aggregate demand. A reduction in domestic demand, say through reduced government spending, would cause contractions in the non-traded sectors of the economy. However, it would also tend to reduce domestic costs and thus improve the competitiveness of domestic export and import-competing industries. It can be seen from the fifth column of Table 1 that a 0.77 per cent cut in real absorption (that is, the sum of real household consumption, real investment and real government spending) would generate a $1 billion (1985–86 prices) improvement in the balance of trade after about 2 years. This cut in real absorption causes the CPI to fall by 1.80 per cent. Exports are projected to increase by 1.97 per cent and imports are reduced by 1.52 per cent. The reduction in imports is partially due to the contraction in the size of the domestic economy. Real GDP and hence aggregate employment are both projected to decline.[21]

[20] Note that this result is not listed in Table 1. In the other simulations reported here the percentage change in the CPI is a good proxy for the percentage change in the prices received by producers.

[21] Note that aggregate employment calculated using wage-bill weights actually declined by 0.22 per cent.

Agricultural outputs

As agriculture is an export sector, it generally benefits from the effects of policies designed to improve the balance of trade. However, the increases in outputs are neither uniform across the simulations nor across the agricultural industries. This is due in the first instance to the different mixes of aggregate export and import responses observed to achieve the balance of trade target, and in the second instance to the different cost structures, sales patterns and product mixes of the agricultural industries. The short-run effects on agricultural industry outputs of the economic shocks discussed above are shown in Table 2.[22]

In the first column of Table 2, the effects of a 6.28 per cent increase in the world prices of wool, wheat, barley, other cereal grains, meat products, other food products and a composite commodity consisting of cotton ginning, wool scouring and top making are shown. If it is assumed that wages are maintained in real terms and if the approximation is made that the costs of intermediate inputs move in line with the CPI, then the ORANI short-run supply function for industry j can be written as[23]

$$z_j = \lambda_j(p_j - \xi) \tag{2}$$

where

$$\lambda_j = \sigma(1 - S_{Fj})/(S_{Fj}H_{Xj}) \tag{3}$$

The percentage change in the output of industry j is represented by z_j; p_j is the percentage change in the farm-gate price of the output of industry j[24] (this is an appropriately weighted index for the multi-product industries); ξ is the percentage change in the index of consumer prices; σ is the elasticity of substitution between primary factors (assumed to be 0.5 for all industries in the short run); S_{Fj} is the share of the fixed factors in the primary-factor inputs of industry j; H_{Xj} is the share of primary-factor inputs in the total costs of industry j.

Equation (2) suggests that it is necessary to look only at three influences to determine an industry's output response. The first is λ_j which, according to equation (3), consists of base-period shares and an elasticity. The second is the change in the industry output price, and the third is the CPI (that is, an index of costs). The greater the fixed-factor share, S_{Fj}, and the primary-factor share, H_{Xj}, the less responsive is the industry (that is, the smaller is λ_j). For the three zonal industries, the values of λ_j are as follows: $\lambda_1 = 0.75$, $\lambda_2 = 0.57$ and $\lambda_3 = 0.92$. Thus, of the zonal industries it would be expected that the high rainfall zone ($j = 3$) would be the most responsive, followed by the pastoral zone ($j = 1$), and finally by the wheat–sheep zone ($j = 2$). These relative responses are reflected in the projections listed in Table 2. Furthermore, if the crude approximation is made

[22] Note that most of the results reported in Table 2 were obtained by rescaling the projections contained in Higgs (1986). In particular: column 1 of Table 2 was largely derived from the projections in Higgs (1986, Table 5.6); columns 2 and 5 were obtained from Higgs (1986, Table 10.5); column 3 is a multiple of the results given in Higgs (1986, Table 6.7); column 4 was derived from Higgs (1986, Table 8.6).

[23] See Higgs (1986, Appendix A.2) for the derivation of equation (2).

[24] Note that the ORANI model accounts for the effects on the price at the farm gate of transportation costs and subsequent changes in world agricultural prices induced by changes in Australian exports.

TABLE 2

Short-Run Effects on Agricultural Industry Outputs[a]

Industry[b]	Increase in world agricultural prices[c] of 6.28 per cent	Cut in real wage rate as cost to employers of 1.08 per cent	Across-the-board tariff cut[d] of 81.96 per cent	Imposition of consumption tax of 4.80 per cent accompanied by compensating cuts in income taxes[e]	Cut in real absorption[f] of 0.77 per cent
1. Pastoral zone	2.99	1.78	4.92	1.69	1.16
2. Wheat-sheep zone	2.59	1.46	4.23	1.45	0.96
3. High rainfall zone	3.71	2.11	6.07	2.05	1.39
4. Northern beef	5.91	3.27	9.77	3.35	2.17
5. Milk cattle and pigs	1.91	1.12	3.28	1.12	0.70
6. Other farming (sugar cane, fruit and nuts)	6.25	3.23	9.70	3.24	2.09
7. Other farming (vegetables, cotton, oilseeds and tobacco)	1.04	1.13	1.70	1.12	0.39
8. Poultry	2.98	1.64	4.88	1.63	1.08
Agriculture[g]	3.23	1.85	5.25	1.83	1.16

[a] All projections are percentage deviations from the values the outputs would have taken in the absence of the shock at the head of the column.
[b] A detailed description of these industries is given in Higgs (1986).
[c] The results presented in this column were generated by a 6.28 per cent increase in world prices (at initial Australian export levels) of the ORANI commodities wool, wheat, barley, other cereal grains, meat products, other food products, and a composite commodity consisting of cotton ginning, wool scouring and top making.
[d] Note that quantitative restrictions have been expressed in terms of tariff equivalents.
[e] It is assumed that post-tax wage rates are maintained in real terms and that the direct tax cuts in effective tax rates on labour are calculated to hold constant real private disposable income.
[f] Absorption is defined as the sum of household consumption, investment and government spending.
[g] The effect on total agriculture is calculated by weighting the effects on agricultural industry outputs by their respective base-period shares in total output for all of agriculture.

(for the purpose of this back-of-the-envelope calculation) that the output price of these industries increased by 6.28 per cent, and this and the CPI response from Table 1 are substituted into equation (2), then the percentage change in the output of, say, the pastoral zone is roughly equal to 3 per cent [that is, $0.75 \times (6.28 - 1.86)$].

The northern beef industry produces only meat cattle which it sells to the meat products industry. Largely as a result of the increase in the world price of meat products, the increased demand for meat cattle causes the price of meat cattle to rise by 17.17 per cent. The λ_j for the northern beef industry is equal to 0.67. Thus, the relatively large increase in output for this industry of 5.91 per cent is due to the relatively large increase in the selling price of meat cattle over the costs of the industry (that is, approximately equal to $17.17 - 1.86 = 15.31$).

The milk cattle and pigs and poultry industries also sell some of their output to the meat products industry. However, these industries do not benefit from the world price rise to the same extent as the northern beef industry since a significant amount of their sales is to domestic household consumption.[25]

Both of the 'other farming' industries given in Table 2 are projected to increase their output due to the world agricultural price rises. The 'other farming' (sugar cane, fruit and nuts) industry sells approximately half of its output to the 'other food products' processing industry. This industry in turn exports about one-third of its output.[26] Finally, the 'other farming' (vegetables, cotton, oilseeds and tobacco) industry experiences a small increase in output. This industry sells to a number of sectors in the economy. However, it is largely stimulated by increased sales to the other food products and cotton ginning processing sectors.[27]

The results for the effects of a real wage cut and a change in the tax mix are given in the second column and fourth column, respectively, of Table 2. These results are very similar since, as discussed above, the change in the tax mix results in a fall in the real wage as a cost to employers. The pastoral, wheat–sheep and high rainfall zones all directly export a significant portion of their output. Due to competitive pressures on world markets the exports of these industries will rise if there is a fall in real wages. The northern beef and other farming (sugar cane, fruit and nuts) industries sell a significant portion of their product to domestic processing industries which do the exporting. Because the produce of these export-related industries must be processed before export, they are exposed to greater opportunities for domestic cost reductions and consequently are particularly sensitive to the cut in real wages. The three remaining industries, that is milk cattle and pigs, other farming (vegetables, cotton, oilseeds and tobacco) and poultry, also sell some of their output to food processing export industries. However, these industries are not affected to the same extent as the other agricultural industries since a significant amount of their sales is to domestic household consumption.

The agricultural industries are all projected to increase their output if there is an across-the-board tariff cut or a cut in real absorption; see Table 2, third column and fifth column, respectively. However, the size of the increases generated by the tariff cut are the largest in the table while

[25] Note that $\lambda_5 = 1.11$ and $\lambda_8 = 2.97$.

[26] Note that $\lambda_6 = 1.65$.

[27] Note that $\lambda_7 = 3.00$.

those generated by the cut in real absorption are, for the most part, the smallest. This can be explained as follows. The cut in tariffs results in increased imports which must be offset by a relatively large increase in exports to achieve the targeted improvement in the balance of trade; see Table 1, third column. However, the cut in real absorption causes a contraction in the size of the domestic economy. As a result, imports fall and exports need only increase a relatively small amount to achieve the balance-of-trade target. Note also that the contraction in the domestic economy means that sales are relatively suppressed for those agricultural industries which sell to the domestic economy.

Farm incomes

The effects of the above economic shocks on real net farm returns (real NFR) are shown in Table 3.[28] Real NFR is defined as the earnings of labour (hired and owner-operator), capital and agricultural land all deflated by the CPI:

$$(4) \qquad (nfr_j - \xi) = S_{Lj}(l_j + w - \xi) + S_{Kj}(k_j + q_j - \xi) + S_{Vj}(v_j + r_j - \xi)$$

where $(nfr_j - \xi)$ is the percentage change in real NFR in industry j; S_{Lj}, S_{Kj} and S_{Vj} are the shares of returns to labour, capital and agricultural land in primary factors in industry j, respectively; l_j, k_j and v_j are the percentage changes in the employment levels of labour, capital and agricultural land in industry j, respectively; w is the percentage change in the nominal wage rate;[29] q_j and r_j are the percentage changes in the rentals on capital and agricultural land in industry j, respectively; ξ is the percentage change in the CPI.

As shown in the second section, labour is a variable input in the environment under which these simulations were made; therefore, its earnings can increase through an increase in the amount of labour used and through an increase in real wages. On the other hand, capital and agricultural land do not respond to the shocks (that is, $k_j = v_j = 0$); therefore, the earnings of these factors can only increase through an increase in rental rates. The rental rate on capital and agricultural land in industry j will rise as the ratio of labour to capital and agricultural land in use in the industry increases (that is, as the industry's output increases). In fact, the percentage change in real net returns to industry j can be written as[30]

$$(5) \qquad (nr_j - \xi) = z_j \pi_j + (w - \xi)$$

where

$$(6) \qquad \pi_j = 1 + S_{Kj}/(\sigma S_{Lj})$$

[28] Note that most of the results reported in Table 3 were obtained by rescaling the projections contained in Higgs (1986). In particular: column 1 of Table 3 was largely derived from the projections in Higgs (1986, Table 5.9); columns 2 and 5 were obtained from Higgs (1986, Table 10.8); column 3 is a multiple of the results given in Higgs (1986, Table 6.10); column 4 was derived from Higgs (1986, Table 8.9).

[29] While labour costs vary across industries in ORANI, the percentage change in the hourly wage rate is assumed to be the same across industries, hence the lack of an industry-specific subscript on w.

[30] The derivation of equation (5) can be found in Higgs (1986, Appendix A.4).

TABLE 3

Short-Run Effects on Real Net Farm Returns[a]

Industry[b]	Increase in world agricultural prices[c] of 6.28 per cent	Cut in real wage rate as cost to employers of 1.08 per cent	Across-the-board tariff cut[d] of 81.96 per cent	Imposition of consumption tax of 4.80 per cent accompanied by compensating cuts in income taxes[e]	Cut in real absorption[f] of 0.77 per cent
1. Pastoral zone	8.24	3.83	13.57	−1.27	3.21
2. Wheat-sheep zone	9.22	4.11	15.08	−0.75	3.43
3. High rainfall zone	10.05	4.62	16.46	−0.35	3.75
4. Northern beef	18.46	9.14	30.52	4.56	6.78
5. Milk cattle and pigs	4.57	1.61	7.87	−3.23	1.68
6. Other farming (sugar cane, fruit and nuts)	12.10	5.17	18.85	0.36	4.07
7. Other farming (vegetables, cotton, oilseeds and tobacco)	1.64	0.71	2.69	−4.15	0.60
8. Poultry	6.98	2.76	11.51	−2.09	2.53
Agriculture[g]	8.64	3.82	14.06	−1.06	3.15

[a] All projections are percentage deviations from what real net farm returns in each industry would have been in the absence of the shock at the head of the column. Real net farm returns is the before-tax earnings of capital, agricultural land and labour (hired and owner-operator) deflated for increases in the CPI.
[b] A detailed description of these industries is given in Higgs (1986).
[c] The results presented in this column were generated by a 6.28 per cent increase in world prices (at initial Australian export levels) of the ORANI commodities wool, wheat, barley, other cereal grains, meat products, other food products, and a composite commodity consisting of cotton ginning, wool scouring and top making.
[d] Note that quantitative restrictions have been expressed in terms of tariff equivalents.
[e] It is assumed that post-tax wage rates are maintained in real terms and that the direct tax cuts in effective tax rates on labour are calculated to hold constant real private disposable income.
[f] Absorption is defined as the sum of household consumption, investment and government spending.
[g] The effect on real net farm returns for agriculture is calculated by weighting the effects on industry real net farm returns by the industry's base-period share of primary factors in the total input of primary factors for all of agriculture.

According to equation (5) the percentage change in real net returns in industry j depends upon: z_j, the percentage change in the output of industry j, multiplied by π_j (as defined above), and $(w-\xi)$, the percentage change in the real wage. If there is full wage indexation (that is, $w=\xi$), then the percentage change in real net returns $(nr_j-\xi)$ is equal to $z_j\pi_j$. Furthermore, if the only primary factor is labour (that is, $\pi_j=1$), to take an extreme case, then the percentage change in real net returns will equal the percentage change in industry output (which in turn equals the percentage change in the size of the workforce employed in the industry). However, as the share of fixed factors (that is, capital and agricultural land) increases, the percentage change in real net returns increases by more than the percentage change in output. The values of π_j can be calculated from the ORANI database and are equal to 2.76, 3.56, 2.71, 3.12, 2.39, 1.94, 1.58 and 2.34 for industries 1 to 8, respectively. To take the pastoral zone as an example, a 6.28 per cent increase in world agricultural prices is projected to cause this industry's output to increase by 2.99 per cent; see Table 2, first column. Since wages are assumed to be maintained in real terms $(w=\xi)$ the change in real NFR for the pastoral zone is equal to $2.99\times 2.76=8.25$ per cent.

Given equation (5), it is not surprising that similar to the industry output responses, real NFR would be increased most by the tariff cut, followed by the increases in world agricultural prices, the cut in real wages and the cut in real absorption, in that order.

On average, the change in the tax mix has an unfavourable effect on pre-tax real NFR. This can be explained as follows. The pre-tax nominal wage rate is projected to fall by 2.89 per cent, as compared with the 3.04 per cent increase in the CPI; see Table 1, fourth column. Thus, the term $(w-\xi)$ in equation (5) is equal to $-2.89-3.04=-5.93$ per cent. This represents the change in the farmer's pre-tax purchasing power due to the fall in the return to farm labour. However, this is substantially offset by the positive effects on industry outputs induced by the change in the tax mix [that is, by the $z_j\pi_j$ terms in equation (5)]. Finally, note that the effects of the compensating tax cuts on post-tax real NFR have not been estimated here.

Conclusions

The results presented here are sensitive to the assumptions made concerning real absorption and the real wage rate. If improvements in Australia's real national income are fully absorbed domestically then there will be little, if any, improvement in the balance of trade. Similarly, if improved conditions in Australia's labour markets are realised as higher real wage rates rather than increased employment levels then again there will be little, if any, improvement in the balance of trade. It is shown in the Appendix how the results presented here can be recomputed under a range of assumptions concerning real absorption and the real wage rate. However, given that a large improvement in the balance of trade is required to stabilise Australia's overseas debt burden, then assumptions of absorption being maintained in real terms and no increase in real wage rates are not unreasonable.

A number of different approaches towards moderating Australia's current account deficit have been highlighted in this paper. The first conclusion made is that while a cut in real absorption will improve the balance

of trade, it has less desirable implications for growth and employment than the other changes. That is, a cut in the real hourly wage rate, a reduction in tariffs, a change in the tax mix or a lift in world prices brought about by a measure of reform in the trade policies of other countries, can secure an improvement in Australia's trade balance with fewer undesirable macroeconomic effects.

The second observation concerns the obvious importance of real labour costs to employers for Australia's competitive position. An alternative to reducing the real cost to employers of a person-hour of labour is to increase the productivity of that person-hour.[31] Current negotiations on so-called 'work practices' are highly pertinent. Hence, changes to the country's wages policy and/or productivity increases would have to be a major component of any feasible trade strategy; only small changes are required to obtain very significant benefits. The obverse to this point is also apparent. A wages policy that fails to take adequate cognisance of the trade position can significantly worsen Australia's trade performance.

The third point has a sectoral focus. As is well known, cutting tariffs leads to an expansion in exporting at the expense of the import-competing sectors. By contrast, a cut in real wages or a cut in real absorption leads to expansion in both import competing and in exporting. Thus, if an improvement in the balance of trade is required to alleviate Australia's debt position, then this should be done in a balanced way with due consideration of the sectoral consequences.

The fourth observation made concerns how the possibilities of implementing the options studied above might be interlinked. For example, it may be possible that Australia can convince the European Community to liberalise some of its restrictive trade policies (which would increase world agricultural prices). However, the chances of Australia's success might be increased if it offered to reduce its own tariffs in a negotiating stance taken at multilateral trade negotiations (such as the current Uruguay Round).

Finally, although estimates vary of the extent of the trade improvement required to stabilise the overseas debt burden, all point to a large improvement. The policy approaches studied here are neither exhaustive nor mutually exclusive. Given that the size of the improvement in the trade balance is so large, realistic strategies would combine several elements. The current emphasis on productivity and on costs of labour to employers, however, must be a central part of any such strategy.

APPENDIX

Here, it is explained how the results can be recomputed under some alternative closures to the one discussed in the second section. It is possible, using a hand calculator, to recompute the results under a range of assumptions concerning real absorption. It is also possible to swap the exogenous–endogenous roles of the real wage rate and aggregate employment. It is explained how these changes can be made separately or simultaneously. The sensitivity of projections to these alternative closures is also examined.

[31] That is, an alternative to reducing the real wage rate as a cost to employers is to increase the real marginal product of labour at a given level of capital input.

A real absorption function

In the second section, it is shown that real absorption is exogenous and, with the exception of the simulated cut in real absorption, set to zero change. These assumptions can be expressed in terms of the following real absorption function:

$$a = \gamma gdp + f \tag{A1}$$

where a and gdp are the percentage changes in real absorption and real GDP, respectively; γ specifies the link between the percentage changes in real GDP and real absorption; f is a shift variable. For the projections presented thus far, γ is implicitly set to zero and similarly f is set to zero, with the exception of the simulated cut in real absorption where f is set to -0.77.

It is possible for the projections to be recomputed with γ set to some value other than zero. For example, the results for the case of $\gamma = 1$ can be recomputed as follows. First a system of simultaneous equations for the projected change in real absorption must be solved. Equation (A1) is the first equation of the system. The second equation is:

$$gdp = \eta_{gdpy} y + \eta_{gdpa} a \tag{A2}$$

where y is the percentage change in the exogenous variable which is being shocked; the coefficients on y and a are elasticities that show the effects on real GDP of a 1 per cent increase in the respective variables. For example, if the exogenous variable that is being shocked is tariffs then η_{gdpy} is the change in real GDP that occurs if there is a 1 per cent across-the-board tariff increase. This can be computed from Table 1. If an 81.96 per cent across-the-board tariff cut causes real GDP to increase by 0.56 per cent, then a 1 per cent across-the-board tariff increase would cause real GDP to decrease by 0.0068 per cent (that is, $-0.56/81.96 = -0.0068 = \eta_{gdpy}$). Similarly, it can be computed from Table 1 that $\eta_{gdpa} = 0.1948$ (that is, $-0.15/-0.77$). To continue the example of the exogenous shock being an 81.96 per cent across-the-board tariff cut (that is, $y = -81.96$) it is now possible to solve for a from equations (A1) and (A2). That is, since $\gamma = 1$ and $f = 0$, then equation (A1) simply says that $a = gdp$. Thus, the system reduces to one equation [that is equation (A2)] with one unknown (a). Solving equation (A2) $a = 0.69$ per cent [that is, $-81.96 \times -0.0068/(1 - 0.1948)$].

The next step is to compute the new projected change in an endogenous variable of interest. This is equal to the existing projected change plus the impact of the above change in real absorption:

$$x = \eta_{xy} y + \eta_{xa} a \tag{A3}$$

where x is the percentage change in the endogenous variable of interest; y and a are as defined above; the coefficients on y and a are elasticities that show the effects on the endogenous variable of 1 per cent increase in y and a, respectively. For example, if the endogenous variable of interest is the balance of trade and the exogenous shock is an 81.96 per cent across-the-board tariff cut then the new projected change in the balance of trade is a move towards surplus of $A104 million [that is, $1.00 + (-1.2987)$

$\times 0.69$]. Note that equation (A3) can also be used to check that the change in real GDP is now equal to the change in real absorption. The change in real GDP is equal to 0.69 per cent (that is, $0.56 + 0.1948 \times 0.69$), as expected.

Real wage rate versus aggregate employment

In the second section the real wage rate is exogenous (and, with the exception of the simulated cut in real wages, set to zero change) and aggregate employment is endogenous. Here, it is explained how the results can be recomputed with the real wage rate endogenous and aggregate employment exogenous (set to zero change).

The size of the change in the real wage rate that would need to accompany the exogenous shock in question to cause zero change in aggregate employment is first computed:

$$0 = \eta_{ly} y + \eta_{lw} w \tag{A4}$$

where w and y are the percentage changes in the real wage rate and the exogenous variable being shocked; the coefficients are elasticities that show the effects on aggregate employment of 1 per cent increase in the respective variables. For example, $\eta_{lw} = -0.8704$ (that is, $0.94/-1.08$; see Table 1). w can be solved from equation (A4). To continue the earlier example, if the exogenous shock is an 81.96 per cent across-the-board tariff cut (that is, $y = -81.96$) then from Table 1 $\eta_{ly} = -0.0112$ (that is, $0.92/-81.96$). Substituting these values into equation (A4) the percentage change in the real wage rate (w) that would need to accompany an 81.96 per cent across-the-board tariff cut to leave aggregate employment unaffected is 1.06 per cent (that is, 0.92/0.8704).

Next, the effects of a w per cent change in the real wage rate to the projected effects of the exogenous shock in question are added:

$$x = \eta_{xy} y + \eta_{xw} w \tag{A5}$$

where x is the percentage change in the endogenous variable of interest; y and w are as defined above; the coefficients on y and w are elasticities. For example, if the endogenous variable of interest is the balance of trade and the exogenous shock is an 81.96 per cent across-the-board tariff cut then the new projected change in the balance of trade is a move towards surplus of $A19 million [that is, $1.00 + (-0.9259) \times 1.06$].

A real absorption function and the real wage rate versus aggregate employment

Here it is explained how the results can be recomputed with a real absorption function, the real wage rate endogenous and aggregate employment exogenous. First the following system of simultaneous equations must be solved for the change in real absorption that is consistent with the real absorption function and for the change in the real wage rate that would need to accompany the exogenous shock in question to cause zero change in aggregate employment:

$$a = \gamma\, gdp + f \tag{A6}$$

(A7) $$gdp = \eta_{gdpy} y + \eta_{gdpa} a + \eta_{gdpw} w$$

(A8) $$0 = \eta_{ly} y + \eta_{la} a + \eta_{lw} w$$

where the variables and coefficients are as defined above. Note that $\eta_{gdpw} = -0.5926$ and $\eta_{la} = 0.1948$; see Table 1. a and w can be solved for using equations (A6) to (A8). For example, if the exogenous shock is an 81.96 per cent across-the-board tariff cut and it is assumed that $l = 1$ and $f = 0$, then $a = -0.09$ per cent and $w = 1.04$ per cent.

Finally, the effects are added of an a per cent change in real absorption and a w per cent change in the real wage rate to the projected effects of the shock in question:

(A9) $$x = \eta_{xy} y + \eta_{xa} a + \eta_{xw} w$$

where the variables and coefficients are as defined above. For example, if the endogenous variable of interest is the balance of trade and the exogenous shock is an 81.96 per cent across-the-board tariff cut the balance of trade is now projected to move towards a surplus by $A154 million [that is, $1.00 + (-1.2987) \times -0.09 + (-0.9259) \times 1.04$].

Sensitivity analysis

Finally, it is shown how the techniques explained here can be used to test the sensitivity of projections to the closure selected. To illustrate this, Table 4 contains the effects of an 81.96 per cent across-the-board tariff cut on the balance of trade under four alternative closures.

A shift from the closure used for the projections in this paper to one where changes in real GDP are absorbed by the domestic economy to produce little, if any, improvement in the balance of trade would be expected. An increase in real absorption has the effect of causing an increased demand for imports, and it is inflationary which results in a deterioration of the international competitiveness of the traded sectors. For the case of the across-the-board tariff cut, the projected improvement in the nominal balance of trade is reduced from $1 billion to $0.10 billion.

TABLE 4

Effect of an 81.96 Per Cent Across-The-Board Tariff Cut on Australia's Balance of Trade Under Some Alternative Closures[a]

Labour market assumption	Real absorption assumed to be	
	Held constant ($\gamma = 0$)	Linked with real GDP ($\gamma = 1$)
Aggregate employment endogenous Real wage rate exogenous	1.00	0.10
Aggregate employment exogenous Real wage rate endogenous	0.02	0.15

[a] All projections are the change in billions of 1985–86 dollars in the balance of trade from the value it would have been in about 2 years in the absence of the tariff cut.

The effect of shifting from the closure used for the projections in this paper to one where the real wage rate is endogenous and aggregate employment is exogenous has the effect of lowering the projected improvement in the balance of trade from $1 billion to $0.02 billion. A shift to a closure where an improvement in the labour market is realised as increased real wage rates rather than increased employment results in relatively higher domestic costs. This causes a relative decline in exports and an increase in imports.

The effect of shifting to a closure where real absorption is linked with real GDP and the real wage rate is endogenous is for the projected improvement in the balance of trade to be reduced from $1 billion to $0.15 billion. Note that the effect on the balance of trade projection of introducing a real absorption function and endogenising the real wage rate is more favourable than making either of these changes separately. To achieve the targets of real absorption changing by the same percentage as real GDP and no change in employment, the increase in real wages of 1.04 per cent is less than the 1.06 per cent increase when just the employment–real wage swap is done and the fall in real absorption of 0.09 per cent is less than the 0.69 per cent increase when just real absorption is assumed to change by the same percentage as real GDP. Both of these relative changes suggest a more favourable balance of trade projection. The key to why real absorption is projected to decrease is that the increase in real wages required to achieve the target of no change in employment has a significant negative effect on real GDP ($\eta_{gdpw} = -0.5926$).

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