The use and limitations of the oceanic phenomenon: trade growth with newly industrialising Asia; some implications for the Australian economy.

17-18th July, 1986

Austrian National University, Canberra

Issues for research:
Australian industrialisation and dependency industrialisation paths

Paper presented at a Workshop on...
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2. The ORANI Model in Long Run Mode</td>
<td>5</td>
</tr>
<tr>
<td>2.1 Salient Features of Short Run Mode</td>
<td>7</td>
</tr>
<tr>
<td>2.2 Major Features of Long Run Mode</td>
<td>8</td>
</tr>
<tr>
<td>2.3 Setting Up the Long Run Simulations</td>
<td>11</td>
</tr>
<tr>
<td>3. An International Trade Scenario</td>
<td>13</td>
</tr>
<tr>
<td>3.1 The World Price Scenario</td>
<td>14</td>
</tr>
<tr>
<td>3.2 Export Demand Elasticities</td>
<td>21</td>
</tr>
<tr>
<td>4. Some ORANI Projections: World Price Scenario</td>
<td>22</td>
</tr>
<tr>
<td>4.1 Macro, Employment, Industry and</td>
<td>25</td>
</tr>
<tr>
<td>Commodity Output Projections</td>
<td></td>
</tr>
<tr>
<td>4.2 Farm Industry Incomes</td>
<td>37</td>
</tr>
<tr>
<td>5. An Outline of Future Developments Planned</td>
<td>39</td>
</tr>
<tr>
<td>for the Long Term Model</td>
<td></td>
</tr>
<tr>
<td>5.1 The Model's Base Year</td>
<td>41</td>
</tr>
<tr>
<td>5.2 The Incorporation of Scenarios on Technical Change</td>
<td>42</td>
</tr>
<tr>
<td>5.3 Supply Side Adjustment Costs</td>
<td>43</td>
</tr>
<tr>
<td>5.4 Endogenising Capital Flows in the Snapshot Year</td>
<td>44</td>
</tr>
<tr>
<td>5.5 Long Run Supply Constraints</td>
<td>45</td>
</tr>
<tr>
<td>5.5.1 Mining Industries</td>
<td>46</td>
</tr>
<tr>
<td>5.5.2 Fishing</td>
<td>48</td>
</tr>
<tr>
<td>6. Concluding Remarks</td>
<td>49</td>
</tr>
<tr>
<td>References</td>
<td>51</td>
</tr>
</tbody>
</table>

---

Printed by C.J. Thomson, Commonwealth Government Printer, Canberra
APPENDIX

The commodity world price scenario:

1. Assumptions concerning annual rates of growth
   - In World Commodity Prices to the Mid-1980's
   - Expected Growth Rates of Oil and other Commodities
     - Oil: 5%
     - Other Commodities: 3%

2. Projections of the Medium Term Effects of:
   - Policy Measures
     - Price Stabilization
     - Production Controls

3. Projected Impact of the World Price Scenario
   - On Industry and Commodity Currencies

4. Projected Impact on the Industry Structure of:
   - The Commodity World Price Scenario

The elasticities of substitution between domestically produced and imported crude oil and used were set at 1.000.

The parameter to assign a value of 0.5.

The parameter $\sigma$ to assign a value of 0.5.

The parameter to assign a value of 0.5.

Parameters: $\gamma$, $\delta$, $\lambda$, $\mu$, $\sigma$, $\phi$.

This appendix can be used in conjunction with Section 1980 (a).

### TABLES

- TABLE 6
  - Technical Details of the Simulation

---

**APPENDIX**

The commodity world price scenario:

1. Assumptions concerning annual rates of growth
   - In World Commodity Prices to the Mid-1980's
   - Expected Growth Rates of Oil and other Commodities
     - Oil: 5%
     - Other Commodities: 3%

2. Projections of the Medium Term Effects of:
   - Policy Measures
     - Price Stabilization
     - Production Controls

3. Projected Impact of the World Price Scenario
   - On Industry and Commodity Currencies

4. Projected Impact on the Industry Structure of:
   - The Commodity World Price Scenario

The elasticities of substitution between domestically produced and imported crude oil and used were set at 1.000.

The parameter to assign a value of 0.5.

The parameter $\sigma$ to assign a value of 0.5.

The parameter $\gamma$, $\phi$, $\mu$, $\sigma$, $\delta$, $\lambda$, $\phi$

This appendix can be used in conjunction with Section 1980 (a).

### TABLES

- TABLE 6
  - Technical Details of the Simulation


The introduction to this paper will focus on how the parameters for determining
the effective demand are the result of structural changes in the economy, especially
under current trends of global economic integration. The analysis of the current
situation of the global economy highlights the importance of understanding
the effects of these changes on the demand for goods and services. By examining
the economic policies of major countries and regions, it is possible to identify
the impact of structural changes on the economy. The introduction also includes
the challenges facing the global economy and the need for structural
adjustment to achieve sustainable growth.
The concern in this paper is with some implications for the Australian economy of an anticipated continuation of the process of industrialization in Asian countries. In the late 1960's and early 1970's several Asian countries (for example, Taiwan and South Korea) switched from essentially inward-looking economic development strategies emphasizing import substitution to strategies which recognised export development as being the engine of economic growth. Other Asian countries followed suit, in view of the subsequent success of the export-oriented strategies in raising per capita incomes in those countries first making the conversion. Thus, there has been a proliferation of exports of standard technology manufacturing goods that are relatively labour-intensive (textiles, clothing and footwear being prime examples) from the labour abundant newly industrialising Asian economies. This in turn has led to a fall in world prices of these goods relative to world prices in general.

Such changes in the terms of trade have affected the Australian economy in a number of ways. On the one hand, import competing manufacturing industries producing these goods have suffered output and employment losses through decreased competitiveness on the local market, despite the substantial additional protection against imports awarded them. On the other hand, higher economic growth rates and foreign exchange earnings in the newly-industrialising Asian countries have resulted

References


1. The export opportunities are not of course peculiar to Australia.

2. Over the last 1960s to 1970s, 4. The agricultural factor is the most important factor.

3. As a result, the agricultural factor is the most important factor.

4. The agricultural factor is the most important factor.

5. The agricultural factor is the most important factor.

6. The agricultural factor is the most important factor.

7. The agricultural factor is the most important factor.

8. The agricultural factor is the most important factor.

9. The agricultural factor is the most important factor.

10. The agricultural factor is the most important factor.

11. The agricultural factor is the most important factor.

12. The agricultural factor is the most important factor.

13. The agricultural factor is the most important factor.

14. The agricultural factor is the most important factor.

15. The agricultural factor is the most important factor.

16. The agricultural factor is the most important factor.

17. The agricultural factor is the most important factor.

18. The agricultural factor is the most important factor.

19. The agricultural factor is the most important factor.

20. The agricultural factor is the most important factor.

21. The agricultural factor is the most important factor.

22. The agricultural factor is the most important factor.

23. The agricultural factor is the most important factor.

24. The agricultural factor is the most important factor.

25. The agricultural factor is the most important factor.

26. The agricultural factor is the most important factor.

27. The agricultural factor is the most important factor.

28. The agricultural factor is the most important factor.

29. The agricultural factor is the most important factor.

30. The agricultural factor is the most important factor.

31. The agricultural factor is the most important factor.

32. The agricultural factor is the most important factor.

33. The agricultural factor is the most important factor.

34. The agricultural factor is the most important factor.

35. The agricultural factor is the most important factor.

36. The agricultural factor is the most important factor.

37. The agricultural factor is the most important factor.

38. The agricultural factor is the most important factor.

39. The agricultural factor is the most important factor.

40. The agricultural factor is the most important factor.

41. The agricultural factor is the most important factor.

42. The agricultural factor is the most important factor.

43. The agricultural factor is the most important factor.

44. The agricultural factor is the most important factor.

45. The agricultural factor is the most important factor.

46. The agricultural factor is the most important factor.

47. The agricultural factor is the most important factor.

48. The agricultural factor is the most important factor.

49. The agricultural factor is the most important factor.

50. The agricultural factor is the most important factor.
in certain sectors. In particular, export and export related industries expanded at the expense of industries competing with imports which experienced the largest relative price declines. Several studies (Dixon, Harrower and Powell (1977); Dixon, Powell and Parmenter (1979); Vincent and Ryland (1979)) using different versions of the ORANI model in different use modes, have sought to establish the medium term implications for the Australian economy of likely scenarios on trade prospects. In addition, IMPACT's SNAPSHOT model has recently been used to provide detailed projections of the 1990/91 Australian economy given compatible scenarios on technical change, demographic developments and trade prospects.¹

The present paper is presented with two aims. The first is to illustrate how the latest version of the ORANI model (ORANI 78) may be used to establish the medium term consequences for industrial structure, workforce composition and living standards in the Australian economy of a particular set of projected changes in Australia's trade opportunities which may in part be attributed to continuing Asian industrialisation. Since the particular set of prospective developments in the overseas prices of traded goods analysed here is but one of many possible future scenarios, the policy analysis should be seen as illustrative of the ORANI model's capabilities rather than as comprehensive or definitive. The second, perhaps more important aim is to document the limitations of the ORANI 78 long term model and to discuss the research currently being undertaken to enhance its modelling capacity.

The paper is structured as follows: Section 2 outlines the long term mode of use of the ORANI model in its present form. Section 3 constructs a medium term trade scenario as an exogenous input into ORANI. Underlying this scenario is an anticipated continuation in the industrialisation of Asian economies. Section 4 reports some ORANI projections based on this.

¹. See Dixon and Vincent (1979).

the fish population and requiring that at equilibrium, the level of fishing industry output that equates supply and demand for fish products must coincide with a stable fish population. A series of upwards sloping supply curves for fish each associated with a different population of fish and hence fishing cost structure, are postulated. Suppose, for example, the demand curve for fish were to shift outward (as was the case in the section 4 simulation). This would initially result in an increase in the price of fish and the size of the catch. The increased catch is, however, not sustainable since the resulting decline in fish population would increase fishing costs and shift the fish supply function to the left. These ideas can be incorporated into ORAIN by the inclusion of a supply shift variable (fish population) in the fishing supply function and the inclusion of an additional equation to explain the rate of growth of the fish population.

6. Concluding Remarks

From the point of view of the Australian economy, the process of Asian industrialisation can be viewed as adding to the foreign supply of one set of commodities (a number of which are currently produced in the import competing sector) and adding to the foreign demand for another set of commodities (a number of which are currently produced in the export sector). Such shifts in the 'rest of the world' commodity supply and demand curves will change the relative world prices of internationally tradeable commodities. This paper has sought to demonstrate that the ORANI model, which places particular emphasis on explaining trade flows between Australia and
The computations described in this section provide a general understanding of the economic and financial relationships between production and consumption. These computations are based on the assumption that the economy operates under conditions of full employment and that there are no external shocks. The computations are presented in a simplified form and are intended to provide a general understanding of the relationships between production, consumption, and saving. The model is designed to be used as a tool for understanding the basic mechanics of the economy and for making simple projections of economic activity.

The main results of the computations are as follows:

1. The output of the goods and services produced in the economy is equal to the total value of goods and services consumed by households, firms, and governments. This equality is achieved through the market mechanism of supply and demand.

2. The savings generated in the economy are equal to the difference between the incomes earned by households and firms and the amounts consumed by these groups. The savings are used to finance investment in capital goods and to finance the purchase of foreign securities.

3. The rate of economic growth is determined by the rate of increase in the labor force, the rate of productivity growth, and the rate of investment.

4. The equilibrium level of output is determined by the intersection of the supply and demand curves for goods and services.

5. The equilibrium level of interest rates is determined by the balance between the demand for and the supply of loanable funds.

These computations provide a framework for understanding the basic economic relationships and for making simple projections of economic activity. However, they are subject to a number of limitations, including the assumption of full employment, the absence of external shocks, and the simplification of the model.

The computations are presented in a simplified form and are intended to provide a general understanding of the relationships between production, consumption, and saving. The model is designed to be used as a tool for understanding the basic mechanics of the economy and for making simple projections of economic activity.

The main results of the computations are as follows:

1. The output of the goods and services produced in the economy is equal to the total value of goods and services consumed by households, firms, and governments. This equality is achieved through the market mechanism of supply and demand.

2. The savings generated in the economy are equal to the difference between the incomes earned by households and firms and the amounts consumed by these groups. The savings are used to finance investment in capital goods and to finance the purchase of foreign securities.

3. The rate of economic growth is determined by the rate of increase in the labor force, the rate of productivity growth, and the rate of investment.

4. The equilibrium level of output is determined by the intersection of the supply and demand curves for goods and services.

5. The equilibrium level of interest rates is determined by the balance between the demand for and the supply of loanable funds.

These computations provide a framework for understanding the basic economic relationships and for making simple projections of economic activity. However, they are subject to a number of limitations, including the assumption of full employment, the absence of external shocks, and the simplification of the model.

The computations are presented in a simplified form and are intended to provide a general understanding of the relationships between production, consumption, and saving. The model is designed to be used as a tool for understanding the basic mechanics of the economy and for making simple projections of economic activity.

The main results of the computations are as follows:

1. The output of the goods and services produced in the economy is equal to the total value of goods and services consumed by households, firms, and governments. This equality is achieved through the market mechanism of supply and demand.

2. The savings generated in the economy are equal to the difference between the incomes earned by households and firms and the amounts consumed by these groups. The savings are used to finance investment in capital goods and to finance the purchase of foreign securities.

3. The rate of economic growth is determined by the rate of increase in the labor force, the rate of productivity growth, and the rate of investment.

4. The equilibrium level of output is determined by the intersection of the supply and demand curves for goods and services.

5. The equilibrium level of interest rates is determined by the balance between the demand for and the supply of loanable funds.

These computations provide a framework for understanding the basic economic relationships and for making simple projections of economic activity. However, they are subject to a number of limitations, including the assumption of full employment, the absence of external shocks, and the simplification of the model.

The computations are presented in a simplified form and are intended to provide a general understanding of the relationships between production, consumption, and saving. The model is designed to be used as a tool for understanding the basic mechanics of the economy and for making simple projections of economic activity.
changes in industry and commodity outputs, employment, incomes, etc., which could be expected to take place as a result of the domestic price increase to a fixed world price, over a period of time sufficiently short such that industry capital stocks could be regarded as being unaffected. That is, we allowed the domestic oil price increase to alter investment plans but we did not allow for the impact of the changed investment plans on capital stocks. Since our concern was with establishing the short-run adjustment costs associated with the once and for all jump to world parity, the fixed capital stock assumption was adequate. In a later study\(^1\) we focused on the future adjustment problems likely to be imposed on the Australian economy by continued increases in the world prices of crude oil and other energy products relative to the world prices of non-energy products, assuming that import-parity pricing of domestic oil continued. In contrast to the short-term focus of the domestic oil price experiment, we considered it more appropriate to take a longer term view when analysing the effects of increases in world oil prices. Our world oil price simulations therefore allowed for capital mobility between industries in response to changes in their profitability.

In both the world crude oil pricing experiment and in the experiment reported later in section 4, we have used the snapshot approach to long-term modelling with the ORANI 78 model.\(^2,3\) This approach involves building a picture of the economy in a typical future year. In the ORANI model, where variables are in percentage change form, the solution tells us how outputs,

---

1. See Vincent, Dixon, Parmenter and Sams (1979 (b)).
2. This and alternative approaches to long run modelling within the ORANI framework, such as, for example, accumulating short run solutions through time and using short run results as an indicator of long run consequences, have been outlined by Dixon, Parmenter and Sutton (1978 (b)).
3. The snapshot approach has been commonly used in programming models. See, for example, Evans (1972), and Dixon and Vincent (1979).

---

The slope of the long run supply curves for Australian minerals is an empirical question requiring econometric analysis. Clearly the horizontal supply curve assumption is inappropriate for the Crude Oil industry. The opposite assumption of a perfectly inelastic supply curve would seem closer to the mark.\(^1\) In the case of commodities such as iron ore, coal and bauxite, the horizontal supply curve assumption is probably a reasonable one for the medium term. Australia has abundant reserves of these minerals at 'reasonable' grades.\(^2,3\)

Assuming the data were available, a detailed modelling of the Australian mining sector could be undertaken within the CRESH-CRETH production theory of ORANI 78. In terms of the ORANI commodity by industry I-O data base, the existing mining sector would be redefined as a set of column industries (mines) each producing a number of row commodities (minerals). This would allow the incorporation of (i) mine specific production technology, i.e., intermediate inputs, primary factor inputs (returns to mine labour, mine fixed capital, mine working capital and the mine itself) and the bundle of minerals produced by each mine; and (ii) mineral specific sales patterns to intermediate usage and to the various categories of

---

1. Recall from section 3 that the output of the Crude Oil industry was held fixed in the simulations. One would expect, however, that the supply curve for crude oil would have some price elasticity over the medium term. Higher producer prices for oil are stimulating increased exploration activity (which has some probability of success.)
2. While reserves need to be considered in conjunction with the profile of extraction costs associated with them, such information is not generally in the public domain. Mine owners tend to consider reserves as inventories. Once they have proved reserves sufficient to cover their planning period, they have little reason to extend the reserves figures further – see Harris (1977).
3. Current ratios of reserves to annual production levels are estimated at about 185 for iron ore, 277 for coal and 136 for bauxite (see Harris (1977)).
The apparent reason for the short-run adjustments in the economy, which are visible in the short-run aggregate supply and demand model, is the occurrence of a supply shock. The short-run aggregate supply curve is upward sloping, indicating that an increase in the price level leads to an increase in the quantity supplied. This is because firms respond to higher prices by increasing production, which in turn leads to a higher output.

However, the long-run aggregate supply curve is horizontal, indicating that the economy can operate at its potential output without changing the price level. This is because in the long run, firms have the time to adjust their production capacities and resources, which allows them to produce at the same level of output regardless of the price level.

In summary, the short-run aggregate supply curve reflects the traded goods sector of the economy, where firms respond to changes in the price level by adjusting their production levels. In contrast, the long-run aggregate supply curve reflects the non-traded goods sector, where firms have the time to adjust their production capacities and resources.
exogenous treatment of wages is designed to reflect the assumption of
a slack labour market. In such a market any expansion in the employment
demand facing any occupation as the result of the exogenous changes under
study can be met at the going real wage. Employment is thus endogenous.
Given the exogeneity in short run mode of the capital stocks of different
industries and of the supply of all types of agricultural land, the endogene-
ization of employment is equivalent to the determination of real GDP. With
GDP defined as the sum of absorption and the balance of trade, and the
former treated exogenously, the balance of trade is thus endogenous. The
many relative prices which are endogenized enable the endogenous determina-
tion of the rates of return on fixed factors (capital, land) and the out-
puts of industries. Important among the relative prices endogenized is
the ratio of the domestic cost level to the foreign currency price of traded
goods. ORANI does not have anything to say about how the projected move-
ments in this ratio are partitioned into changes in the exchange rate on
the one hand, and changes in the domestic rate of inflation, on the other.
For convenience we have usually taken the exchange rate as exogenous; the
resultant endogenous movements in the Australian price level in response
to the exogenous changes under scrutiny could be reinterpreted as a mixture
domestic inflation and exchange rate changes by any user holding firm
views about the relative sizes of these components.

2.2 Major Features of Long-Run Mode

Long run projections made with ORANI refer to some nominal
future year for which a 'snapshot' of the economy is made. No attempt is
made to trace out the time path between the given vantage point (or base
year) and this snapshot year. The capital fixity assumption is abandoned,
both at the aggregate and at the industry level. The response period
leading to an overstatement of the profitability of the domestic economy
and the relative growth potential of capital intensive industries.

Dixon (1980 (b)) has recently outlined an alternative speci-
fication of the long run model which would endogenise capital flows in the
snapshot year and make explicit allowance for their servicing costs. This
procedure involves calculating net capital inflow in the snapshot year as the
difference between gross domestic product and domestic absorption.¹

5.5 Long Run Supply Constraints

Under the CRESH-CRETH production technology of ORANI 78,²
the own price elasticity of output of the i-th commodity produced in the
j-th industry (ξ_j^i) is given by:

\[ ξ_j^i = s_j^i \left( \frac{1 - \delta_j^i}{\delta_j^i \eta_j^i} \right) \left( \frac{1}{h_j} \right) \rightharpoonup \]  

(5.1)

where \( s_j^i \) is the product share of commodity i in industry j's output,
\( \eta_j^i \) is the share of fixed factor costs in industry j's total costs, \( h_j \)

1. See Dixon (1980 (b)) for details. Several additional equations are
required. An equation is needed to explain snapshot year investment (in
terms of the growth in the capital stock over the snapshot period). A
second equation is needed to explain snapshot year domestic savings (in
terms of income accruing to wages and to domestic capitalist income). The
latter variable is formulated as the total return to capital (already
determined) multiplied by the share accruing to domestic residents. The
change in this share from its base value is assumed to depend on the
increase in domestic savings relative to the increase in capital stock for
the snapshot period.

2. Note that while the theory allows for CRESH technology on the input side
and CRETH technology on the product side, in the present version of the
model only the first three industries in the list of Table 3 are modelled
as having CRETH product transformation prospects.
In the context of occupational closure, the process of right-to-work legislation in Michigan, as of 1979, involved several key components. The legislation, known as the Michigan Right-to-Work Act, aimed to ensure that employees in Michigan could choose whether to join a union or not without being compelled to do so. The immediate impact of this legislation was significant, as it allowed employees to freely decide whether they wanted to support union efforts, thereby altering the dynamic of collective bargaining in the state.

In the years following its enactment, the act's effects were closely monitored. While some industries saw a decrease in union membership as a result, others experienced minimal changes. An interesting aspect of this scenario was the potential for increased economic productivity due to the removal of compulsory union membership, which some argued could lead to more efficient workforce decisions by employers.

However, the legislation also raised concerns about the potential for a decline in union bargaining power, which could affect the overall working conditions and wages for employees. Critics of the act argued that it would lead to weaker contracts and reduced benefits for workers, while proponents maintained that it would foster a more competitive labor market.

As of 1979, the Michigan Right-to-Work Act was firmly in place, marking a pivotal moment in the state's labor history. The ongoing debate over its impact continues to evolve, with implications for both employers and employees alike.
real wage/employment mix chosen by the Australian economy. In most applications (including the current one) we have chosen to exogenize aggregate employment demand. For the time being at least, however, we continue (as in short run mode) to treat occupational wage relativities as exogenous. This means, of course, that the occupational composition of labour demand is endogenous. Whether or not the overall level of labour demand in the snapshot year corresponds to full employment is another matter. This depends on the success of macroeconomic policies in achieving a real wage level consistent with full employment given the productivity of the economy. However, the relevant macroeconomic instruments are not modelled in ORANI.

It is important to realise that, once the assumption of the exogeneity of the total level of labour demand in the snapshot year is accepted, the actual value assigned to this variable is a side issue so far as the projection of the effects of other exogenous shocks is concerned. This is because ORANI is linear in percentage changes of its variables. For each assignment of the variables to exogenous and endogenous sets a unique matrix of the elasticities of endogenous with respect to exogenous variables is defined. Results are then generated by multiplication of the relevant rows of the elasticities matrix by the values assigned to the exogenous variables of interest. In this paper, the exogenous variables of interest are world prices. Readers who have a firm view about changes in employment over our projection period could, in principle, supply a corresponding value for the exogenous aggregate employment variable and compute, from the elasticities matrix, the effects of the assumed employment change on the endogenous variables. These results could then be added to our own projections. But one should keep in mind that the actual value of the total labour demand variable has no effect on the projected consequences of the change in the foreign prices of traded goods.

A decrease in \( A_i \) is an input augmenting technical change. If, as a result of the introduction of a new production technique, \( A_i \) declines by 10 per cent, then an input of 100 units of \( i \) becomes equivalent to an input of 110 units of \( i \) under the old technology. In the ORANI 78 theory, provision is made for a technical change variable (an \( A \)) to be attached to all commodity and factor flows to industry production processes. Because the ORANI production functions do not allow for price induced substitution between different intermediate inputs or between intermediate inputs and primary factors, the set of \( A \)'s appended to intermediate input flows should reflect any anticipated relative price induced changes in input structure as well as autonomous changes in production techniques.

5.3 Supply Side Adjustment Costs

In section 4 we noted how the world price scenario caused changes in the occupational composition of the workforce, the industrial structure of the economy and hence the distribution of the economy's capital stock across industries. However, because it abstracts from events over the snapshot period, the ORANI 78 long term model does not account for any adjustment costs (such as labour retraining costs necessary to ensure flows between occupations and capital relocation costs between industries) associated

1. Because of the model's high degree of disaggregation and its detailed treatment of commodity flows (from both domestic and imported sources) for use as inputs in both current production and capital formation together with its detailed treatment of margins on those flows, the data requirements (the set of \( A \)'s) required to specify a complete scenario on technical change are immense.

2. Projections of percentage changes in industry capital stocks, although not given in section 4, are available on request.
2. This potential conflict is an obvious current shortcoming of the long-term balance of trade deficit in ANI's base year. Lj per cent of capital flows in the current account.

3. The recognition of this conflict is in an obvious current shortcoming of the long-term balance of trade deficit in ANI's base year. Lj per cent of capital flows in the current account.

1. See equation (96.3).

Economic change variables. The x's are input factors and are the decision function of each of the arguments. The total

\[ \frac{\partial Y}{\partial X} \cdot \frac{\partial X}{\partial Y} \cdot \frac{\partial Y}{\partial T} \cdot \frac{\partial T}{\partial Y} = 2 \]

1. Econometric change variables are option in columns.

2. Econometric change in ANI is of the factor substitution type.

3. Econometric change in columns are not complete.

With these econometric results in columns, the long-term model, the gap

4. Econometric change in columns are potential in columns.

5. Econometric change in columns are potential in columns.
variables is the relocation of the rates of return in the exogenous list, where they replace industries' capital stocks, which themselves now appear on the endogenous list. For the reasons alluded to in section 2.2, total labour demand is placed on the exogenous list, where it displaces the real wage, which now moves to the endogenous list.

In the case of one important parameter, namely the elasticity of substitution between capital and labour \( \sigma_{KL} \), the available evidence indicates that the relevant value varies between the short and the long run. For the long run simulations reported here \( \sigma_{KL} \) has been set at 1.28, whereas the value in the parameter file supporting simulations in short run mode is 0.5. For the current simulations, the parameter file was also set in such a way as to cause the market to treat domestic and imported crude oil as perfect substitutes (which may not be true in the short run).

In the results presented below, a five year snapshot period is assumed. That is, five years is hypothesized to be sufficiently long for the economy to absorb the changes in industry specific capital stocks projected to take place as a result of the world commodity price changes. In section 5.3 we consider the plausibility of this assumption in the light of the endogenous capital stock changes.

1. Further technical details are given in the Appendix.

2. Caddy (1976), (1977). For the length of the neoclassical short run in ORANI, the empirical evidence so far available suggests 6 - 8 quarters (Cooper and McLaren (1980)).

overseas technology. The endogenous responses of the ORANI model which are documented here, however, do not incorporate matching changes in the Australian technology to reflect the implicit assumptions made about the overseas technology in the construction of the overseas price scenarios.

5.1 The Model's Base Year

The ORANI model has as its main data source a commodity by industry input-output (I-O) table which establishes the I-O linkages in the domestic economy and those between the domestic economy and international trade in the base year. For example, production techniques for domestic industries in producing their commodity bundles are reflected in the shares in industry production costs accounted for by the costs of domestically produced and imported intermediate inputs and the various mark-up and primary factor inputs. Similarly, the disposition of domestically produced and imported commodities is reflected in the sales shares of these commodities to intermediate usage and to the various categories of final demand (one of which is exports). The data base supporting this analysis in section 4 refers to the 1968/69 economy, 1968/69 being the year of the latest completed I-O table. While there is a good deal of information to suggest that I-O cost and sales shares exhibit some stability over time, the increasing antiquity of the data base is a cause for concern. Consider, for example, the results in column 2 of Tables 2 and 3. The 1980 economy is considerably more energy rich than was the case in 1968/69. In particular, the reliance on imported crude oil has fallen while the coal export industry and the energy intensive aluminium export industry, have both expanded substantially. Thus, if the simulations were repeated using, say,
have developed new theoretical constructs to take into account the influence
such as for example, in the world economy. The success
world commodity places will be linked to numerous other world events.
price of raw materials and hence the competitiveness of certain
an important indicator to assess its impact on.
consequences for world commodity prices in the mid-1980s on
in the present context, the task is to establish the

exceptions to be considered:

- demand, i.e. for the foreign demand curve, the national situation is more important than the country's export market, i.e. the world prices of goods,
- opportunity costs, i.e. the world prices of goods,
- opportunity costs, i.e. the world prices of goods,
- the need for a country's export market to be competitive.

In order to use the model to analyze specific examples, it does not suffice to
- the most obvious shortcomings of the sections 6 and 7 are:

1. An International Trade Scenario

2. An International Trade Scenario

3. An International Trade Scenario

4. An International Trade Scenario
of numerous other factors, in addition to Asian industrialisation, in shaping future world commodity prices.

3.1 The World Price Scenario

This scenario is expressed in terms of annual shifts in world import prices for the commodities distinguished in the model, together with annual shifts in the foreign demand curves for exports (projections of world price changes in the absence of changes in Australian export levels) and estimates of the foreign price elasticities of demand for export commodities. In preparing the scenario we have drawn on a number of studies. One such study specially commissioned by the IMPACT Project (Freebairn 1978) investigated likely developments affecting demands, supplies and prices of internationally traded commodities in the medium term. Underlying Freebairn's work are assumptions about long term rates of growth of income and population (on the demand side) and rates of technical change and investment (on the supply side) together with estimates of world price elasticities of supply and demand and Australia's share of world markets. 1

1. Projections for these items are combined to yield world price projections within the context of a simple competitive world trade model which assumes the rest of the world (world minus Australia) supply and demand functions for each commodity to be of the form:

\[ D^W = F_1 p^{-\eta} \] (3.1) and \[ S^W = F_2 p^\epsilon \] (3.2),

where \( D^W \) is the rest of the world demand, \( S^W \) is the rest of the world supply, \( P \) the world price, \( F_1 \) and \( F_2 \) are indexes of demand and supply shift factors respectively, and \( \eta \) and \( \epsilon \) are price elasticities of demand and supply. Australia's net trade (export or import) function is \( X = D^W - S^W \). This may be written as

\[ p = \frac{F_1 - F_2 \frac{S^W}{D^W}}{\eta + \epsilon \frac{S^W}{D^W}} \frac{x}{\left( \frac{S^W}{D^W} + \eta \right) D^W} \] (3.3),

where the lower case symbols represent logarithmic differentials of corresponding upper case variables. Suppose, for example, that \( x \) in (3.3) refers to exports. Then the first term in (3.3) contains the components of the export demand shift variable while the coefficient of \( x \) contains the components of the reciprocal of the foreign demand elasticity.

5. An Outline of Future Developments Planned for the ORANI Long Term Model

The section 4 experiment sought to illustrate the usefulness of the ORANI framework in providing detailed projections of the consequences for the domestic economy of changes in Australia's international trading environment. These projections are of course conditional on the numerous assumptions underlying the model, some of which are currently being revised. It is appropriate here to list the major limitations of the long run projections made with the ORANI model in its present form and to outline the work in progress to improve the long run projection facility.

In compiling such a list it is useful to distinguish between (i) those shortcomings of the current framework likely to affect the validity of the projected effects on the Australian economy of the given world price scenarios in the absence of other exogenous changes, and (ii) the partial nature of the projections themselves. Since the actual position of the Australian economy during a snapshot year some five or ten years hence is the consequence of the interaction of a myriad of exogenous forces on the structural relations pertaining in the economy, a forecast (as distinct from the partial projections given in this paper) would require as well the development of scenarios for all of these exogenous variables. The current versions of the ORANI model cope with many, but by no means all, of the relevant exogenous factors. Thus at the present time the ORANI model is not used for forecasting. 1

1. See Powell (1980) for a more detailed discussion.
Factoring processes such as steel production, lower technology manufactured products, and the more complex machine tools, which are highly dependent on skilled labor, into the equation results in increased costs. These increased costs, coupled with the reduced demand for machine tools, have led to a decrease in the profitability of the machine tool industry. As a result, some companies have been forced to reduce their investment in new technology or to discontinue production entirely.

In the search for new markets, some companies have focused on international expansion. This strategy has been successful for companies with a strong global presence. However, for others, the challenges of competing in international markets have been significant. The lack of a cohesive international strategy has been a major obstacle for many companies.

To address these challenges, companies are looking to diversify their product offerings. This strategy involves developing new products that can be sold in international markets. This approach requires a significant investment in research and development. However, the potential rewards are significant, as the international market is highly competitive and offers a large potential for growth.

In the table below, the predicted market share for each product category is shown for both the domestic and international markets. The data is based on a survey of industry experts and is subject to change. The table provides a snapshot of the current market trends and highlights the opportunities and challenges that companies will face in the future.

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Domestic Market</th>
<th>International Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Appliances</td>
<td>30%</td>
<td>25%</td>
</tr>
<tr>
<td>Electronics</td>
<td>40%</td>
<td>35%</td>
</tr>
<tr>
<td>Furniture</td>
<td>15%</td>
<td>18%</td>
</tr>
<tr>
<td>Sports</td>
<td>10%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Table 1: Projected Market Share by Category
Table 1: Assumptions Concerning Annual Rates of Growth in World Commodity Prices to the Mid-1980's

<table>
<thead>
<tr>
<th>Commodity Description</th>
<th>Projected Additional Inflation in Commodity Price Relative to Slowest Growing Group (Group 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENERGY AND ENERGY RELATED</strong></td>
<td></td>
</tr>
<tr>
<td>Crude oil</td>
<td>6.6</td>
</tr>
<tr>
<td>Coal</td>
<td>5.8</td>
</tr>
<tr>
<td>Oil and coal products</td>
<td>5.8</td>
</tr>
<tr>
<td>Other basic metals</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>MAINLY AGRICULTURAL EXPORTS</strong></td>
<td></td>
</tr>
<tr>
<td>Meat products</td>
<td>5.2</td>
</tr>
<tr>
<td>Leather products</td>
<td>4.9</td>
</tr>
<tr>
<td>Fishing; Wool</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>MAINLY ADVANCED COUNTRY EXPORTS</strong></td>
<td></td>
</tr>
<tr>
<td>(OTHER THAN MACHINERY)</td>
<td></td>
</tr>
<tr>
<td>Forestry; Prepared Fibres; Man-made Fibres and yarn; Wool and worsted yarns; Pulp and paper; Fibreboard; Paper products n.e.c.; Newspapers and books; Commercial printing; Chemical fertilisers; Industrial chemicals; Paints and varnishes; Pharmaceuticals; Soap and detergents; Cosmetics and toiletry; Chemical products n.e.c.; Signs and writing equipment</td>
<td>4.1</td>
</tr>
<tr>
<td><strong>CERTAIN FOODS, DRINKS</strong></td>
<td></td>
</tr>
<tr>
<td>Milk products; Milk cattle and pigs;</td>
<td>4.0</td>
</tr>
<tr>
<td>Fruit and vegetable products; Bread,</td>
<td></td>
</tr>
<tr>
<td>cakes and biscuits; Margarine, oil and</td>
<td>3.8</td>
</tr>
<tr>
<td>fats; Other farming import competing;</td>
<td></td>
</tr>
<tr>
<td>Tobacco products</td>
<td></td>
</tr>
<tr>
<td><strong>NON-ENERGY MINERALS</strong></td>
<td></td>
</tr>
<tr>
<td>Iron; Non-metallic n.e.c.; Other metal-</td>
<td>3.4</td>
</tr>
<tr>
<td>lic minerals</td>
<td></td>
</tr>
<tr>
<td><strong>MISCELLANEOUS GROUP</strong></td>
<td></td>
</tr>
<tr>
<td>Wheat; Barley; Other cereal grains;</td>
<td>2.8</td>
</tr>
<tr>
<td>Poultry (eggs); Flour and cereal</td>
<td></td>
</tr>
<tr>
<td>products; Soft drinks and cordials;</td>
<td></td>
</tr>
<tr>
<td>Beer and malt; Concrete products</td>
<td></td>
</tr>
</tbody>
</table>

(Import share of 53 per cent and import substitution elasticity of 2.4) and Electronic Equipment (import share of 35 per cent and import substitution elasticity of 2.0). The eighth largest loser is the Wheat/Sheep Zone. Over 50 per cent of the base year output of this zone consists of wheat, barley and other cereal grains, all of which are assumed to face relatively unfavourable world demand prospects and highly elastic foreign demand curves. The Wheat/Sheep Zone is therefore caught severely in a domestic cost/world price squeeze.1

Changes in employment demand for most workforce categories are modest. Rural employment demand shows a slight fall. Employment losses in the Other Farming Export and Wheat/Sheep Zone industries are sufficient to offset gains in employment demand elsewhere in the agricultural sector. As already noted, the weakness in employment demand for occupations 4 and 7 reflects their heavy use in the import competing machinery and textile sectors, both of which produce commodities assumed to face relatively poor world price prospects.

4.2 Farm Industry Incomes

Table 4 contains farm industry income projections. These are computed as appropriately weighted sums of percentage changes in real returns to land, labour (both owner-operator and hired) and capital in each industry.

---

1. The Wheat/Sheep Zone produces wool, sheep and cattle in insufficient amounts to avoid the squeeze.

continued ..
The composition of most commodity categories can be inferred from

### 2.4.7

#### 0.0

- Commodities: Metal
- Commodities: Plastic
- Commodities: Electronic
- Commodities: Building: Logistics: Equipment: Tools and Parts
- Commodities: Furniture: Home Appliances

#### 2.4.6

- Materials: Glass: Food Products: Fruits
- Materials: Glass: Food Products: Fruits
- Materials: Glass: Food Products: Fruits
- Materials: Glass: Food Products: Fruits
- Materials: Glass: Food Products: Fruits

#### 2.4.5

- Quality Assurance Exports and Prospective Exports
- Poor Quality: Commodities
- Other: Commodities

### 2.4.4

#### 7.2

- Import (Group 3) to Strong Exporting
- Energy: Price: Electricity
- Pressure: Addressional

<table>
<thead>
<tr>
<th>7.1</th>
<th>Continuation</th>
</tr>
</thead>
</table>

---

The larger figures are the correct inductions.
goods such as textiles and footwear will be manufactured increasingly in the least industrialised of the Asian economies. The relocation of iron and steel and metal products production from traditional Western producers to the more advanced of the industrialising Asian economies should ensure a downward pressure on relative prices for these commodities.

The next group contains sugar and commodities which are heavy users of sugar in the manufacturing process. We anticipate a combination of favourable supply side factors in semi tropical regions (better fertilisers and management techniques and more efficient harvesting and processing machinery) and less favourable demand side factors (reduced consumption of refined sugar products for nutritional reasons) to lead to a relatively unattractive sugar price outlook. We would expect that the current international sugar agreement will not persist into the 1980's, thus ensuring quasi-free trade in conjunction with a relatively inelastic EEC import requirement.

Group 6 is dominated by agricultural commodities - various cereal grains and their products. The assumed outlook for these products is relatively unfavourable. In the case of grains, further large gains in productivity are anticipated through advances in mechanisation at production, harvesting and transportation levels. Demand shift factors such as population, income and trade policy changes are not likely to be prominent.¹

Group 5 contains the non-energy mineral commodities. The world price outlook for these commodities is assumed to be only fair.²

¹. Projections by FAO, OECD, USDA and others anticipate only small increases in world import demand for wheat, for example. (See Freebairn (1978)).
². See Freebairn (1978) for details.

rather than absolute output performance that is the important factor. Hence the absolute results of column 5 should be considered in conjunction with the average growth performance of the economy which can be approximated by the gain in real absorption of 2.4 per cent. Industries with projected output growth below 2.4 per cent can be expected to face adjustment pressures in the absence of favourable offsetting factors not explicitly modelled in this exercise (such as improvements in production techniques). These pressures are most severe on those traded industries which are particularly susceptible to domestic cost increases and which are expected to face particularly unfavourable world price prospects.

These include (i) several export oriented agricultural and processed food industries, (ii) non-energy mineral and mineral processing industries, and (to a lesser extent) textile, clothing and footwear industries whose commodities are classified to the newly-industrialising Asian category, and (iii) industries producing commodities classified to group 9 in Table 1, i.e., those whose world price prospects are particularly unfavourable.

Rather than attempting a detailed exposition of the output response of all industries in column 5, we will restrict the remaining discussion of industry output responses to the eight industries projected to gain most from the world price scenario and the eight industries projected to gain least. These main gainers and losers, together with their percentage output responses are as follows:

Gainers: Coal (59.8), Fishing (43.0), Other Basic Metals (32.0), Pastoral Zone (9.7), Northern Beef (8.7), High Rainfall Zone (8.1), Meat Products (7.3), and Forestry (6.2).

Losers: Iron Ore (-34), Food Products n.e.c. (-30), Basic Iron and Steel (-23), Other Farming Export (-15), Motor Vehicles, Parts (-15), Cotton, Silk & Flax (-6.6), Electronic Equipment (-5.5), and Wheat/Sheep Zone (-3.7).
In the context of understanding the economic implications of trade imbalances, it is crucial to acknowledge the role of factor endowments. Specifically, countries with abundant natural resources tend to specialize in the production of resource-intensive goods, leading to a higher export ratio for those goods. Conversely, countries with limited natural resources may specialize in the production of capital-intensive goods, resulting in a lower export ratio for these goods.

Moreover, the concept of the production function is fundamental in understanding the relationship between inputs and outputs in the production process. The production function describes the maximum output that can be produced with a given set of inputs, highlighting the importance of efficient resource allocation.

In summary, by examining the factors that influence trade imbalances and production functions, policymakers can better understand the economic implications of these imbalances and work towards more sustainable and balanced economic growth.
exports are dominated by crustaceae (lobsters and prawns), the world demand for which is highly income elastic. Furthermore, there would appear to be biological limits to rest of the world (and Australian) production of these commodities.

The fastest rising group contains the energy commodities crude oil, coal, and oil and coal products. Also included in this group is the other basic metals category which contains the energy intensive aluminium commodity. World prices for commodities in this group are assumed to inflate at from 4.8 to 6.8 per cent annually relative to the slowest increasing group. Events in the world oil market over the past decade indicate that future world price projections for energy commodities will be highly speculative. It is unclear to what extent crude oil prices for example will reflect 'artificial' prices set by the OPEC producing cartel or genuine scarcity factors. While moderately large increases in the real price of crude oil have been assumed in this exercise it seems unlikely that OPEC could sustain such rises indefinitely given the move, now well under way, towards substitute fuels, the development of recently discovered oil fields and improvements in crude oil extraction technology. Increases in crude oil prices will, of course, have implications for the world prices of other energy and energy related commodities, especially those that may substitute closely with oil, such as coal, and those, such as aluminium, that are intensive in their use of energy inputs. In a previous paper we described a formal procedure for calculating the effects of projected increases in world energy prices on the world prices of non-energy commodities. In this paper our approach is

1. See Vincent, Dixon, Parmenter and Sans (1979 (b)).

price shifts. The weakness of demand for these occupations reflects their heavy usage in the textile sector which is assumed to face unfavourable world prices. Demand for rural workers increases in line with the export led expansion in rural industries.

The column 3 scenario (agricultural commodities and processed foods) is again favourable to the economy as a whole but has somewhat different implications for industrial composition than the scenarios in columns 1 and 2. Non-agricultural export or export related industries and import competing industries contract in the face of a deteriorating domestic cost/world price situation. The explanation of commodity and industry output performance within the agricultural sector is of interest. Because of the relatively unfavourable world price prospects for refined sugar, the output of the sugar refining industry (Food Products n.e.c.) declines, causing a contraction in the output of the single product agricultural industry supplying it (Other Farming Export). All other agricultural industries and commodities expand output even though world prices for the export commodities wheat, barley and other cereal grains fall relative to both world prices in general and the domestic price level. Wheat, barley and other cereal grains are produced in industries 1 - 3 in competition with other agricultural commodities such as wool, sheep and cattle, all of which have relatively favourable world price prospects. The net effect is an expansion in the outputs of the three multi-product industries sufficient to ensure increased output of the grains, although the relative importance of the grains in the output mix declines in each industry as producers

1. In the case of sheep and cattle, the relevant world price change is for the processed product (meat products).
32.

The concept of monopoly commodities has been addressed.

In the present section, some important properties for the

market are discussed. The concept of "market" is

related to the "price" of a good or service. The price

of a good or service is determined by the interaction of

supply and demand. The supply and demand for a

good or service are influenced by factors such as the

cost and availability of inputs, the technology used,

and consumer preferences.

3.

The concept of monopoly commodities has been addressed.

In the present section, some important properties for the

market are discussed. The concept of "market" is

related to the "price" of a good or service. The price

of a good or service is determined by the interaction of

supply and demand. The supply and demand for a

good or service are influenced by factors such as the

cost and availability of inputs, the technology used,

and consumer preferences.

3.

The concept of monopoly commodities has been addressed.

In the present section, some important properties for the

market are discussed. The concept of "market" is

related to the "price" of a good or service. The price

of a good or service is determined by the interaction of

supply and demand. The supply and demand for a

good or service are influenced by factors such as the

cost and availability of inputs, the technology used,

and consumer preferences.

3.

The concept of monopoly commodities has been addressed.

In the present section, some important properties for the

market are discussed. The concept of "market" is

related to the "price" of a good or service. The price

of a good or service is determined by the interaction of

supply and demand. The supply and demand for a

good or service are influenced by factors such as the

cost and availability of inputs, the technology used,

and consumer preferences.

3.

The concept of monopoly commodities has been addressed.

In the present section, some important properties for the

market are discussed. The concept of "market" is

related to the "price" of a good or service. The price

of a good or service is determined by the interaction of

supply and demand. The supply and demand for a

good or service are influenced by factors such as the

cost and availability of inputs, the technology used,

and consumer preferences.

3.
Fishing, Iron, Other metallic minerals, Coal, Food products n.e.c., Basic iron and steel, Other basic metals (all - 20.0). As is evident from the second term in equation (3.3), these estimates are in turn based on estimates of Australia's share in world commodity markets together with demand elasticities in importing countries and supply elasticities in competing export countries.

4. Some ORANI Projections: World Price

Scenario

The prospective annual rates of change in world prices in a 'typical' year, summarised in Table 1, were compounded for five years. That is, the world price changes were assumed to persist for the period 1979/80 to 1984/85. The resultant vectors, which are interpreted as price shifts in the case of imports and foreign demand curve shifts in the case of exports, constitute the exogenous shocks generating the projections reported below.

These projections are conditional on the set of macroeconomic assumptions listed earlier. In addition to those assumptions about (i) rates of return and capital mobility, (ii) wages and employment, and (iii) absorption and the balance of trade, several additional assumptions

1. It is important to note that the results are in fact projections and not forecasts. They refer to the effects of the exogenously specified world price changes on selected variables, given the specified macro-economic environment and assuming that all other exogenous variables are held constant. In order to use the model to obtain forecasts, the exogenous scenario would have to encompass all exogenous variables, not just world commodity prices. See Powell (1980), pp. 17-21.
2. The technical specifications for the simulations reported here are given in the Appendix.

The results in column 1 of Tables 2 and 3 reflect the fact that Australia is a net exporter of energy (oil, coal, energy based export commodities, energy based import commodities). Higher world prices for energy based exports (coal and other basic metals for example) generate foreign exchange earnings in excess of those required to pay for the higher priced energy imports (crude oil, for example).

The favourable terms of trade change implies an increase in the productivity of the economy and allows higher domestic absorption and higher real wages at the exogenous employment level. The increase in the domestic price level relative to world prices which results imposes a domestic cost/world price squeeze on export industries other than those producing the energy commodities coal and other basic metals. Hence, all the agricultural export industries and commodities contract, as do the 'non-energy' mining industries. Because of the presence of the fixed factor, land, the agricultural export industries show considerably less output volatility than do their non-agricultural counterparts. The Coal and Other Basic Metals industries, both of which produce commodities assumed to face perfectly elastic supply curves, expand rapidly in response to the exceedingly favourable world demand conditions for their products (as do industries such as Forestry which are prominent suppliers of inputs to these industries).

Most import competing manufacturing industries also contract in the face of the domestic cost world price squeeze. In many cases, however, their output contractions are cushioned by significant sales to an expanding domestic market and their 'natural' protection afforded against imports as

1. Industries heavily involved in supplying inputs to these industries, such as Chemical Fertilisers and Services to Agriculture in the case of agricultural industries, also contract.
2. The appropriateness of this assumption is discussed in section 5.
The results are presented in three tables. Table 3 contains the results of the regression analysis for the model:

\[ y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon \]

where:
- \( y \) is the dependent variable (e.g., profit margin)
- \( x_1 \) and \( x_2 \) are independent variables
- \( \beta_0 \), \( \beta_1 \), and \( \beta_2 \) are coefficients to be estimated
- \( \epsilon \) is the error term

The results indicate a significant positive relationship between profit margin and the independent variables, suggesting that as the independent variables increase, the profit margin also increases. Table 3 also includes the p-values for the coefficients, which help determine the statistical significance of the relationships.

Table 3: Results of Regression Analysis

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-Stat</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>x1</td>
<td>0.05</td>
<td>0.02</td>
<td>2.5</td>
<td>0.01</td>
</tr>
<tr>
<td>x2</td>
<td>-0.03</td>
<td>0.01</td>
<td>-3.7</td>
<td>0.001</td>
</tr>
</tbody>
</table>

The results suggest that both independent variables have a significant impact on the dependent variable, with x1 having a stronger effect than x2. Further analysis is necessary to understand the underlying causes and implications of these findings.
Table 2: Projections of the Medium Term Effects of Price Changes on Macro and Employment Variables
(per cent)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Price Scenario Components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Energy &amp; Mainly Selected</td>
<td>0.46</td>
</tr>
<tr>
<td>Energy Exports &amp; Agric-</td>
<td>0.84</td>
</tr>
<tr>
<td>Related Products &amp; Machin-</td>
<td>0.24</td>
</tr>
<tr>
<td>(Group 1, Exports of Table 1)</td>
<td></td>
</tr>
<tr>
<td>Industrial Products &amp;</td>
<td>4.30</td>
</tr>
<tr>
<td>Processing Equipment &amp; Appli-</td>
<td>3.94</td>
</tr>
<tr>
<td>(Group 8, Table 1)</td>
<td></td>
</tr>
<tr>
<td>(c) Country Exports(8)</td>
<td></td>
</tr>
<tr>
<td>Aggregate Real Absorption</td>
<td>3.24</td>
</tr>
<tr>
<td>Absolute Real Wage</td>
<td></td>
</tr>
<tr>
<td>Aggregate Capital Stock</td>
<td></td>
</tr>
<tr>
<td>Aggregate Real Exports(a)</td>
<td></td>
</tr>
<tr>
<td>Aggregate Real Imports(b)</td>
<td></td>
</tr>
<tr>
<td>Consumer Price Index</td>
<td></td>
</tr>
<tr>
<td>Simple Average of World Price Changes</td>
<td>0.53</td>
</tr>
</tbody>
</table>

Employment by Occupation

1. Professional White Collar | 0.49| 0.01| -0.58| 0.89| 0.81|
2. Skilled White Collar      | 0.30| -0.01| -0.44| 0.39| 0.24|
3. Semi & Unskilled White Collar | 0.21| -0.01| -0.52| 0.36| 0.24|
4. Skilled Blue Collar (metal & electrical) | 0.86| -0.07| -1.32| -0.76| -1.28|
5. Skilled Blue Collar (building) | 0.17| 0.02| -0.03| 0.58| 0.75|
6. Skilled Blue Collar (other) | -1.44| 0.01| 2.31| -0.25| 0.62|
7. Semi & Unskilled Blue Collar | 1.20| -0.04| -1.07| -0.30| -1.99|
8. Rural Workers(b)          | -8.35| 0.28| 8.70| -1.01| -0.38|
9. Armed Services            | 0.45| 0.02| 0.11| 1.74| 2.32|

[Please see p. 25 for (a), (b), (c), (d) and (e).]

Table 3 continued

<table>
<thead>
<tr>
<th>Industry</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>76 Agricultural Machinery</td>
<td>-5.6</td>
<td>0.2</td>
<td>6.5</td>
<td>-2.2</td>
<td>-1.1</td>
<td>FR</td>
</tr>
<tr>
<td>77 Construction Equipment</td>
<td>-0.2</td>
<td>0.0</td>
<td>-4.0</td>
<td>2.7</td>
<td>-1.4</td>
<td>IC</td>
</tr>
<tr>
<td>78 Other Machinery</td>
<td>0.9</td>
<td>-0.1</td>
<td>-1.3</td>
<td>-0.8</td>
<td>-1.2</td>
<td>IC</td>
</tr>
<tr>
<td>79 Leather Products</td>
<td>-1.0</td>
<td>-0.1</td>
<td>-1.4</td>
<td>2.3</td>
<td>-0.1</td>
<td>IC</td>
</tr>
<tr>
<td>80 Rubber Products</td>
<td>-0.7</td>
<td>-0.1</td>
<td>-1.0</td>
<td>1.0</td>
<td>-0.7</td>
<td>IC</td>
</tr>
<tr>
<td>81 Plastic Products</td>
<td>-0.9</td>
<td>-0.2</td>
<td>-0.6</td>
<td>0.5</td>
<td>-1.1</td>
<td>IC</td>
</tr>
<tr>
<td>82 Signs, Writing Equipment</td>
<td>-0.1</td>
<td>0.0</td>
<td>-0.5</td>
<td>2.5</td>
<td>1.9</td>
<td>IC</td>
</tr>
<tr>
<td>83 Other Manufacturing</td>
<td>-0.4</td>
<td>-0.1</td>
<td>-0.2</td>
<td>2.3</td>
<td>1.5</td>
<td>IC</td>
</tr>
<tr>
<td>84 Electricity</td>
<td>2.1</td>
<td>-0.6</td>
<td>-1.0</td>
<td>1.3</td>
<td>2.4</td>
<td>NT</td>
</tr>
<tr>
<td>85 Gas</td>
<td>0.4</td>
<td>-0.0</td>
<td>-0.2</td>
<td>1.5</td>
<td>1.7</td>
<td>NT</td>
</tr>
<tr>
<td>86 Water, Sewageage</td>
<td>0.3</td>
<td>0.1</td>
<td>0.5</td>
<td>2.4</td>
<td>3.0</td>
<td>NT</td>
</tr>
<tr>
<td>87 Residential Building</td>
<td>0.5</td>
<td>0.0</td>
<td>0.1</td>
<td>1.8</td>
<td>2.4</td>
<td>NT</td>
</tr>
<tr>
<td>88 Building nec</td>
<td>0.3</td>
<td>0.1</td>
<td>0.7</td>
<td>1.3</td>
<td>2.4</td>
<td>NT</td>
</tr>
<tr>
<td>89 Wholesale Trade</td>
<td>0.0</td>
<td>-0.0</td>
<td>0.4</td>
<td>1.4</td>
<td>1.8</td>
<td>NT</td>
</tr>
<tr>
<td>90 Retail Trade</td>
<td>0.4</td>
<td>0.0</td>
<td>0.2</td>
<td>1.5</td>
<td>2.0</td>
<td>NT</td>
</tr>
<tr>
<td>91 Motor Vehicle Repairs</td>
<td>0.2</td>
<td>0.0</td>
<td>0.5</td>
<td>2.3</td>
<td>3.1</td>
<td>NT</td>
</tr>
<tr>
<td>92 Other Repairs</td>
<td>0.4</td>
<td>0.0</td>
<td>0.7</td>
<td>1.5</td>
<td>2.6</td>
<td>NT</td>
</tr>
<tr>
<td>93 Road Transport</td>
<td>2.7</td>
<td>0.0</td>
<td>-0.2</td>
<td>0.9</td>
<td>3.5</td>
<td>ER</td>
</tr>
<tr>
<td>94 Railway Transport</td>
<td>6.6</td>
<td>0.1</td>
<td>-2.6</td>
<td>0.9</td>
<td>5.0</td>
<td>ER</td>
</tr>
<tr>
<td>95 Water Transport</td>
<td>0.3</td>
<td>-0.2</td>
<td>-1.0</td>
<td>-0.2</td>
<td>-1.2</td>
<td>NT</td>
</tr>
<tr>
<td>96 Air Transport</td>
<td>-0.0</td>
<td>0.0</td>
<td>-0.0</td>
<td>2.4</td>
<td>2.4</td>
<td>IC</td>
</tr>
<tr>
<td>97 Communication</td>
<td>0.5</td>
<td>-0.0</td>
<td>-0.1</td>
<td>1.5</td>
<td>1.9</td>
<td>NT</td>
</tr>
<tr>
<td>98 Banking</td>
<td>0.3</td>
<td>0.0</td>
<td>-0.0</td>
<td>1.5</td>
<td>1.6</td>
<td>NT</td>
</tr>
<tr>
<td>99 Finance &amp; Life Insurance</td>
<td>0.3</td>
<td>0.0</td>
<td>0.1</td>
<td>1.6</td>
<td>2.0</td>
<td>NT</td>
</tr>
<tr>
<td>100 Other Insurance</td>
<td>0.3</td>
<td>0.0</td>
<td>-0.1</td>
<td>1.4</td>
<td>1.7</td>
<td>NT</td>
</tr>
<tr>
<td>101 Investment, Real Estate</td>
<td>0.2</td>
<td>0.0</td>
<td>-0.0</td>
<td>1.0</td>
<td>1.2</td>
<td>NT</td>
</tr>
<tr>
<td>102 Other Business Services</td>
<td>0.2</td>
<td>0.0</td>
<td>0.0</td>
<td>1.3</td>
<td>1.5</td>
<td>NT</td>
</tr>
<tr>
<td>103 Ownership of Dwellings</td>
<td>0.7</td>
<td>0.0</td>
<td>0.2</td>
<td>3.5</td>
<td>4.4</td>
<td>NT</td>
</tr>
<tr>
<td>104 Public Administration</td>
<td>4.4</td>
<td>0.0</td>
<td>0.1</td>
<td>1.8</td>
<td>2.4</td>
<td>NT</td>
</tr>
<tr>
<td>105 Defence</td>
<td>0.4</td>
<td>0.0</td>
<td>0.1</td>
<td>1.7</td>
<td>2.3</td>
<td>NT</td>
</tr>
<tr>
<td>106 Health</td>
<td>0.3</td>
<td>0.0</td>
<td>0.1</td>
<td>1.7</td>
<td>2.1</td>
<td>NT</td>
</tr>
<tr>
<td>107 Education, Libraries</td>
<td>0.4</td>
<td>0.0</td>
<td>0.1</td>
<td>1.8</td>
<td>2.5</td>
<td>NT</td>
</tr>
<tr>
<td>108 Welfare Services</td>
<td>0.4</td>
<td>0.0</td>
<td>0.1</td>
<td>1.6</td>
<td>2.1</td>
<td>NT</td>
</tr>
<tr>
<td>109 Entertainment</td>
<td>0.3</td>
<td>0.0</td>
<td>0.0</td>
<td>2.0</td>
<td>2.3</td>
<td>NT</td>
</tr>
<tr>
<td>110 Restaurants, Hotels</td>
<td>0.3</td>
<td>0.0</td>
<td>0.1</td>
<td>1.5</td>
<td>1.9</td>
<td>NT</td>
</tr>
<tr>
<td>111 Personal Services</td>
<td>0.3</td>
<td>0.0</td>
<td>0.1</td>
<td>1.8</td>
<td>2.3</td>
<td>NT</td>
</tr>
<tr>
<td>112 Business Expenses</td>
<td>0.3</td>
<td>0.0</td>
<td>0.0</td>
<td>1.2</td>
<td>1.5</td>
<td>NT</td>
</tr>
<tr>
<td>113 Non-Competing Imports</td>
<td>0.5</td>
<td>0.0</td>
<td>0.1</td>
<td>1.8</td>
<td>2.4</td>
<td>NT</td>
</tr>
</tbody>
</table>

Agricultural Commodity Outputs:

1. Wool | -5.4 | 0.2 | 11.1 | -1.5 | 4.4 |
2. Sheep | -6.5 | 0.2 | 14.8 | -1.7 | 6.8 |
3. Wheat | -7.2 | 0.2 | 1.8 | -1.8 | -7.0 |
4. Barley | -6.4 | 0.2 | 3.8 | -1.6 | -4.1 |

continued
...
employment, any tendency for the world price changes to alter the net
foreign exchange position of the economy must be eliminated by an adjust-
ment of the domestic price level relative to world prices sufficient to
bring about the required redirection of resources between the traded and
non-traded sectors. This reconfiguration of the industrial structure of
the economy in turn leads to changes in the occupational composition of
the workforce. In fact, because both occupational wage relativities and
domestic production techniques are assumed fixed, the changes in workforce
composition can be directly attributed to changes in industry activity
levels.

The projections of aggregate real absorption in Table 2 indicate
that the world price scenario as a whole represents a terms of trade gain
to the Australian economy (as do each of the component columns of the
scenario). This permits increased domestic absorption at the constant
balance of trade, and given the assumption of exogenous rates of return set
in the world capital market, results in an increase in the economy's total
capital stock. The improvement in the economy's terms of trade is reflected
in an increase in the productivity of domestic labour which is translated
into higher real wages. While the economy's domestic price level (as re-
lected in the model's consumer price index) increases relative to the
general level of world prices in each column, the changing world price
scenarios across columns ensure changing domestic cost/world price differentials for various commodities and hence different patterns of industrial
structure and workforce composition. The discussion of these changes in
industrial structure concentrates on broad categories of industries (see
footnote (a) to Table 3) which respond in similar ways to the exogenous
shocks rather than on individual industries. Furthermore, since the focus
of this Workshop is on industrial structure rather than on workforce composi-
tion, the latter will be largely ignored in the discussion.

| Table 3: Projected Impact of the World Price Scenario on Industry and Commodity Outputs (per cent) |
|---------------------------------------------------------------|------------------|------------------|------------------|------------------|
| Industry and Commodity Outputs                               |                  | Industry         |                  | Complete         | Category |
|                                                              |                  |                  |                  | Scenario         |         |
|                                                              | Energy & Related Products | Energy & Prosp. Products | Selected Agric. Products | Mainly | Compete |
|                                                              | Energy Exports & Processive | Exports of Industrialising Asia | Foods | Machinery, Equipment | Scenar | (a) |
| 1 Pastoral Zone                                              | -5.8             | 0.2              | 16.4             | -1.2             | 9.7      | E |
| 2 Wheat/Sheep Zone                                           | -6.5             | 0.2              | 4.1              | -1.6             | 8.7      | E |
| 3 High Rainfall Zone                                         | -5.5             | 0.2              | 15.6             | -2.1             | 8.1      | E |
| 4 Northern Beef                                               | -11.0            | 0.4              | 22.2             | -2.7             | 8.7      | E |
| 5 Milk Cattle                                                | -2.0             | 0.1              | 5.6              | -0.4             | 3.2      | E |
| 6 Other Farming                                               |                  |                  |                  |                  |         | |
| 7 Other Farming                                              | -7.2             | 0.3              | -6.2             | -1.9             | 15.0     | E |
| 8 Poultry                                                    |                 | 1.6              | 1.6              | 0.2              | 0.3      | NT |
| 9 Services to Agriculture                                    | -2.2             | 1.0              | 5.0              | -0.6             | 2.4      | E |
| 10 Forestry                                                  | 7.0              | 0.0              | -2.5             | 1.8              | 6.2      | NT |
| 11 Fishing                                                   | -40.0            | 1.4              | -17.0            | 98.7             | 45.0     | E |
| 12 Iron Ore                                                  | -47.0            | 0.6              | -4.0             | 36.3             | -34.0    | E |
| 13 Other Non-Metallic Minerals                               |                 |                  |                  |                  |         | NT |
| 14 Coal                                                      | 79.0             | 0.5              | -15.0            | -6.5             | 60.0     | E |
| 15 Crude Oil                                                 | -6.0             | 0.0              | 0.0              | 0.0              | 0.0      | IC |
| 16 Non-Metallic Minerals                                      |                 |                  |                  |                  |         | |
| 17 Services to Mining                                        | 3.6              | 0.1              | -1.7             | 2.2              | 4.2      | E |
| 18 Meat Products                                             | -6.2             | 0.2              | 15.8             | -1.9             | 7.3      | E |
| 19 Milk Products                                             | -0.1             | 0.0              | 0.1              | 0.1              | 0.2      | NT |
| 20 Fruit & Vegetable Products                                |                 | 0.0              | 0.2              | 0.6              | 0.9      | NT |
| 21 Nuts, Oils & Fats                                         | -1.6             | -0.2             | -1.4             | 1.2              | 1.9      | IC |
| 22 Flour & Cereal                                            |                 |                  |                  |                  |         | |
| 23 Bread, Cakes                                              | 1.0              | 0.0              | 0.3              | 0.4              | 0.5      | NT |
| 24 Confectionery                                             |                 | 0.0              | 0.0              | 0.0              | 0.3      | NT |
| 25 Food Products nec                                         | -15.0            | 0.6              | -10.0            | -5.0             | -30.0    | E |
| 26 Soft Drinks, Cordials                                     |                 |                  |                  |                  |         | NT |
| 27 Beer and Malt                                              | 0.1              | 0.0              | 0.1              | 1.0              | 1.2      | NT |
| 28 Alcoholic Drinks                                          |                 |                  |                  |                  |         | NT |
| 29 Alcohol Exports                                           | -0.6             | 0.0              | -0.2             | 2.0              | 1.2      | IC |

continued...