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References

initial impact effects on its balance of trade of the world price increases. Where they are unfavourable (as in column (I)) we could expect, for example, additional stimulation of export industries associated with the need to cover a reduced ability to attract capital inflow. In column (II), on the other hand, an increased ability to attract capital inflow would further reduce non-coal exports.

Finally, there are serious difficulties in handling substitution possibilities between energy sources. In the present version of ORANI, oil and coal are treated as non-substitutes. If this is (as we have argued on page 4) an acceptable assumption for the period of our study (5 years), then column (I) of Table 1 is readily interpretable. The question arises, however, as to the relevance of column (II) where the price of coal follows the price of oil. On page 4, we mentioned substitution possibilities as a justification for assuming a close relationship between coal and oil prices. But if this is the case, we should allow for substitution possibilities in the domestic economy. We have been unable to attempt such an allowance in the simulations reported above.
1. Introduction

2. The Effects of World Energy Price Increases on the World Prices of Traded Commodities

3. Analytical Procedure and Results

4. Conclusions

5. References
4. CONCLUSION

In the August 1978 budget, the price of domestically produced crude oil was raised to the import parity level existing at that time. Since the budget's domestic oil price adjustment, domestic crude oil prices have been increased at six monthly intervals to reflect increases in the world price of crude oil.

Our analysis indicates that the short term implications for the agricultural and other sectors, of the initial jump to import parity pricing, differ considerably from the longer term implications for these sectors of continued increases in world oil prices. Raising domestic oil prices to a fixed import parity level generates domestic cost increases - especially via wage indexation - thus imposing a cost-price squeeze on the traded goods sector. Agricultural exports and export related industries are among the principal losers. The longer term consequences of higher world crude oil and other energy prices for the sectoral composition of the economy are however quite different. Our results suggest that increases in world crude oil prices, provided they do not impinge directly on the price of coal, will lead to an expansion in the outputs of the export oriented agricultural and mining sectors at the expense of the more domestically oriented manufacturing and service sectors. The price adjustment mechanism is via the balance of trade. A reduction in the domestic price level relative to world prices must occur in order to generate sufficient foreign exchange to pay for the higher priced oil imports.

However because the Australian economy is a net exporter of energy, increases in crude oil and coal prices of the same magnitude will lead initially to a net increase in foreign exchange earnings. External
1. The proportion of agricultural, rural, and small domestic enterprises is so large in the world's economy that any major changes in agricultural prices have a significant impact on other sectors of the economy. Therefore, it is important to monitor agricultural prices closely.

2. The global food crisis of 2008 highlighted the importance of agricultural prices and their impact on the world economy. This crisis led to a significant increase in food prices, which in turn affected the prices of other goods and services. This suggests that agricultural prices are closely linked to other sectors of the economy.

3. Therefore, it is important to monitor agricultural prices closely and take action to stabilize them when necessary. This can be achieved through various measures such as subsidies, trade policies, and international agreements.

4. In conclusion, agricultural prices are crucial for the stability of the global economy. Therefore, it is important to monitor them closely and take necessary actions to ensure their stability.
those attributable to the 1978 budget decision to increase domestic prices to world parity, and
those attributable to likely continued increases in the world price of oil relative to the world prices of other internationally traded goods, assuming that the domestic price is maintained at world parity.

In a previous paper (Vincent, Dixon, Parmenter and Sams (1979)) we investigated in detail the short term effects on industrial and workforce composition of the August 1978 budget decision to raise domestic prices to import parity, i.e., part (i) above. We concluded that the short-run adjustment problems facing the Australian economy were not trivial, especially if the commodity price increases engendered by the crude oil price increase were allowed to flow through into money wages. Our analysis showed that the effects of (i) are borne unevenly by different sectors of the economy. In particular, since it increases the domestic price level relative to foreign prices, the short-run costs of (i) are borne most heavily by exporting and import competing industries. Because of international competition, these trading sectors find it difficult to pass on cost increases.\footnote{Such cost increases result from the direct effects of higher priced inputs of oil products and the indirect effects via increased prices for oil intensive inputs and higher labour costs if some degree of wage indexation is assumed. The size of the direct effect of higher oil prices on domestic production costs for a particular industry will depend on the share of oil products in that industry's total costs. For most industries in the economy, these shares are small, generally less than one per cent in 1968/69 (see ABS (1977)). (The output of the oil products industry in 1968/69 represented about 2 per cent of GDP in that year.) The primary industries are amongst the most intensive in their direct use of oil products with shares of oil in total costs ranging from 2 to 5 per cent.} Assuming constant real wages and constant real domestic absorption, we projected the

\footnote{The model's index of consumer prices increases by 0.07 per cent compared with a simple average increase in foreign commodity prices of 0.28 per cent.}

The adjustment mechanism underlying the column (I) results is analogous to (although of opposite sign to) that advanced by Gregory (1976) and Dixon, Parmenter and Sams (1978) in their analyses of the effects of the 1960's mining boom on the sectoral composition of the economy. The initial effect of the higher foreign currency cost of oil imports is to move the balance of trade towards deficit. In order to eliminate the deficit (as required by the balance of trade constraint) without a reduction in domestic employment, domestic prices must fall relative to world prices.\footnote{It is interesting to note that the degree of dependence on energy inputs is only of very minor significance in determining output performance. Although the comparatively energy intensive agricultural sector must pay higher prices for fuel and fuel based products, these specific cost increases are more than offset by the reduction in the general price level relative to overseas that occurs via the balance of trade.}

The results in column (II) indicate, however, that the sectoral consequences of an initial increase in world oil and coal prices are quite different, being of the same general pattern as those obtained in the 'mining boom' analyses referred to earlier. The column (II) results reflect the fact that while Australia is a net importer of oil it is also a net exporter of energy (oil, coal, energy based exports, energy based imports). Higher world prices for coal in particular generate foreign exchange earnings in excess of those required to meet the higher oil import bill. Hence the balance of trade initially moves towards surplus. External balance is achieved via an increase in the domestic price level relative to overseas
3. The importance of the domestic economy in the domestic model of trade.

A table showing the importance of world income price increases.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Iron ores</td>
<td>$0.02</td>
<td>$0.03</td>
<td>$0.02</td>
</tr>
<tr>
<td>Petroleum</td>
<td>$0.04</td>
<td>$0.07</td>
<td>$0.04</td>
</tr>
<tr>
<td>Coal</td>
<td>$0.05</td>
<td>$0.08</td>
<td>$0.05</td>
</tr>
<tr>
<td>Copper</td>
<td>$0.06</td>
<td>$0.09</td>
<td>$0.06</td>
</tr>
<tr>
<td>Aluminum</td>
<td>$0.07</td>
<td>$0.10</td>
<td>$0.07</td>
</tr>
<tr>
<td>Steel</td>
<td>$0.08</td>
<td>$0.11</td>
<td>$0.08</td>
</tr>
<tr>
<td>Glass</td>
<td>$0.09</td>
<td>$0.12</td>
<td>$0.09</td>
</tr>
<tr>
<td>Wood</td>
<td>$0.10</td>
<td>$0.13</td>
<td>$0.10</td>
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</table>

3. The importance of the domestic economy in the domestic model of trade.
expect, at least over the medium term, periodic increases in the real price of oil. Our analysis, as well as assuming such increases, recognizes that increases in oil prices will have implications for the world prices of other 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 Section 2 we describe a procedure for calculating the effects of projected increases in world energy prices on the world prices of non-energy commodities. Section 3 discusses our analytical approach, the model simulation and the results. Conclusions are presented in Section 4.

Results

A summary of results is presented in Table 1. In order to conserve space, outputs from the 113 industries in the model have been aggregated to five broadly defined sectors. Following the interpretation suggested earlier, the figure in the first row, first column of Table 1 indicates that in the fifth year, the real wage would be 0.27 per cent lower than it otherwise would have been had the world price of crude oil not been increased.

The results in column (I) reflect the fact that Australia is a net importer of oil. In order to meet the higher oil import bill without running a balance of payments deficit the economy is forced to divert resources from domestic absorption to the international account. Thus real domestic absorption falls by 0.17 per cent, aggregate exports rise by 0.70 per cent and the increase in the import bill (0.59 per cent) is moderated by

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1. It seems unlikely that OPEC could sustain rises in the relative price of oil for an indefinite period. Already a move towards substitute fuels has taken place and major research on new energy sources is under way. Although more moderate members of OPEC, such as Saudi Arabia, appear to recognize that continued oil price increases are not necessarily in the interests of the oil producing nations, this is not yet the collective view of the cartel.

2. Increases in world oil prices may also have wider implications for general world trading conditions. For example, of particular concern to Australian agriculture is the extent to which overseas market access for 'sensitive' commodities such as beef will be affected by the reduction in foreign exchange likely to confront energy poor Australian beef importing countries such as Japan and Korea. Our analysis does not take into account any change in overseas market access that might be attributed to higher world oil prices.
The two equations show:

\[ a = \frac{1}{2} \sum_{i=1}^{n} (x_i - \bar{x})^2 \]

\[ b = \frac{1}{2} \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y}) \]

where the notation is as follows:

\[ x_i \] - value of individual company

\[ \bar{x} \] - average value of individual company

\[ a \] - intercept

\[ b \] - slope

This shows the relationship between the variables and the regression line.

After establishing the model, we need to:

- Establish the relationship with the model statements.
- Make sure the assumptions are met.
- Adjust the model as necessary.
Assumptions Underlying the Simulations

Our focus is on a typical year five years hence. We use the model to provide a picture of how the Australian economy, if exposed to increases in world energy prices and other commodity price increases that ensue from increased energy prices, would differ in year five compared to its state in year five if no changes in world prices had occurred. Our results are produced under the following set of assumptions:

(a) Fixed rates of return by industry and endogenous capital stocks. As discussed above, we believe the long run setting is more appropriate for examining the structural consequences of future world oil price changes than the short run focus we adopted in our earlier study (which examined the consequences of raising domestic oil prices to world parity).

(b) Fixed occupational wage relativities and employment held constant at the level of year zero. Since we wish to examine the effects of higher energy prices on the Australian economy independently of short-run business cycle phenomena, we abstract from changes in aggregate employment. Occupational wage relativities are assumed fixed to reflect institutional rigidities in the labour market and the given level of employment is achieved by the endogenous adjustment of the average real wage level.

(c) Constant balance of trade. We assume that the economy must meet its higher import bill for crude oil without being able to run a balance of payments deficit.

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1. In our calculations the term \( \hat{M} \) includes small amounts of other costs (such as taxes) in addition to labour costs.
be close to, shape, world production technology. In order to improve the production technology, we must improve the production technology.

1. The transformation of the production technology is a process of improving the existing production technology and creating new production technology. The transformation of the production technology involves improving the production technology and creating new production technology. The transformation of the production technology involves improving the production technology and creating new production technology. The transformation of the production technology involves improving the production technology and creating new production technology. The transformation of the production technology involves improving the production technology and creating new production technology.

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4. The transformation of the production technology is a process of improving the existing production technology and creating new production technology. The transformation of the production technology involves improving the production technology and creating new production technology. The transformation of the production technology involves improving the production technology and creating new production technology. The transformation of the production technology involves improving the production technology and creating new production technology. The transformation of the production technology involves improving the production technology and creating new production technology.
The world price vectors for non-energy commodities are available from the authors. Because direct energy inputs for most industries represent only a small proportion (less than one per cent) of total costs, the total (direct plus indirect) price impact of an initial 2 per cent increase in primary energy prices is minimal for most non-energy commodities. The simple annual average of all non-energy price increases is 0.04 per cent in price vector A and 0.06 per cent in price vector B. The largest increase of from 1.1 to 1.2 per cent per year is for oil and coal products. Crude oil constitutes about 50 per cent of the total costs of this industry. Price increases for agricultural commodities average about 0.04 per cent per year in price vector A and about 0.06 per cent per year in price vector B.

1. The evidence suggests that there are immense reserves of coal. However, it is unclear what the implications will be for coal extraction costs should massive substitution of coal for oil occur. Over the time horizon of this study it is consistent to envisage both a horizontal world supply curve for coal and steady increases in world oil prices. The installation of sufficient coal-oil conversion capacity is likely to take at least five years. On the other hand, Freebairn (1978) provides some evidence of a correlation between oil and coal prices.

2. Thus our world price scenarios imply annual increases in the real price of energy of about 1.96 and 1.94 per cent respectively for the five year period. We believe increases of this order of magnitude to be within the plausible range given the recent behaviour of OPEC and the comments made in footnote 1 on page 4.

3. ANALYTICAL PROCEDURE AND RESULTS

Our projections are derived from the ORANI model of the Australian economy. ORANI is a large multisectoral model of industrial and workforce composition, based on a 115 x 113 commodity by industry input-output matrix and a labour force disaggregated into nine occupations. The theoretical structure emphasises price responsiveness and substitution. The model's main behavioural postulates are that producers minimise the costs of producing their outputs (subject to appropriately specified production functions) and that consumers maximise their utility subject to an aggregate consumption constraint. Competitive pricing behaviour is imposed via zero pure profit constraints.

A complete description of the theoretical structure and data base of the basic model is given in Dixon, Parmenter, Ryland and Sutton (1977). In the current and previously cited simulation involving the effects of oil price increases, we have employed a more recent version of the model (referred to as ORANI 78). This version differs from the earlier version mainly in the specification of the agricultural sector. Rather than rely on the I-O treatment of agriculture which defines agricultural industries as product groups, ORANI 78 incorporates a 10 x 8 commodity by industry agricultural sector which recognizes both the multiproduct features of agricultural industries and regional differences in agricultural industry production technologies.

The ORANI model is extremely flexible from a policy user's viewpoint. This flexibility is reflected in the user's ability to make almost any (logically valid) classification of the variables in the model into endogenous and exogenous sets. As well as being used to study the effects