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SOME EFFECTS OF CHANGING OIL PRICES ON THE AUSTRALIAN ECONOMY

by

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The views expressed in this paper do not necessarily reflect the opinions of the participating agencies, nor of the Commonwealth government

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(i) the CES primary factor substitution elasticity was set at 1.276 for all industries (whereas in typical short run experiments, this parameter is assigned a value of 0.5) ;

(ii) the elasticity of substitution between domestically produced and imported crude oil was set at 10,000. (This ensured that the price of domestically produced crude oil would reflect the price of imported crude oil).

Exogenous shocks were imposed on the world import price vectors (the p_i^m's) and the export demand shift variables (the p_i^e's) according to the numbers generated from the world price model in Vincent et al., IMPACT General Paper No. G-23, op. cit., p.5.

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APPENDIX : Technical Details of the Simulations

This appendix can be used in conjunction with DPRS (1977).[1] The simulations reported in Table 1 employed the list of exogenous variables shown in DPRS, p. 104. The exogenous variable representing the percentage change in the price of other cost tickets to the oil and coal products industry was set at 2001.8 to induce a 40 per cent increase in that industry's unit costs. All other exogenous variables were set at zero. The indexing parameters (i.e., the h's) were set at unity. The export commodities and the industries for which the ORANI investment theory was not operative were the standard sets.

The simulation reported in Table 2 employed a somewhat different parameter file and exogenous/endogenous variable partition. The exogenous/endogenous partition differed from the standard partition in DPRS as follows :

(i) ΔB was exogenous and C_R was endogenous ;

(ii) all elements in r_j were exogenous and all elements in $k_j(0)$ were endogenous ;

(iii) μ was exogenous and $f_{(g+2)1}$ (a new, economy-wide, average real wage shift variable which appears in ORANI 78 but not in ORANI 77) was endogenous[2] ;

(iv) The output of industry 15 (Crude Oil) was exogenous and the 'other cost' shift variable for the crude oil industry was endogenous.

The parameter file differed from the standard file as follows:

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1. Peter B. Dixon, B. R. Parmenter, G. J. Ryland and John Sutton, ORANI, A General Equilibrium Model of the Australian Economy : Current Specification and Illustrations of Use for Policy Analysis, First Progress Report of the IMPACT Project, Volume 2 (Canberra : Australian Government Publishing Service, 1977).

2. Note that equation (13.5) in DPRS has been modified in ORANI 78 to include $f_{(g+2)1}$.

higher oil prices, the agricultural sector, for example, would expand by less than 0.14 per cent while under the shock of higher oil and coal prices the agricultural sector would contract by more than 1.54 per cent.

Second, our abstraction from induced effects on international capital flows may be inadequate in the present context. Increasing world energy prices may change the relative attractiveness of countries as places for investment. The results in both column (I) and (II) of Table 2 would be accentuated if Australia's long term capital inflow depends on the 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, and accentuate the squeeze on agricultural industry outputs and incomes.

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 an acceptable assumption for the period of our study (5 years), then column (I) of Table 2 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 13, we mentioned substitution possibilities as a justication 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.

SOME EFFECTS OF CHANGING OIL PRICES ON THE AUSTRALIAN ECONOMY

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D. P. Vincent*

1. INTRODUCTION

In its August 1978 budget the Australian Government introduced import parity pricing for domestically produced crude oil. This decision, although acknowledged at the time to involve short run costs, was taken for longer term resource allocation reasons. That is, it sought to improve the efficiency with which oil is used in the economy by allowing its price to reflect its real value or 'opportunity cost'. Before this pricing decision was taken, the major part of domestic oil production had been priced at import parity levels set before the large increases in world oil prices of the mid and late 1970's. Hence up until the budget decision, Australian consumers of oil products were reasonably well insulated from the direct effects of the world price hikes imposed by the OPEC producing cartel, because of our relatively large degree of self-sufficiency in oil[1] and the maintenance of comparatively stable (and low) prices for domestically produced oil. In addition, the Government announced that henceforth it would adjust domestic crude oil prices at

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* The author wishes to thank Alan Powell for detailed comments on an earlier draft of this paper.

1. The proportion of Australia's crude oil requirements met from domestic production climbed rapidly from the mid-1960's to a current level of around 70 per cent.

periodic intervals (originally specified as six monthly) to reflect changes in the world price. Thus since the 1978 budget decision, the Australian economy has been more or less fully exposed to the influence of price fixing behaviour in the world oil market.

The purpose of this paper is to analyse the effects of higher oil prices on the agricultural and other sectors of the Australian economy. It is convenient to separate these effects into two parts;

(i) those attributable to the 1978 budget decision to increase domestic prices to world parity ,

and

(ii) 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.

At the IMPACT Research Centre we have investigated in detail the short term effects on the domestic inflation rate, the industrial structure of the economy and the occupational composition of labour demand that could be attributable to the August 1978 budget decision to raise domestic prices to import parity, i.e., part (i) above. We have also undertaken a somewhat less detailed and more hypothetical analysis of the likely longer term implications for the Australian economy of higher world energy (oil and coal) prices, assuming continued import parity pricing of Australian crude oil.

A discussion of the results of these two studies and the economic model from which they were obtained forms the basis of this paper. At the outset it should be noted that this paper avoids addressing the

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. By comparing columns I and II in Table 2 it is obvious that the key factor in determining the medium term competitive position of the Australian agricultural sector in a world of increasing crude oil prices will be the extent to which higher world prices are translated into higher world coal prices. Because the Australian economy is a net exporter of energy, increases in crude oil and coal prices of the same magnitude will lead inevitably to a net increase in foreign exchange earnings. External balance would then be achieved via an increase in domestic relative to world prices (the Gregory effect). Hence the export oriented agricultural and mining sectors (with the exception of the coal export industry) suffer at the expense of the domestically-oriented sectors.

In conclusion, there are a number of qualifications which should be kept in mind in interpreting the results of our experiments, especially those in Table 2. First, the current input-output data base underlying our ORANI model experiments refers to the 1968/69 economy.[1] The 1978/79 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 has expanded substantially (as has the energy-intensive aluminium export industry). Hence we would expect the results in column (I) of Table 2 to be overstated and the results in column (II) to be understated. Thus if our experiments were repeated using 1978/79 cost and sales information in the model's data base, we would expect that under the shock of

1. Input-output tables are a means of describing the production and the disposal of the products of an entire economic system. A row of such a table shows the sales pattern of a particular commodity while a column shows the origin of inputs into a particular industry. The latest currently available table in completed form is for the year 1968/69. A completed table for 1974/75 is soon to be released.

absorption. The slight expansion in the services sector reflects increased activity in transport industries engaged in moving coal to the ports.

The increase in the level of real wages at the given level of employment together with the reduced aggregate absorption indicates that labour's share of national income has increased. The change in the industrial composition of the economy reflected in column (II) is heavily biased against both land- and capital-intensive industries. The real payments to land in each of the land-using agricultural industries fall as do those to capital in the economy as a whole.

5. CONCLUSION

Our experiments, conducted with IMPACT's ORANI model, indicate 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. In Section 3, we noted that 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 export industries and domestic industries competing with imports. Agricultural export and export related industries are among the principal losers. However, the jump to import parity pricing should be regarded as a once only event, the effects of which by now have probably worked themselves out.

Hence in attempting to address the title of this symposium - "Energy : Crisis or Opportunity?" - our focus should be on the medium term implications of higher world energy prices, i.e., the results in Table 2. These suggest that increases in world oil prices, provided they do not

rather sensitive question of what is an appropriate oil pricing policy. I expect that this question will receive adequate consideration in the segment of the programme titled "Government Policy and Initiatives in Energy".

Section 2 of the paper provides some background information on the IMPACT Project and the model used to conduct the oil pricing experiments. Section 3 considers the short run adjustment costs attributable to the August 1978 jump to import parity pricing of domestic crude oil, while Section 4 discusses some likely longer term implications of higher world energy prices. Conclusions are presented in Section 5.

2. ANALYTICAL FRAMEWORK

Our projections were made with the IMPACT Project's ORANI model. IMPACT is a Commonwealth Government inter-agency project being carried out in co-operation with the University of Melbourne. Its aim is to facilitate the analysis of the impact of economic, demographic and social changes on the structure of the Australian economy.[1] The IMPACT framework consists of a series of economy-wide analytical models designed to be used separately or together to assist in the analysis of a wide range of economic issues. The largest of these models is the ORANI model which

1. For a non-technical discussion of the IMPACT Project and its role in policy analysis, see Alan A. Powell and B. R. Parmenter, "The IMPACT Project as a Tool for Policy Analysis : Brief Overview," IMPACT Preliminary Working Paper No. IP-04, Industries Assistance Commission, Melbourne, May 1978, which appeared in Australian Quarterly, Vol. 51, No. 1 (March 1979), pp. 62-74.

we have used to provide the projections in the two oil pricing experiments. The ORANI model divides industrial production in the economy into some 112 sectors, and the workforce into nine occupational categories. As noted recently by its architect, ORANI, like any other quantitative economic model, is a combination of data and assumptions.[1] The data describe, for points of time in the past, production technologies, industry sales patterns, the commodity composition of imports and exports, the allocation of aggregate expenditure to investment and household consumption, and many other economic variables. The assumptions specify the behaviour of the economic agents. For example, producers are assumed to choose their mix of inputs so as to minimize the cost of producing any given level of output. From the data base and the assumptions, we deduce how sales patterns, the composition of imports and exports, living standards, etc., would change under the influence of changes such as, for example, higher domestic and world oil prices.

Because of its great design flexibility, ORANI can be used to analyse a variety of economic policy issues. For example, as well as being used to study the effects of higher oil prices on the economy, the ORANI model has in recent years been used to analyse the effects on industries, occupations and regions[2] of :

1. Peter B. Dixon, "The Challenge to Government," Inaugural Lecture, Department of Economics, La Trobe University, March 1980.

2. Regional detail is currently restricted to the six States treated as units, and to the BAE zones recognized in the Australian Sheep Industry Survey. Regional results have been reported only for some of the studies listed below.

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.[1]

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. 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 prices.[2] This is detrimental to export oriented industries (other than coal) who face a domestic cost-world price squeeze (the Gregory effect). Thus the agricultural and food processing sectors contract and the mining sector as a whole expands (because of the higher world price for coal). The manufacturing sector contracts because of increased pressures from imports and slightly reduced domestic

1. 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.

2. The model's consumer price index increases by 1.15 per cent compared with a simple average increase in all world commodity prices of 0.5 per cent.

Care should be taken in interpreting the results of Table 2, all of which are expressed in percentage changes. For example, the figure in the first row, first column, indicates that in the 5th year the level of real wages in the economy would be 0.27 per cent lower than it otherwise would have been had the world price of crude oil not increased. The results in column I reflect the fact that Australia is a net importer of oil. In order to meet its higher import bill without running a balance of payments deficit the economy is forced to divert resources from within the domestic economy to the international account. Thus real domestic absorption (aggregate consumption, investment and government expenditure) falls by 0.18 per cent, aggregate exports rise by 0.71 per cent and the increase in the import bill (0.65 per cent) is moderated by across the board reductions in non-oil imports.[1] The sectoral composition of national output is shifted in favour of export oriented sectors (agriculture, mining[2] and food processing) and away from the domestic oriented manufacturing[3] and service sectors. The adverse movement in the terms of trade caused by the rise in the oil import bill reduces the productivity of the domestic economy leading to a corresponding fall in the real wage level. The adjustment mechanism underlying the column (I) results is analogous to (although opposite in sign to) that advanced by Gregory in his widely reported analysis of the effects of the 1960's mining boom on the sectoral composition of the economy (the so called Gregory effect.)[4] The initial effect of the higher

1. Results for imports by commodity are available on request. These results show that the quantity of oil imports also falls because of a reduced demand for the refined product and a fixed domestic output of crude oil.
2. Agricultural export industries are less responsive to domestic cost-world price changes than are mining industries because of the existence of the fixed factor land in agriculture.
3. Gains to the manufacturing sector from reduced import competition are more than offset by reduced activity in the domestic economy.
4. See R. G. Gregory, "Some Implications of the Growth of the Mining Sector," Australian Journal of Agricultural Economics, Vol. 20, No. 2 (August 1976), pp. 71-91.

(i) changes in tariff levels ;

(ii) subsidies to ailing industries ;

(iii) changes in the exchange rate ;

(iv) changes in real wages and the move towards equal pay for women ;

(v) the adoption of Keynesian demand stimulation policies to increase economic activity and employment ;

(vi) home consumption pricing arrangements for agricultural commodities ;

(vii) the exploitation of mineral resources ; and

(viii) changes in world trade prospects for agricultural and other commodities .

In addition to these applications with the ORANI model, IMPACT's long term model, called SNAPSHOT, has been used to investigate the effects on industry structure, employment patterns, and living standards of anticipated technical changes to the year 1990/91.

In most of the above experiments the initial impact of the change has not directly involved the agricultural sector. The results, however, demonstrate that when economy-wide linkages are taken into account, it is frequently the agricultural industries which end up feeling the greatest pressures. The explanation can be found in the links connecting the agricultural sector, the rest of the economy, and international trade. Agricultural industries, because they sell most of their output on world markets, are particularly susceptible to events which increase domestic production costs without influencing the world prices of their commodities. Thus, the main way in which changes in the rest of the economy impinge upon agriculture is via the effects on general cost conditions (particularly on wage costs which represent over half the economy's total costs).

It might be of interest if I provide some brief comments on how the agricultural sector fared in the previously listed experiments.[1] The results from (i) demonstrate that increases in protection do not lead to increased employment in the economy as a whole. Gains in employment and activity in import competing industries (those domestic industries facing import competition) are more than offset by reductions in activity and employment in export industries such as agriculture. Similarly, subsidies to ailing industries are ultimately 'paid for' by the export sector of the economy and by its (initially) healthier import competing industries. Results from (iii) suggest that exchange rate changes (such as, for example, a devaluation of the Australian dollar) do not confer any real advantages on industries or sectors of the economy unless at the same time some reduction in real wage costs or in the real costs of capital, can be achieved.

The results of (iv) and (v) well illustrate the acute sensitivity of export industries to domestic cost increases, the most important component of which is wage increases. ORANI suggests that general expansions in aggregate demand in the absence of reductions in real wage costs are unlikely to restore macroeconomic health. Potential gains in economic activity and employment are dissipated by the adverse effects on export and import competing industries of the increase in domestic costs brought about by the demand stimulation.

ORANI results from (vi) demonstrate that increasing the home consumption price of a commodity above its export parity price results in higher domestic costs : higher domestic food prices are passed on into

1. Papers describing in detail the results and the economic mechanisms underlying these experiments can be obtained by writing to the IMPACT Information Officer, Industries Assistance Commission, P.O. Box 80, BELCONNEN. A.C.T. 2616.

world price changes which deplete Australia's foreign exchange earnings cause these domestic activity variables to contract. Next, we assume that domestic oil producers are unable to expand their production in response to higher world oil prices. This assumption about the medium term supply constraints on domestic oil production accords with commonly expressed views of oil industry commentators. Finally, we assume fixed industrial production technology. The present version of ORANI does not allow industries to substitute between alternative forms of energy or between energy and other intermediate inputs.

Table 2 MEDIUM TERM IMPACT OF WORLD ENERGY PRICE INCREASES

Variable Projected	Column I : initial 2 per cent increase in crude oil price, with prices cumulated for 5 years	Column II : initial 2 per cent increase in crude oil and coal prices, with prices cumulated for 5 years
Real Wage	- 0.27	0.15
Aggregate Real Absorption	- 0.18	- 0.09
Aggregate Real Exports	0.71	1.45
Aggregate Real Imports	0.65	1.33
Rural Employment	0.32	- 2.24
Industry Sector Outputs		
Agriculture	0.14	- 1.54
Mining	0.48	6.30
Processed Foods	0.07	- 1.04
Other Manufacturing	- 0.04	- 0.71
Services	- 0.14	0.07

distinguished in the model using the procedure set out in Vincent et al.[1]. These annual world price changes are compounded for a period of five years.[2] In actual fact, because direct energy inputs for most industries represent a relatively small proportion of total costs, the total impact of an initial 2 per cent increase in primary energy prices on the world prices of non-energy commodities turns out to be minimal for most non-energy commodities.

The results, set out in Table 2, refer to a typical year, five years hence. That is, they indicate 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.

The assumed economic environment in which the experiment is undertaken differs somewhat from that assumed in Section 3. To coincide with our long term focus[3] we assume that occupational wage relativities are fixed and that employment is held constant at the level of year zero. This allows us to examine the longer term effects of higher world energy prices independently of short term 'business cycle' phenomena which contribute to changes in employment levels. Furthermore, we assume that the economy must meet its higher import bill for crude oil without being able to run a balance of payments deficit. Alternatively, if the economy is a net exporter of energy, any increase in export earnings must be spent on imports. Changes in world prices which increase Australia's foreign exchange earnings allow increases in domestic consumption, investment and government spending. Conversely,

1. Ibid.
2. Readers requiring a tabular summary of the full set of price assumptions can obtain this information by writing to the IMPACT Research Centre, 153 Barry Street, CARLTON. VICTORIA. 3053.
3. In technical terms, for a long term setting with the ORANI model we hold rates of return to capital across industries fixed and allow capital mobility between industries.

higher money wages via wage indexation. Hence while high home prices for a particular agricultural commodity assist agricultural industries producing that commodity, the domestic cost increases they generate ensure that such pricing arrangements are eventually 'paid for' by non-agricultural export industries. ORANI results from (vii) indicate that the exploitation of Australia's vast mineral resources, while leading to higher national income over the longer term, will result in a smaller agricultural sector relative to the size of the mining, manufacturing and service sectors of the economy.

A likely medium term world trade scenario is that the world prices of export commodities in which Australia has a comparative advantage (e.g., wool, beef) will increase relative to those of commodities which are traditionally cheaper to import (such as textiles and motor vehicles). Results from (viii), which make use of this scenario, indicate that such world price changes are equivalent to a potential gain in productivity, and hence in income, by the Australian economy, provided it adjusts to the new set of circumstances. Higher real national incomes lead to higher real wage levels and hence to increased adjustment pressures on import competing industries and on those export industries producing commodities whose world prices are projected to increase less rapidly than world commodity prices in general. The economic mechanism underlying the results in (vii) and (viii) centres on the increased foreign exchange receipts earned by some export industries. The higher value of these exports tends to intensify adjustment pressures on the remaining export industries and on import competing industries. These issues are more fully discussed in Section 4.

Finally, the SNAPSHOT results indicate the manner in which technical progress lowers unit production costs in the domestic economy and

allows productivity gains to be transmitted into higher economic growth and higher real incomes over the longer term. On the other hand, the imposition of a moratorium on technical innovation would, according to SNAPSHOT, result in a loss of international competitiveness of export and import competing industries and to stagnant or declining living standards.

3. THE SHORT TERM EFFECT OF HIGHER DOMESTIC OIL PRICES[1]

Table 1 presents some selected results from the ORANI experiment in which ex refinery oil products prices were increased by 40 per cent - - the amount judged to be attributable to that part of the move towards import parity pricing that was implemented in the August 1978 budget. These results refer to the short term (1 to 2 years) and are conditional on the following short term assumptions for the macro-economy : (i) a fixed exchange rate and fixed real aggregate consumption, investment and government spending (the sum of these three aggregates is often referred to as domestic absorption); and (ii) fixed real wages in each occupation with employers able to employ as much labour of each occupation that they desire at the given wage.

1. Readers seeking a comprehensive treatment of the ORANI domestic oil pricing experiment are referred to D. P. Vincent, P. B. Dixon, B. R. Parmenter and D. Sams, "The Short Term Effect of Oil Price Increases on the Australian Economy with Special Reference to the Agricultural Sector," IMPACT General Paper No. G-17, Industries Assistance Commission, Melbourne, February 1979. An abridged version appeared in the Australian Journal of Agricultural Economics, Vol. 23, No. 2 (August 1979), pp. 79-101.

Increases in oil prices, however, 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 outputs.[1] Our analysis attempts to incorporate these features, by tracing the effects on commodity prices that may be attributed to higher intermediate input costs incurred by the industries producing these commodities.[2]

We consider two polar cases. In the first case we assume that increases in the world price of crude oil will not influence the world price of coal (except to the extent that oil based inputs are reflected in coal production costs). In the second case we assume that both the world prices of crude oil and of coal will increase by the same amount per year. The most likely world energy price scenario probably lies somewhere between these two extremes. Attempts to raise the world oil price will lead over the medium term to increased substitution of coal for oil in some end-uses. The implications for coal extraction costs and hence prices is unclear though it seems reasonable to postulate increased coal prices.

For each of these cases we then establish the effects of higher world prices for energy commodities (crude oil only in case I and crude oil and coal in case II) on the world prices of all other commodities

1. 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 earnings 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.

2. Details of the procedure used to determine the effects of world energy price increases on the world prices of other commodities are given in Vincent et al., IMPACT General Paper No. G-23, op. cit..

4. THE EFFECTS OF HIGHER WORLD OIL PRICES ON THE AUSTRALIAN ECONOMY

This section concentrates on the implications for industrial and workforce composition and living standards of higher world oil prices. The essence of this situation is not so much a change in domestic relative to world prices (the situation in Section 3) as a general change in the world prices of oil and other energy intensive commodities relative to the world prices of other traded commodities. In contrast to the short term focus of our analysis in Section 3 we consider it more appropriate to take a longer term view when analysing the effects of increases in world oil prices. The analysis we carried out was designed to establish implications (say, five years hence) for Australia of changes in world commodity prices initiated by annual increases in the world price of oil, assuming that the current policy of adjusting domestic oil prices to world parity levels would be maintained.[1]

Before proceeding we first need to develop a scenario of future developments in world oil prices, something we do not pretend to be able to do with any accuracy. In view of the recent performance of the OPEC cartel, it seems reasonable to expect, at least over the medium term,[2] periodic increases in the real price of oil. Our analysis is based on the (perhaps rather conservative) assumption that the real price of oil increases by slightly less than 2 per cent each year for a period of five years.

1. Readers seeking greater detail of the medium term world oil pricing experiment are referred to D. P. Vincent, P. B. Dixon, B. R. Parmenter and D. Sams, "Implications of World Energy Price Increases for the Rural and Other Sectors of the Australian Economy," IMPACT General Paper No. G-23, Industries Assistance Commission, Melbourne, August 1979.

2. It seems unlikely (to me) that OPEC could sustain rises in the relative price of oil for an indefinite period. Their recent price fixing behaviour is accelerating a move towards substitute fuels. Major research on new energy sources is now well 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.

Table 1 DOMESTIC OIL PRICE INCREASE : SOME SELECTED RESULTS FROM THE ORANI EXPERIMENT

Variable	Projection [a]
Aggregate Employment (persons)	- 0.79
Rural Employment (persons)	- 2.77
Real Gross National Product	- 0.52
Aggregate Exports (foreign currency value)	- 2.43
Aggregate Imports (foreign currency value)	0.60
Balance of Trade	- $117 m.[b]
Index of Consumer Prices	2.13
Agricultural Commodity Outputs	
Wool	- 1.05
Sheep	- 1.39
Wheat	- 1.67
Barley	- 1.02
Other Grains	- 0.15
Meat Cattle	- 1.46
Milk Cattle	- 0.55
Other Farming Export	- 1.56
Other Farming Import Competing	- 0.46
Farm Industry (Real) Incomes[c]	
Pastoral Zone	- 6.6
Wheat-Sheep Zone	- 6.2
High Rainfall Zone	- 6.9
Northern Beef	- 8.7
Milk Cattle	- 3.3
Other Farming Export	- 6.1
Other Farming Import Competing	- 2.8
Poultry	- 1.3

continued ....

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Variable	Projection (a)
Outputs by Sector	
Agriculture	- 1.06
Fishing/Forestry	- 2.18
Mining	- 2.03
Processed Foods	- 0.83
Other Manufacturing	- 1.04
Services	- 0.20

(a) All projections are percentage changes with the exception of the balance of trade which has units "millions of 1968/69 Australian dollars."

(b) Note that this is equivalent to approximately 3 per cent of exports in the base period.

(c) Farm industry income is defined as the sum of the returns to farm labour (hired and owner-operator), farm capital and land.

As alluded to in Section 2, the price level projection is the key to understanding the results of Table 1. Under full wage indexation the model's consumer price index increases by 2.1 per cent. This change is to be interpreted as a shift in domestic prices relative to world prices and is therefore directly reflected in the aggregate trade results. The balance of trade deteriorates because of both an expansion in imports and a contraction in exports. The import expansion and export contraction result in a 0.5 per cent reduction in real gross national product. Aggregate employment falls by 0.8 per cent with the rural employment category being

hardest hit. The cost price squeeze on trading sectors and the contraction in employment demand and industry activity is modified considerably if the commodity price rises engendered by the change in oil prices are prevented from flowing through into money wage increases. For example, assuming zero wage indexation, the increase in the domestic price level is only 0.8 per cent.

Table 1 also illustrates that, since they increase domestic prices relative to foreign prices, the short run adjustment costs accompanying the August 1978 increase in domestic oil prices are born most heavily by exporting and import competing sectors. Because of international competition, these trading sectors find it difficult to pass on cost increases.[1] All the agricultural commodities listed in Table 1 are export oriented to various degrees and hence suffer output contractions under the influence of the domestic cost-world price squeeze caused by the increase in domestic oil prices. Agricultural industries producing these export commodities suffer short-run output contractions of about 0.9 to 1.8 per cent and contractions in their real incomes of from 6 to 9 per cent. Agricultural industries producing commodities more oriented to the domestic market are projected to suffer lower output and income reductions.

1. Note that these cost increases result from the direct effects of higher priced inputs of oil products and, if some degree of wage indexation is assumed, from indirect effects via increased prices for oil-intensive inputs and higher labour costs. 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. In most industries in the economy, these shares are small. The primary industries as a group are amongst the most intensive in their direct use of oil products.