IMPACT OF DEMOGRAPHIC CHANGE ON INDUSTRY STRUCTURE IN AUSTRALIA

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LONG TERM STRUCTURAL PRESSURES ON INDUSTRIES AND THE LABOUR MARKET

by

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Table A

EXOGENOUS VARIABLES USED FOR PROJECTIONS

Variable	Subscript Range	Number	Description
p^m_{j2}	$j = 1,\ldots,g$	$g = 109$	C.i.f. foreign currency import prices.
p^m_{g+1}		1	
f_R		1	Ratio of I_R to C_R.
t_j	$j = 1,\ldots,g+1$	$g+1 = 110$	One plus the ad valorem tariffs.
ΔB		1	Balance of trade.
s_j	$j \in G$	$g = 109$	One plus the ad valorem export subsidies.
$x^{(4)}_j$	$j \notin G$		Export demands.
x_j	$j \in H$	$g = 109$	Exogenous outputs.
$q^{(4)}_j$	$j \notin H$		Exogenous "other costs."
μ		1	Total employment
g		1	Total capital stock.
n		1	Supply of agricultural land.
q		1	Total Population
$f_{(g+2)1m}$	$m = 2,\ldots,M$	$M-1=8$	Wage shift variables.
$f^{(5)}_{is}$	$i = 1,\ldots,g$ $s = 1, 2$	$2g = 218$	"Other" demand shift terms.
$f^{(5)}_{g+1}$		1	
$f^{(2)}_j$	$j \notin J$	$g-J^* = 11$	Exogenous investment.†
f^e_j	$j = 1,\ldots,g$	$g = 109$	Shifts in foreign export demands.
$q^{(2)}_j$	$j = 1,\ldots,g$	$g = 109$	Rental prices of capital.
		TOTAL = $8g + (g-J^*) + M + 8 = 900$.	

† There are $((g - J^*) = 11)$ industries, mainly in the public sector, whose investment is treated exogenously.

the adjustment beyond about one year.[1] Thus we have used the same import substitution elasticities as Dixon et al.[2]

1. Chris M. Alaouze, John S. Marsden and John Zeitsch, "Estimates of the Elasticity of Substitution between Imported and Domestically Produced Commodities at the Four Digit ASIC Level", Import of Demographic Change on Industry Structure in Australia, Preliminary Working Paper No. OP-11, Industries Assistance Commission, Melbourne, (forthcoming) (mimeo).

2. Op. cit.

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1. Introduction

This paper gives a preliminary report of some fairly long term (1986-87) projections made using the IMPACT framework.[1] The various economic models under development within IMPACT (i.e., it's 'modules') are designed to help assess the effects of demographic, economic and social changes on Australia's industry structure and on the structure of the workforce.[2] Within IMPACT there is under current development a module

* Without implicating them in any errors in the paper, the authors would like to thank the following : for making the computing possible, John Sutton and Bruce Coe; for comments and suggestions, Tony Lawson and Brian Parmenter; for advice on demography, Rowen Craigie, Malcolm McIntosh, Janice Naphtali, Ron Silberberg and Ashok Tulpule; for research assistance, Denise Truscott; and finally, for technical advice on the agricultural sector, David Vincent.

1. The IMPACT project is a co-operative inter-agency research endeavour sponsored by the Australian Bureau of Statistics, the Department of Environment, Housing and Community Development, the Department of Employment and Industrial Relations, the Department of Industry and Commerce, and the Industries Assistance Commission. The views expressed in this paper are those of the authors and do not necessarily represent the official views of any of these agencies, nor of the Government.

2. For a non-technical (but comprehensive) review of the aims, scope and methods of the project, see Alan A. Powell, The Impact Project : An Overview, March 1977 - - First Progress Report of the IMPACT Project, Vol. 1 (Canberra : Australian Government Publishing Service, forthcoming 1977).

specialized for long term projections. This module is termed SNAPSHOT.[1] Eventually it will provide long term projections of Australian industry structure and occupational patterns of employment under various scenarios relating to technological change, population growth and developments in international trade. Another of IMPACT's modules, ORANI, is more fully developed at the present time.[2] Although the latter module is primarily designed for interactive use within IMPACT's medium term model, we have been able to modify ORANI to address some long term questions. In due course the insights obtained with this technique will be used as a cross check on results from SNAPSHOT, and the comparison will, of course, help to assess whether this particular use of the ORANI module warrants further development in order to complement SNAPSHOT in the field of long run projections. In the meantime it should be kept in mind that the projections made in this paper are preliminary, are based only on some easily erected scenarios, and are designed to illustrate the kinds of issues whose analysis should benefit from the further development of the IMPACT framework. Notwithstanding these strong qualifications, we believe that the picture emerging from the exercise does highlight several of the more important issues, and for the most part poses the questions within a quantitative framework which is correct at least in terms of the orders of magnitude involved.

1. Peter B. Dixon, John D. Harrower and Alan A. Powell, "SNAPSHOT, A Long Term Economy-Wide Model of Australia : Preliminary Outline," Impact of Demographic Change on Industry Structure in Australia, Preliminary Working Paper No. SP-01, Industries Assistance Commission, Melbourne, February, 1976 (mimeo), pp. 26.

2. 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, Vol. 2 (Canberra : Australian Government Publishing Service, forthcoming 1977).

List of Exogenous Variables

The list of exogenous variables for the long-run version of ORANI reported here is as in Table A. In the list given in Table A, H is the set of industries whose outputs are set exogenously. The number of elements in H in the current application is 29 (the 11 export industries listed in Table 5, plus the 18 vulnerable import-competing industries listed as groups "C" and "D" in Table 6). In the case of those industries where output is set exogenously, changes in the endogenous "other costs" variables $q_j^{(4)}$, $j \in H$, simulate the subsidy equivalent of the additional protection required. For industries j' with endogenous output, i.e., $j' \notin H$, the changes in the "other costs" are set exogenously (to zero, in the current application).

Parameter values

With one exception, the values of the parameters used for our simulations are the same as those listed in the report by Dixon et al. on the use of ORANI for annual projections.[1] The exceptional case is the elasticity of substitution between capital and labour, where we have used a larger value (i.e., 1.276) which is more appropriate to the longer run context.[2] Recent empirical work suggests that there is no sizeable increase in import substitution elasticities resulting from increasing

1. Ibid.

2. Vern Caddy, "An Application of a Random Coefficient Model to the Problem of Estimating Aggregate Production Parameters", Impact of Demographic Change on Industry Structure in Australia, Preliminary Working Paper No. OP-10, Industries Assistance Commission, Melbourne, March 1977 (mimeo), pp. 29.

APPENDIX

Capital Constraint

The full list of equations of the basic version of the ORANI model are given elsewhere.[1] To that version we add an additional variable g (not to be confused with the number of input-output industries) and an additional equation, namely :

$$(13.9) \qquad g = \sum_{j=1}^{g} k_j(0) \quad \{\text{base period share in aggregate capital stock of industry } j\} .$$

Setting g exogenously to the projected percentage growth μ in the labour force (and population) has the effect of keeping the aggregate capital/output ratio constant.

Earnings Relativities

Equation (13.5) is modified to read :

$$(13.5') \qquad p_{(g+2)(lm)} = \xi^{(3)} + f_{(g+2)11} \qquad (m = 1, \ldots, M) ,$$

in which the last mentioned variable is interpreted as the rise in real wages. Since the right hand side of (13.5') is the same for each occupation m, earnings relativities are thereby frozen.

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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, Vol. 2 (Canberra : Australian Government Publishing Service, forthcoming 1977).

2. Scope and Structure of the Paper

Although it is not accepted practice in schools of salesmanship, here it is probably best to list at the outset those issues on which these long term projections have nothing to say. First, the paper offers no guidance on macroeconomic questions such as the attainment of overall full employment or the control of inflation. Second, the determination of appropriate relative wage structures for different occupational groups is not addressed in this paper (although work on that question is under way within IMPACT's demographic and labour force module, BACHUROO.[1]) Further, in this paper we will not attempt to give guidance on the form or timing of any adjustment assistance measures which might be desirable in order to lower the social cost of adapting the composition of Australia's industries and workforce to a changing economic environment - - such issues properly fall within the ambit of IMPACT's medium term model (currently under development).

The ORANI module (on which our projections here are based) deals mainly with the industrial composition of the economy, relative prices, imports, exports and the occupational composition of labour demand. Consequently the major focus of these projections is on compositional changes (rather than on overall growth rates). It is natural, therefore, to report

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1. Ashok Tulpule and M. K. McIntosh, "BACHUROO - An Economic-Demographic Module for Australia," Impact of Demographic Change on Industry Structure in Australia, Working Paper No. B-02, Industries Assistance Commission, Melbourne, May, 1976 (mimeo), pp. 37.

our results with reference to some neutral rate of growth as the bench mark. For the purposes of these projections, both the labour force in total and the aggregate capital stock have been assumed to grow at the same rate over the ten year projection horizon 1976-77 to 1985-86. The supply of agricultural land is projected to grow over the same period by only six per cent of the rate of growth of capital and labour. Whilst many other sets of projections could have been used for these variables, we believe that, within plausible limits, the resulting compositional changes which we project below are not very sensitive to the particular figures chosen for the overall growth rates in the stocks of the primary factors labour, capital and (agricultural) land.

The stimuli whose effects we trace out below are mainly of two types:

(i) a continuation in the drift in overseas relative prices in favour of energy sources, and energy-based products, accompanied by a lowering in the relative prices of the principal (i.e., mainly labour-intensive) exports of less developed countries (LDCs) ;

(ii) a further modest expansion in the mining sector, based largely on a highly capital intensive technology.

In order to ascertain the distribution of the above effects across the economy, we use the 1968-69 input-output classification and the technical coefficients contained in the 1968-69 input-output table.[1] Employment effects are considered in terms of the nine major IMPACT labour force groups listed in Table 1.

1. Australian Bureau of Statistics, Australian National Accounts, Input-Output Tables 1968-69 (Preliminary), Canberra, November 1976, Reference No. 7.9.

In this paper we have had nothing to say about (i) supply of labour in the various groups; (ii) the overall employment level; or (iii) occupational earnings relativities. All these require study in depth, as do the questions of differential rates of technical change, the welfare costs and benefits of additional protection, adjustment assistance, and so on. These issues (and many more) are under current study by the IMPACT group. These preliminary results are published not to service any particular policy study, but to indicate the types of long term issues amenable to analysis within our general framework. The projections themselves, we stress, have no official status.

This is because for each job transferred from other groups to this group it would be necessary (according to column (5), Table (9)) to transfer also three and a half jobs to the top end of the market for skilled tradesmen (i.e., to Skilled Blue Collar (Metal and Electrical)). In the case of the latter group, of course, this rise in projected demand may not be capable of eliciting a matching increase in supply, and would therefore be choked off by increased earnings relativities.

6. Conclusion

The eight occupational groups upon which we have focussed attention, whilst being far from internally homogeneous, do reflect broad divisions in vocational and general educational programmes. Since retraining within the eight occupational groups would seem to be quite feasible (in many cases requiring no more than a relatively short period of on-the-job training), the greatest stresses in the occupational composition of the workforce would reveal themselves as a mis-match of labour demand and labour supply at this level of aggregation.

The broad labour market prospect -- as throughout this paper, we mean its composition, not its total activity level -- seems to be relatively insensitive to the question of increased protection for domestic manufacturing. Only small changes in the shares of employment of different occupational groups seem to be involved, and the absolute numbers involved in adjustments over a ten year horizon seem to be manageable.

Table 1

MAJOR OCCUPATIONAL GROUPS USED IN IMPACT

1.	Professional White Collar
2.	Skilled White Collar
3.	Semi and Unskilled White Collar
4.	Skilled Blue Collar (Metal and Electrical)
5.	Skilled Blue Collar (Building)
6.	Skilled Blue Collar (Other)
7.	Semi and Unskilled Blue Collar
8.	Rural Workers
* 9.	Armed Services

* Armed Services are included for completeness of coverage. They are usually excluded from labour force statistical collections and are modelled largely exogenously in IMPACT, although they impinge indirectly by employing persons who would otherwise be available for the civilian labour force.

The plan of the rest of the paper is as follows. In Section 3 we give further details of the scenarios upon which our projections are based. A brief discussion of the economic model underlying the projections is given in Section 4. In Section 5 the projections themselves are tabulated and discussed. They fall into two groups :

(i) projections based on a flexible economy which adapts to the changed circumstances without additional protection for the more vulnerable industries ('flexecon' for short) ;

(ii) projections based on a less flexible economy in which certain of the more vulnerable industries are guaranteed enough additional protection to maintain their shares in total economy-wide output ('fixecon' for short).

This amount of emphasis on industry structure is needed to enable inferences to be drawn about the resultant pattern of employment demand. In the sixth and final section, we point out the potential relevance of this type of exercise for the evaluation of alternative approaches to a national development strategy.

Table 10

INITIAL AND PROJECTED FINAL SHARES OF EMPLOYMENT DEMAND OF THE TWO SLOWEST GROWING OCCUPATIONAL GROUPS, 1973-74 TO 1985-86

Occupational Group	Approximate Initial Share (1973-74)	Approximate Final Share (1985-86)	
		Flexecon	Fixecon
	(per cent)	(per cent)	(per cent)
4. Skilled Blue Collar (Metal & Electrical)	10.1	9.6	10.1
7. Semi and Unskilled Blue Collar	29.9	29.3	29.5

Under the price-scenarios we have adopted, the prospects for employment in rural industries seem bright. Under both flexecon and fixecon, the projections (of columns (1) and (2), Table 9) imply that rural employment would reverse its long term trend. In both cases rural labour would increase its share of total employment from about seven per cent to about nine per cent. As pointed out earlier, since our treatment of major export industries (including rural exports) has been rather ad hoc, it is possible that these projections for rural labour demand are somewhat on the high side. Given the possibilities of scale economies in agriculture, the number of owner-operators (included in the category Rural Workers in our treatment) could remain constant without causing output to be lower. This is one of several points in the analysis where the relative simplicity of our technological scenarios becomes limiting.

The occupational groups which have most to gain from the fixecon strategy are Skilled Blue Collar (Metal and Electrical) and Semi and Unskilled Blue Collar workers (particularly the former group). But under either strategy both groups share in overall growth, although some small drop in their respective shares of total employment is involved, as shown in Table 10.

Altogether leaving aside the debate on the appropriateness of industry specific measures (of which fixecon is an example) as a tool of employment policy, these projections suggest that additional protection for the domestic industries most vulnerable to import competition could redistribute jobs in favour of the least skilled group (Semi and Unskilled Blue Collar) only in a very inefficient way.

3. Projection Scenarios

Before giving details of the scenarios adopted on external prices, we briefly recapitulate important elements of our projection scenarios which have been introduced above :

(a) In the economy as a whole, employment demand and the capital stock grow by the same percentage over the projection horizon.

(b) The supply of agricultural land grows at six per cent of the above rate.

(c) The relative earning rates (before tax, per man per year) of the different occupational groups in Table 1 settle down to values which, over the projection horizon, approximate those prevailing in the early seventies.

Price Scenarios

To these we add the following scenario for external movements in relative prices :

(d) The drift in relative prices of goods overseas observed in the period 1968-74 will continue throughout the projection period; in particular, world prices will move over the projection horizon (1976-77 through 1985-86) according to the relativities displayed in Table 2.

Table 2

SIMPLE TREND PROJECTIONS OF WORLD RELATIVE PRICES, 1976-77 TO 1985-86*

Group of Commodities	Projected Rates of Growth of Prices, Percent Per Annum	Projected Cumulated Price Movements 1976-77 to 1985-86, Percent	Projected Final Price Level (relative to 1976-77 = 100)
1. Unprocessed Agricultural Products and Fish	9.9	157	257
2. Processed Agricultural Products and Fish	8.9	134	234
3. Unprocessed Mineral Products	7.6	108	208
4. Processed Mineral Products (including metal products, but excluding machinery)	8.8	132	232
5. Energy (coal, oil)	13.2	247	347
6. Processed Energy	11.6	200	300
7. LDC Exports	6.6	89	189
8. Machinery, Equipment and Appliances	4.0	48	148
9. Advanced Country Exports n.e.c., and Other	8.3	121	221

* These projections are prepared for the sole purpose of illustrating the consequent pressures generated in the Australian economy; the authors do not regard these projections as forecasts, and would have no especial confidence in them as such. The projections are based on simple log-linear trends in commodity prices from data spanning the period 1968 through 1974. U.S. prices are taken as world prices. An ad hoc reconciliation of the U.S. wholesale price index classification and the Australian input-output classification has been made. Source data is from U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States 1975 (96th edition) (Washington, D.C. : U.S. Government Printing Office, 1975), pp. 418-419.
It should be noted that only ratios between the numbers in this table have relevance for our projections; that is, the absolute external rate of inflation has no effect on our projections.

change category as a result of a move from flexecon to fixecon, namely Skilled Blue Collar (Metal and Electrical), whose prospects brighten from B to A, and Rural Workers whose AA rating slips to A.

It is natural to ask what these results mean in terms of new jobs. For this it is necessary to do what we have carefully refrained from this far, namely, to project some absolute (rather than relative) growth rates. For illustrative purposes, we have taken a percentage rate of growth in the workforce 1973-74 to 1985-86 based on projections made by the National Population Enquiry (under Professor Borrie's chairmanship).[1] The actual figure chosen was 22 per cent. Using this growth rate, the projected increases in employment demand by occupational group under flexecon and fixecon are as shown in columns (3) and (4) of Table 9. The total numbers involved are relatively insensitive to the development strategy adopted, the differences in the increase in employment as between flexecon and fixecon being less than 10 per cent of the increase under fixecon in all cases but two; namely, Skilled Blue Collar (Metal & Electrical) (+28 per cent of the fixecon increase) and Rural Workers (-19 per cent of the fixecon increase).

1. Australian Government, National Population Inquiry (W.D. Borrie, Chairman), Population and Australia - A Demographic Analysis and Projection, (Canberra : Australian Government Publishing Service, Canberra 1975), Vols. 1&2, pp. xxxiv & 760. Projections of the workforce are given in Volume 1 Chapter VIII pp. 315-352. These were made using the base data for 1971. Projections of the population were updated by the ABS using the same method and 1973 data base. In estimating the workforce growth rate, absolute values for 1973-74 and 1985-86 were interpolated from a smooth curve through the projected values. The interpolated 1973-74 value is roughly the same as estimated in the May 1974 Labour Force Survey (Australian Bureau of Statistics, The Labour Force (ABS Ref. 6.20 and 6.22), Canberra 1974). Employment demand has been projected to grow at the same rate as the workforce.

Table 9

PROJECTED CHANGES IN EMPLOYMENT DEMAND THROUGH THE MID-EIGHTIES UNDER FLEXECON AND FIXECON*

Occupational Group	Projected rate of growth of employment demand 1973-74 to 1985-86 as a multiple of the average growth rate of employment		Projected number of new job opportunities emerging between 1973-74 and 1985-86 if total employment grows by 22 per cent in the same period*		Redistribution of employment projected to result from adoption of fixecon strategy. col (4) - col (3)†
	Flexecon (1)	Fixecon (2)	Flexecon (3)	Fixecon (4)	(5)
			(thousands)		(thousands)
1. Professional White Collar	1.104	1.003	73.6	66.9	- 6.63
2. Skilled White Collar	1.027	.987	168.0	161.6	- 6.42
3. Semi & Unskilled White Collar	1.050	1.029	360.6	350.8	- 9.82
4. Skilled Blue Collar (Metal & Electrical)	.706	.981	90.0	125.3	+ 35.24
5. Skilled Blue Collar (Building)	1.091	1.081	66.4	65.8	- 0.53
6. Skilled Blue Collar (Other)	1.002	.935	33.2	30.9	- 2.26
7. Semi and Unskilled Blue Collar	.887	.915	334.3	345.3	+ 11.02
8. Rural Workers	1.409	1.179	127.8	107.1	- 20.80
9. Armed Services	n.p.	n.p.	n.p.	n.p.	Sum - 0.2††

* Based on the assumption that relative before tax earnings rates for the different occuptional groups in 1985-86 is the same as that prevailing in the early 1970's.

† Apparent discrepancies due to rounding in columns (3) and (4).

†† Difference from zero due to accumulated rounding errors.

n.p. Not projected.

The relative price movements shown in Table 2 are simple trend projections based on movements of the various components of wholesale prices in the U.S. between 1968 and 1974. Although, in principle, virtually every commodity price could have been projected, this amount of detail would certainly have been spurious. We have, therefore, aggregated the 80 odd internationally tradeable commodities in the Australian 1968-69 input-output table into the nine groups shown in Table 3. Within groups, all prices are projected to move by the same percentage; the between-group movements range from a low of 48 per cent over 10 years for the 'Machinery' group to a high of 247 per cent for the 'Energy' group. The prices of the principal exports of LDCs are projected to rise considerably slower than Australia's agricultural exports - - the inflation factors projected are 89 per cent for the LDCs, and 134 to 157 per cent in the case of Australian agricultural exports.

These scenarios on prices reflect the movements in the terms of trade for commodities in the late sixties and early seventies, and our projections to the mid eighties are made on the basis of a continuance of these trends. Whether this is realistic or not is a matter for the reader to judge; at least in the case of oil and coal prices, and the prices of LDC exports, these trend projections are well within the ambit of the conventional wisdom on the subject.

Table 3

COMMODITY GROUPS USED FOR PRICE PROJECTIONS

Group Name	Input-Output Commodity Groups Included*					
1. Unprocessed Agricultural Products and Fish	01.01	Sheep	01.02	Cereal Grains	01.03	Meat Cattle
	01.04	Milk Cattle and Pigs	01.05	Poultry	01.06	Other Farming
			03.00	Forestry & Logging	04.00	Fishing, Trapping, Hunting
2. Processed Agricultural Products and Fish	21.01	Meat Products	21.02	Milk Products	21.03	Fruit & Vegetable Products
	21.04	Margarine, Oils & Fats	21.05	Flour & Cereal Products	21.06	Bread, Cakes & Biscuits
	21.07	Confectionery Products	21.08	Food Products n.e.c.	21.09	Soft Drinks, Cordials, etc.
	21.10	Beer & Malt	21.11	Alcoholic Beverages	22.01	Tobacco Products
	34.01	Leather Products		n.e.c.		
3. Unprocessed Mineral Products	11.01	Iron	11.02	Other Metallic Minerals	14.00	Non-metallic n.e.c.
4. Processed Mineral Products (including metal products, but excluding machinery)	28.01	Glass & Glass Products	28.02	Clay Products	28.03	Cement
	28.04	Ready-mixed Concrete	28.05	Concrete Products	28.06	Non-metallic Mineral Products
	29.01	Basic Iron & Steel	29.02	Other Basic Metal Products	31.01	Structural Metal Products
	31.02	Sheet Metal Products	31.03	Metal Products n.e.c.		
5. Energy (coal, oil)	12.00 Coal & Crude Petroleum					
6. Processed Energy	27.08 Petroleum & Coal Products					

10.

There are some twenty-one industries whose growth prospects slip from A to B under fixecon (Table 8.4) including (not unexpectedly) Clothing and Knitting mills. Four service industries (see Table 8.1) slip from AA to A.

Employment Demand Projections

The occupational composition of employment demand depends on (i) the levels of activity in different industries, (ii) the requirements of the technologies used by these different industries for different types of labour, and on (iii) the wage relativities among the different types of labour. In this paper our projections are based on the projected rates of change in factor (i) given above on the basis of the picture of (ii) obtained from the 1971 Population Census. Our projections are made on the basis of no change in wage relativities from those responsible for the occupational composition of different industries' labour forces in mid 1973; allowing for some adjustment lag, and not trying to put too fine a point on it, these would be the relativities applying in the early seventies (1970 through 1972).

The prospects for growth in employment in IMPACT's 8 major occupational groups are given in Table 9. The first and most striking difference between these projections and the industry projections is that of relative uniformity in the prospects for employment in the different groups, both within and between the different development strategies (columns (1) and (2)). On the growth prospect scale used above for industries, the total range of eventualities covered in Table 9 is encompassed by AA, A and B. On that scale, only two occupational groups

(ii) As a result of prempting enough capital for the selected 18 industries to enable them to grow at the economy-wide rate, over the projection horizon capital becomes scarcer than it would otherwise have been.

Factor (ii) implies that capital goods (including housing) become more expensive relative to other goods and services; over the long run, the economy adjusts by settling for a smaller stock of housing (perhaps reflected in less area per family) than it would otherwise have done.

The effect becomes more plausible if we think in terms of levels. If one were to project (say) a thirty per cent growth in the economy, our results suggest that the real stock of housing under flexecon in 1985-86 would be around 1.4 times the real stock in 1976-77; under fixecon the corresponding multiple would be about 1.2, that is to say, some 14 per cent or so lower. As explained earlier, the appearance of Residential buildings in the AA group reflects more on our rudimentary treatment of this industry than it does on projected economic forces.

Under fixecon Signs, writing equipment, Pharmaceuticals ..., Plywood, veneers ..., Pulp, paper ..., Chemical products, n.e.c. and Other manufacturing are forced to buy more expensive inputs -- both domestic prices have risen and as well the fixecon strategy has resulted in exchange rate movements unfavourable to the purchaser of imported intermediate inputs. The general scarcity of capital and the exchange rate movements are very unfavourable to highly capital intensive industries which rely on imported equipment, and this in part explains the squeeze on Air transport.

Table 3 (contd)

Group Name	Input-Output Commodity Groups Included*				
7. LDC Exports	23.01	Prepared Fibres	23.02	Man-made Fibres, Yarns, etc.	23.03 Cotton, Silk, Flax Yarns, etc.
	23.04	Wool & Worsted Yarns, etc.	23.05	Textile Finishing	23.06 Textile Floor Covering
	23.07	Textile Products n.e.c.	24.01	Knitting Mills	24.02 Clothing
	24.03	Footwear	25.01	Sawmill Products	25.02 Plywood, Veneers & Boards
	25.03	Joinery & Wood Products	25.04	Furniture, Mattresses, Brooms	34.02 Rubber Products
	34.03	Plastic and Related Products	34.05	Other Manufacturing	
8. Machinery, Equipment & Appliances	32.01	Motor Vehicles & Parts	32.02	Ship & Boat Building	32.03 Locomotives, Rolling Stock
	32.04	Aircraft Building	33.01	Scientific Equipment etc.	33.02 Electronic Equipment
	33.03	Household Appliances n.e.c.	33.04	Electrical Machinery n.e.c.	33.05 Agricultural Machinery
	33.06	Construction, etc., Equipment	33.07	Other Machinery, Equipment	
9. Advanced Country Exports n.e.c., and Other	26.01	Pulp, Paper & Paperboard	26.02	Fibreboard, Paper Containers	26.03 Paper Products n.e.c.
	26.04	Newspapers and Books	26.05	Commercial&Job Printing	27.01 Chemical Fertilisers
	27.02	Industrial Chemicals n.e.c.	27.03	Paints, Varnishes, Lacquers	27.04 Pharmaceutical & Chemicals
	27.05	Soap & Other Detergents	27.06	Cosmetic, Toilet Preparations	27.07 Chemical Products n.e.c.
	34.04	Signs, Writing Equipment, etc.			

* For further details of the input-output classification, see : Australian Bureau of Statistics, Australian National Accounts, Input-Output Tables 1968-69, op. cit., pp. 38-40 and Commonwealth Bureau of Census and Statistics, Australian Standard Industrial Classification (Preliminary Edition) 1969, Volume 1 : The Classification, Canberra 1969.

Foreign Exchange Effect of A Mining Boom

In Section 2 we mentioned that a modest further mining expansion was part of the projection scenario. The existing mining technology (as characterized by the 1968-69 input-output coefficients) is not the relevant technology for much of the projected expansion; in particular, the expansion in output is likely to be brought about by the use of highly capital intensive techniques. For example, according to Trengove, an expansion of Hamersley's iron ore capacity (which is planned to come into operation during 1979 at Mt. Tom Price) will involve additional capital of around $250 million, but will employ only about 270 additional people.[1] In terms of the total economy, the employment and derived demand effects of such an expansion are small enough to be neglected (especially so if mainly imported equipment is used); the foreign exchange earned (via its pressure on the exchange rate), however, has substantial implications for the whole economy.[2] It follows that, in order to obtain a good first approximation to the influence of a minerals expansion on the rest of the economy, it is more important to capture the effects of the foreign exchange earned than it is to simulate the direct linkages of the new segment of the mining industry with other industries. Since our knowledge about these linkages is, at best, scanty, this feature is indeed fortunate.

A useful way of looking at the additional foreign exchange earned is to regard it (in a certain sense) as a windfall gain. That is to

1. Alan Trengove, Adventure in Iron (Mont Albert, Victoria : Stockwell Press, 1976), p. 200.

2. R. G. Gregory, "Some Implications of Growth in the Mineral Sector," Australian Journal of Agricultural Economics, Vol. 20, No. 2 (August 1976), pp. 71-91.

Those industries whose growth prospects suffer most severely under fixecon are those moving from either A or AA under flexecon to either C or D under fixecon, plus those moving from B to D. The relevant industries are :

Newspapers and books,	Signs, writing equipment, etc.,
Alcoholic beverages, n.e.c.,	Pharmaceuticals ...,
Plywood, veneers, ...,	Pulp, paper ...,
Chemical products, n.e.c.,	Other manufacturing,
Air transport,	Ownership of dwellings.

Space prevents our tracing out in detail the linkages explaining all of these -- the general explanation is the obvious one, namely, that each of the above activities have been squeezed by higher costs due to the additional protection afforded the 18 industries selected for insulation from change.

The fall in the prospects of Ownership of dwellings under fixecon may occasion some surprise, particularly as the industry supplying investment capital to this activity (namely, Residential buildings) does not suffer under fixecon. As we have remarked earlier 'Ownership of dwellings' has nothing to do with who actually owns the houses, flats, etc., but rather is the activity or industry whose output is measured by the stock of housing in use. The reason that growth in the stock of housing proceeds at only half the economy-wide rate stems from two factors :

(i) Ownership of dwellings (as defined in the I-O table) is the most capital intensive activity in the economy, employing no labour.

Table 8.5

INDUSTRIES IN THE "B" CATEGORY WHOSE GROWTH PROSPECTS ARE RELATIVELY INSENSITIVE TO THE FIXECON/FLEXECON CHOICE*

Industry Code	Description
03.00	Forestry and logging
23.04	Wool and worsted yarns etc.
23.05	Textile finishing
27.08	Petroleum and coal products
32.02	Ship and boat building
33.03	Household appliances n.e.c.
33.05	Agricultural machinery
36.01	Electricity
36.02	Gas

* Industries in the B row and B column of Table 8.1.

say, the difference in the economy before and after the mining expansion is summed up by the idea that after the expansion Australia is 'wealthier' in terms of its command of real resources (including foreign currency). It is as if nothing had changed in the economy except that it now could run up a bigger imports bill than previously. Relative to the initial economy, this is simulated by permitting a balance of trade deficit to develop without inducing per se any pressure on the exchange rate. Since our technological knowledge is confined to the initial economy,[1] this is the route we take. To be fully specific, we base our projections on the assumption that

(e) A further modest mining boom occurs, and this is equivalent to a windfall gain in the balance of trade at the rate of 0.3 billion 1968-69 dollars per annum.

Productivity

A major effort is currently being made by the Department of Industry and Commerce (an IMPACT participating agency) to project technological changes into the eighties and beyond. Inter alia, this will involve in-depth interviews with the production management personnel of firms spanning several industries. These data, unfortunately, have not yet been assembled.

It is quite likely that rates of technical improvement will differ widely among industries. Over a three-year period for which an attempt was

1. There remains the question of the relevance of the 1968-69 mining industry technology (or any of the other technologies) to that of the initial year, 1976-77. More frequent compilation and updating of input-output tables are clearly needed to support analysis of this sort.

made to measure gains in real output per man, for example, the disperse and disparate results shown in Table 4 were obtained. Since, unhappily, matching data on the capital stocks of these industries were not available, even the interpretation of this small supply of information is obscure.

For the present exercise we have no alternative but to base our projections on the assumptions that :

(f) (i) technological progress is uniform across the economy, and

(ii) such progress consists of equal percentage growth in the marginal productivities of both capital and labour (and, where relevant, agricultural land); i.e., Hicks-neutral technical change is assumed.

In the cases of industries where the rate of technical progress is believed to be markedly different from the economy-wide average, ex post judgmental corrections to the projections may be attempted.

Exports

The real outputs of traditional export industries (those listed in Table 5) have been projected exogenously in this study. This is not an ideal procedure since the stimuli studied would, indeed, have implications for the total volume of output of these products, as well as for the composition of this aggregate. There are three factors in favour of the procedure, however : (i) it helps to concentrate the focus on the

Table 8.4

INDUSTRIES WHOSE GROWTH PROSPECTS DECLINE FROM "A" TO "B" UNDER A MOVE FROM FLEXECON TO FIXECON*

Industry Code	Description
01.06	Other farming
14.00	Non-metallic n.e.c.
21.04	Margarine, oils and fats
21.07	Confectionery products
21.10	Beer and malt
24.01	Knitting mills
24.02	Clothing
26.02	Fibreboard, paper containers
26.03	Paper products n.e.c.
26.05	Commercial and job printing
27.01	Chemical fertilizers
27.05	Soap and other detergents
27.06	Cosmetic, toilet preparations
28.02	Clay products
28.06	Non-metallic mineral products
37.01	Water, sewerage and drainage
61.03	Other insurance
61.04	Investment, real estate, etc.
61.05	Other business services
92.01	Restaurants, hotels, clubs
93.01	Personal services

* Industries in the A row and B column of Table 8.1.

Table 8.3

INDUSTRIES IN THE "A" CATEGORY WHOSE GROWTH PROSPECTS ARE RELATIVELY INSENSITIVE TO THE FIXECON/FLEXECON CHOICE *

Industry Code	Description
01.03	Meat cattle
01.04	Milk cattle and pigs
01.05	Poultry
02.00	Services to agriculture
21.02	Milk products
21.03	Fruit and vegetable products
21.05	Flour and cereal products
21.06	Bread, cakes and biscuits
21.09	Soft drinks, cordials etc.
22.01	Tobacco products
25.03	Joinery and wood products
25.04	Furniture, mattresses, brooms
28.03	Cement
28.04	Ready-mixed concrete
28.05	Concrete products
31.01	Structural metal products
31.02	Sheet metal products
32.03	Locomotives, rolling stock
41.02	Building n.e.c., construction
46.01	Wholesale trade
51.01	Road transport
52.01	Railway and other transport
53.01	Water transport
55.01	Communication
61.01	Banking
61.02	Finance and life insurance
83.01	Welfare services
99.01	Business expenses

* Industries in the A row and A column of Table 8.1.

Table 4

RATES OF GROWTH IN REAL VALUE ADDED PER MAN PER YEAR IN AUSTRALIAN INDUSTRIES 1968-69 TO 1971-72*

Group of Commodities†	Growth rate over the period which, among the industries included in the group, is			Simple Average
	Lowest	Highest	Median	
1. Unprocessed Agricultural Products and Fish	2.25**	2.25**	2.25**	2.25**
2. Processed Agricultural Products and Fish	1.0	12.9	5.8	6.1
3. Unprocessed Mineral Products	19.0**	19.0**	19.0**	19.0**
4. Processed Mineral Products	0.8	8.3	4.2	4.5
5. Energy (Coal, Oil)	19.0**	19.0**	19.0**	19.0**
6. Processed Energy	6.7††	6.7††	6.7††	6.7††
7. L.D.C. Exports	-1.9	8.4	5.0	4.4
8. Machinery, Equipment, & Appliances	-1.2	9.2	3.7	3.6
9. Advanced Country Exports, n.e.c., and Other	-0.2	28.7	3.7	5.7

* In case of commodity group (1), average applies to period 1969-70 through 1972-73 in order to take a period which is more typical climatically.

† For details of the composition of these groups, see Table 3.

** Data from source (b) below. Data available only for a single aggregate commodity. Commodity groups (3) and (5) based on the same aggregate data.

†† Only one input-output industry included in this group.

Table 4 (contd)

Sources and Methods

(a) Except for commodity groups (1), (3) and (5), rates of growth in nominal value added per man were obtained from -

Industries Assistance Commission, Recent Trends in the Australian Manufacturing Sector. Staff paper prepared for the Committee to Advise on Policies for Manufacturing Industry, Canberra, April 1975.

From these nominal growth rates were subtracted the rates of growth in product price indexes prepared on the basis of confidential information.

(b) For commodity groups (1), (3) and (5), the rates of growth in real output per person were obtained from Table 6 of

Australian Bureau of Statistics, Australian National Accounts, Gross Product by Industry at Current and Constant Prices 1962-3 to 1973-4, Canberra, November 1975, Reference No. 7.12.

Table 8.2

SCHEMATIC SIMPLIFICIATION OF TABLE 8.1 SHOWING NUMBER OF INDUSTRIES AFFECTED*

Growth Prospects Under Flexecon	Growth Prospects Under Fixecon					Total
	AA	A	B	C	D	
AA	5	3	1	1		10
A	1	28	21	2	2	54
B			9	2	5	16
C		3				3
D		15				15
Total	6	49	31	5	7	98

* For key to growth categories, see Table 8.1.

Those within single ruled boxes gain under fixecon. Those within the double ruled box lose.

Table 8.1

PROJECTED GROWTH PROSPECTS THROUGH THE MID EIGHTIES OF DIFFERENT INDUSTRIES UNDER FLEXECON AND FIXECON

Growth Prospects Under Flexecon	Growth Prospects Under Fixecon									Total No. of Industries
	AA		A		B		C		D	
AA exceeding 1.2 times the av. growth rate	41.01	Residential Building	48.01	Retail Trade	81.01	Health	61.06	Ownership of Dwellings		10
	48.02	Motor Vehicle Repairs	82.01	Education, Libraries, etc.						
	48.03	Other Repairs	91.01	Entertainment						
	71.01	Public Admin.								
	72.01	Defence								
A at about the av. growth rate	16.00	Services to Mining	The 28 industries listed in Table 8.3		The 21 industries listed in Table 8.4		26.04	Newspapers and Books	21.11	Alcoholic Beverages n.e.c.
							34.04	Signs, Writing Equipment, etc.	27.04	Pharmaceutical and Chemicals
B at about 0.75 times the av. growth rate					The 9 industries listed in Table 8.5		33.06	Construction etc., Equipment	25.02	Plywood Veneers ...
							34.01	Leather Products	26.01	Pulp, Paper...
									27.07	Chemical Products n.e.c.
									34.05	Other Manufacturing
									54.01	Air Transport
C at about half the av. growth rate			27.03	Paints, Varnishes...						3
			28.01	Glass and...						
			31.03	Metal Products n.e.c.						
D less than 45% of the av. growth rate			The last 15 industries of Table 6							15
Total No. of Industries	6		49		31		5		7	98

Table 5

TRADITIONAL EXPORT INDUSTRIES WITH EXOGENOUSLY PROJECTED REAL OUTPUTS

Export Industry No.	Input-Output Commodity Classification*	
	Code	Description
1	01.01	Sheep
2	01.02	Cereal Grains
3	04.00	Fishing, Trapping, Hunting
4	11.01	Iron
5	11.02	Other Metallic Minerals
6	12.00	Coal and Crude Petroleum
7	21.01	Meat Products
8	21.08	Food Products n.e.c. (including fish and sugar)
9	23.01	Prepared Fibres (cotton ginning, wool scouring, top-making)
10	29.01	Basic Iron and Steel
11	29.02	Other Basic Metal Products

* For further details of the input-output classification see : Australian Bureau of Statistics, Australian National Accounts, Input-Output Tables 1968-69, op. cit..

import-competing sector, an awareness of whose adjustment problems seems to be uppermost in contemporary discussions; (ii) it avoids making projections concerning the composition of agricultural production on the basis of a methodology which the authors believe is unreliable and which, in any event, is soon to be replaced by a superior methodology;[1] (iii) it would make it possible to use existing judgmental projections about the likely volume of mineral exports. The projections we have chosen are particularly simple, namely that

(g) The real output of all existing export industries grow at the same rate as the overall economy.

(Notice that in terms of the above, expanded mineral exports do not count as an existing industry.) The principal limitations of this assumption are

(i) that it is not properly consistent with the price scenario set out in Table 2; and

(ii) it prevents the terms of trade effects of the price and mining boom scenarios feeding back in a deleterious manner onto rural and other exports.

In future work these limitations will be removed by replacing (g) by a scenario in which the volumes of certain exports and the prices of others are projected exogenously, depending upon the relative reliability of

1. Peter B. Dixon, David P. Vincent and Alan A. Powell, "Factor Demand and Product Supply Relations in Australian Agriculture : The CRESH/CRETH Production System," Impact of Demographic Change on Industry Structure in Australia, Preliminary Working Paper No. OP-08, Industries Assistance Commission, Melbourne, November, 1976 (mimeo), pp. 41.

Industry Code	Description
37.01	Water, sewerage and drainage
61.03	Other insurance
61.04	Investment, real estate etc.
61.05	Other business services
81.01	Health
92.01	Restaurants, hotels, clubs
93.01	Personal services

C Those projected to grow at about half the average growth rate:

26.04	Newspapers and books
33.06	Construction etc., equipment
34.01	Leather products
34.04	Signs, writing equipment, etc.
61.06	Ownership of dwellings

D Those projected to decline, or to grow at less than 0.45 times the average growth rate:

21.11	Alcoholic beverages n.e.c.
25.02	Plywood, veneers and boards
26.01	Pulp, paper and paperboard
27.04	Pharmaceutical and chemicals
27.07	Chemical products n.e.c.
34.05	Other manufacturing
54.01	Air transport

* For details of commodity classification, see footnote to Table 3.

† 'Grow' refers to growth in real output of commodities produced by the industries in question.

Industry Code	Description
82.01	Education, libraries, etc.
83.01	Welfare services
91.01	Entertainment
99.01	Business expenses

B. Those projected to grow at about three quarters the average growth rate:

01.06	Other farming
03.00	Forestry and logging
14.00	Non-metallic n.e.c.
21.04	Margarine, oils and fats
21.07	Confectionery products
21.10	Beer and malt
23.04	Wool and worsted yarns etc.
23.05	Textile finishing
24.01	Knitting mills
24.02	Clothing
26.02	Fibreboard, paper containers
26.03	Paper products n.e.c.
26.05	Commercial and job printing
27.01	Chemical fertilisers
27.05	Soap and other detergents
27.06	Cosmetic, toilet preparations
27.08	Petroleum and coal products
28.02	Clay products
28.06	Non-metallic mineral products
32.02	Ship and boat building
33.03	Household appliances n.e.c.
33.05	Agricultural machinery
36.01	Electricity
36.02	Gas

information on these two variables. These projections will be carried out in a fully consistent manner. In the meantime we note that, since our principal focus is on the import-competing and the non-internationally traded goods sectors, only some minor errors would be introduced into the pattern of demands confronting industries in these sectors by virtue of their linkages to the exporting industries.

4. Synopsis of the Economic Model

In broad terms, the ORANI model used for these projections may be described as a general equilibrium representation of the economy which allows for price competition between imports and domestically produced products. The main behavioural postulates driving the model are the ideas that producers minimize the costs of producing their outputs, and that consumers choose to spend their incomes in a way which maximizes their satisfaction. Whilst labour demand is determined within the ORANI model, labour supply is exogenous to it.

Full technical details of the basic version of the ORANI model are given in a forthcoming volume;[1] a synoptic view is available in a recent conference paper.[2] Whilst in the basic version of the model the capital stocks in different industries are set exogenously to their base year

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, Vol. 2 (Canberra : Australian Government Publishing Service, forthcoming 1977).

2. Peter B. Dixon, B. R. Parmenter, G. J. Ryland and John Sutton, "ORANI, A Multisectoral Model of the Australian Economy : Theoretical Structure," paper read to the Economic Society of Australia and New Zealand's Sixth Conference of Economists, Hobart, May 1977, pp. ii + 100 (mimeo).

values and then subsequently updated annually by projected investment less depreciation, in the long-run version used here the allocation of the aggregate capital stock across industries is determined endogenously.[1] Full details of the structural form of the model we have used may be obtained by consulting the references cited, together with the Appendix to this paper.

1. Even in a somewhat inflexible economy the period of adjustment allowed (10 years) would be long enough for the initial composition of the capital stock to have very little influence on the projected capital structure. In any event, in our projections, the initial composition of the capital stock does not constrain its final configuration.

Industry Code	Description
33.04	Electrical machinery n.e.c.
33.07	Other machinery, equipment
34.02	Rubber products
34.03	Plastic and related products
01.03	Meat cattle
01.04	Milk cattle and pigs
01.05	Poultry
02.00	Services to agriculture
21.02	Milk products
21.03	Fruit and vegetable products
21.05	Flour and cereal products
21.06	Bread, cakes and biscuits
21.09	Soft drinks, cordials etc.
22.01	Tobacco products
25.03	Joinery and wood products
25.04	Furniture, mattresses, brooms
28.03	Cement
28.04	Ready-mixed concrete
28.05	Concrete products
31.01	Structural metal products
31.02	Sheet metal products
32.03	Locomotives, rolling stock
41.02	Building n.e.c., construction
46.01	Wholesale trade
48.01	Retail trade
51.01	Road transport
52.01	Railway and other transport
53.01	Water transport
55.01	Communication
61.01	Banking
61.02	Finance and life insurance

Table 7

PROJECTED GROWTH PROSPECTS THROUGH THE MID-EIGHTIES OF DIFFERENT INDUSTRIES UNDER FIXECON*

AA Those projected to grow† at 1.2 times the economy-wide growth rate or faster:

Industry Code	Description
16.00	Services to mining
41.01	Residential buildings
48.02	Motor vehicle repairs
48.03	Other repairs
71.02	Public administration
72.01	Defence

A Those projected to grow at about the average growth rates:

23.02	Man-made fibres, yarns etc.
23.03	Cotton, silk, flax yarns etc.
23.06	Textile floor covering
23.07	Textile products n.e.c.
24.03	Footwear
25.01	Sawmill products
27.02	Industrial chemicals n.e.c.
27.03	Paints, varnishes, lacquers
28.01	Glass and glass products
31.03	Metal products n.e.c.
32.01	Motor vehicles and parts
32.04	Aircraft building
33.01	Scientific equipment etc.
33.02	Electronic equipment

5. The Projections

The way in which the impact on labour demand of the scenarios set out in Section 4 is determined consists first of tracing the consequences of those stimuli on imports, exports, relative commodity prices and the resultant industrial composition of the economy. Because different industries use different amounts of the various types of labour listed in Table 1, it then becomes possible to calculate the consequences for the composition of employment demand.

Projections under Flexecon

With the exception of the 11 export industries listed in Table 5, the relative sizes of different industries projected to result from the scenarios are as given in Table 6. The projections in that table are made under the assumption that the economy is flexible to the extent that it absorbs the stresses generated by the projected changes in the mining industry and in world relative prices without recourse to further protection of domestic import-competing industries. We use the term 'flexecon' to denote this development strategy.

As would be expected, under flexecon some domestic industries fare better than others. The fastest growing industries (those in the AA group in Table 6) tend to be in areas which enjoy natural protection from overseas competition. These are Residential Buildings,[1] and service

1. The input-output category '61.06 Ownership of dwellings' has nothing to do with the proportion of the population owning their own homes, but merely reflects the total stock of housing available. Additions to this stock appear in the accounts as investment in 61.06, whose purchases are almost 100 per cent from '41.01 Residential buildings'. The treatment of the Residential buildings industry in these projections is rudimentary. This is because the 1985-86 rate of investment in the Ownership of dwellings industry has been projected exogenously and independently of the size of the housing stock. The latter stock, of course, reflects investment in housing in the intervening period, which is endogenous.

Table 6

PROJECTED GROWTH PROSPECTS THROUGH THE MID-EIGHTIES OF DIFFERENT INDUSTRIES UNDER FLEXECON*

AA Those projected to grow† at 1.2 times the economy-wide growth rate or faster:

Industry Code	Description
41.01	Residential buildings
48.01	Retail trade
48.02	Motor vehicle repairs
48.03	Other repairs
61.06	Ownership of dwellings
71.01	Public administration
72.01	Defence
81.01	Health
82.01	Education, libraries, etc.
91.01	Entertainment

A Those projected to grow at about the average growth rates:

01.03	Meat cattle
01.04	Milk cattle and pigs
01.05	Poultry
01.06	Other farming
02.00	Services to agriculture
14.00	Non-metallic n.e.c.
16.00	Services to mining
21.02	Milk products
21.03	Fruit and vegetable products

projections if another set of industries were selected to be insulated from external changes.

The fixecon projections on growth rates are given in Table 7. For reasons of space, we will not discuss them separately, but rather in the light of a comparison of them with flexecon.

The Trade-Off between Industries

Table 8.1 cross-classifies the growth prospects of the 98 industries concerned under flexecon and fixecon. The distributions of the column and row totals in groups AA through D are fairly similar. The simplified version given in Table 8.2 identifies the 'winners' and the 'losers' resulting from adoption of the fixecon strategy. Nineteen industries gain -- those in the set selected for further protection (namely the C and D group industries in Table 6), plus Services to mining (whose prospects brighten from A to AA). Thirty-seven industries have reduced prospects under fixecon : twenty-six whose prospects slip one grade, and eleven industries whose prospects slip two or more grades. Forty-two of the eighty relevant (that is, of the non-exogenous export, non-selected exogenous import-competing) industries are relatively insensitive to the Flexecon/Fixecon choice. These are the industries listed in Tables 8.3 and 8.5, plus the other five industries listed on the diagonal of Table 8.1. These will receive no further attention as we turn our focus to the industries in the upper triangle of Table 8.1, the fixecon 'losers'.

The Fixecon Strategy

One possible response to the difficulties faced by some industries (particularly by the more severely effected industries within group D) would be to supply further protection in order to enable them to grow at some mimimum acceptable rate (perhaps zero). At its most ambitious level, such a strategy might attempt to ensure that industries on some select list continued to grow at about the average economy-wide rate. This might or might not be possible by further protection measures -- it is quite possible that some of the less favourably placed domestic industries could not obtain such a rate of growth even under total import embargos, the reason being that the prices of the products of these industries could be pushed so high by an unfavourable cost structure as to enforce a curtailment of domestic demand. However, we have not investigated this aspect. In what follows the device used to simulate additional protection is a direct subsidy paid to producers. The economic model determines the subsidies necessary to enable the selected industries to maintain their growth rate at the economy-wide average in the face of the increasing costs faced by them. There may or may not be a finite tariff or other protective measure equivalent to these subsidies; nevertheless, we assume in our fixecon projections that they are paid to the industries selected. But how should the industries be selected?

In this paper we have chosen the 18 industries which are most vulnerable to import competition under the projection scenarios. These are the industries with C or D prospects in Table 6. This choice is essentially arbitrary; the same methodology could be employed to prepare

Industry Code	Description
21.04	Margarine, oils and fats
21.05	Flour and cereal products
21.06	Bread, cakes and biscuits
21.07	Confectionery products
21.09	Soft drinks, cordials etc.
21.10	Beer and malt
21.11	Alcoholic beverages n.e.c.
22.01	Tobacco products
24.01	Knitting mills
24.02	Clothing
25.03	Joinery and wood products
25.04	Furniture, mattresses, brooms
26.02	Fibreboard, paper containers
26.03	Paper products n.e.c.
26.04	Newspapers and books
26.05	Commercial and job printing
27.01	Chemical fertilisers
27.04	Pharmaceutical and chemicals
27.05	Soap and other detergents
27.06	Cosmetic, toilet preparations
28.02	Clay products
28.03	Cement
28.04	Ready-mixed concrete
28.05	Concrete products
28.06	Non-metallic mineral products
31.01	Structural metal products
31.02	Sheet metal products
32.03	Locomotives, rolling stock
34.04	Signs, writing equipment, etc.
37.01	Water, sewerage and drainage
41.02	Building n.e.c., construction
46.01	Wholesale trade
51.01	Road transport
52.01	Railway and other transport
53.01	Water transport

Industry Code	Description
55.01	Communication
61.01	Banking
61.02	Finance and life insurance
61.03	Other insurance
61.04	Investment, real estate etc.
61.05	Other business services
83.01	Welfare services
92.01	Restaurants, hotels, clubs
93.01	Personal services
99.01	Business expenses

B Those projected to grow at about three quarters the average growth rate:

03.00	Forestry and logging
23.04	Wool and worsted yarns etc.
23.05	Textile finishing
25.02	Plywood, veneers and boards
26.01	Pulp, paper and paperboard
27.07	Chemical products n.e.c.
27.08	Petroleum and coal products
32.02	Ship and boat building
33.03	Household appliances n.e.c.
33.05	Agricultural machinery
33.06	Construction etc., equipment
34.01	Leather products
34.05	Other manufacturing
36.01	Electricity
36.02	Gas
54.01	Air transport

(at least partially) for the performance of Paints ..., which sells approximately 10 per cent of its output to Motor vehicles and parts.

The industries with poor growth prospects, those in the D group, can be classified as follows :

(a) Nine industries, viz.,

Man-made fibres ..., Cotton, silk, flax ...,
Textile floor covering, Textile products, n.e.c.,
Footwear, Sawmill products,
Other machinery ..., Rubber products,

and

Plastic and related products,

which face increasing import competition from L.D.C.'s.

(b) Faced with increasing import competition (mainly from developed countries), five industries in the Machinery, Equipment and Appliances group, as follows :

Motor vehicles and parts, Aircraft building,
Scientific equipment, etc., Electronic equipment,

and

Electrical machinery.

(c) Industrial Chemicals, n.e.c.

Only the last-mentioned requires further comment. More than a third of the sales of Industrial chemicals, n.e.c. is to other members of the D group, with Plastics and related products, Rubber products, Electrical machinery and Man-made fibres, yarns, etc., being the four largest customers.

competition from LDC exports; under our price-scenarios another four (Ship and boat building, Household appliances, n.e.c., Agricultural machinery and Construction, etc., equipment) face increasing import competition from developed countries. Leather products' B rating has been commented upon above. The B rating of the prospects for growth in the real output of Petroleum and coal products is a consequence of a demand reduction in the face of the major price rise projected for energy (plus possibly some derived demand effects via changes in industry composition). The same factor accounts for the B prospects for Electricity and Gas. The B prospect for Forestry and Logging very likely stems from increased indirect import competition feeding back from the processed wood products (25.01, 25.02, 25.03) included under our price-scenarios in the LDC Export group. The remaining B prospect under flexecon is Air transport, whose slightly worse than average growth prospect is accounted for by a projected stagnation in the volume of Qantas' overseas sales.

Under flexecon, only three industries would grow at about half the average rate. Two fall into the processed mineral product group (Glass ..., Metal products, n.e.c.), whilst the third was classified to the advanced country group. The reason for the relatively slow growth of Glass ..., is that in excess of 20 per cent of its sales are to industries with even slower growth prospects, i.e., to industries in the D group, and in particular to Motor vehicles and parts. A similar story holds for Metal products, n.e.c., again with 15 per cent of its sales going to D group industries, among whom its more important customers are Motor vehicles and parts and Other machinery, equipment. Similar first round input-output effects account

C Those projected to grow at about half the average growth rate:

Industry Code	Description
27.03	Paints, varnishes, lacquers
28.01	Glass and glass products
31.03	Metal products n.e.c.

D Those projected to decline, or to grow at less than 0.45 times the average growth rate:

23.02	Man-made fibres, yarns etc.
23.03	Cotton, silk, flax yarns etc.
23.06	Textile floor covering
23.07	Textile products n.e.c.
24.03	Footwear
25.01	Sawmill products
27.02	Industrial chemicals n.e.c.
32.01	Motor vehicles and parts
32.04	Aircraft building
33.01	Scientific equipment etc.
33.02	Electronic equipment
33.04	Electrical machinery n.e.c.
33.07	Other machinery, equipment
34.02	Rubber products
34.03	Plastic and related products

* For details of commodity classification, see footnote to Table 3.

† 'Grow' refers to growth in real output of commodities produced by the industries in question.

industries (such as Motor Vehicle Repairs, Entertainment, and Health services). Because we have so projected them (and for no other reason), the purchases of the government have grown just fast enough to place I-O categories which 'sell' mainly or wholly to the government sector into the AA group. This accounts for the appearance of Defence and Public Administration in the AA group, and partly accounts for that of Health (which, on our data base, sold about a third of its output to the public sector). A similar explanation, coupled with a fairly high income elasticity of demand, accounts for the rapid projected growth of Education, libraries, etc.

Among the 98 industries whose output is projected endogenously under flexecon, the A prospects -- that is, those 54 industries projected to grow at about the economy-wide average rate -- may be grouped as follows :

(a) Four out of those five members of the commodity group 'Unprocessed Agricultural Products ...' which were not treated as exogenous export industries (Table 5), the exceptional case being Forestry and Logging (whose growth prospects get only a B rating).

(b) Ten out of those eleven members of the commodity group 'Processed Agricultural Products ...' which were not treated as exogenous export industries, the exceptional case being Leather Products, whose B rating is a direct result of the D prospect projected for Footwear (which in terms of our data base appears as a major customer of the Leather Products industry).

(c) Four of the 17 LDC Export group (i.e., group 7, Table 5). (Perhaps unexpectedly, Clothing and Knitting mills are among the four successes. Their relative success is no doubt due to the lower costs of raw materials, which they would source overseas.)

(d) Nine of the 12 industries included in commodity group 9 (Advance Country Exports ...), the three exceptions being Pulp, paper and paperboard (B), Chemical Products n.e.c. (B) and Paints, varnishes, lacquers (C).

(e) Seven of the nine (other than exogenously projected export) industries in commodity group 4, the exceptions being Glass & glass products (C) and Metal products n.e.c. (C).

(f) Sixteen out of the nineteen industries supplying non-internationally traded goods and services.

(g) Locomotives and rolling stock.

Clearly it is of interest to investigate each of the exceptions mentioned above, as well as to explain the overall relationship between the price-scenario groups and their representation in the A prospect group. Unfortunately, space prevents our going into fine detail in this paper. Since the A growth category is in a sense the norm, we will concentrate our remarks on the deviants.

Under flexecon, sixteen industries fall into the B group (which would grow at about three quarters of the average pace of the economy as a whole). Four of them (Wool and worsted yarns, Textile finishing, Plywood ..., and Other manufacturing) face increasing import