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WHO PAYS FOR HOME CONSUMPTION PRICING SCHEMES?

by

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(iii) Industries within the agricultural sector and industry 25 are assumed not to attract any increase in the price of the wheat they use. Decreases in the prices of 'other costs' to these industries were imposed in order to offset the 2.5 per cent increase in the price of wheat generated via (i) above. The share of wheat in the total costs of industry 25, for example, is 0.02856 and the share of 'other costs' is 0.04121. In order to offset a 2.5 per cent increase in the price of wheat a decrease in 'other costs' equal to $\frac{0.02856}{0.04121} \times 2.5 =$ 1.7326 per cent is required. The corresponding percentage reductions for industries 1-3 and 5 are 0.0807, 0.2795, 0.2121 and 0.4339 respectively.

All other exogenous variables were set at zero.

All indexing parameters (i.e., the h's in the notation of DPRS) were set at unity. Commodity tax rates were also indexed to the consumer price level.

Exports were determined endogenously for the following commodities: wool, barley, other cereal grains, fishing, iron, other metallic minerals, coal, meat products, food products n.e.c., prepared fibres, basic iron and steel, and other basic metal products.

The ORANI investment theory was overwritten (i.e., investment was exogenous) for the following industries: 17, 84-86, 103-8, 112, 113.

WHO PAYS FOR HOME CONSUMPTION PRICING SCHEMES?

by

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IMPACT Project Staff*

1. INTRODUCTION

Home consumption pricing arrangements for agricultural commodities are a common method of supporting agricultural industries in Australia. Such arrangements depend on price discrimination between an overseas market exhibiting high elasticity of demand and a less elastic domestic market. Supplies to the domestic market are manipulated in order to insulate domestic prices from world price fluctuations and to ensure a fixed price for domestic sales, typically above the export price.[1] Revenues accruing from domestic sales are pooled with those from sales to the world market and the unit price paid to the producer for supplies delivered to the pool (the 'equalized' price) is a weighted average of the domestic and world prices. The domestic market and the world market must, of course, be kept separate. Import controls must be instituted to prevent supplies leaking back from the rest of the world to the domestic market and domestic supplies to the domestic market must be regulated to prevent undue pressure being placed on the domestic monopoly price fixing mechanism. Given these requirements it is not surprising that home consumption pricing regulations are administered in Australia by statutory authorities with legislative backing and are applicable only to those products which become centralised at some point in the marketing process.

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* The authors wish to thank Roger Mauldon for suggesting this topic and Peter Dixon and Tony Lawson for helpful comments.

1. On occasions, however, during periods of buoyant world commodity prices, the home consumption price for a particular commodity has stood below the world price.

In this paper we use a multi-sectoral model of the Australian economy to analyse the allocative effects of home price schemes. We investigate the likely implications, for the agricultural sector and for the economy in general, of the introduction of a home price scheme for wheat. In doing so we indicate which sectors of the economy ultimately pay for the producer benefits of the scheme.[1]

The paper is organized as follows. In section 2 we provide a brief survey of the Australian literature on home price schemes. In section 3 we describe the method for simulating the effects of a home price scheme for wheat using the ORANI model. The results of the simulation are presented in section 4. Section 5 contains our conclusions.

1. An alternative answer to the question posed in our title concerns the effects of such schemes on the personal distribution of income. It is often claimed that, because of the nature of the products to which they are applied, home price schemes are regressive. Our analytical tool does not at present allow us to throw any light on this issue.

ORANI does not allow for endogenous substitution between intermediate inputs of a given I-O class and any other input, intermediate or primary. Substitution is allowed between imported and domestic supplies of a given category of intermediate inputs but wheat is not a commodity which faces import competition in the domestic economy. An implication of this production function specification is that industries use wheat in fixed proportions with output and an increase in the price of wheat is then strictly equivalent to the imposition of a production tax on the using industry.

The required production taxes were imposed by increases in the prices of 'other costs' (variable $f_{(g+3)j}$, for $j = 8,22$). In the ORANI data base the share of 'other costs' in the total costs of industry 22 is 0.02425, whilst the share of wheat is 0.19526. A 7.5 per cent increase in the price of wheat is therefore equivalent to a $7.5 \times \frac{0.19526}{0.02425} = 60.4$ per cent increase in 'other costs'. For the case of industry 8 the relevant shares of 'other costs' and wheat in total costs are, respectively, 0.06708 and 0.02803, so that an exogenous increase of 3.13 per cent in 'other costs' was required.

APPENDIX : Technical Details of the Simulation

This Appendix can be used in conjunction with DPRS (1977). Dimensions of variables differ slightly in ORANI 78 compared to the earlier version of the model but the list of exogenous variables employed in this simulation is essentially that given in Table 3 of DPRS, p.104.

Shifts were imposed on exogenous variables as follows.

(i) The required 2½ per cent increase in the farm-gate price of wheat was induced by an exogenous increase in 'other final demand' for wheat. Under the selection of exogenous variables chosen for this experiment the elasticity of the basic value (i.e., farm-gate) price of wheat with respect to 'other final demand' (variable $f_{i1}^{(5)}$, for i = wheat) is 0.000006293. In order to induce a 2.5 per cent increase in the farm-gate price an increase in 'other final demand' equal to 2.5/0.000006293 = 397267 per cent is therefore required.

(ii) The experiment requires a 10 per cent increase in the price of wheat to industries 8 and 22. The price of wheat itself is increased by only 2.5 per cent (see (i) above) and the balance of the cost effect of the home price consumption scheme on industries 8 and 22 (i.e., the equivalent of a further 10-2.5 = 7.5 per cent increase in the users' price of wheat) has been simulated by the imposition of production taxes on these industries.

2. HOME PRICE SCHEMES IN AUSTRALIA : A BRIEF SURVEY OF THE LITERATURE

Home consumption pricing arrangements are operating currently in Australia as part of the stabilization schemes for certain dairy products, dried vine fruits, eggs, sugar and wheat. Mauldon (1979) provides an excellent chronological account of the development of such arrangements for Australian agricultural commodities and the varying reasons put forward to justify their introduction. Our short discussion of these issues in this section draws heavily on Mauldon's paper.

2.1 Justifications for home price schemes

The principle of a home consumption price scheme was first established for the sugar industry around the time of federation. In this instance home consumption pricing became a necessary condition for achieving federation, Queensland being prepared to join the Commonwealth on condition that a profitable domestic market for sugar be guaranteed.[1] By the late 1920's home consumption pricing was seen as a means of preventing industry collapse in the face of falling world prices for agricultural commodities. In the public debate on wheat industry policy of the mid 1930's, considerable emphasis was placed on the role of home consumption pricing as a means of offsetting the net cost disadvantage to wheat growers of the tariff on manufactured goods.[2] The tariff compensation principle as a justification for domestic pricing of agricultural products above import parity levels

1. At this stage Australia was still an importer of sugar. By the early 1920's however, Australia's sugar production had exceeded domestic consumption and imports of sugar were prohibited. Thus a home consumption price scheme as defined earlier had begun to operate.
2. However, the Royal Commission enquiring into the wheat, flour and bread industries suggested that by the mid 1930's the net cost disadvantage to the growing of wheat had declined considerably and it was unable to justify a home consumption price on the basis of a cost disadvantage caused by tariffs (Mauldon (1979)).

was supported by the war-time Rural Reconstruction Commission.[1] The next major government-commissioned review of agricultural policy, the 'green paper' of 1974, did not specifically endorse the use of home consumption pricing arrangements but it did note that agricultural pricing and support policies could facilitate a move to more uniform effective rates of protection between the rural and non rural sectors of the economy and between industries within the rural sector.[2]

Home consumption pricing arrangements have also been justified as a means of offsetting monopoly power elsewhere in the economy. Implicit in this argument is the view that farmers are poorly organized and lack the bargaining power enjoyed by the domestic purchasers of their products. Thus, farmers should be permitted to engage in 'orderly marketing' on the domestic market; their behaviour as monopoly sellers being justified as countervailing the monopoly power exercised elsewhere in the economy.

Finally, the balance of payments constraint to economic growth under a fixed exchange rate regime during the post war period (at least until the 1960's mining boom) and the contribution of rural exports to foreign exchange earnings has been advanced as providing some justification for the introduction of agricultural assistance measures such as home consumption pricing.

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1. See Rural Reconstruction Commission (1946).
2. See Rural Policy in Australia (1974, p.152). However the 'green paper's' preferred course of action for achieving a more efficient allocation of resources between sectors was for a gradual lowering of protection to manufacturing industries with commensurate adjustments to the exchange rate rather than via tariff compensation to rural industries.

because of the projected rearrangement of production between industries within the agricultural sector, the export squeeze leads to a net adverse effect for only two rural industries in our simulation. The most obvious losers are in the minerals and processed foods sectors.

5. CONCLUSION

The case for an analysis of home consumption pricing schemes which attempts to account for some general equilibrium effects was put by Giblin as long ago as the 1930's. Our analysis demonstrates the importance of such an approach. In particular it indicates the importance of two indirect mechanisms. The first is the impact which home consumption pricing schemes have, via their general inflationary effects, on industries involved in international trade, especially export industries. The second is the ability of agricultural producers, in the context of multi-product enterprises, to redirect their resources towards commodities which are experiencing increases in relative prices.

In our wheat price simulation wheat producers take advantage of available possibilities to increase the degree to which they specialize in wheat when the producer price of wheat is increased. This allows agricultural industries which do not themselves produce wheat but which produce other commodities in common with the wheat producers to increase their shares in the markets for these other products. This was sufficient to produce increases in activity levels and incomes even in industries producing mainly export commodities, the overall demand for which is falling. In this way, the benefits of home consumption pricing for wheat were spread around the agricultural sector to non-wheat producing industries.

Our results support the contention of Giblin [1934] and Mauldon [1979] that the costs of home price support schemes for agricultural exports are borne mainly by other industries in the export sector. However,

2.2 Studies of resource allocation effects

Australian agricultural economists have been particularly active in demonstrating the distributional and allocational consequences of home consumption pricing arrangements for agricultural commodities. See for example the analyses of Parish (1962) for the dairy industry, Longworth (1966), Watson and Duloy (1968) and McMahon (1978) for wheat, and Banks and Mauldon (1966) and Beck (1974) for eggs. All such studies have been of a partial equilibrium flavour, carried out within the standard Marshallian welfare analysis framework which assumes, amongst other things, fixed domestic supply and demand curves for the commodity concerned. The assumed starting point in these studies is that of a free market economy in which the allocation of productive resources is considered optimal. Social costs arise - in terms of the distortion of production and consumption patterns - when the domestic price is administered at a level different from the export price (after allowance for transport costs). The extent of these production and consumption costs, together with the size of the transfer payment between producers and consumers for a given domestic-export price differential, is then estimated for specified values of the price elasticities of the domestic supply and demand curves over the relevant price range.

In most instances the authors of these partial equilibrium studies have been particularly careful to point out the limitations of that approach when discussing the implications of their results. The studies have been unable to capture a number of indirect consequences of home consumption pricing - in particular the extent to which higher domestic prices for agricultural commodities are passed on into the cost

structure of the domestic economy and the subsequent implications for the competitive position of the agricultural sector in international trade. Another previously neglected issue is the extent to which the resulting change in the relative farm-gate prices of agricultural commodities leads to changes in the product mix, and hence in agricultural industry outputs and incomes, in the fundamentally multiproduct Australian agricultural sector.

Within the restrictive partial equilibrium framework it is assumed that, under a high home price scheme, income is transferred to farmers from the whole body of consumers. However, Giblin writing in a memorandum to the 1934-35 Royal Commission on the wheat, flour and bread industries[1] argued forcefully that the income benefits of such a scheme are paid for mainly by the export sector as a whole, the burden being particularly onerous on those exporting industries which receive least assistance. Mauldon (1979) argues along similar lines.[2] If it could be established empirically that most of the income transfer is from other export industries rather than from domestic consumers then this might suggest that home consumption pricing schemes are of dubious value as a means of providing compensatory assistance to the rural sector.

1. See Giblin (1934).
2. The proposed mechanism is that alluded to earlier. A high home price raises labour costs via wage indexation. Many import competing industries are able to pass on, to some extent, these additional labour costs through higher output prices. Agricultural export industries not producing commodities whose domestic prices are administered above export parity, are poorly placed to pass on such domestic price increases and therefore suffer a cost price squeeze.

In part (b) of Table 4.4 we have presented projections of income changes for six broad sectors of the economy.[1] Agriculture as a whole gains income but all other sectors experience income losses. The losses are most severe in the sectors which contain significant export industries, i.e., Fishing and Forestry, Mining and Processed Foods. This is explained by the cost-price squeeze which is imposed on exports by the inflationary effects of home consumption pricing. Most of the import competing industries (textiles, machinery, motor vehicles, etc.) are classified in the Manufacturing sector. The slight fall in income projected for this sector is a consequence of the loss of competitiveness vis-à-vis imports which the domestic inflation imposes on the import competing industries. The final sector, Services, is dominated by industries producing non-traded commodities. Since aggregate domestic absorption is held constant in our simulation, income changes in this sector are only very small.

1. The sector results were obtained as the obvious weighted averages of results for the industries comprising the sectors.

Table 4.4 : Projected percentage changes in real value added

	Percentage Change in real value added
(a) Agricultural industries	
1. Pastoral Zone	0.26
2. Wheat-Sheep Zone	1.83
3. High Rainfall Zone	0.04
4. Northern Beef	0.29
5. Milk Cattle and Pigs	0.27
6. Other Farming Export	-0.27
7. Other Farming Import Competing	0.11
8. Poultry	-0.18
(b) Sectors	
Agriculture (industries 1-8)	0.78
Fishing and Forestry (industries 10, 11)	-0.17
Mining (industries 12-16)	-0.18
Processed Foods, Drinks (industries 18-29)	-0.15
Manufacturing (industries 30-83)	-0.06
Services (industries 84-112)	-0.02

3. THE ORANI SIMULATION

ORANI is a multi-sectoral model of the Australian economy based on the ABS 1968/69 Input-Output (I-O) Tables. The basic version of the model is fully described in Dixon, Parmenter, Ryland and Sutton (hereafter referred to as DPRS) (1977). The simulations produced for the present paper were derived from a later version of the model, ORANI 78.[1] This version differs from the version described in DPRS (1977) mainly in the specification of the agricultural sector. In ORANI 78 multi-product enterprises, which are fundamental to Australian agriculture, are modelled explicitly. Full details are given in Dixon, Parmenter, Powell and Vincent (1979).

We have chosen to simulate the essential features of a home consumption price scheme for wheat. The choice of wheat is of no particular significance. We could equally well have chosen any of the other export-oriented agricultural commodities distinguished in the current version of the model. It should however be noted that our analysis does not set out to capture the pricing details of the current wheat stabilization scheme.

3.1 The specification of the direct effects of the introduction of a home price scheme for wheat

We have simulated the effects of the introduction of a home price scheme which raises the price of wheat to non-agricultural domestic

1. A useful description of the basic structure of ORANI 78 is given in Dixon (1979).

users by 10 per cent.[1,2] It is assumed that revenues from these domestic sales and revenues from all other, mainly export, sales are pooled and that wheat producers are paid an average price.[3] The producers, moreover are assumed to act as price takers. That is, in planning output decisions they do not account for any effect which changes in their supply levels might have on the pool price.

Equation (1) relates the percentage change in the average price paid to wheat producers (p_1) to the percentage changes in net prices for wheat recovered from domestic, non-agricultural users (p^d), domestic agricultural users (p^a) and exports (p^e).

$$p_1 = S_d p^d + S_a p^a + S_e p^e \qquad (1)$$

The coefficients (S_d, S_a and S_e) are the shares of the various sales categories in total revenue from wheat sales in the base period. Setting

$$p^a = p^e = 0 \ ,$$

$$p^d = 10 \ ,$$

1. We assume that the small share of total wheat sales which is represented by usage within agriculture does not pass through the centralized selling system and hence is not priced at the home consumption level. Sales to the Poultry industry are assumed to attract the home consumption price. For this purpose then, Poultry is referred to as non-agricultural.
2. The price actually paid by users for wheat includes the cost of various margins associated with the transfer of the wheat from the producer to the user. Note that we have assumed a 10 per cent increase in the basic value component of this purchaser's price.
3. Note that we ignore, amongst other features of the existing wheat stabilization scheme, the concept of the guaranteed price for a stated volume of wheat exports. In principle however there is no reason why the ORANI model could not be used to replicate the details of such a combined home consumption and guaranteed price arrangement.

market share but the gain is insufficient, in this case, to offset the effect of the fall in total demand for the commodity which it produces. Only the Poultry industry has no opportunity to mitigate the effects of commodity demand contraction by gaining market share from non-specialist producers.

4.4 Sector incomes

The effects of the hypothetical wheat price scheme on real returns to factors employed in various sectors of the economy are given in Table 4.4.[1] These results summarise neatly the conclusions which we have drawn from our simulation about the likely effect of home price consumption schemes on the structure of the economy. They confirm the impression of the likely fate of the agricultural sector which was given in the last section. Income gains are experienced in the wheat producing industries (i.e., the three zones, especially the Wheat-Sheep Zone) and in those industries which are able to increase their shares of markets for products which they produce in common with the wheat producers (i.e., Meat Cattle, Milk Cattle and Pigs, and Other Farming Import Competing). Both the industries Other Farming Export and Poultry lose income as a consequence of a falling demand for the exported commodities which they produce, combined with the absence of opportunities to increase their market shares.

1. The projected percentage changes in factor returns, or real value added, have been calculated as weighted sums of projected percentage changes in returns to land, labour and capital in each sector.

cattle production reflects the greater ease of transformation, exhibited in the transformation parameters ϕ, between this commodity and other products than between wool/sheep and other products. High Rainfall Zone producers are projected to increase their output of the wheat/other products composite at the expense of wool, sheep and meat cattle. Again transformation prospects were found, in the estimation of the parameters, to be greatest between the composite commodity group containing wheat and the meat cattle commodity. Sheep, however, is the product whose output is curtailed most severely. Notice that a particularly sharp fall in price for sheep is projected.

The Wheat-Sheep Zone is the major wheat producer. It is projected to expand its output of wheat at the expense of all other products. Transformation possibilities with wheat were found, in this zone, to be especially strong for barley, meat cattle and the other products composite.[1]

A useful summary of the commodity-industry results contained in the body of Table 4.3 is suggested by examination of the industry output projections given in the penultimate row of the table. Increases in activity levels are projected for the three zones according to the strength of their direct participation in wheat production. Three of the non-wheat producing industries are projected to increase output because, although the aggregate outputs of all other agricultural commodities are projected to fall, these industries are able to gain market share of non-wheat commodities at the expense of the zones which are moving their resources into expanded wheat production. The Other Farming Export industry also increases its

1. This consists, for the Wheat-Sheep Zone, of other grains, milk cattle and pigs, other farming export and other farming import competing.

and noting from the ORANI I-O data base that

$$S_d \approx 0.25 ,$$

then equation (1) implies that the average farm-gate price of wheat is increased by about 2½ per cent as a consequence of the introduction of the home pricing scheme. Our simulation proceeds via the imposition on the model of exogenous shocks equivalent to these two price changes, a 10 per cent increase in the price of wheat to domestic, non-agricultural users and a 2½ per cent increase in the farm-gate price of wheat.[1]

The increase in wheat output which is stimulated by the increase in the farm-gate price is assumed to be disposed into the exogenous "other final demand" category. The increase in "other final demand" is thus our measure of the excess supply generated by the pool-price system. Unless eliminated by quotas, this excess supply must either be held in stocks or dumped on the world market. The obvious effect of assuming disposal of the supply increase to exports would be to increase the foreign exchange earnings of the economy.[2] Since no balance of trade constraint has been imposed[3] in our simulation, such an increase in exports would have no effect on the values for other variables in the solution.

1. For technical reasons it is difficult to treat the relevant price variables themselves as exogenous in the current version of ORANI. Details of the methods by which the shocks were imposed on the model are given in the Appendix.
2. See footnote 4, p.16.
3. See subsection 3.2.

There are only three significant non-agricultural users of wheat in the domestic economy. They are industry 8 (Poultry), industry 22 (Flour and Cereal Products) and industry 25 (Food Products n.e.c.), which account respectively for 1.7 per cent, 18 per cent and 6 per cent of total wheat sales. In our simulation the higher home consumption price is imposed only on the first two of these users. An aggregation problem, which was insoluble in the short run, prevented the application of the price increase to industry 25. Wheat is used in this industry mainly in the production of stock-feed but the industry also encompasses sugar refining. Refined sugar is an important export commodity and the refining industry is one of those for which exports are usually determined endogenously in ORANI 78. Under this specification, the domestic price of the industry's output is set by world prices rather than by domestic costs so that the imposition of an increase in the price of its inputs would cause a contraction in exports rather than an increase in domestic prices. The solution to the problem is to split the sugar production and the stock-feed enterprise into separate industries, a fairly time consuming and data intensive task. In the meantime, we have chosen not to allow the increase in domestic wheat prices to affect stock-feed prices in our simulation.[1] An alternative interim measure would be to treat exports from industry 25 as exogenous. This is less attractive since an issue of paramount interest in this paper is the effect of the general inflationary implications of the home price scheme on the export sector (see section 4 below).[2]

1. Note, however, that we have allowed for effects on wheat producers of the increased wheat-pool revenue implied by a rise in the price of wheat sold to stock-feed manufacturers. What is not allowed for is the effects of this price rise on the price of stock-feed.
2. In this paper we overlook restrictions placed on Australian sugar exports by the recently introduced international sugar agreement. History would indicate that, in any case, this phenonenon is likely to be transitory.

cattle prices is necessary. A secondary effect of this rise is to increase the rentals earned by fixed factors in the Milk Cattle industry[1] and thus to raise the price of milk cattle. Similar factors explain the rise in the price of the commodity'other farming import competing'. The Wheat-Sheep Zone, which produces 5 per cent of total output of this commodity, is projected to reduce its supply. A rise in price is necessary to induce increased output from the specialist producer.

Given the relative price changes shown in the final column of Table 4.3, the projected changes in commodity outputs within the first three industries, the BAE zones, are explained by the operation of the CRETH supply system (equations (4.1) - (4.3)). The CRETH share weighted industry prices which appear in equation (4.2), are given in the final row of Table 4.3 and the estimated values for the parameters ϕ can be found in Table 3.4 of Dixon, Parmenter, Powell and Vincent (1979). The prices of all commodities other than wheat are projected to fall relative to the industry weighted averages and producers in each zone are projected to transform their product mixes in favour of wheat at the expense of other commodities.

In the Pastoral and High Rainfall Zones wheat is a comparatively minor product and is assumed to be produced in fixed proportions with a number of other minor commodities.[2] The Pastoral Zone is projected to increase its output of the composite containing wheat and to reduce its output of both wool/sheep[3] and meat cattle. The much greater fall in

1. Meat cattle accounts for 23 per cent of the output of the Milk Cattle industry.
2. These are barley, other grains and other farming import competing in the case of the Pastoral Zone and barley, other grains, milk cattle and pigs, and other farming export in the case of the High Rainfall Zone.
3. Wool and sheep meat are assumed to be produced in fixed proportions in the Pastoral Zone.

small rises in world prices. The importance of margins in moving the commodities from producers to the port (i.e., the S_{mi}) determine how these rises in world prices feed through into farm gate prices.[1]

The prices of both sheep and other farming export are projected to fall in Table 4.3. Both projections are explained by the cost price squeeze on exporters engendered by the inflationary effects of the wheat price scheme. In the case of sheep this is reflected in a fall in demand for sheep meat by the Meat Products industry. Similarly the demand for other farming export declines because of the contraction of the sugar exporting industry, Food Products n.e.c.[2]

The contraction of activity in the Meat Products industry also reduces the demand for meat cattle as shown in the penultimate column of Table 4.3. Its price however is projected to rise. The explanation for the price rise is to be found in the reduction in the supply of meat cattle offered by the three zonal industries (especially the Pastoral Zone) all of which transform their output mixes away from cattle and towards wheat (see Table 4.3 and below). In order to induce a partially compensating increase in supply from the specialist cattle producers, a rise in

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1. Take the case of wool for example. Exports of wool are projected to fall by 0.12 per cent and the relevant value for γ is 0.77. The share of margins in the purchasers' price of wool is about 0.14 per cent. The price of margins will have increased by somewhat less than the rise in the index of consumer prices owing to a fall in the relative price of transport. Assuming $p_m = 0.08$, equations (4.4) and (4.5) give, for i = wool,

$$p_{il} = \frac{-\gamma_i x_i^{(4)} - S_{mi} p_{mi}}{S_{BVi}} \simeq 0.01 \quad .$$

2. Sales to Meat Products accounts for 95 per cent of the total sales of sheep and sales to Food Products n.e.c. for 45 per cent of the total sales of other farming export.

To summarize, the impact effects of the introduction of our home price scheme for wheat are assumed to be

(i) a 10 per cent increase in the price of wheat sold to the domestic 'Poultry' and 'Flour and Cereal Products' industries,

and

(ii) a 2½ per cent increase in the farm-gate price of wheat.

Details of how these shocks were imposed on the model are given in the Appendix.

3.2. Assumptions underlying the simulation

ORANI simulations can be run under a range of alternative sets of assumptions about the economic environment[1]. By choosing which variables are to be treated as exogenous and by the values assigned to certain parameters, the model user must impose specifications about the implicit time frame for the analysis and about various aspects of the macroeconomy.

The simulation reported in this paper was run under a standard short-run specification[2]. The key assumptions are:

(i) fixed, industry-specific capital stocks,

(ii) fixed real domestic consumption, investment and government spending,

(iii) endogenous balance of trade,

(iv) a slack labour market for each of the model's nine occupation categories,

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1. See DPRS, section 19.

2. See DPRS, section 19, and Dixon, Parmenter, Powell and Vincent (1979), section 4.1.

(v) 100 per cent indexation of wages to the consumer price index, and

(vi) a fixed exchange rate.

Assumption (i) is a conventional, neo-classical short-run assumption. When combined with the CES production functions used in ORANI, it implies that industries' supply curves slope upwards in the short run. Note that the assumption does not preclude investment. Changes in the allocation of the investment budget among investing industries in response to changes in relative rates of return are allowed in the simulation. The effects of such changes are evident in changes in the pattern of demand for investment goods (see section 4) but an implicit single-period gestation lag on capital formation prevents changes in capital availability within the solution period. An appropriate calender time interpretation of this short run would be 1-2 years.

Assumption (ii) indicates that our simulation abstracts from any effect which the introduction of the home price scheme for wheat might have on the level or broad composition of real domestic absorption. The macro expenditure aggregates are regarded as determined by other instruments of economic policy, fiscal and monetary policy, for example, independently of agricultural price support measures. The size of the foreign trade component of the gross domestic product is, however, endogenous in the simulation. Assumption (ii) reflects our decision not to impose a balance of trade constraint in the short-run focus.[1]

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1. For longer run simulations the reverse assignment, i.e., an exogenous balance of trade constraint and endogenous real domestic absorption would usually be more appropriate.

The export volumes of three of the commodities listed in Table 4.3, i.e., wool, barley and other cereal grains, are determined endogenously in the simulation. Under this treatment their domestic prices are linked closely to world prices via equations (4.4) and (4.5),

$$p_i^e = -\gamma_i \, x_i^{(4)} \quad , \tag{4.4}$$

and

$$p_i^e = S_{BVi} \, p_{il} + S_{mi} \, p_m \quad , \tag{4.5}$$

where

p_i^e is the percentage change in the at port (f.o.b.) export price of commodity i ,

$x_i^{(4)}$ is the percentage change in the level of exports of commodity i ,

p_{il} is the percentage change in the basic value of commodity i ,

p_m is the percentage change in the price of margins services ,

γ_i is the reciprocal of the foreign elasticity of demand for commodity i and S_{BVi} and S_{mi} are, respectively, the shares of basic values and margins in the at port export value of a unit of commodity i .

Export volumes are squeezed by the rise in domestic costs caused by the introduction of the wheat price scheme but, given the high values of the relevant export demand elasticities, the squeeze is associated with only

The implications of the supply system (4.1) - (4.3) for the results of our wheat price simulation depend heavily on the changes in the basic value prices of commodities which are projected by the model. These are listed in the final column of Table 4.3. Basic value prices for agricultural commodities are equivalent to farm gate prices. They represent prices received by producers and exclude the margins (trade, transport and commodity taxes) which are included in prices paid by the users of the commodities.

The price of wheat is projected to increase by approximately 2.5 per cent. Recall from section 3.1 that this is the direct effect on the pool price of wheat implied by the 10 per cent increase in the price of wheat to domestic consumers. The direct effects of the price scheme are also evident in the price movement projected for poultry in Table 4.3. The costs of the Poultry industry increase to a greater extent than do domestic costs generally[1] owing to the 10 per cent increase in the price of its wheat inputs and a 2.2 per cent increase in the cost of inputs drawn from the Flour and Cereal Products industry,[2] itself a major domestic user of wheat. Offsetting these cost increases is a 0.17 per cent squeeze on the rental earned on capital in the industry[3] due mainly to a reduction in the demand for poultry by the Meat Products industry[4] which accounts for 32 per cent of the total sales of poultry.

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1. The projected increase in the index of consumer prices is 0.097 per cent (see section 4.1).
2. These inputs account respectively for 2.8 per cent and 3.9 per cent of the total costs of the Poultry industry.
3. Complete results for projected changes in capital rental rates and for rates of return are available on request.
4. Recall from Section 4.2 that Meat Products is an exporter whose prospects are adversely affected by the introduction of the wheat price scheme. See Table 4.2.

Taken together assumptions (iv) and (v) imply that producers can employ as much labour as they require in all occupations at fixed real wages. This combination, which implies that the level of employment is demand determined, seems appropriate for the current state of the Australian economy. Alternative assumptions about wage indexation could easily be used. We could, for example, have excluded some part of the policy induced rise in wheat prices from flowing into money wage increases.

The final assumption, assumption (vi), merely fixes the exchange rate as the numeraire in the model. Changes in the domestic price level are therefore to be interpreted as changes in domestic prices relative to world prices. ORANI has nothing to say about how such a relative price change might actually be split between changes in money prices in the domestic economy and changes in the exchange rate. Note that, with full indexation of all domestic cost items, changes in the exchange rate in ORANI produce no permanent changes in relative prices and therefore no real effects. A 10 per cent devaluation under these circumstances will simply increase all domestic prices by 10 per cent.

4. RESULTS

4.1. Macro and employment results

The projected effects of the introduction of the wheat price scheme on some macro-economic indicators and employment variables are listed in Table 4.1. The correct interpretation of these results, indeed of all the results from the simulation, is that they are projections, conditional upon the assumptions discussed in subsection 3.2 (above), of the effects of the imposed exogenous shock alone. Thus our results must be distinguished carefully from forecasts. Rather than make explicit forecasts of how the endogenous variables will actually change over any particular period, ORANI simulations aim to give estimates of how the values of the endogenous variables would differ, if the shock were imposed, from the values which would apply in the absence of the shock. For example, from Table 4.1 it can be seen that ORANI projects an increase in the consumer price index of 0.097 per cent in the current experiment. That is, the model indicates that the consumer price index would be 0.097 per cent higher 1 - 2 years after the imposition of the hypothetical wheat pricing scheme than it would have been had the scheme not been implemented.

The implications of home consumption pricing for the domestic price level are crucial to the understanding of the effects on the economy in general. The most obvious domestic price effect of the scheme which has been imposed in our simulation is to increase the basic value price of flour and cereal products (the output of industry 22) by 2.23 per cent[1].

1. The impact effect of the scheme is equivalent to a 10 per cent rise in the price of wheat to industry 22. Wheat accounts for about 20 per cent of the industry's costs. Projections of changes in basic value prices by commodity are produced as part of the output of ORANI simulations. For reasons of space, a full list is not presented here but is available on request from the authors.

$$p_q(j) = \sum_t H_{tq}(j)\, p_t \quad , \tag{4.3}$$

where the notation is explained below.

Equation (4.1) reflects the assumption of fixed commodity proportions within composite commodities. It states that the percentage change in the production of commodity i by industry j ($y_i(j)$) is equal to the percentage change in the output of composite commodity r by industry j ($\tilde{y}_r(j)$) for each commodity i included in that composite commodity. Equation (4.2) shows that, under CRETH, the output of the r^{th} composite commodity produced in industry j changes in proportion to the overall level of activity in industry j (Z_j). It also responds to any deviation between the percentage change in price of the r^{th} composite commodity $p_r(j)$ and a weighted average of the prices of all composite commodities produced in the j^{th} industry. The weight $R_q^*(j)$ is related to the share (denoted by $R_q(j)$) of composite commodity q in the total revenue of industry j.[1] Equation (4.3) defines the percentage change in the price of a composite commodity as a weighted average of the percentage changes in the prices of the individual products included therein. The weights $H_{tq}(j)$ are the shares of the products t in the total value of output of composite commodity q for industry j. The non-negative parameter $\phi_r(j)$ in equation (4.2) reflects the ease of transformation within industry j between composite commodity r and other composite commodities produced by the industry.

1. $R_q^*(j) = \phi_q(j)\, R_q(j) \Big/ \sum_q \phi_q(j)\, R_q(j)$.

agricultural industries for our wheat price simulation. Notice that 10 commodities and 8 industries are distinguished within the agricultural sector. Four of the industries are assumed to produce multi-commodity output bundles, although one of these (Milk Cattle and Pigs) produces only two distinct commodities (the composite 'milk cattle and pigs' and 'meat cattle') and these in fixed proportions. Notice also that the first four industries in Table 4.3 have explicit regional dimensions.

The first three industries in Table 4.3 are based on the zonal classification developed by the Bureau of Agricultural Economics (BAE) for its sheep industry surveys. These industries are assumed to select their output mixes, according to relative commodity prices, so as to maximize revenue subject to intercommodity production possibility frontiers of the CRETH type.[1] In some cases the CRETH transformation possibilities were specified in terms of composites of commodities rather than at the single commodity level.[2] Within composites, commodities are assumed to be produced in fixed proportions. This set of assumptions yields, for ORANI 78, a commodity supply system in percentage change form as follows:

$$y_i(j) = \tilde{y}_r(j) \ , \qquad \text{where commodity } i \text{ is included in composite commodity } r \ , \tag{4.1}$$

$$\tilde{y}_r(j) = z_j + \phi_r(j) \left[p_r(j) - \sum_q R^*_q(j) \, p_q(j) \right] \ , \tag{4.2}$$

$$\phi_r(j) > 0 \ ,$$

and

1. For details see Dixon, Parmenter, Powell and Vincent (1979) and the references cited therein.
2. See Dixon, Parmenter, Powell and Vincent (1979), Table 3.1.

Table 4.1 : Projections of the Effects of the Introduction of a Home Price Scheme for Wheat[1] on Macro and Employment Variables

Variable	Projection[2]	Employment Weights
Aggregate Employment (persons)[3]	-0.008	
Employment		
1. Professional White Collar	-0.015	0.039
2. Skilled White Collar	-0.021	0.134
3. Semi and Unskilled White Collar	-0.021	0.274
4. Skilled Blue Collar (metal and electrical)	-0.037	0.103
5. Skilled Blue Collar (building)	0.002	0.043
6. Skilled Blue Collar (other)	-0.062	0.027
7. Semi and Unskilled Blue Collar	-0.038	0.299
8. Rural Workers	0.267	0.065
9. Armed Services	0.0	0.016
Aggregate Exports (foreign currency value)	-0.185	
Aggregate Imports (foreign currency value)	0.032	
Balance of Trade	-8.1	
Index of Consumer Prices	0.097	
Capital Goods Price Index	0.064	

1. The scheme is assumed to raise the price of wheat to domestic users by 10 per cent. Producers are assumed to be paid a pool price. (See section 3.1 above).
2. All projections are percentage changes with the exception of the balance of trade which has the units "millions of 1968/69 Australian dollars".
3. Assumes average hours worked per person is constant.

Flour and cereal products, in turn, account for 21 per cent of the costs of industry 23 (Bread and Cakes) so that the price of its output is also increased significantly. (The projected rise in the basic value price of bread and cakes is in fact 0.54 per cent.) These two price rises alone contribute an increase of 0.022 per cent in the consumer price index.[1] Other indirect effects and the multiplying effect of full wage indexation[2] lift the eventual rise in the consumer price index to 0.097 per cent. Note that the investment price index rises by a smaller percentage (0.064 per cent). The prices most severely affected by the wheat price scheme have very low weights in this index.

The impact of the increase in domestic prices is clearly reflected in the projections for aggregate international trade flows. Aggregate exports fall (0.185 per cent) in response to the cost-price squeeze imposed on domestic producers attempting to sell on world markets which are assumed to exhibit fairly high elasticities of demand for Australian exports.[3] Some increase in import penetration is also projected. The net effect is to move the balance of trade slightly towards deficit.[4]

The most obvious feature of the employment results shown in Table 4.1 is the significant increase in the employment of rural workers (0.267 per cent). This is a direct result of the stimulation of wheat production.

1. The weight of flour and cereal products in the ORANI index of consumer prices is 0.005 and the weight of bread and cakes is 0.020.
2. Wages are about one half of total costs in the data base so that the effect of wage indexation is to approximately double the direct and indirect effect on the price level of the exogenous changes.
3. Values for the elasticities range from 1.3 (wool) to 20 (fishing, minerals and sugar). See Dixon, Parmenter, Powell and Vincent (1979), Table 4.4.
4. Note that disposal to export of the increased supply of wheat generated by the home price scheme (see p.9) would raise export earnings by about 0.12 per cent. Under this assumption a net decrease in export revenue only 0.065 per cent would be implied. The adverse movement in the balance of trade would be correspondingly smaller.

Table 4.3 : Projected Percentage Changes in Commodity Prices and in Industry and Commodity Outputs : Agricultural Sector (including Poultry)

Commodity \ Industry	Pastoral Zone	Wheat-Sheep Zone	High Rainfall Zone	Northern Beef	Milk Cattle and Pigs	Other Farming Export	Other Farming Import Competing	Poultry	Aggregate Commodity Outputs(a)	Basic Value Commodity Prices
Wool	-0.11	-0.23	-0.01	-	-	-	-	-	-0.12	-0.10
Sheep	-0.11	-0.30	-0.12	-	-	-	-	-	-0.21	-0.68
Wheat	3.04	1.37	0.29	-	-	-	-	-	1.40	2.49
Barley	3.04	-0.62	0.29	-	-	-	-	-	-0.48	0.08
Other grains	3.04	-1.77	0.29	-	-	-	-	-	-1.29	0.35
Meat cattle	-1.76	-0.52	-0.07	0.05	0.05	-	-	-	-0.22	0.27
Milk cattle and pigs	-	-1.77	0.29	-	0.05	-	-	-	-0.08	0.26
Other farming export	-	-1.77	0.29	-	-	-0.08	-	-	-0.11	-0.03
Other farming import competing	3.04	-1.77	-	-	-	-	0.02	-	-0.02	0.15
Poultry	-	-	-	-	-	-	-	-0.07	-0.07	0.40
Industry Outputs(b)	0.04	0.29	0.01	0.05	0.05	-0.08	0.02	-0.07		
CRETH Share Weighted Industry Prices(c)	1.39	1.82	0.49							

(a) Aggregate commodity output changes are share weighted averages of individual industry output changes. The appropriate weights are in Dixon, Parmenter, Powell and Vincent (1979), Table 3.2.

(b) Industry output changes are the share weighted averages of commodity output changes in each industry. The appropriate weights are in Dixon, Parmenter, Powell and Vincent (1979), Table 3.1.

(c) The industry price changes are weighted averages of the commodity price changes. The weighting scheme ($R^*_q(j)$ in equation 4.2) reflects both the base period shares of the commodities in the industry outputs and the ease of transformation between commodities within the industries. See Dixon, Parmenter, Powell and Vincent (1979), section 3.2.

The level and composition of government spending is usually set exogenously in ORANI simulations. In this simulation no changes in government spending are allowed so that the output changes of industries supplying primarily public sector demands are very small. Industry 105 (Defence) is an extreme case and industries 104 (Public Administration) and 107 (Education,Libraries) are other examples in Table 4.2.

A final important determinant of the output responses of industries in our simulation is capital intensity. In short-run ORANI simulations a high share of capital in primary factor costs implies low output flexibility.[1] Industry 103 (Ownership of Dwellings) is a polar case. Since this industry employs no labour it is unable to vary its output in the short run when capital is fixed. Industry 12 (Iron) is another very capital intensive industry. Although exports account for a large share of its sales, in the short run it is less vulnerable than other exporters to the increase in variable costs (especially labour) generated by the increase in the domestic price level.

4.3 Agricultural industry and commodity outputs

The specification of the agricultural sector in ORANI 78 allows explicitly for the production of combinations of different agricultural commodities within agricultural industries and for regional differences in production technology between agricultural industries producing similar bundles of commodities.[2] Table 4.3 includes a matrix of projected percentage changes in the output of agricultural commodities by

1. Cf. footnote 4, p.21.
2. See Dixon, Parmenter, Powell and Vincent (1979).

The blue collar occupations (4, 6 and 7) face the largest declines in output because they are relatively intensively used in import competing industries. The net effect of the occupational changes is to generate a small fall in aggregate employment.

4.2 Industry outputs : gainers and losers

The effects of the hypothetical wheat price scheme on the industrial composition of the economy can be described by the projected percentage changes in industries' output levels. These projections are reproduced in Table 4.2, ranked in order from gainers to losers. In this section we provide a guide to the industry results as a whole by first indicating the main factors responsible for the relative performance of industries and then showing, in rather more detail, how these factors impinge on a selection of the more interesting cases from Table 4.2. In the following two sections the implications of the home price scheme for the agricultural sector in particular are discussed in more detail.

Recall that the introduction of the scheme is assumed to increase the farm gate price of wheat by 2½ per cent. All of the major output gains exhibited in Table 4.2 can be quite directly attributed to the consequent stimulation of wheat production. Another direct effect of the home consumption pricing arrangement is an increase in the domestic price level which generates a cost-price squeeze for domestic exporting industries (other than wheat producers) and reduces the competitiveness of the import competing sector. These latter factors are responsible for the main output reductions listed in Table 4.2.

Table 4.2 : Projections of the Effects of the Introduction of a Home Price Scheme for Wheat on Industry Outputs (Percentage Changes)

	Industry	Projection	Rank		Industry	Projection	Rank
76	Agricultural Machinery	.455	1	42	Joinery and Wood Products	-.014	57
2	Wheat/Sheep Zone	.286	2	33	Wool and Worsted Yarns	-.015	58
49	Chemical Fertilisers	.115	3	34	Textile Finishing	-.017	59
9	Services to Agriculture	.085	4	48	Commercial Printing	-.017	60
4	Northern Beef	.050	5	65	Structural Metal	-.018	61
5	Milk Cattle	.047	6	47	Newspapers and Books	-.020	62
1	Pastoral Zone	.041	7	43	Furniture, Mattresses	-.021	63
88	Building n.e.c.	.029	8	83	Other Manufacturing	-.021	64
60	Ready-Mixed Concrete	.021	9	89	Wholesale Trade	-.022	65
7	Other Farming Import Competing	.021	10	45	Fibreboard	-.023	66
61	Concrete Products	.015	11	79	Leather Products	-.023	67
3	High Rainfall Zone	.011	12	35	Textile Floor Covers	-.023	68
92	Other Repairs	.010	13	71	Aircraft Building	-.023	69
59	Cement	.007	14	80	Rubber Products	-.024	70
56	Oil and Coal Products	.004	15	40	Sawmill Products	-.024	71
15	Crude Oil	.004	16	24	Confectionery	-.025	72
90	Retail Trade	.002	17	57	Glass	-.025	73
91	Motor Vehicle Repair	.001	18	41	Plywood, Veneers	-.025	74
87	Residential Building	.000	19	46	Paper Products n.e.c.	-.026	75
103	Ownership of Dwellings	.000	20	97	Communication	-.027	76
105	Defence	.000	21	74	Household Appliances	-.027	77
86	Water, Sewerage	-.000	22	75	Electrical Machinery	-.030	78
104	Public Administration	-.001	23	93	Road Transport	-.030	79
26	Soft Drinks, Cordials	-.001	24	81	Plastic Products	-.030	80
107	Education, Libraries	-.002	25	39	Footwear	-.031	81
16	Non-Metallic Minerals n.e.c.	-.003	26	67	Metal Products n.e.c.	-.032	82
62	Non-Metal Mineral Products	-.004	27	72	Scientific Equipment	-.034	83
27	Beer and Malt	-.005	28	21	Margarine, Oils and Fats	-.035	84
20	Fruit and Vegetable Products	-.005	29	36	Textile Products n.e.c.	-.037	85
108	Welfare Services	-.006	30	23	Bread, Cakes	-.038	86
106	Health	-.006	31	68	Motor Vehicles, Parts	-.038	87
110	Restaurants, Hotels	-.006	32	10	Forestry	-.040	88
19	Milk Products	-.006	33	55	Chemical Products n.e.c.	-.041	89
85	Gas	-.007	34	82	Signs, Writing Equipment	-.042	90
111	Personal Services	-.007	35	66	Sheet Metal Products	-.044	91
99	Finance and Life Insurance	-.008	36	44	Pulp, Paper	-.045	92
54	Cosmetics, Toiletry	-.008	37	50	Industrial Chemicals	-.054	93
51	Paints, Varnishes	-.009	38	73	Electronic Equipment	-.063	94
52	Pharmaceuticals	-.009	39	78	Other Machinery	-.066	95
53	Soap and Detergents	-.009	40	94	Railway Transport	-.066	96
17	Services to Mining	-.009	41	32	Cotton, Silk, Flax	-.070	97
29	Tobacco	-.010	42	13	Other Metallic Minerals	-.072	98
109	Entertainment	-.010	43	31	Man-Made Fibres, Yarn	-.074	99
37	Knitting Mills	-.010	44	8	Poultry	-.074	100
102	Other Business Services	-.011	45	6	Other Farming Export	-.078	101
38	Clothing	-.011	46	22	Flour and Cereal Products	-.093	102
12	Iron	-.011	47	64	Other Basic Metals	-.093	103
58	Clay Products	-.012	48	63	Basic Iron and Steel	-.096	104
100	Other Insurance	-.012	49	77	Construction Equipment	-.113	105
28	Alcholic Drinks n.e.c.	-.012	50	69	Ship and Boat Building	-.119	106
95	Water Transport	-.012	51	11	Fishing	-.120	107
98	Banking	-.013	52	70	Locomotives	-.121	108
84	Electricity	-.013	53	14	Coal	-.144	109
101	Investment, Real Estate	-.013	54	30	Prepared Fibres	-.151	110
112	Business Expenses	-.014	55	18	Meat Products	-.228	111
96	Air Transport	-.014	56	25	Food Products n.e.c.	-.241	112

or after further processing in industry 23 (Bread and Cakes). Aggregate domestic consumption is held fixed in our simulation[1] but the adverse relative price movements for these wheat using consumer commodities[2] are projected to generate significant substitution against them by consumers.

Import competing industries[3] are not represented among the main gainers or losers in Table 4.2. but the inflationary effect of the wheat pricing scheme has adverse consequences for their competitive position.[3] The increase in domestic prices is projected to cause domestic users of import competing goods to substitute imports for domestically produced commodities. Import competing industries are therefore generally projected to experience contractions in their output levels in Table 4.2. Industries in the textile sector, industries 31 (Man Made Fibres) and 32 (Cotton, Silk and Flax) for instance, and the Motor Vehicle industry (industry 68) are important examples.

Industries producing non-traded commodities sold mainly to domestic consumption show, in general, very little output movement in our simulation since aggregate consumption is constant. Industries 90 (Retail Trade), 91 (Motor Vehicle Repairs) and 26 (Soft Drinks, Cordials) are typical. Demands for such commodities change in the simulation only as a result of minor reallocations of the fixed aggregate consumer spending in response to projected relative price changes.

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1. See section 3.2.
2. The projected increase in the basic value price of bread and cakes is 0.54 per cent.
3. The extent to which industries compete with imports in ORANI depends both on the elasticity of substitution between imports and domestic output and on the level of import penetration in the base period. See DPRS (1977), sections 3-5, 16.5(a) and 21.

All of the industries which occupy the first twelve places in the ranking presented in Table 4.2 are either themselves wheat producers or have important links with the wheat producing sector. Industry 2 (Wheat-Sheep Zone) is the economy's major wheat producer. The share of wheat in the total value of its output is 44 per cent and this accounts for 93 per cent of total wheat production in the data base.[1] The other two agricultural zones, industry 1 (Pastoral Zone) and industry 3 (High Rainfall Zone), also produce some wheat. The increase in wheat production in these two zones has a much smaller impact on their aggregate activity levels owing to the much smaller base-period shares of wheat in their total outputs (10 per cent and 3 per cent respectively).

Apart from the three wheat producers, three other agricultural industries appear among the top twelve gainers in Table 4.2. They are industry 4 (Northern Beef), industry 5 (Milk Cattle and Pigs) and industry 7 (Other Farming Import Competing). These industries all experience increases in activity levels because they are able to increase their shares of markets for the agricultural commodities meat cattle, milk cattle and pigs, or other farming import competing (see section 4.3 below).

The strong output performance of industries 76 (Agricultural Machinery), 49 (Chemical Fertilizers) and 9 (Services to Agriculture) is readily accounted for by the large proportions of their sales going

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1. Dixon, Parmenter, Powell and Vincent (1979), section 3.3.

Industries 70 (Locomotives), 69 (Ship and Boat Building), 37 (Construction Equipment) and 6 (Other Farming Export) do not export directly but are heavily dependent on sales to the export sector. The sales of industry 70 are largely accounted for by intermediate and investment sales to industry 94 (Rail Transport). The services provided by the latter industry are intensively used in the transport of exports, especially minerals. Industry 94 is projected to experience falls in both its output (0.07 per cent) and its investment (0.19 per cent) and to make corresponding reductions in its demands for current and capital inputs from industry 70. Industry 69 sells more than one third of its output to industry 95 (Water Transport) which is another export related transport industry. Industry 69 also suffers sales losses because of a projected decline in investment in the Fishing industry (1.10 per cent). The position of industry 77 (Construction Equipment) is explained by its dependance on sales of capital equipment to the minerals sector. Twenty-five per cent of its sales are accounted for by investment sales to mining or metal processing industries which are projected to reduce their investment by between 0.09 and 0.55 per cent. Industry 6 is the industry to which sugar growing is classified. A large share of its output is exported via the sugar refining exporter, industry 25.

The final industry among the twelve major losers in Table 4.2 is industry 22 (Flour and Cereal Products). This is the major domestic wheat using industry and hence experiences a severe cost increase as a consequence of the increase in the domestic wheat price. An increase in the basic value price of flour and cereal products of 2.23 per cent is projected. The sales of industry 22 go mainly to domestic personal consumption either directly

to agriculture, especially to the wheat producing sector. Industry 76 supplies both intermediate and capital inputs to agriculture. In particular almost 22 per cent of its sales in the ORANI data base are sales of investment goods to the Wheat-Sheep Zone. An increase in investment of 1.8 per cent is projected for this zone in our simulation.[1] The sales of industries 49 and 9 are mainly intermediate sales to agricultural industries. Sales to the Wheat-Sheep Zone account for 40 per cent of the total sales of industry 49 and 29 per cent of the sales of industry 9.

The remaining three of the twelve principal gainers in Table 4.2 form a highly interdependent group. Industries 60 (Ready-mixed Concrete) and 61 (Concrete Products) are both primarily suppliers of inputs to industry 88 (Building n.e.c.). The outputs of the former pair therefore move very closely with the output of the latter industry.[2] The sales of industry 88 comprise mainly sales to investment.[3] As explained in section 3.2 aggregate investment spending is held constant in the current simulation. The output gain experienced by industry 88 (and hence industries 60 and 61) is therefore a consequence of a projected reallocation between industries of the economy's fixed investment budget. The importance of construction in the structure of the new capital formation is much greater for the industries which show strong output (and therefore investment)

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1. A complete set of results for investment by industry is available from the authors.
2. Sales to industry 88 account for 75 per cent of the total sales of industry 60 and 67 per cent of those of industry 61. The larger share evident in the case of industry 60 explains why its output movement is more closely identified with that of industry 88.
3. The share of the total sales of industry 88 going to investment in the base period is 75 per cent.

gains in Table 4.2 than for the industries which suffer output declines and shrinking shares in the investment budget.[1]

Of the industries occupying the last twelve places in the ranking given in Table 4.2 (i.e., the twelve main losers from the wheat pricing scheme), eleven depend heavily on exporting. Industries 25 (Food Products n.e.c.), 18 (Meat Products), 30 (Prepared Fibres), 14 (Coal), 11 (Fishing), 63 (Basic Iron and Steel) and 64 (Other Basic Metals) are all major exporting industries which are assumed to face fairly elastic foreign demand curves.[2] Export levels for these seven industries are determined endogenously in our simulation. The model projects falls in their exports[3] and thus in their output levels as a consequence of the introduction of the hypothetical home price support scheme for wheat.[4]

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1. The weighted average share of inputs from industry 88 in new capital formation in the top ten gainers in Table 4.2 is 62 per cent. The corresponding share for the top 10 losers is 29 per cent, and that for the economy as a whole 39 per cent.
2. The assumed demand elasticities are 20 for industries 25, 14, 11, 63 and 64; 16.6 for industry 18; and 2.6 for industry 30.
3. The projected percentage changes in exports are as follows : industry 25 (- 0.75), industry 18 (- 0.75), industry 30 (- 0.23), industry 14 (- 0.30), industry 11 (- 0.18), industry 63 (- 0.45) and industry 64 (- 0.20).
4. For ORANI in short run mode, i.e., with fixed industry specific capital stocks, the elasticity of supply with respect to real value added price for industry j (n_j) is given by

$$n_j = \sigma_j \, S_{Lj}/(1-S_{Lj}) \ ,$$

where σ_j is the elasticity of substitution between capital and labour in industry j
and S_{Lj} is the share of labour in primary factor costs in industry j .

The assumed value of σ_j is 0.5 for all industries. The values of the S_{Lj} for these export industries range from 0.52 to 0.80. Taking a typical value of 0.65 yields a supply elasticity of 0.9.