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IMPLEMENTATION OF ADAMS' TYPICAL YEAR FOR THE AGRICULTURAL SECTOR IN THE ORANI 1977-78 DATA BASE

by

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La Trobe University
and
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ACKNOWLEDGEMENTS

The author is heavily indebted to Philip Adams and Mark Horridge. Philip Adams not only collected the typical-year data presented in Adams (1984b) but also the time series data presented in this paper, of which the previously unpublished data on exports of agricultural commodities are particularly significant (these data are listed in Table 3.1). Mark Horridge modified his complex HAMMER computer program (presented in Appendix Figure A.2) to enable the implementation of the typical-year agricultural data base in such a way as to minimize the inevitable distortions which occur between the 'typicalized' and 'non-typicalized' sections of the data base.

IMPLEMENTATION OF ADAMS' TYPICAL YEAR FOR THE AGRICULTURAL SECTOR IN THE ORANI 1977-78 DATA BASE

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1. INTRODUCTION

The ORANI model is a large computable general equilibrium model of the Australian economy (see Dixon, Parmenter, Sutton and Vincent (1982)). Eight agricultural industries are recognised in the model. The three largest, namely, the Pastoral Zone, the Wheat-Sheep Zone and the High Rainfall Zone, are modelled as multiproduct industries capable of producing nine separate commodities. The remaining industries are modelled essentially as single product industries.[1] It is assumed that the input and output decisions of each industry are made separately. Costs are minimized under CRESH (Constant Ratios of Elasticities of Substitution, Homothetic) input technology and revenue is maximized under CRETH (Constant Ratios of Elasticities of Transformation, Homothetic) output technology.[2] Vincent, Dixon and Powell (1980) estimated the CRESH/CRETH system with time series data spanning the years 1952-53 through 1973-74. To complement this work Adams (1984b) has estimated a typical year of input-output data for the agricultural sector from data covering the period from 1967-68 to 1979-80.

The behaviour of ORANI in short-run (say, 2 year) simulations is dependent on cost shares in the different agricultural industries. One exceptionally important component of the cost structure is the share of costs which are represented by factors (such as agricultural land and fixed capital) whose aggregate usage does not respond, in the short run, to a policy or other shock under analysis. If this share is high relative to the share of variable costs, an industry will respond with less flexibility than it otherwise would.[3]

The shares of returns to agricultural land and fixed capital in total inputs to current production for each of the ORANI agricultural industries over the period 1967-68 to 1979-80 are depicted in Figure 1.1. It is clear from Figure 1.1 that these shares fluctuated markedly in most of the agricultural industries.[4] The reasons for these fluctuations can be traced to short-term disturbances such as drought, floods and fluctuations in world commodity prices.

The Pastoral Zone, Wheat-Sheep Zone and High Rainfall Zone ORANI agricultural industries experienced drought conditions in the early and late periods of the 1970s. This can be seen by comparing Figure 1.2, which shows the geographical location of these industries, with Figure 1.4 which depicts the major drought-affected areas in Australia from 1969 to 1982. The periods in which the shares of returns to agricultural land and fixed capital in total inputs to current production were below average for these zonal industries also occurred in the early and late 1970s (see Figure 1.1). The Northern Beef ORANI agricultural industry, whose geographical location is depicted in Figure 1.3, experienced drought conditions in 1978

FIGURE 1.1 : THE SHARE OF RETURNS TO AGRICULTURAL LAND AND FIXED CAPITAL IN TOTAL INPUTS TO CURRENT PRODUCTION FOR EACH OF THE ORANI AGRICULTURAL INDUSTRIES FROM 1967-68 TO 1979-80*

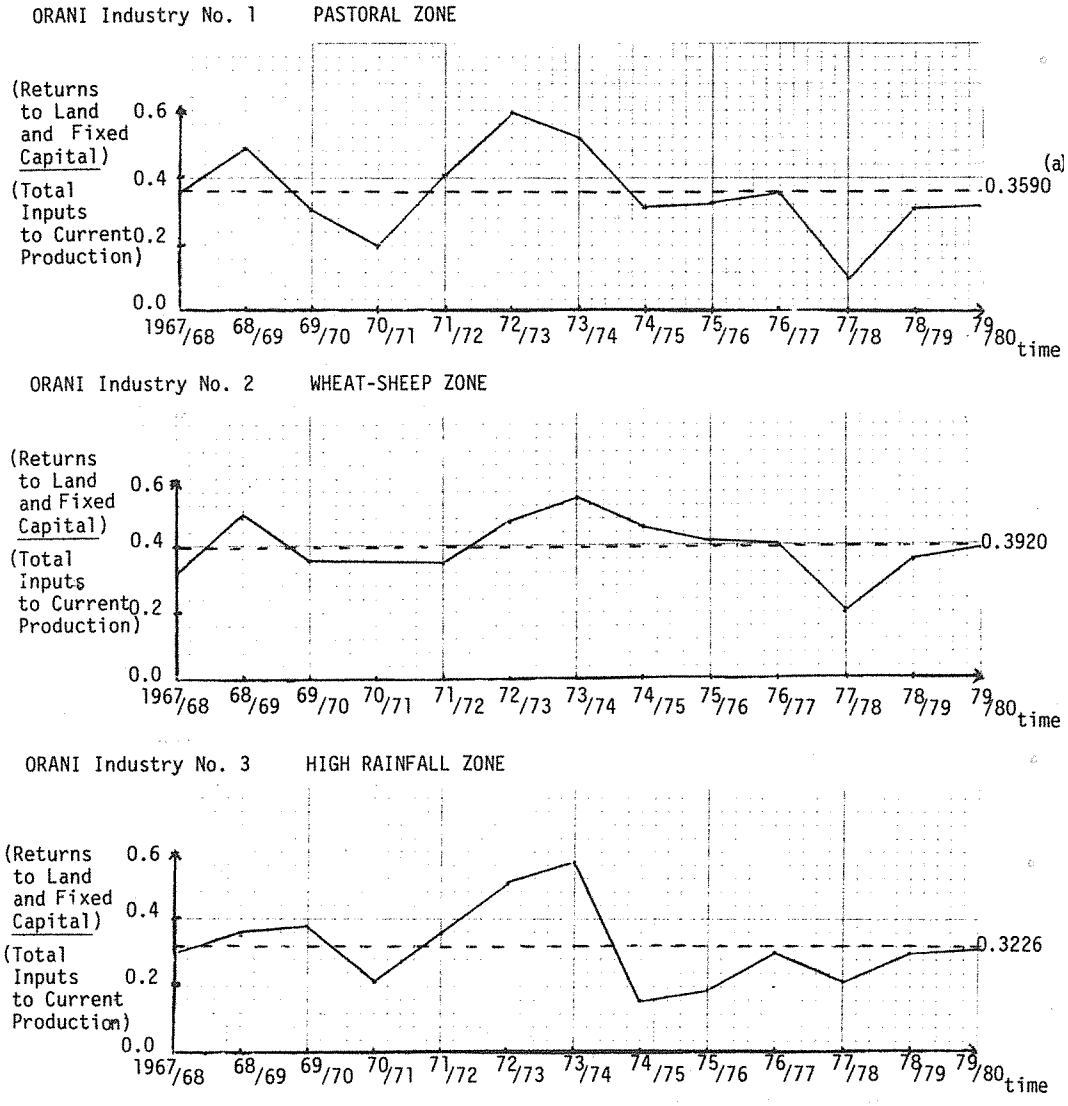
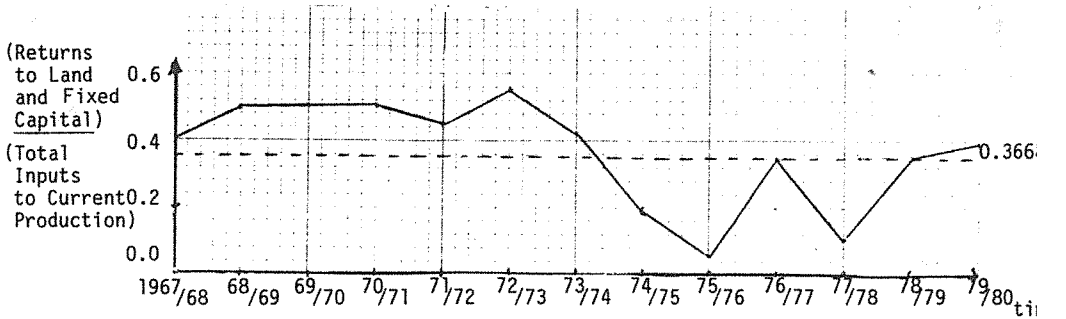
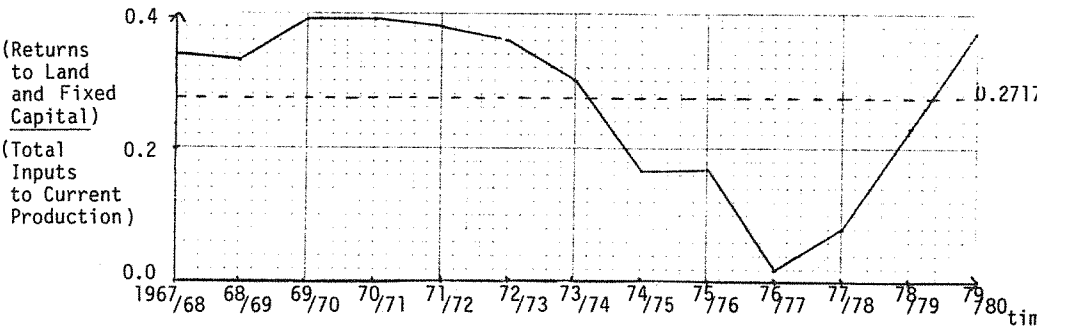


FIGURE 1.1 (continued)

ORANI Industry No. 4 NORTHERN BEEF



ORANI Industry No. 5 MILK CATTLE AND PIGS



ORANI Industry No. 6 OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)

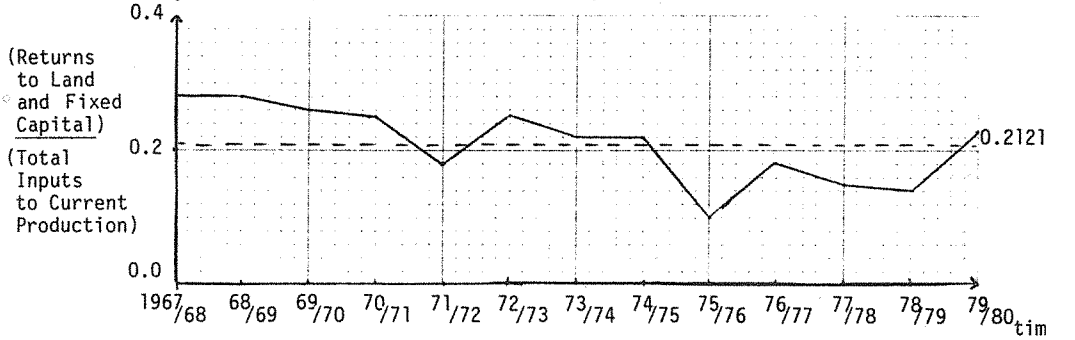
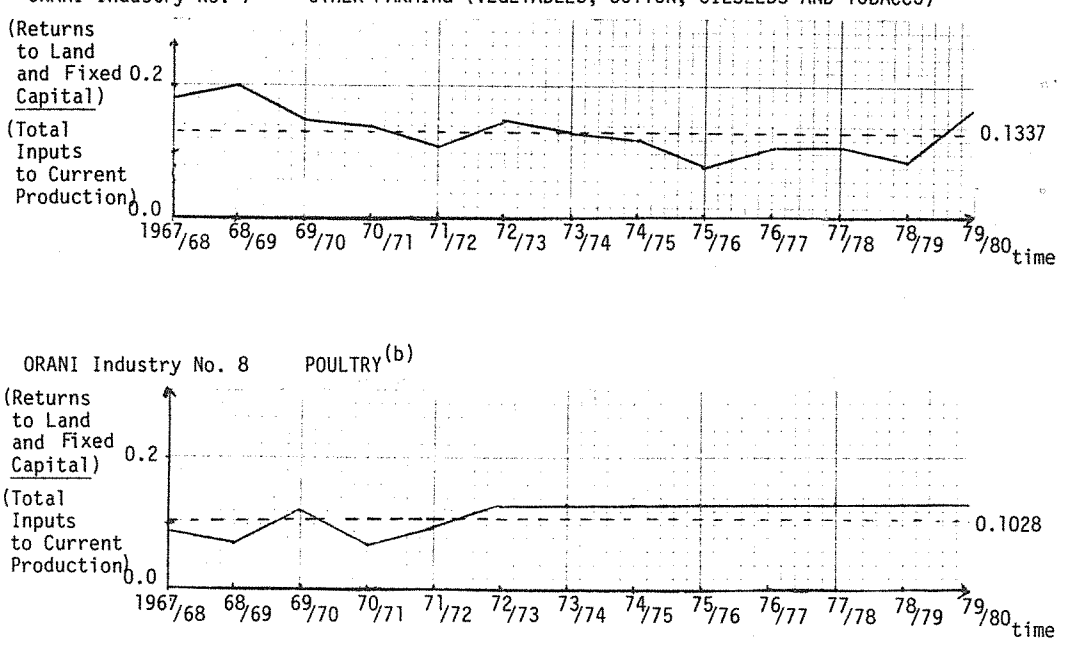


FIGURE 1.1 (continued)

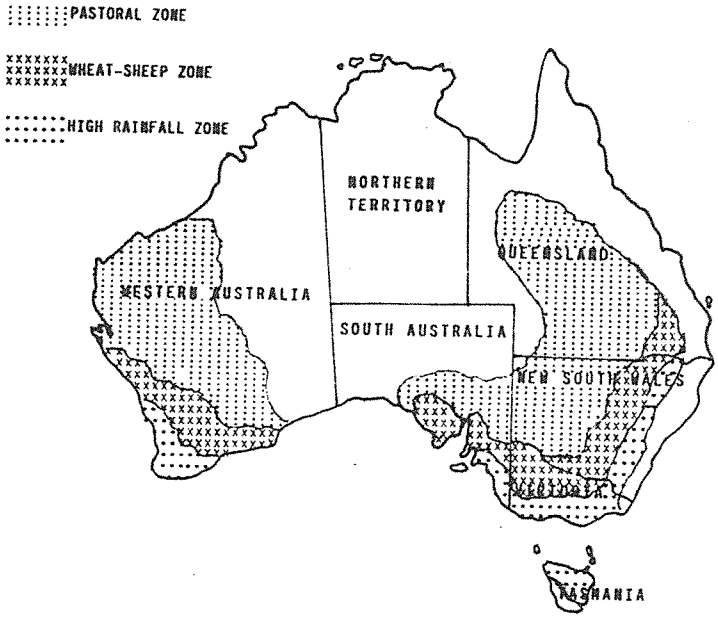


* Inputs to current production in the ORANI model includes domestic and imported material inputs, returns to agricultural land, fixed capital and working capital, wages paid and an imputed return to owner-operators' labour. The inputs and their respective shares in total inputs to current production for the agricultural industries over the period 1967-68 to1979-80 are given in Table A.3.

(a) The average shares of returns to land and fixed capital in total inputs to current production over the period 1967-68 to 1979-80 are given by the dotted lines.

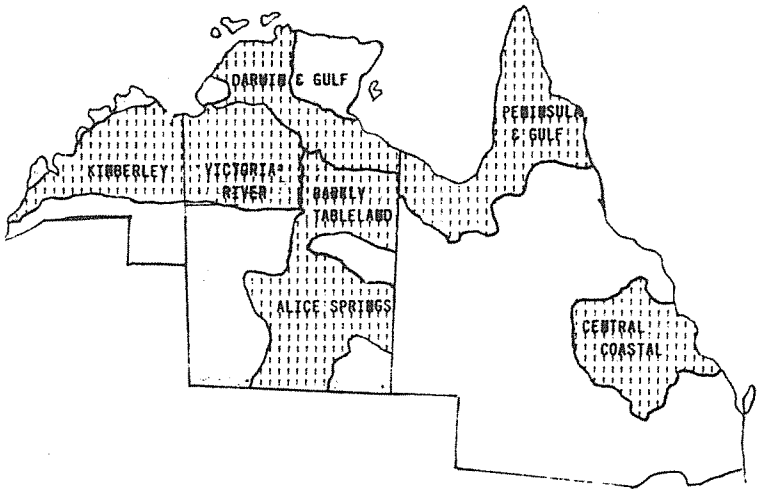
(b) Note that the poultry industry is not modelled as using agricultural land. The land occupied by a poultry industry is treated as fixed capital.

FIGURE 1.2 : GEOGRAPHICAL LOCATION OF THE ORANI PASTORAL ZONE, WHEAT-SHEEP ZONE AND HIGH RAINFALL ZONE INDUSTRIES*



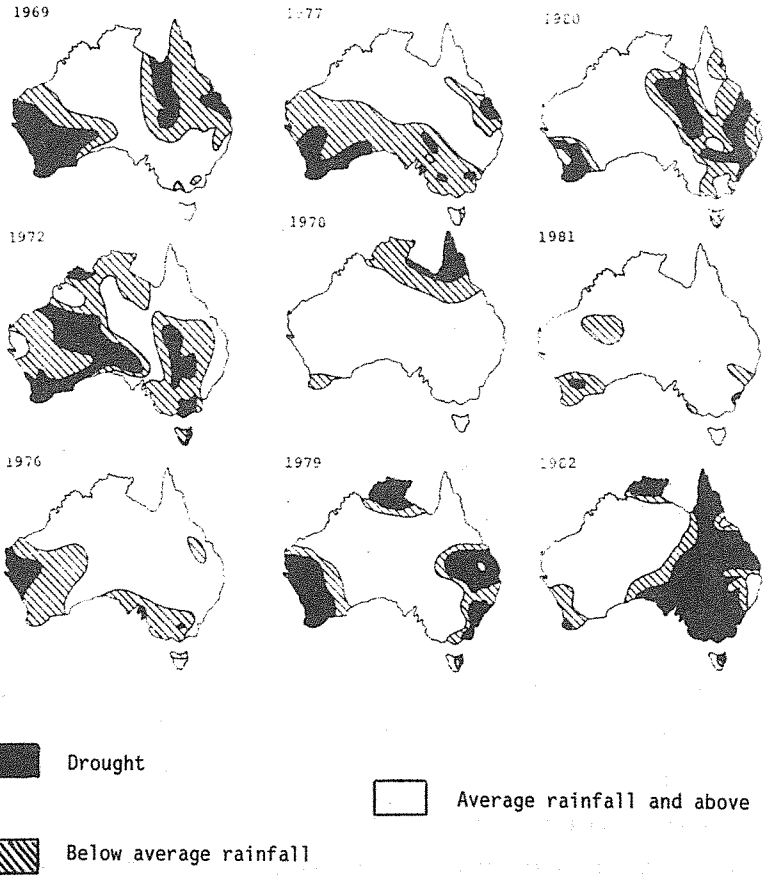
* These zones are based on the Australian Sheep Industry Survey, hereafter ASIS, Zones (see Bureau of Agricultural Economics, hereafter BAE, 1972 and 1976a). To obtain a consistent series Adams (1984b) continued to apply the ASIS definitions even after the BAE changed its definitions in the Australian Grazing Industry Survey (see BAE (1976b)) and subsequent surveys (see Adams (1984b) for further details). As a result the above boundaries of the zones will have changed slightly over time as farms qualified to be included under the definitions set out in the ASIS.

FIGURE 1.3 : GEOGRAPHICAL LOCATION OF THE ORANI NORTHERN BEEF INDUSTRY*



* The Northern Beef Industry consists of all properties located in the Kimberley region in Western Australia, the Northern Territory (see BAE (1974a)) and the Peninsular Gulf and Central Coastal regions of Queensland (see BAE (1974b)).

FIGURE 1.4 : THE MAJOR DROUGHT-AFFECTED AREAS IN AUSTRALIA OVER THE PERIOD 1969 TO 1982*



* Source: Reynolds, Watson and Collins (1983, Figures 4.3 and 4.4).

and 1979. The returns to agricultural land and fixed capital as a share of total inputs to current production were below average in 1978 for this industry; however they recovered in 1979. It will be shown that this recovery was due to an increase in the world price of beef; i.e., a demand side factor.

The terms of trade for the production of Australian agricultural commodities (i.e., the ratio of an index of prices received by farmers to an index of prices paid by farmers for inputs to current production) over the period 1967-68 to 1978-79 are given in Table 1.1. To assist in the interpretation of Table 1.1, the terms of trade for the production of each agricultural commodity from 1967-68 to 1978-79 are plotted in Figure 1.5. The principal commodities produced by the three zonal ORANI agricultural industries are wool, wheat, meat cattle and sheep.[5] It can be seen by comparing Figures 1.5 and 1.1 that the fluctuations in the terms of trade of production of these commodities explain a considerable amount of the movement in the shares of returns to agricultural land and fixed capital. The Northern Beef agricultural industry only produces the commodity meat cattle. The recovery of the share of returns to agricultural land and fixed capital for this industry in 1979 (see Figure 1.1) was due to an increase in the world price for beef. If the price index for meat cattle listed in Table 1.1 had been extended past 1978-79 a dramatic increase to 136 for this index in 1979-80 would have been observed. Thus the sharp rise shown in Figure 1.5 in the terms of trade for meat cattle production in 1978-79 would have continued on into 1979-80. In the case of the remaining industries and commodities, Figure 1.5 enables most of the movement in the shares of returns to agricultural land and fixed capital as shown in Figure 1.1 to be rationalized.

TABLE 1.1 : TERMS OF TRADE FOR THE PRODUCTION OF AUSTRALIAN AGRICULTURAL COMMODITIES FROM 1967-68 TO 1978-79

Year	Index of Prices Paid by Australian Farmers for their Inputs to Current Production[a] [1]	Index of Prices Received for Australian WOOL[b] [2]	Terms of Trade for WOOL Production[c] [2]/[1]	Index of Prices Received for Australian SHEEP[d] [3]	Terms of Trade for SHEEP Production[c] [3]/[1]
1967-68	36	45	1.25	34	0.94
1968-69	36	48	1.33	32	0.89
1969-70	36	41	1.14	32	0.89
1970-71	38	32	0.84	25	0.66
1971-72	40	40	1.00	26	0.65
1972-73	43	89	2.07	59	1.37
1973-74	50	89	1.78	83	1.66
1974-75	65	62	0.95	29	0.45
1975-76	76	70	0.92	25	0.33
1976-77	85	88	1.04	47	0.55
1977-78	93	91	0.98	64	0.69
1978-79	100	100	1.00	100	1.00

TABLE 1.1 (continued)

Year	Index of Prices Received for Australian WHEAT[e] [4]	Terms of Trade for WHEAT Production[c] [4]/[1]	Index of Prices Received for Australian BARLEY[f] [5]	Terms of Trade for BARLEY Production[c] [5]/[1]	Index of Prices Received for Australian OTHER CEREAL GRAINS[g] [6]	Terms of Trade for OTHER CEREAL GRAINS Production[c] [6]/[1]
1967-68	51	1.42	65	1.81	65	1.81
1968-69	49	1.36	59	1.64	59	1.64
1969-70	45	1.25	50	1.39	50	1.39
1970-71	46	1.21	51	1.34	51	1.34
1971-72	48	1.20	54	1.35	54	1.35
1972-73	49	1.14	70	1.63	70	1.63
1973-74	72	1.44	84	1.68	84	1.68
1974-75	96	1.48	99	1.52	99	1.52
1975-76	95	1.25	107	1.41	107	1.41
1976-77	86	1.01	113	1.33	113	1.33
1977-78	84	0.90	119	1.28	119	1.28
1978-79	100	1.00	100	1.00	100	1.00

TABLE 1.1 (continued)

Year	Index of Prices Received for Australian MEAT CATTLE[h] [7]	Terms of Trade for MEAT CATTLE Production[c] [7]/[1]	Index of Prices Received for Australian MILK CATTLE AND PIGS[i] [8]	Terms of Trade for MILK CATTLE AND PIGS Production[c] [8]/[1]	Index of Prices Received for Australian OTHER FARMING (SUGAR CANE, FRUIT & NUTS)[j] [9]	Terms of Trade for OTHER FARMING (SUGAR CANE, FRUIT & NUTS) Production[c] [9]/[1]
1967-68	51	1.42	64	1.78	48	1.33
1968-69	51	1.42	63	1.75	48	1.33
1969-70	52	1.44	64	1.78	47	1.31
1970-71	54	1.42	69	1.82	48	1.26
1971-72	56	1.40	76	1.90	49	1.23
1972-73	64	1.49	76	1.77	56	1.30
1973-74	73	1.46	75	1.50	71	1.42
1974-75	30	0.46	81	1.25	88	1.35
1975-76	32	0.42	85	1.12	91	1.20
1976-77	42	0.49	87	1.02	97	1.14
1977-78	46	0.49	94	1.01	96	1.03
1978-79	100	1.00	100	1.00	100	1.00

TABLE 1.1 (continued)

Year	Index of Prices Received for Australian OTHER FARMING (VEGETABLES, COTTON, OILSEEDS & TOBACCO)[k] [10]	Terms of Trade for OTHER FARMING (VEGETABLES, COTTON, OILSEEDS & TOBACCO) Production[c] [10]/[1]	Index of Prices Received for Australian POULTRY[ℓ] [11]	Terms of Trade for POULTRY Production[c] [11]/[1]
1967-68	55	1.53	52	1.44
1968-69	48	1.33	52	1.44
1969-70	41	1.14	52	1.44
1970-71	53	1.39	50	1.32
1971-72	47	1.18	48	1.20
1972-73	57	1.33	54	1.26
1973-74	88	1.76	69	1.38
1974-75	82	1.26	78	1.20
1975-76	93	1.22	82	1.08
1976-77	89	1.05	91	1.07
1977-78	82	0.88	97	1.04
1978-79	100	1.00	100	1.00

Footnotes to TABLE 1.1

a These data were obtained from Bureau of Agricultural Economics (hereafter BAE) (1980, Table 10, row 29).

b This price index was obtained from BAE (1980, Table 9, row 19).

c These ratios are plotted in Figure 1.5.

d This price index was obtained from BAE (1980, Table 9, row 21). Note that ideally an index incorporating lamb as well as sheep prices should be used. However we elected simply to use the sheep price index as a proxy.

e This price index was obtained from BAE (1980, Table 9, row 1).

f This price index was obtained from BAE (1980, Table 9, row 2). Note that only an aggregate price index for barley and other cereal grains was available.

g This price index was obtained from BAE (1980, Table 9, row 2). Note that only an aggregate price index for barley and other cereal grains was available.

h This price index was obtained from BAE (1980, Table 9, row 20).

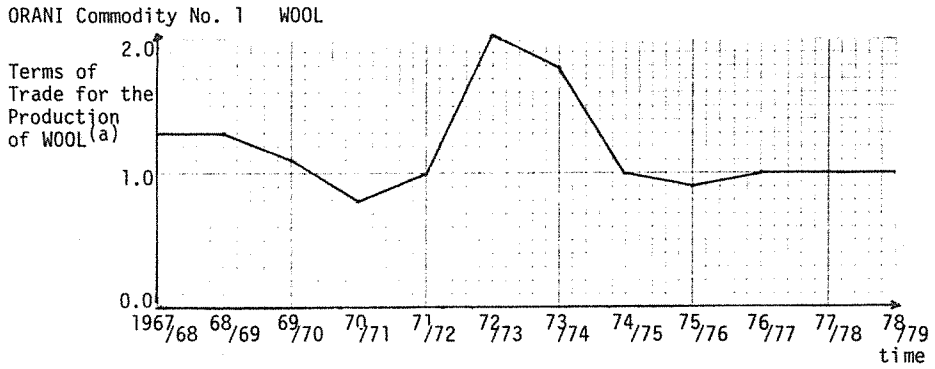
i This price index was obtained from BAE (1980, Table 9, row 28). Note that ideally an index incorporating dairy produce as well as pig prices should be used. However we elected simply to use the total dairy produce index as a proxy.

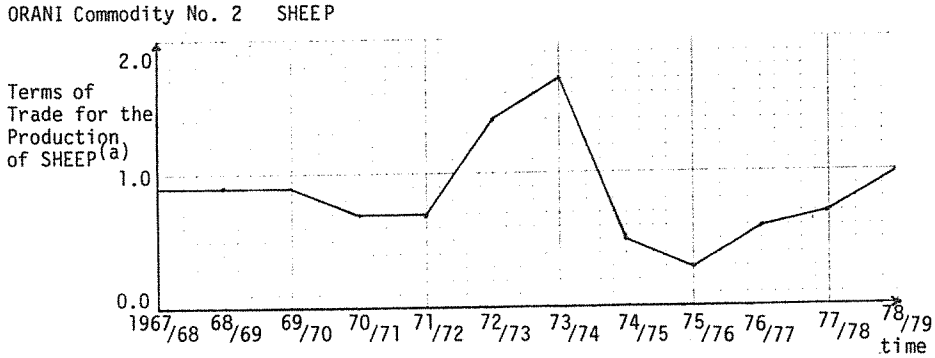
j This price index was obtained from BAE (1980, Table 9, row 18). Note that this index includes fruit, vine fruit, industrial crops, vegetables, hay and other grains prices. A more desirable index would be one that excluded vegetables, hay and other grains prices. However we elected to use this aggregate index as a proxy.

k This price index was obtained from BAE (1980, Table 9, row 7). Note that indeally an index incorporating tobacco, cotton, oilseeds and vegetable prices should be used. However we elected to simply use the total vegetables index as a proxy.

ℓ This price index was obtained from BAE (1980, Table 9, row 30).

FIGURE 1.5 : TERMS OF TRADE FOR THE PRODUCTION OF AUSTRALIAN AGRICULTURAL COMMODITIES FROM 1967-68 TO 1978-79





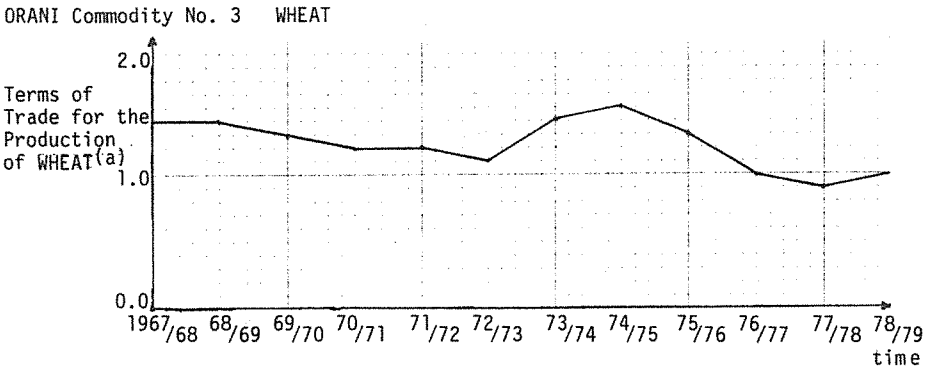
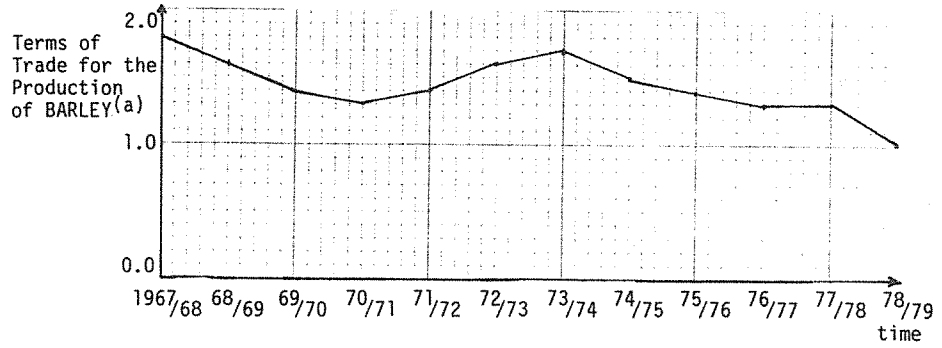
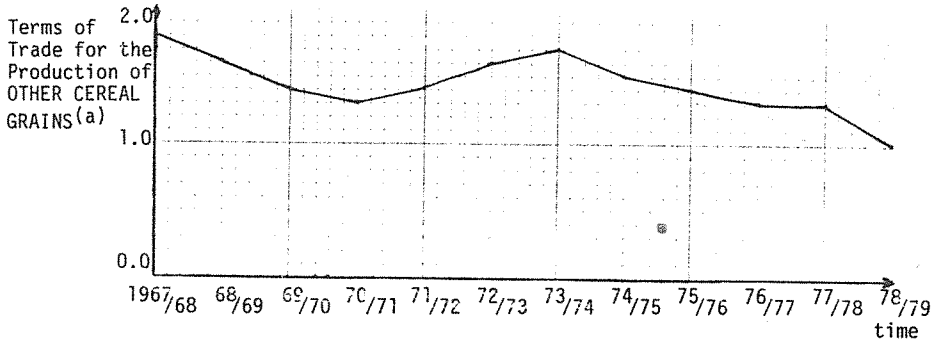


FIGURE 1.5 (continued)

ORANI Commodity No. 4 BARLEY



ORANI Commodity No. 5 OTHER CEREAL GRAINS



ORANI Commodity No. 6 MEAT CATTLE

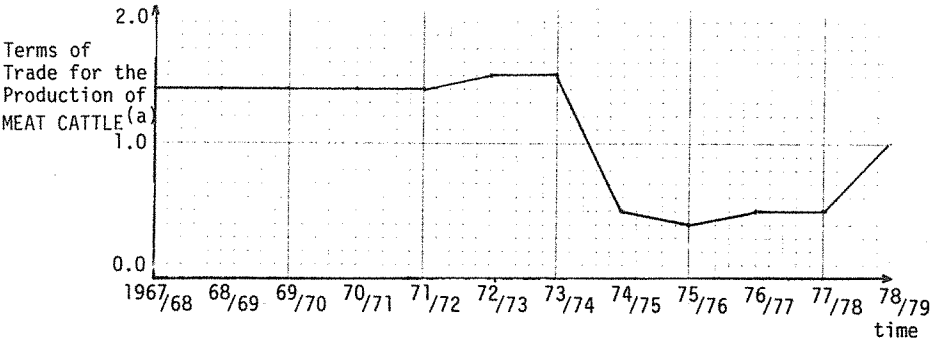
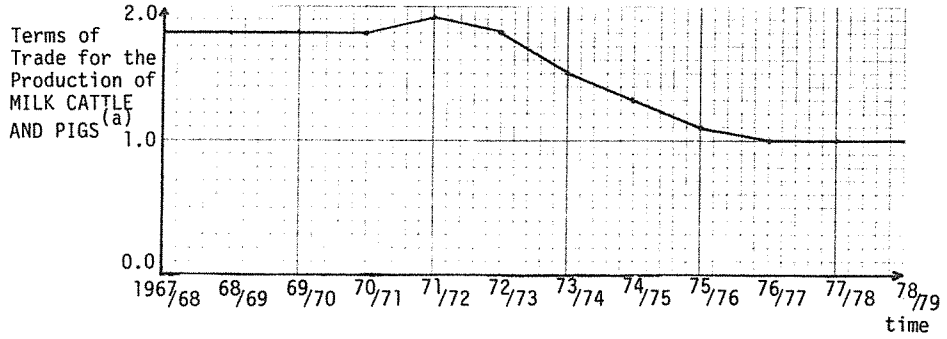
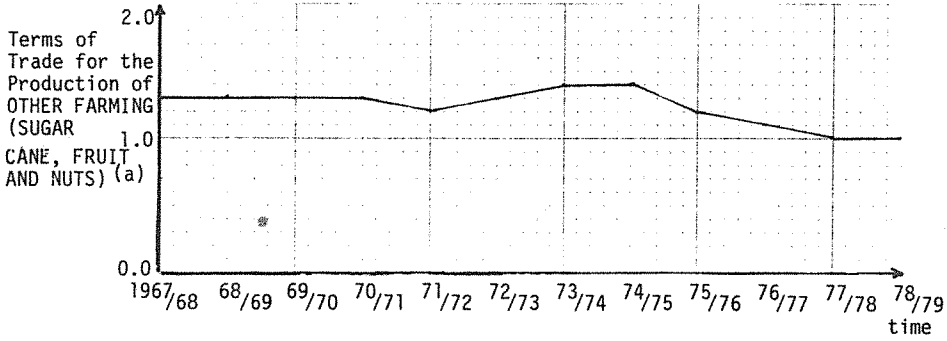


FIGURE 1.5 (continued)

ORANI Commodity No. 7 MILK CATTLE AND PIGS



ORANI Commodity No. 8 OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)



ORANI Commodity No. 9 OTHER FARMING (VEGETABLES, COTTON, OILSEEDS AND TOBACCO)

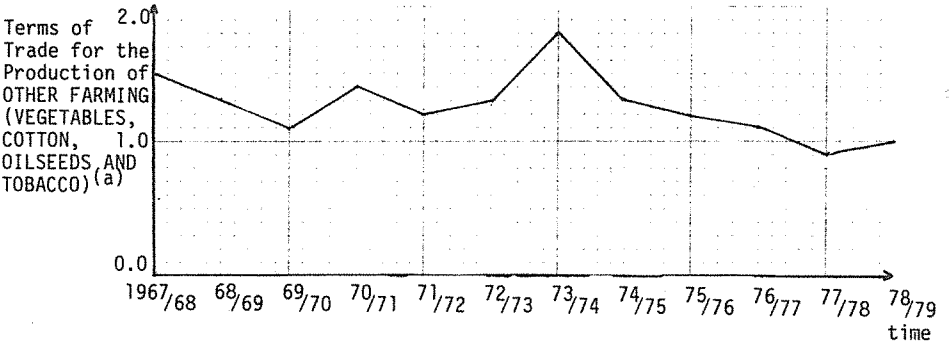
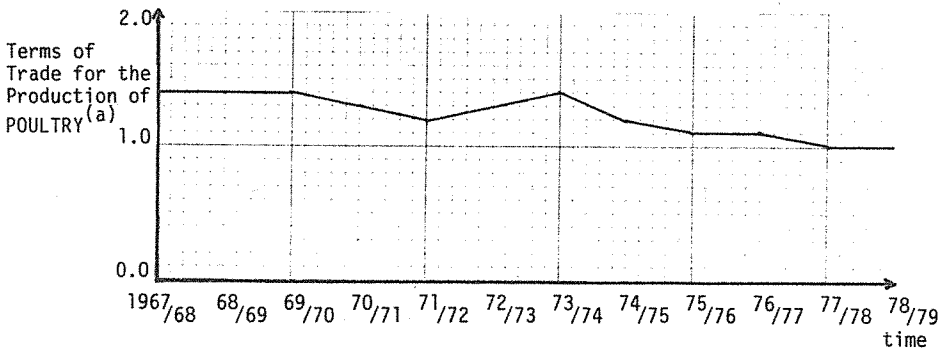


FIGURE 1.5 (continued)

ORANI Commodity No. 10 POULTRY



a The terms of trade for the production of a commodity is the ratio of an index of prices received by the farmer for that commodity to an index of prices paid by farmers for inputs to current production. See Table 1.1.

Up to now the agricultural input-output data bases supporting the ORANI model[6] have been vulnerable to drought, floods, wild fluctuations in international commodity prices, and other short-term disturbances which influence the size of the gross operating surplus and the commodity mix in particular years. The aim of this paper is to implement the Adams' typical year of input-output data for the agricultural sector in the ORANI 1977-78 data base. The conceptual typical year for the most part is interpreted in this paper to be the average over the period for which Adams collected data (e.g., the average over 1967-68 through 1979-80 values of shares of returns to agricultural land in gross operating surplus are imposed), but in some special contexts is interpreted to be the most recent in-sample trend observation (e.g., the most recent in-sample trend observation of the shares of exports in total sales are imposed for some commodities). The criterion adopted to decide between using average versus trend data is as follows: if there appeared to be random fluctuations around the average value of a variable, then the average value was adopted; if, however, a trend was strongly evident in the data, then this new information was incorporated by using the most recent in-sample trend observation. The main items affected by emergent trends were shares of production exported of some commodities (e.g., sheep). The implementation of Adams' typical-year data will ensure that subsequent projections of ORANI are based on a representation of the agricultural sector for a typical recent year. Thus the label 1977-78 on the typicalized data base should not be taken literally, this date merely indicating the year from which the non-agricultural input-output data were obtained.

The ORANI 1977-78 data base is documented in Bruce (1985). This paper in conjunction with the Bruce manuscript documents the ORANI 1977-78 data base after adjustment to reflect typical conditions in the agricultural sector. It should also be noted that whilst implementing Adams' typical-year data the entire ORANI data base was balanced, in the sense that the costs of the inputs to current production in each industry are equal to its sales.[7] It is planned to produce an integrated account of this 'typicalized-balanced' data base during 1985. This account will incorporate all of the strategic information contained in the current paper and in Bruce (1985).

The rest of the paper is organized as follows. In section 2 the estimation of the typical-year size of the agricultural sector with respect to the economy as a whole is described and the 'typicalized' ORANI 1977-78 mix of commodities produced by agricultural industries is presented. The actual implementation of the typical-year data was a two stage procedure. The first involved imposing typical-year relationships between various elements of the data base on both the sales and input sides, without regard for the constraint that the values of inputs to current production in each industry should sum to its sales. The input-output data base for the ORANI model is depicted in Figure 1.6. The first stage of the implementation involved modifications to both the sales of agricultural commodities (i.e., the rows of matrices $\tilde{A}$, $\tilde{B}$, $\tilde{C}$, $\tilde{D}$ and $\tilde{E}$) and the margins associated with these sales (i.e., the rows of matrices $\tilde{K}_1,\ldots,\tilde{K}_{g+1}$, $\tilde{L}_1,\ldots,\tilde{L}_{g+1}$, $\tilde{M}_1,\ldots,\tilde{M}_{g+1}$, $\tilde{N}_1,\ldots,\tilde{N}_{g+1}$ and $\tilde{O}_1,\ldots,\tilde{O}_{g+1}$). These modifications are explained in section 3. The inputs to current production in agricultural

Figure 1.6: Input-Output Data Base for ORANI

		Final Demands				
	Domestic industries (current production)	Domestic industries (capital formation)	Household cons'n.	Exports	Other	
	←h→	←h→	←1→	←1→	←1→	
Domestic commodities	g ↑↓ $\tilde{A}$	$\tilde{B}$	$\tilde{C}$	$\tilde{D}$	$\tilde{E}$	Row sums = total direct usage of domestic commodities
Imports	g ↑↓ $\tilde{F}$	$\tilde{G}$	$\tilde{H}$	$\underline{\underline{0}}$	$\tilde{J}$	- Duty - $\tilde{Z}$ | Rows sums = total imports (c.i.f.)
Margin type 1 — on domestic flows	g ↑↓ $\tilde{K}_1$	$\tilde{L}_1$	$\tilde{M}_1$	$\tilde{N}_1$	$\tilde{O}_1$	Row sums = total margin (type 1) on sales of each domestic commodity
Margin type 1 — on imports flows	g ↑↓ $\tilde{P}_1$	$\tilde{Q}_1$	$\tilde{R}_1$	$\underline{\underline{0}}$	$\tilde{T}_1$	Row sums = total margin (type 1) on sales of each imported commodity
Continues through margin types 2 to g						
Margin type g+1 (tax) — on domestic flows	g ↑↓ $\tilde{K}_{g+1}$	$\tilde{L}_{g+1}$	$\tilde{M}_{g+1}$	$\tilde{N}_{g+1}$	$\tilde{O}_{g+1}$	Row sums = total tax on sales of each domestic commodity
Margin type g+1 (tax) — on imports flows	g ↑↓ $\tilde{P}_{g+1}$	$\tilde{Q}_{g+1}$	$\tilde{R}_{g+1}$	$\underline{\underline{0}}$	$\tilde{T}_{g+1}$	Row sums = total tax on sales of each imported commodity
Primary inputs — Labor	M ↑↓ $\tilde{U}$	$\underline{\underline{0}}$	$\underline{\underline{0}}$	$\underline{\underline{0}}$	$\underline{\underline{0}}$	
Primary inputs — Capital	1 ↑↓ $\tilde{V}$					
Primary inputs — Land	1 ↑↓ $\tilde{W}$					
Primary inputs — Other costs	1 ↑↓ $\tilde{X}$					
	Column sums = outputs of domestic industries at basic values	Column sums = investment expenditure by each industry	Column sums = total household expenditure	Column sums = total exports	Column sums = total "other" final demand	

Domestic commodities	g ↑↓ $\tilde{Y}$ (Product-mix matrix)	Row sums = domestic output by commodity
	Column sums (of $\tilde{Y}$) = output by industry	

Source: Dixon, Parmenter, Sutton and Vincent (1982, Figure 25.1).

industries (i.e., the columns of matrices $\tilde{A}$, $\tilde{F}$, $\tilde{K}_1,\ldots,\tilde{K}_{g+1}$, $\tilde{P}_1,\ldots,\tilde{P}_{g+1}$, $\tilde{U}$, $\tilde{V}$, $\tilde{W}$ and $\tilde{X}$) were also adjusted at this stage. These adjustments are described in section 4. Once the typical-year relationships between various elements of the data base were imposed the second stage was to balance the data base so that inputs to current production in each industry equalled its total sales whilst preserving these typical-year relationships.[8] In section 5 the results of this two stage procedure are presented. An inside view of program HAMMER, which balances the data base whilst preserving typical-year relationships, is given in section 6. This discussion explains how rebalancing inevitably causes further changes in sales patterns and cost shares. An attempt is made to identify changes introduced at this stage which are so drastic as to justify being regarded as accidental distortions. Concluding remarks are offered in section 7. An appendix contains miscellaneous tables of agricultural data and listings of the AGCID computer program, which imposes the typical-year relationships between various elements of the data base, and of the HAMMER computer program.

2. ESTIMATION OF THE SIZE OF THE AGRICULTURAL SECTOR RELATIVE TO THE OVERALL ECONOMY AND OF THE AGRICULTURAL PRODUCT-MIX MATRIX IN THE TYPICAL YEAR

A three step procedure is used to estimate the typical-year size of the agricultural sector relative to the overall economy (where the latter is as represented in the ORANI 1977-78 data base). The first step involves estimating the typical-year share of Gross Farm Product, hereafter GFP, in Gross Domestic Product, hereafter GDP. Table 2.1 contains a list of these shares from 1967-68 to 1982-83. These shares are plotted in Figure 2.1. A downward trend in the size of this share can be seen in Figure 2.1, reflecting the secular decline in agriculture over the period observed. This secular decline is incorporated in the typical-year data base by declaring the 1982-83 linear trend value of the share of GFP in GDP, i.e., 0.0620, to be the typical-year share.

The second step of this three-step procedure is to compute the size of GFP that would give rise to this typical-year share when combined with the gross non-farm product, hereafter GNFP, in the ORANI 1977-78 data base. The breakdown of the returns to primary factors plus payments to other labour, i.e., the gross product or value added, in the ORANI 1977-78 data base, into its agricultural and non-agricultural components is given in Table 2.2. The GFP that would give rise to the typical-year share (0.0620) of GFP in GDP, when combined with the GNFP from the ORANI 1977-78 data base, can be calculated from:

$$0.0620 = GFP/(GFP + GNFP) \quad . \qquad (2.1)$$

TABLE 2.1 : GROSS FARM PRODUCT AND GROSS DOMESTIC PRODUCT AT FACTOR COSTS FROM 1967-68 TO 1982-83

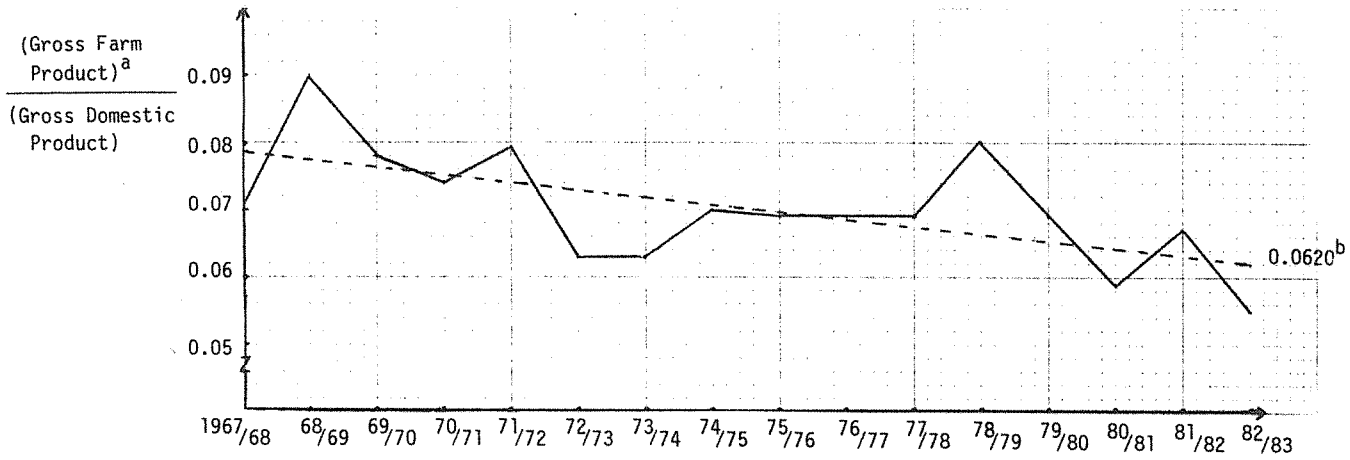
Year	Gross Farm Product at Factor Costs[a] ($m. current prices) (1)	Gross Domestic Product at Factor Costs[a] ($m. current prices) (2)	Gross Farm Product Deflator[b] (1979-80 = 100) (3)	Gross Domestic Product Deflator[b] (1979-80 = 100) (4)	Gross Farm Product at Factor Costs ($m. 1979-80 prices) (5)	Gross Domestic Product at Factor Costs ($m. 1979-80 prices) (6)	(Gross Farm Product)[c] / (Gross Domestic Product) (5)/(6)
1967-68	1844	21816	41	34	4498	64165	0.0701
1968-69	2348	24722	37	35	6346	70634	0.0898
1969-70	2189	27432	38	37	5761	74141	0.0777
1970-71	2020	30443	34	38	5941	80113	0.0742
1971-72	2351	33996	36	41	6531	82917	0.0788
1972-73	3099	38694	57	45	5437	85987	0.0632
1973-74	4168	46094	73	51	5710	90380	0.0632
1974-75	3651	55259	58	61	6295	90589	0.0695
1975-76	3436	64434	54	70	6363	92049	0.0691
1976-77	3837	73601	58	77	6616	95586	0.0692
1977-78	3722	80158	56	83	6646	96576	0.0688
1978-79	6212	90680	77	90	8068	100756	0.0801
1979-80	7037	101689	100	100	7037	101689	0.0692
1980-81	6745	115974	108	110	6245	105431	0.0592
1981-82	6934	130840	96	121	7223	108132	0.0668
1982-83	5348	142457	93	135	5751	105524	0.0545
TOTAL					100468	1444669	$\frac{100468}{1444669} = 0.0695$

(a) These data were taken from Australian Bureau of Statistics, hereafter ABS, (various issues), "Quarterly Estimates of National Income and Expenditure, Australia" (ABS catalogue No. 5206.0); ABS, "Australian National Accounts: National Income and Expenditure 1972-73" (ABS catalogue No. 5204.0); and ABS, "Australian National Accounts: National Income and Expenditure 1979-80" (ABS catalogue No. 5204.0).

(b) These implicit price deflators were derived from data contained in ABS (various issues), "Quarterly Estimates of National Income and Expenditure, Australia" (ABS catalogue No. 5206.0).

(c) These shares are graphed in Figure 2.1.

FIGURE 2.1 : THE SHARE OF GROSS FARM PRODUCT IN GROSS DOMESTIC PRODUCT FROM 1967-68 TO 1982-83



a These shares are listed in Table 2.1.

b The in-sample share for 1982-83 of a fitted linear trend was 0.0620. Let Q_n be the share of GFP in GDP in year n. The linear trend is then given by:

$$Q_n = \hat{a} + \hat{b}n$$

where $$\hat{a} = \sum_{n=1}^{N} Q_n/N - \hat{b}(N+1)/2$$

and $$\hat{b} = \left[\sum_{n=1}^{N} nQ_n/(N+1) - \sum_{n=1}^{N} Q_n/2\right] \Big/ \left[N(N-1)/12\right] .$$

Note that the number of observations, N, is equal to 16 and that for 1967-68 n=1.

When calculating the typical-year share of GFP in GDP from the data listed in Table 2.1, $\hat{a}$ = 0.0796 and $\hat{b}$ = -0.0011.

TABLE 2.2 : RETURNS TO PRIMARY FACTORS PLUS PAYMENTS TO OTHER LABOUR IN THE 1977-78 ORANI DATA BASE

	Economy-Wide ($m. 1977-78 prices)	Agriculture ($m. 1977-78 prices)	Non-Agriculture ($m. 1977-78 prices)
Returns to owner-operators' labour plus payments to other labour	53878	2080	51798
Returns to Fixed Capital	19371	436	18935
Returns to Working Capital[a]	9362	111	9251
Returns to Land	696	696	0
TOTAL	83307	3323	79984

(a) These data were obtained from Cox (1984, Tables 4.1, 5.1, 6.1 and 7.1).

When \$79984m. (1977-78 prices) is substituted from Table 2.2 into equation (2.1) for GNFP, GFP is equal to \$5287m. (1977-78 prices).

The third and final step is to convert the typical-year GFP value of \$5287m. (1977-78 prices) into a typical-year value of current production for the agricultural sector. We note that the current value of production is equal to the total value of inputs to current production. Adams' (1984b) time series on total inputs to current production in the agricultural sector, and a series on GFP's were used to compute a time series of shares of GFP in total inputs to current production. These shares are presented in Table 2.3. They are very stable over the observed period with an average value of 0.6822. The typical-year value of current production of the agricultural sector, hereafter VCPA, can be calculated from:

$$0.6822 = GFP/VCPA \quad . \tag{2.2}$$

When \$5287m. (1977-78 prices) is substituted for GFP in equation (2.2) VCPA is equal to \$7749.9267m. (1977-78 prices).

The next task in the implementation of the typical-year data base is to allocate the VCPA of \$7749.9267m. (1977-78 prices), calculated above, across commodity production levels by agricultural industries such that the following relationships are imposed:

(i) the mix of commodity production within each agricultural industry is that of the typical year;

TABLE 2.3 : RETURNS TO PRIMARY FACTORS PLUS PAYMENTS TO OTHER LABOUR AND TOTAL INPUTS TO CURRENT PRODUCTION FOR ALL OF AGRICULTURE FROM 1967-68 TO 1979-80

Year	Returns to land, fixed capital, working capital, owner-operators' labour and payments to other labour for all of agriculture[a] ($m. current prices) (1)	Total inputs to current production for all of agriculture[a] ($m. current prices) (2)	Share of returns to primary factors plus payments to other labour in total inputs to current production for all of agriculture (1)/(2)
1967-68	1989.66	3007.15	0.6616
1968-69	2497.97	3576.00	0.6985
1969-70	2232.43	3277.88	0.6811
1970-71	2073.12	3099.97	0.6688
1971-72	2092.77	3156.16	0.6631
1972-73	2861.01	4121.52	0.6942
1973-74	3695.38	5102.17	0.7243
1974-75	2940.87	4308.00	0.6827
1975-76	3010.66	4465.98	0.6741
1976-77	3442.59	4989.54	0.6900
1977-78	3764.87	5525.98	0.6813
1978-79	4541.00	6797.03	0.6681
1979-80	5614.54	8242.80	0.6811
AVERAGE			0.6822

(a) These data were obtained from Adams (1984b, Tables 3.5 and 3.6). Note that Adams' data are reproduced in Table A.3.

(ii) the mix of output by agricultural industries in the total output of the agricultural sector is that of the typical year; and

(iii) the mix of output of agricultural commodities in the total output of the agricultural sector is that of the typical year.

Adams (1984b) estimated product-mix matrices for the agricultural sector over the period 1967-68 to 1979-80. These matrices, along with the shares of each commodity's production by agricultural industry in the total output of the agricultural sector (i.e., the share of each element in the matrix in the total for the matrix) are given in Appendix Table A.1. The typical-year shares of each commodity's production by agricultural industry in the total output of the agricultural sector were estimated by taking the average of these shares over the period 1967-68 to 1979-80. The elements of the 1977-78 typical-year product-mix matrix were then obtained by multiplying these typical-year shares by $7749.9267m. (1977-78 prices) (see Table 2.4). This 1977-78 typical-year product-mix matrix has as properties the typical-year relationships (i) - (iii), listed above, and is subsequently used in this paper as a benchmark for determining the value of sales of agricultural commodities and the value of inputs to current production in the agricultural industries.

TABLE 2.4 : THE 'TYPICALIZED' 1977-78 PRODUCT-MIX MATRIX ($\tilde{Y}$) AND THE 'TYPICAL-YEAR' SHARES OF COMMODITY BY INDUSTRY OUTPUTS IN THE TOTAL OUTPUT FOR THE AGRICULTURAL SECTOR*

$m. 1977-78 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	314.0900 (.0405)[a]	57.2808 (.0074)	42.8015 (.0055)	8.4807 (.0011)	4.0809 (.0005)	73.4903 (.0095)	.5211 (.0001)	.4165 (.0001)	12.9375 (.0017)		514.0993 (.0663)
2. WHEAT-SHEEP ZONE	647.7047 (.0836)	295.5930 (.0381)	856.8674 (.1106)	148.5002 (.0192)	113.6947 (.0147)	218.2814 (.0282)	60.4960 (.0078)	2.9984 (.0004)	36.5334 (.0047)		2380.6692 (.3072)
3. HIGH RAINFALL ZONE	548.9446 (.0706)	225.7988 (.0291)	21.3978 (.0028)	19.5302 (.0025)	43.8638 (.0057)	245.7927 (.0317)	23.4925 (.0030)	6.5614 (.0008)	54.0716 (.0070)		1187.4534 (.1532)
4. NORTHERN BEEF						208.1089 (.0269)					208.1089 (.0269)
5. MILK CATTLE AND PIGS						57.9175 (.0075)	900.4899 (.1162)				958.4074 (.1237)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								1247.6984 (.1610)			1247.6984 (.1610)
7. OTHER FARMING (VEGS, COTTN, OILSEEDS & TOB.)									853.0691 (.1101)		853.0691 (.1101)
8. POULTRY										400.4210 (.0517)	400.4210 (.0517)
TOTAL OUTPUT BY COMMODITY	1508.7393 (.1947)	578.6726 (.0747)	921.0667 (.1188)	176.5111 (.0228)	161.6394 (.0209)	803.5908 (.1037)	984.9995 (.1271)	1257.6747 (.1623)	956.6116 (.1234)	400.4210 (.0517)	7749.9267 (1.0000)

* The 'typicalized' figures are estimates of the values these variables would have taken in 1977-78 had experience in the agricultural sector been typical in that year. Note that these data are required as data input by the AGCID program listed in Appendix Figure A.1.

a The typical-year shares of commodity production by agricultural industry in the total output for the agricultural sector are given in parentheses.

3. PREPARATION OF THE ORANI 1977-78 DATA ON SALES OF AGRICULTURAL COMMODITIES

This section is concerned with the imposition of typical-year relationships between various elements of the data base associated with sales of agricultural commodities, without regard for the constraint that inputs to current production in each industry should equal its sales. The first part is devoted to estimating typical-year basic-value export shares for the ORANI agricultural commodities. The implementation of these shares along with the appropriate margins and taxes associated with the sales of agricultural commodities is then discussed in the second part of this section.

The estimation of typical-year basic-value exports shares should ideally be carried out using time-series data on basic-value export shares. Unfortunately no such time-series was available; however, it was possible to compile data on exports free-on-board (hereafter f.o.b.), and on the value of production at principal markets for each of the ORANI commodities. These data are presented in Table 3.1. Exports f.o.b. is the value of the exports loaded on board overseas vessels and aircraft in Australia and hence includes all the margins and taxes associated with getting the commodity from the farm gate to the port of exit. The value of production at principal markets is the value of production calculated using wholesale prices realised at principal domestic markets: it thus includes all the margins and taxes associated with getting the commodity from the farm gate to the principal markets. The shares of exports f.o.b. in the value of

TABLE 3.1 : EXPORTS F.O.B. AND VALUE OF PRODUCTION AT PRINCIPAL MARKETS FOR EACH OF THE ORANI AGRICULTURAL COMMODITIES FROM 1967-68 TO 1982-83

ORANI Commodity No.1 WOOL

Year	Value of Production at Principal Markets[a] ($m. current prices)	Exports F.O.B.[b] ($m. current prices)	Price Index[c] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	(Exports F.O.B.) / (Production Principal Markets)[d]
1967-68	709.5	645.64	92	771.20	701.78	0.9100
1968-69	838.7	718.94	98	855.82	733.61	0.8572
1969-70	735.2	684.57	83	886.14	824.78	0.9308
1970-71	537.5	493.68	65	826.92	759.51	0.9185
1971-72	660.5	525.68	82	805.49	641.07	0.7959
1972-73	1242.6	1066.36	181	686.52	589.15	0.8582
1973-74	1229.3	1063.43	182	675.44	584.30	0.8651
1974-75	952.7	664.07	126	756.11	527.04	0.6970
1975-76	999.6	842.52	142	703.94	593.32	0.8429
1976-77	1172.5	1276.56	179	655.03	713.16	1.0887
1977-78	1206.3	993.53	186	648.55	534.16	0.8236
1978-79	1374.5	1230.95	204	673.77	603.41	0.8956
1979-80	1651.4	1287.57	244	676.80	527.69	0.7797
1980-81	1669.5	1477.76	251	665.14	588.75	0.8852
1981-82	1788.7	1572.31	258	693.29	609.42	0.8790
1982-83	1782.0	1469.66	266	669.92	552.50	0.8247
TOTAL				11650.08	10083.65	$\frac{10083.65}{11650.08}$ =0.8655

TABLE 3.1 (continued)

ORANI Commodity No.2 SHEEP

Year	Value of Production at Principal Markets[e] ($m. current prices)	Exports[f] F.O.B. ($m. current prices)	Price Index[g] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	$\frac{\text{(Exports F.O.B.)}}{\text{(Production Principal Markets)}}$[d]
1967-68	197.1	3.30	114	172.89	2.89	0.0167
1968-69	181.6	2.93	107	169.72	2.74	0.0161
1969-70	214.4	4.15	109	196.70	3.81	0.0194
1970-71	178.4	5.54	85	209.88	6.52	0.0311
1971-72	215.7	6.03	89	242.36	6.78	0.0280
1972-73	306.1	12.31	200	153.05	6.16	0.0402
1973-74	321.4	18.77	281	114.38	6.68	0.0584
1974-75	178.3	19.78	97	183.81	20.39	0.1109
1975-76	203.9	19.75	83	245.66	23.80	0.0969
1976-77	299.1	49.68	158	189.30	31.44	0.1661
1977-78	359.9	87.58	217	165.85	40.36	0.2433
1978-79	484.2	89.73	338	143.26	26.55	0.1853
1979-80	611.9	173.16	363	168.57	47.70	0.2830
1980-81	691.8	170.22	392	176.48	43.42	0.2461
1981-82	601.1	190.96	384	156.54	49.73	0.3177
1982-83	492.0	184.02	271	181.55	67.90	0.3740
TOTAL				2870.00	386.87	$\frac{386.87}{2870.00} = 0.1348$

TABLE 3.1 (continued)

ORANI Commodity No.3 WHEAT

Year	Value of Production at Principal Markets[h] ($m. current prices)	Exports, F.O.B.[i] ($m. current prices)	Price Index[j] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	(Exports F.O.B.) / (Production Principal Markets)[d]
1967-68	435.4	342.77	105	414.67	326.45	0.7873
1968-69	731.3	258.33	102	716.96	253.26	0.3532
1969-70	531.1	337.58	94	565.00	359.13	0.6356
1970-71	403.6	433.60	96	420.42	451.67	1.0743
1971-72	462.6	418.53	99	467.27	422.76	0.9047
1972-73	356.6	273.09	102	349.61	267.74	0.7658
1973-74	1311.9	517.11	150	874.60	344.74	0.3942
1974-75	1256.4	1034.39	199	631.36	519.79	0.8233
1975-76	1249.2	921.50	196	637.35	470.15	0.7377
1976-77	1051.5	863.45	177	594.07	487.82	0.8212
1977-78	994.9	1011.08	174	571.78	581.08	1.0163
1978-79	2295.8	794.25	210	1093.24	378.21	0.3460
1979-80	2478.0	2176.79	262	945.80	830.84	0.8784
1980-81	1684.1	1729.37	287	586.79	602.57	1.0269
1981-82	2599.4	1819.80	293	887.17	621.09	0.7001
1982-83	1543.0	1377.60	319	483.70	431.85	0.8928
TOTAL				10240.79	7349.15	$\frac{7349.15}{10240.79} = 0.7176$

TABLE 3.1 (continued)

ORANI Commodity No.4 BARLEY

Year	Value of Production at Principal Markets[k] ($m. current prices)	Exports F.O.B.[ℓ] ($m. current prices)	Price Index[m] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	(Exports F.O.B.)[d] / (Production Principal Markets)
1967-68	42.2	6.57	119	35.46	5.52	0.1557
1968-69	70.5	18.25	108	65.28	16.90	0.2589
1969-70	66.0	22.72	91	72.53	24.97	0.3442
1970-71	110.8	50.82	94	117.87	54.06	0.4587
1971-72	124.2	74.34	98	126.73	75.86	0.5986
1972-73	90.9	38.51	129	70.47	29.85	0.4237
1973-74	190.5	68.46	154	123.70	44.45	0.3594
1974-75	256.9	186.68	182	141.15	102.57	0.7267
1975-76	313.9	200.83	196	160.15	102.46	0.6398
1976-77	294.8	222.52	207	142.42	107.50	0.7548
1977-78	205.0	121.83	217	94.47	56.14	0.5943
1978-79	339.1	148.36	186	182.31	79.76	0.4375
1979-80	449.8	353.53	222	202.61	159.25	0.7860
1980-81	480.9	242.72	311	154.63	78.05	0.6372
1981-82	463.4	498.50	301	153.95	165.61	1.0757
1982-83	270.0	131.37	345	78.26	38.08	0.4866
TOTAL				1921.99	1141.03	$\frac{1141.03}{1921.99} = 0.5937$

TABLE 3.1 (continued)

ORANI Commodity No.5 OTHER CEREAL GRAINS

Year	Value of Production at Principal Markets[n] ($m. current prices)	Exports F.O.B.[o] ($m. current prices)	Price Index[p] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	$\frac{\text{(Exports F.O.B.)}}{\text{(Production Principal Markets)}}$[d]
1967-68	68.1	10.88	119	57.23	9.14	0.1598
1968-69	95.7	17.42	108	88.61	16.13	0.1820
1969-70	82.5	13.86	91	90.66	15.23	0.1680
1970-71	135.6	53.28	94	144.26	50.68	0.3929
1971-72	110.8	65.35	98	113.06	66.68	0.5898
1972-73	124.2	43.55	129	96.28	33.76	0.3506
1973-74	206.7	71.65	154	134.22	46.53	0.3466
1974-75	183.4	97.94	182	100.77	53.81	0.5340
1975-76	227.3	113.61	196	115.97	57.96	0.4998
1976-77	227.2	119.59	207	109.76	57.77	0.5264
1977-78	201.9	67.31	217	93.04	31.02	0.3334
1978-79	311.3	79.78	186	167.37	42.89	0.2563
1979-80	308.5	130.67	222	138.96	58.86	0.4236
1980-81	455.8	106.37	311	146.56	34.20	0.2334
1981-82	428.9	171.43	301	142.49	56.95	0.3997
1982-83	352.0	112.98	345	102.03	32.75	0.3210
TOTAL				1841.27	670.36	$\frac{670.36}{1841.27} = 0.3641$

TABLE 3.1 (continued)

ORANI Commodity No.6 MEAT CATTLE

Year	Value of Production at Principal Markets[q] ($m. current prices)	Exports F.O.B.[r] ($m. current prices)	Price Index[s] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	$\frac{\text{(Exports F.O.B.)}}{\text{(Production Principal Markets)}}$[d]
1967-68	531.1	0.56	139	382.09	0.40	0.0011
1968-69	558.4	0.74	140	398.86	0.53	0.0013
1969-70	627.5	0.39	143	438.81	0.27	0.0006
1970-71	642.3	0.29	149	431.07	0.19	0.0004
1971-72	717.6	0.86	153	469.02	0.56	0.0012
1972-73	1021.7	2.97	175	583.83	1.70	0.0029
1973-74	1069.1	7.68	109	980.83	7.05	0.0072
1974-75	523.4	3.01	82	638.29	3.67	0.0058
1975-76	706.3	4.91	88	802.61	5.58	0.0070
1976-77	1010.8	7.40	116	871.38	6.38	0.0073
1977-78	1176.9	10.37	127	926.69	8.17	0.0088
1978-79	2154.6	20.73	274	786.35	7.57	0.0096
1979-80	2386.0	22.29	372	641.40	5.99	0.0093
1980-81	2056.5	38.22	344	597.82	11.11	0.0186
1981-82	1890.1	34.60	289	654.01	11.97	0.0183
1982-83	1985.0	28.93	333	596.10	8.70	0.0146
TOTAL				10199.16	79.84	$\frac{79.84}{10199.16} = 0.0078$

TABLE 3.1 (continued)

ORANI Commodity No.7 MILK CATTLE AND PIGS

Year	Value of Production at Principal Markets[t] ($m. current prices)	Exports F.O.B.[u] ($m. current prices)	Price Index[v] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	$\frac{\text{(Exports F.O.B.)}}{\text{(Production Principal Markets)}}$[d]
1967-68	459.2	0.42	103	445.83	0.41	0.0009
1968-69	469.7	0.52	101	465.05	0.51	0.0011
1969-70	510.0	0.46	102	500.00	0.45	0.0009
1970-71	530.6	0.66	110	482.36	0.60	0.0012
1971-72	569.1	0.74	122	466.48	0.61	0.0013
1972-73	587.8	0.84	121	485.79	0.69	0.0014
1973-74	640.6	0.80	120	533.83	0.67	0.0013
1974-75	696.2	1.03	130	535.54	0.79	0.0015
1975-76	673.6	3.64	136	495.29	2.68	0.0054
1976-77	718.3	2.40	139	516.76	1.73	0.0033
1977-78	769.9	0.00	150	513.27	0.00	0.0000
1978-79	879.4	5.04	160	549.63	3.15	0.0057
1979-80	988.3	5.22	181	546.02	2.88	0.0053
1980-81	1168.5	6.41	212	551.18	3.02	0.0055
1981-82	1375.1	6.81	252	545.67	2.70	0.0050
1982-83	1523.0	5.89	280	543.93	2.10	0.0039
TOTAL				8176.63	22.99	$\frac{22.99}{8176.63} = 0.0028$

TABLE 3.1 (continued)

ORANI Commodity No.8 OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)

Year	Value of Production at Principal Markets[w] ($m. current prices)	Exports[x] F.O.B. ($m. current prices)	Price Index[y] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	$\frac{\text{(Exports F.O.B.)}}{\text{(Production Principal Markets)}}$[d]
1967-68	423.4	48.31	109	388.44	44.32	0.1141
1968-69	482.2	48.95	108	446.48	45.32	0.1015
1969-70	470.8	45.37	106	444.15	42.80	0.0964
1970-71	488.6	51.46	109	448.26	47.21	0.1053
1971-72	535.2	46.21	110	486.55	42.01	0.0864
1972-73	609.3	59.07	127	479.76	46.51	0.0970
1973-74	643.8	50.73	159	404.91	31.91	0.0788
1974-75	966.9	48.89	198	488.33	24.69	0.0506
1975-76	911.9	55.80	204	447.01	27.35	0.0612
1976-77	1010.9	48.84	218	463.72	22.40	0.0483
1977-78	1014.2	67.90	215	471.72	31.58	0.0670
1978-79	1090.3	77.00	225	484.58	34.22	0.0706
1979-80	1357.1	114.71	261	519.96	43.95	0.0845
1980-81	1520.7	132.63	325	467.91	40.81	0.0872
1981-82	1382.8	115.09	299	462.47	38.49	0.0832
1982-83	1291.0	126.10	312	413.78	40.42	0.0977
TOTAL				7318.03	603.99	$\frac{603.99}{7318.03} = 0.0825$

TABLE 3.1 (continued)

ORANI Commodity No.9 OTHER FARMING (VEGETABLES, COTTON, OILSEEDS AND TOBACCO

Year	Value of Production at Principal Markets[z] ($m. current prices)	Exports F.O.B.[aa] ($m. current prices)	Price Index[bb] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	$\frac{\text{(Exports F.O.B.)}}{\text{(Production Principal Markets)}}$[d]
1967-68	299.7	8.56	130	230.54	230.54	0.0286
1968-69	337.6	12.05	114	296.14	10.57	0.0357
1969-70	303.4	15.67	97	312.78	16.15	0.0516
1970-71	338.6	15.62	126	268.73	12.40	0.0461
1971-72	364.8	24.96	111	328.65	22.49	0.0684
1972-73	401.4	30.54	135	297.33	22.62	0.0761
1973-74	505.8	19.29	210	240.86	9.19	0.0381
1974-75	541.1	60.85	195	277.49	31.21	0.1125
1975-76	546.1	51.10	222	245.99	23.02	0.0936
1976-77	605.3	33.31	213	284.18	15.64	0.0550
1977-78	690.9	41.94	196	352.50	21.40	0.0607
1978-79	876.0	74.38	238	368.07	31.25	0.0849
1979-80	947.4	139.26	260	364.38	53.56	0.1470
1980-81	1264.4	57.48	336	376.31	17.11	0.0455
1981-82	1437.5	149.43	326	440.95	45.84	0.1040
1982-83	1357.0	79.66	315	430.79	25.29	0.0587
TOTAL				5115.69	364.32	$\frac{364.32}{5115.69} = 0.0712$

TABLE 3.1 (continued)

ORANI Commodity No.10 POULTRY

Year	Value of Production at Principal Markets[cc] ($m. current prices)	Exports F.O.B.[dd] ($m. current prices)	Price Index[ee] (1960-61 to 1962-63 average = 100)	Deflated Value of Production at Principal Markets	Deflated Value of Exports F.O.B.	$\frac{\text{(Exports F.O.B.)}}{\text{(Production Principal Markets)}}^{d}$
1967-68	140.0	1.46	93	150.54	1.57	0.0104
1968-69	142.0	1.38	93	152.69	1.48	0.0097
1969-70	153.9	1.11	93	165.48	1.19	0.0072
1970-71	166.9	1.12	89	187.53	1.26	0.0067
1971-72	172.3	1.63	86	200.35	1.90	0.0095
1972-73	182.0	1.64	97	187.63	1.69	0.0090
1973-74	232.7	1.12	124	187.66	0.90	0.0048
1974-75	246.3	1.11	139	177.19	0.80	0.0045
1975-76	258.9	1.27	146	177.33	0.87	0.0049
1976-77	296.4	0.86	163	181.84	0.53	0.0029
1977-78	356.0	1.04	174	204.60	0.60	0.0029
1978-79	378.2	1.14	179	211.28	0.64	0.0030
1979-80	466.2	1.52	202	230.79	0.75	0.0033
1980-81	545.7	1.94	224	243.62	0.87	0.0036
1981-82	558.1	4.23	247	225.95	1.71	0.0076
1982-83	623.0	2.34	255	244.31	0.92	0.0038
TOTAL				3128.79	17.68	$\frac{17.68}{3128.79} = 0.0057$

Footnotes to TABLE 3.1

a These data were obtained from Bureau of Agricultural Economics (hereafter BAE) (1980, Table 4, row 26) and unpublished BAE data. Production of the various commodities is valued at the wholesale prices realised in the principal markets. Gross value of agricultural commodities produced includes amounts paid as subsidy etc.

b These data were calculated from the Australian Bureau of Statistics, hereafter ABS, (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity wool consisted of the following Australian Export Commodity Classifications, hereafter AECC. For data from 1967-68 to 1977-78 it included 262.10.01 and 262.10.11. For 1978-79 the classification system changed again such that it consisted of 268.10.01 and 268.10.11. Then in 1979-80 it changed again so that it was made up of 268.10.21, 268.10.22, 268.10.23, 268.10.24, 268.10.31, 268.10.32, 268.10.33 and 268.10.34. In 1980-81 it changed once more such that for 1980-81 to 1982-83 it consisted of 211.60.01, 211.60.05, 211.60.09, 211.60.13, 211.60.19, 211.60.21, 211.60.25, 211.70.11, 268.10.21, 268.10.22, 268.10.23, 268,10.24, 268.10.31, 268.10.32, 268.10.33 and 268.10.34. Exports Free On Board (F.O.B) is the value of exports loaded on board overseas vessels and aircraft in Australia.

c This price index was obtained from BAE (1980, Table 9, row 19) and unpublished BAE data.

d These shares are plotted in Figure 3.1.

e These data were obtained from BAE (1980, Table 4, row 28) and unpublished BAE data.

f These data are estimates of the exports of live sheep. They were calculated from ABS (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity sheep consisted of the following AECCs. For data from 1967-68 to 1969-70 it included 001.20.01 and 001.20.09. For 1970-71 to 1977-78 the classification system changed such that it consisted of 001.20.02, 001.20.04, 001.20.06 and 001.20.18. Then in 1979-80 it changed again so that for 1979-80 to 1982-83 it is made up of 001.21.01, 001.21.05, 001.21.09 and 001.21.19.

g This price index was obtained from BAE (1980, Table 9, row 21) and unpublished BAE data. Note that ideally an index incorporating lamb as well as sheep prices should be used. However we elected simply to use the sheep price index as a proxy.

h These data were obtained from BAE (1980, Table 4, row 1) and unpublished BAE data.

i These data were calculated from ABS (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity wheat consisted of the following AECCs. For data from 1967-68 to 1968-69 it was simply category 041.00.00. For 1969-70 to 1977-78 the classification system changed such that it consisted of 041.00.01 and 041.00.09. Then in 1979-80 it changed again so that for 1979-80 to 1982-83 it is made up of 041.10.01, 041.10.05, 041.20.01 and 041.20.05. Note that these export data can be obtained to a good approximation from BAE (1980, Table 7, row 1 less exports of flour) for 1967-68 to 1978-79.

j This price index was obtained from BAE (1980, Table 9, row 1) and unpublished BAE data.

k These data were obtained from BAE (1980, Table 4, row 2) and unpublished BAE data.

l These data were calculated from ABS (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity barley consisted of the following AECCs. For data from 1967-68 to 1968-69 it was simply category 043.00.00. For 1969-70 to 1977-78 the classification system changed such that it consisted of 043.00.01, 043.00.02, 043.00.04, 043.00.05, 043.00.08 and 043.00.09. Then in 1979-80 it changed again so that for 1979-80 to 1982-83 it is made up of 043.00.01, 043.00.03, 043.00.05, 043.00.07, 043.00.11 and 043.00.13. Note that these export data can be obtained to a good approximation from BAE (1980, Table 7, row 2).

m This price index was obtained from BAE (1980, Table 9, row 2) and unpublished BAE data. Note that only an aggregate price index for barley and other cereal grains was available.

n These data were obtained from BAE (1980, Table 4, rows 3, 4, 5 and 6) and unpublished BAE data.

o These data were calculated from ABS (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity other grains consisted of the following AECCs. For 1967-68 it was simply categories 042.10.01 and 042.10.09. Then in 1968-69 the classification system changed such that it consisted of 042.10.11, 042.10.19, 044.00.00, 045.10.00, 045.20.00, 045.90.01, 045.90.03, 045.90.05 and 045.90.09. For 1969-70 to 1974-75 it changed again such that it included 042.10.11, 042.10.19, 044.00.00, 045.10.00, 045.20.01, 045.20.09, 045.90.01, 045.90.03, 045.90.04, 045.90.06 and 045.90.09. For 1975-76 to 1977-78 we observe another change such that it is made up of 042.10.01, 042.10.04, 042.10.19, 044.00.00, 045.10.00, 045.20.01, 045.20.09, 045.90.01, 045.90.03, 045.90.04, 045.90.06 and 045.90.09. In 1979-80 it changed yet again such that for 1979-80 to 1982-83 it consisted of 042.11.00, 042.12.01, 042.12.03, 042.12.09, 044.00.00, 045.10.00, 045.20.01, 045.20.03, 045.91.01, 045.91.09, 045.92.01, 045.92.05, 045.99.01 and 045.99.09. Note that these export data can be obtained to a good approximation from BAE (1980, Table 7, rows 3, 4 and 5 less exports of milled rice).

p This price index was obtained from BAE (1980, Table 9, row 2) and unpublished BAE data. Note that only an aggregate price index for barley and other cereal grains was available.

q These data were obtained from BAE (1980, Table 4, row 27) and unpublished BAE data.

r These data are estimates of the exports of live meat cattle. They were calculated from ABS (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI category meat cattle consisted of the following AECCs. For data from 1967-68 to 1977-78 it included 001.10.01 and 001.10.09. In 1979-80 the classification system changed such that for 1979-80 to 1982-83 it was made up of 001.11.000 and 001.19.00.

s This price index was obtained from BAE (1980, Table 9, row 20) and unpublished BAE data.

t These data were obtained from BAE (1980, Table 4, rows 29 and 32) and unpublished BAE data.

u These data were calculated from ABS (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity milk cattle and pigs consisted of the following AECCs. For data from 1967-68 to 1973-74 it was simply category 022.30.00. For 1974-75 to 1982-83 the classification system changed such that it consisted of 001.30.00 and 022.30.01.

v This price index was obtained from BAE (1980, Table 9, row 28) and unpublished BAE data. Note that ideally an index incorporating dairy produce as well as pig prices should be used. However we elected simply to use the total dairy produce index as a proxy.

w These data were obtained from unpublished BAE data. They correspond to the data listed in BAE (1980, Table 4, rows 7, 9, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 less its fodder component).

x These data were calculated from ABS (various issues) Overseas Trade Australia Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity other farming (sugar, fruits and nuts) consisted of the following AECCs. For data from 1967-68 to 1970-71 it included 051.10.01, 051.10.09, 051.20.01, 051.20.05, 051.20.09, 051.30.00, 051.40.00, 051.50.00, 051.71.00, 051.72.00, 051.92.01, 051.92.09, 051.93.01, 051.93.09, 051.93.11, 051.93.19, 051.94.05, 051.94.09, 051.95.01, 051.95.05, 051.95.09, 051.99.01, 051.99.09, 052.03.01, 052.03.02, 052.03.07, and 052.03.09. For 1971-72 to 1974-75 the classification system changed such that category 051.94.05 was replaced by 051.94.07. For 1975-76 to 1977-78 it changed again such that categories 051.93.01, 051.93.09, 051.95.01 and 051.95.05 were excluded and in their place we find 051.93.02 and 051.95.02. In 1978-79 it changed yet again such that it was then made up of 057.11.00, 057.12.00, 057.21.00, 057.22.00, 057.29.00, 057.40.00, 057.51.00, 057.52.01, 057.52.03, 057.52.05, 057.52.07, 057.76.00, 057.78.00, 057.91.01, 057.91.05, 057.91.07, 057.92.01, 057.92.05, 057.93.01, 057.93.11, 057.93.19, 057.94.01, 057.94.07, 057.98.01 and 057.98.07. In 1979-80 category 057.91.01 was excluded.

For 1980-81 to 1982-83 categories 057.30.00, 057.60.01 and 057.91.01 were included and 057.91.07 was excluded. Note that these export data can be obtained to a good approximation from BAE (1980, Table 7, rows 8, 9, 10 and 11 plus exports of other unprocessed other farming (sugar cane, fruit and nuts commodities).

y This price index was obtained from BAE (1980, Table 9, row 18) and unpublished BAE data. Note that this index includes fruit, vine fruit, industrial crops, vegetables, hay and other grains prices. A more desirable index would be one that excluded vegetables, hay and other grains prices. However we elected to use this aggregate index as a proxy.

z These data were obtained fron unpublished BAE data. they correspond to the data listed in BAE (1980, Table 4, rows 8, 10, 11, 12, 13, 14 and the fodder component of 24).

aa These data were calculated from ABS (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity other farming (vegetables, cotton, oilseeds and tobacco) consisted of the following AECCs. For 1967-68 it included 001.20.11, 001.50.01, 001.50.03, 001.50.05, 001.50.09, 001.90.00, 045.90.07, 054.10.00, 054.40.00, 054.50.01, 054.50.03, 054.50.05, 054.50.09, 081.11.00, 081.12.01, 081.12.05, 081.12.09, 221.40.00, 221.50.00, 221.60.00, 221.80.00 and 263.00.00. For 1968-69 to 1971-72 the classification system changed such that category 263.00.00 was excluded and included were categories 263.10.00 and 263.20.00. In 1972-73 it changed again such that categories 054.50.05 and 221.80.00 were left out and in their place we find 054.50.04, 221.80.01 and 221.80.09. In 1973-74 it changed yet again such that categories 054.50.09 and 221.80.09 were excluded and 054.50.11, 054.50.19 and 221.80.19 were included, plus the following new categories 292.40.01, 292.40.09, 292.50.03, 292.50.07, 292.50.09, 292.50.11, 292.50.15, 292.50.17, 292.50.19, 292.50.21, 292.50.29, 292.60.00, 292.70.01 and 292.70.09. For 1974-75 to 1976-77 categories 292.50.15 and 292.50.21 were excluded and included were 292.50.05, 292.50.13, 292.50.14, 292.50.15, 292.50.18, 292.50.25, and 292.50.27. For 1977-78 to 1978-79 it changed again such that 081.12.01, 081.12.05 and 081.12.09 were excluded and included were 081.12.02, 081.12.06 and 081.12.19. In 1979-80 it changed once more such that 001.20.11, 001.50.09, 045.90.07, 054.50.01, 054.50.03, 054.50.04, 054.50.06, 054.50.11, 054.50.19, 081.12.02, 081.12.06, 221.40.00, 221.50.00, 221.60.00, 221.80.01, 221.80.19, 292.70.01 and 292.70.09 were excluded whilst 001.22.00, 001.50.07, 045.99.05, 054.51.01, 054.51.09, 054.51.19, 054.59.01, 054.59.03, 054.59.05, 054.59.09, 081.12.01, 081.12.11, 222.20.00, 222.30.00, 222.40.00, 222.50.00, 292.71.01 and 292.71.09 were included. Finally in 1980-81 it changed such that for 1980-81 to 1982-83 categories 001.22.01, 001.22.09, 054.20.01 and 223.80.00 were included and categories 001.22.00, 045.99.05, 081.11.00 and 222.20.00 were excluded.

bb This price index was obtained from BAE (1980, Table 9, row 7) and unpublished BAE data. Note that ideally an index incorporating tobacco, cotton, oilseeds and vegetable prices should be used. However we elected to simply use the total vegetables index as a proxy.

cc These data were obtained from BAE (1980, Table 4, rows 30 and 31) and unpublished BAE data.

dd These data were calculated from ABS (various issues) Overseas Trade Australia, Part 1: Exports and Imports (ABS cat. no. 5409.0). Exports of the ORANI commodity poultry consisted of the following AECCs. For 1967-68 to 1977-78 it included 001.40.01, 001.40.09 and 025.00.01. For 1978-79 to 1979-80 the classification system changed such that for 1979-80 to 1982-83 it consisted of 001.41.01, 001.41.09, 001.49.00 and 025.10.00.

ee This price index was obtained from BAE (1980, Table 9, row 30) and unpublished BAE data.

production at principal markets are plotted in Figure 3.1. The typical-year values of these shares are presented in Table 3.2. For the commmodities sheep and barley a significant upward trend in the share value can be observed in Figure 3.1. For these commodities the 1982-83 trend values were declared to be the typical-year share values (see Table 3.2).

The next step is to convert the typical-year shares of exports f.o.b. in the value of production at principal markets into typical-year shares of basic-value exports in total basic-value sales. This can be achieved by the multiplication of the following three shares:

(a) the typical-year shares of exports f.o.b. in the value of production at principal markets, as listed in Table 3.2;

(b) the typical-year shares of basic-value exports in exports f.o.b.; and

(c) the typical-year shares of the value of production at principal markets in the (farm gate) basic value of production.

Share (b), the typical-year share of basic-value exports in exports f.o.b., was estimated for each agricultural commodity from data contained in the ORANI 1968-69, 1974-75 and 1977-78 data bases. These data are listed in Appendix Table A.2. Each typical-year share was calculated by taking the average of the share as given in the three ORANI data bases (Table 3.3). Share (c), the typical-year share of value of production at principal markets

FIGURE 3.1 : THE SHARE OF EXPORTS F.O.B. IN VALUE OF PRODUCTION AT PRINCIPAL MARKETS FOR EACH OF THE ORANI AGRICULTURAL COMMODITIES FROM 1967-68 to 1982-83

)RANI Commodity No.1 WOOL

(Exports F.O.B.) / (Production Principal Markets)

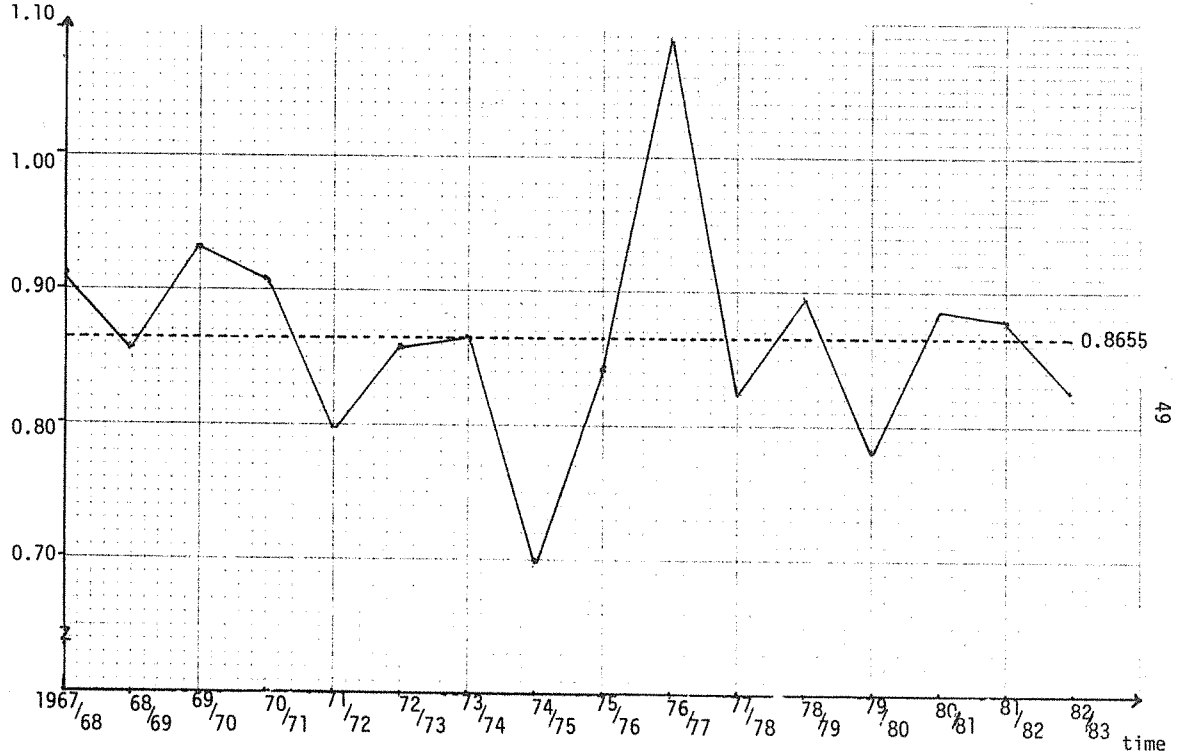
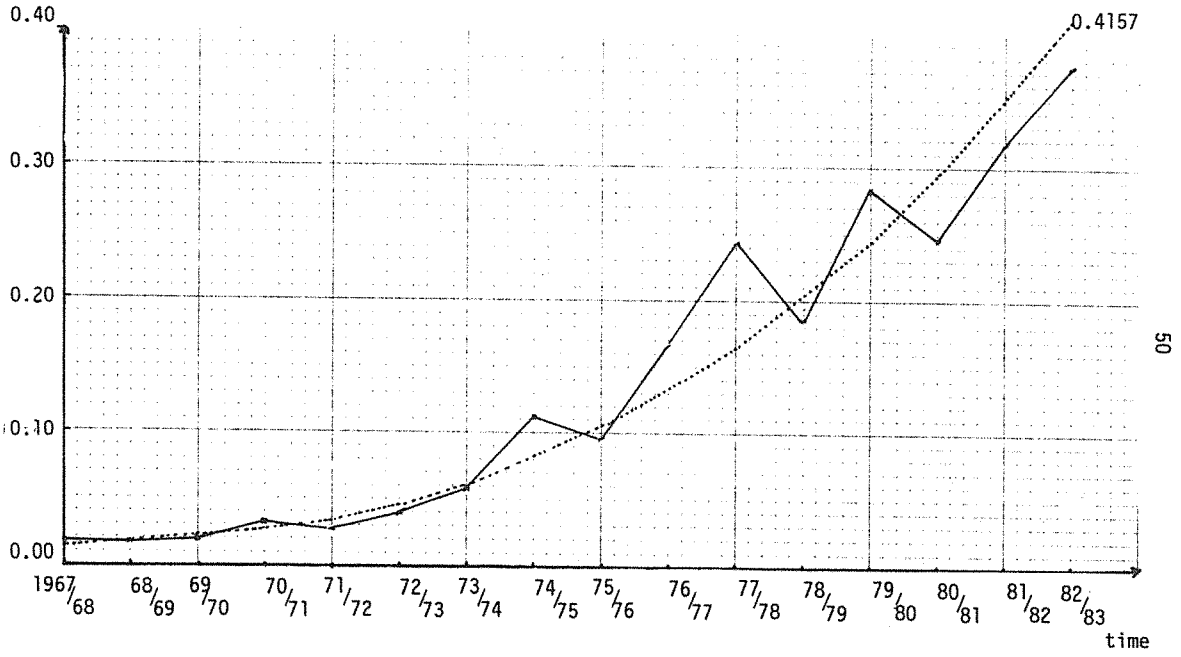


FIGURE 3.1 (continued)

ORANI Commodity No.2 SHEEP

(Exports F.O.B.)

(Production Principal Markets)



(Exports F.O.B.)

(Production Principal Markets)

FIGURE 3.1 (continued)

ORANI Commodity No. 3 WHEAT

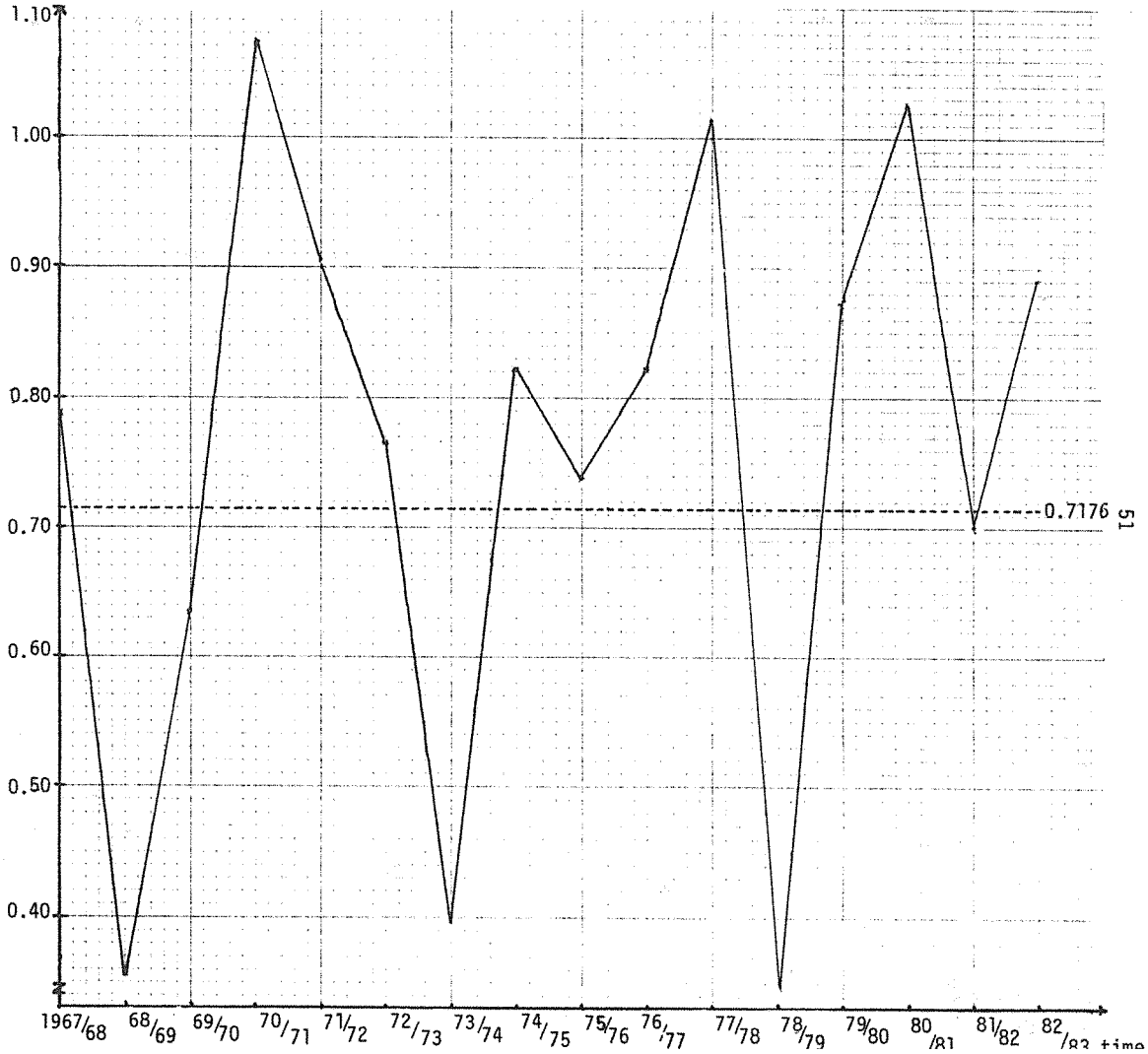


FIGURE 3.1 (continued)

ORANI Commodity No.4 BARLEY

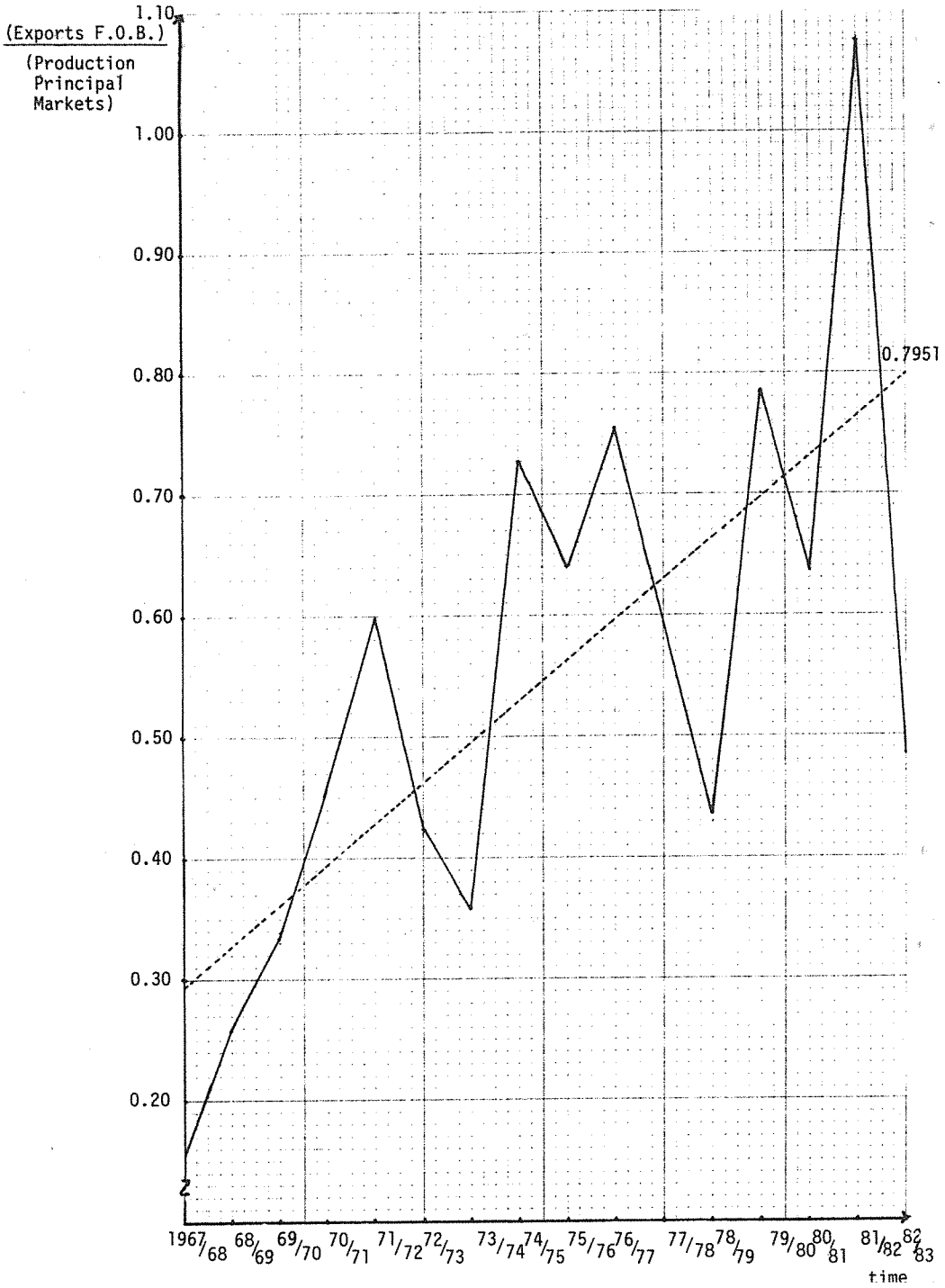


FIGURE 3.1 (continued)

ORANI Commodity No.5 OTHER CEREAL GRAINS

(Exports F.O.B.)

(Production Principal Markets)

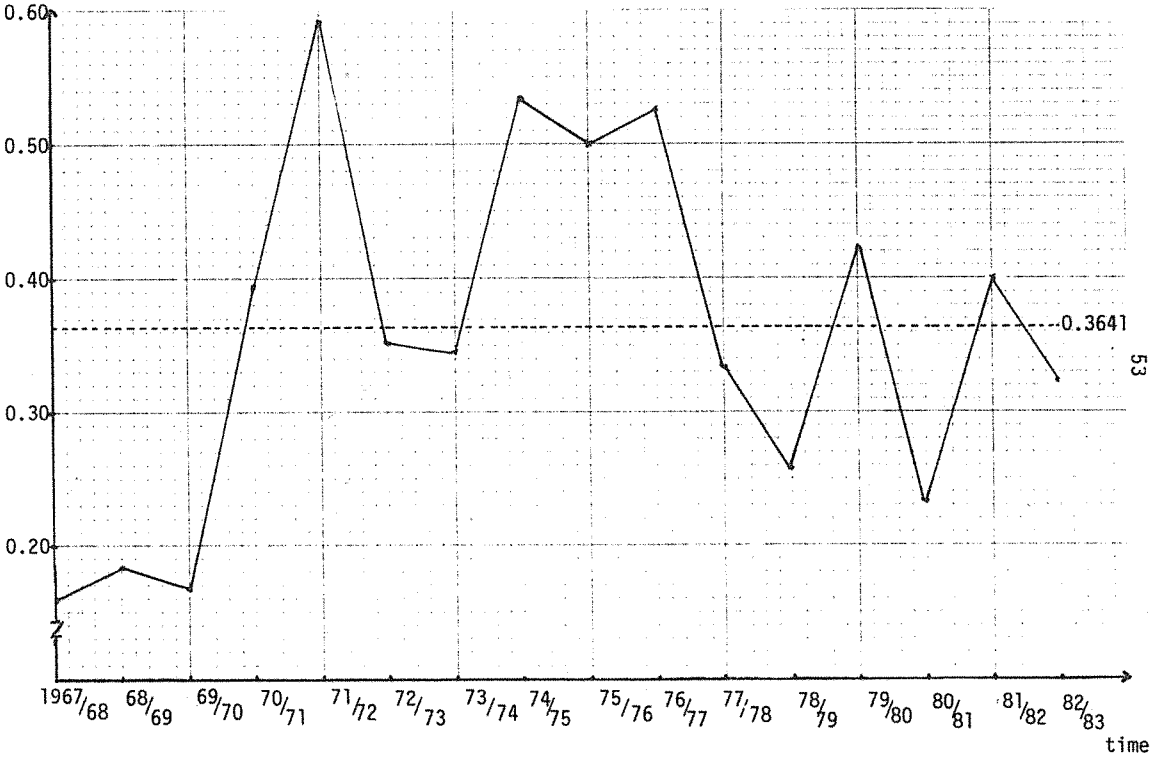
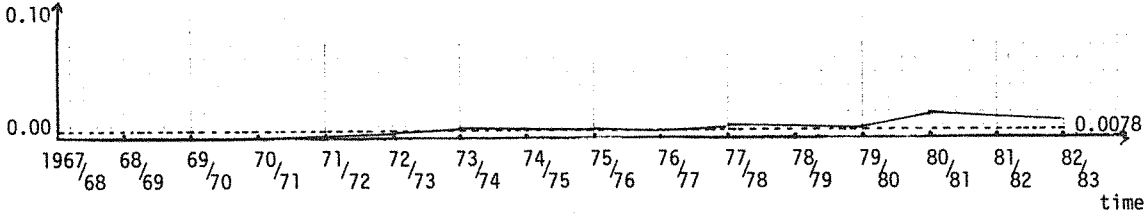


FIGURE 3.1 (continued)

ORANI Commodity No.6 MEAT CATTLE

(Exports F.O.B.)

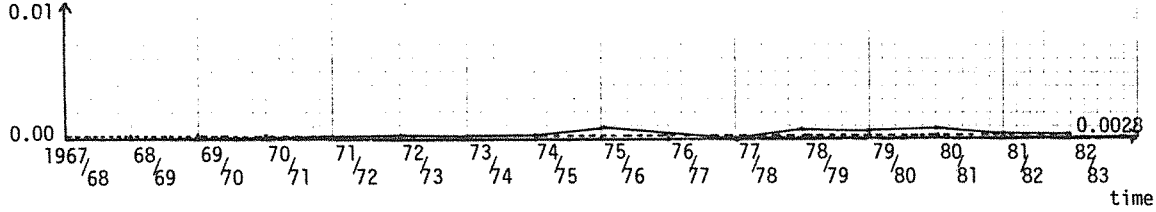
(Production Principal Markets)



ORANI Commodity No.7 MILK CATTLE AND PIGS

(Exports F.O.B.)

(Production Principal Markets)



ORANI Commodity No.8 OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)

(Exports F.O.B.)

(Production Principal Markets)

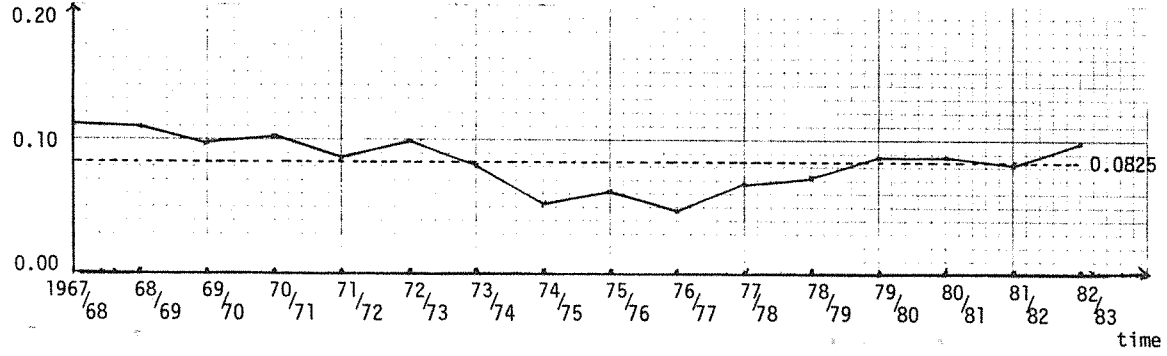
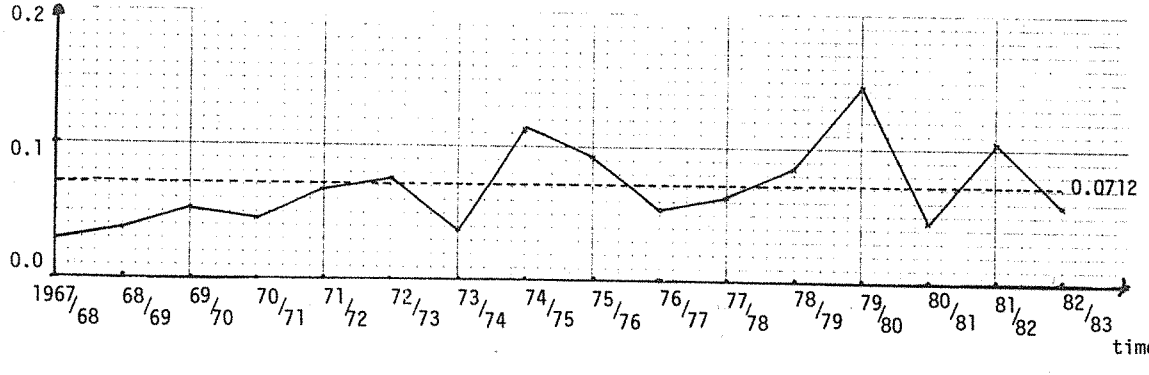


FIGURE 3.1 (continued)

ORANI Commodity No.9 OTHER FARMING (VEGETABLES, COTTON, OILSEEDS AND TOBACCO)

(Exports F.O.B.)

(Production Principal Markets)



ORANI Commodity No.10 POULTRY

(Exports F.O.B.)

(Production Principal Markets)

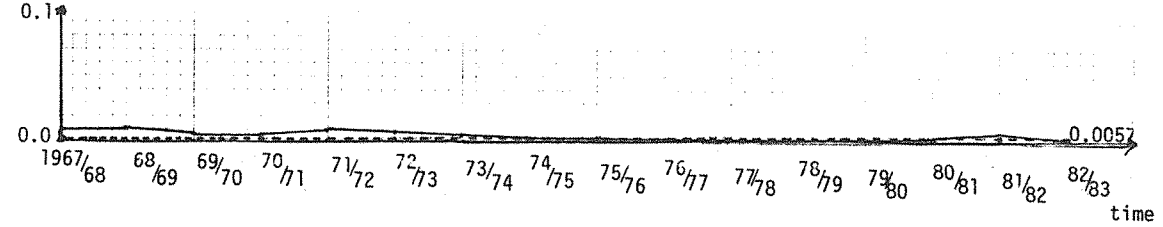


TABLE 3.2 : 'TYPICAL-YEAR' SHARES OF EXPORTS F.O.B. IN VALUE OF PRODUCTION AT PRINCIPAL MARKETS FOR EACH OF THE ORANI AGRICULTURAL COMMODITIES

	Commodity	'Typical-Year' Share of Exports f.o.b. in Value of Production at Principal Markets	Basis of Decision
1.	Wool	0.8655	Deflated value of exports f.o.b. from 1967-68 to 1982-83 divided by the deflated value of production at principal markets from 1967-68 to 1982-83.
2.	Sheep	0.4157	The in-sample share for 1982-83 of a fitted logistic trend with a ceiling parameter of 1.0[a].
3.	Wheat	0.7176	Same basis as for wool above.
4.	Barley	0.7951	The in-sample share for 1982-83 of a fitted linear trend.[b]
5.	Other Cereal Grains	0.3641	Same basis as for wool above.
6.	Meat Cattle	0.0078	Same basis as for wool above.
7.	Milk Cattle and Pigs	0.0028	Same basis as for wool above.
8.	Other Farming (Sugar Cane, Fruit and Nuts)	0.0825	Same basis as for wool above.
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.0712	Same basis as for wool above.
10.	Poultry	0.0057	Same basis as for wool above.

a Let S_{in} be the share of exports f.o.b. of commodity i in value of output at principal markets of commodity i in year n. Let $Q_{in} = \ell n((\kappa - S_{in})/S_{in})$. The ceiling parameter, κ, is set to 1.0. The logistic trend is then given by:

$$Q_{in} = \hat{a}_i + \hat{b}_i n \ ,$$

where
$$\hat{a}_i = \sum_{n=1}^{N} Q_{in}/N - \hat{b}_i(N+1)/2$$

and
$$\hat{b}_i = \left[\sum_{n=1}^{N} nQ_{in}/(N+1) - \sum_{n=1}^{N} Q_{in}/2\right] \Big/ \left[N(N-1)/12\right] .$$

Note that the number of observations, N, is equal to 16 and that for 1967-68 n=1. When calculating the 'typical-year' share for sheep from the data listed in Table 2.4, $\hat{a} = 4.5372$ and $\hat{b} = -0.2623$.

b The equations for the linear trend can be obtained from footnote (a) above by setting the $Q_{in} = S_{in}$ for all i and n. When calculating the 'typical-year' share for barley from the data listed in Table 2.4, $\hat{a} = 0.2639$ and $\hat{b} = 0.0332$.

TABLE 3.3 : SHARES OF THE BASIC VALUE OF EXPORTS OF AGRICULTURAL COMMODITIES IN THEIR F.O.B. EXPORT VALUES FROM THE ORANI 1968-69, 1974-75 AND 1977-78 DATA BASES

	Commodity	Exports ($\tilde{D}$) / (Exports ($\tilde{D}$) + Margins ($\tilde{N}_1,\ldots,\tilde{N}_g$) + Tax ($\tilde{N}_{g+1}$))			
		ORANI 1968-69 Data Base	ORANI 1974-75 Data Base	ORANI 1977-78 Data Base	Average
1.	Wool	0.8421	0.7481	0.8508	0.8137
2.	Sheep	0.8424	0.7510	0.8274	0.8069
3.	Wheat	0.7399	0.8576	0.8050	0.8008
4.	Barley	0.7399	0.8576	0.8301	0.8092
5.	Other Cereal Grains	0.7398	0.8575	0.8639	0.8204
6.	Meat Cattle	0.9218	0.8539	0.8453	0.8737
7.	Milk Cattle and Pigs	0.9349	0.5128	0.9434	0.7970
8.	Other Farming (Sugar Cane, Fruit and Nuts	0.7365	0.7657	0.7827	0.7616
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.0000	0.7656	0.7960	0.7808[a]
10.	Poultry	0.9138	0.7385	0.9710	0.8744

a The 1968-69 share was not included when calculating the average share for the commodity Other Farming (Vegetables, Cotton, Oilseeds and Tobacco).

in the basic value of production, was also estimated for each agricultural commodity from data contained in the ORANI 1968-69, 1974-75 and 1977-78 data bases. The typical-year shares of type (c), again calculated by taking averages of the shares as given in each of the three ORANI data bases, are presented in Table 3.4. The actual conversion of the typical-year shares of exports f.o.b. in the value of production at principal markets into typical-year shares of basic-value exports in the total basic-value sales of each agricultural commodity, is performed in Table 3.5.

The second part of the preparation of the ORANI 1977-78 data on sales of agricultural commodities was to impose the typical-year shares of the basic-value exports in total basic-value sales for each agricultural commodity, listed in Table 3.5. The adjusted export level of commodity i, (say $\tilde{D}_i^*$) that would give rise to the typical-year export share as listed in Table 3.5 for commodity i (say S_i), when combined with the non-export sales in the ORANI 1977-78 data base of commodity i (say $(\tilde{A}_i+\tilde{B}_i+\tilde{C}_i+\tilde{E}_i)$), can be calculated from:

$$S_i = \tilde{D}_i^*/[(\tilde{A}_i+\tilde{B}_i+\tilde{C}_i+\tilde{E}_i)+\tilde{D}_i^*] \qquad i=1,..10 \quad (3.1)$$

The adjusted export levels calculated using equation (3.1) are given in Table 3.6.

The final component of the preparation of the sales data on agricultural commodities concerns estimating the appropriate values for margin services and taxes associated with these sales. It was decided to preserve the ratios of margins and taxes associated with the flow of

TABLE 3.4 : SHARES OF THE PURCHASERS' VALUE OF SALES OF AGRICULTURAL COMMODITIES IN THE BASIC VALUE OF SALES OF AGRICULTURAL COMMODITIES IN THE ORANI 1968-69, 1974-75 AND 1977-78 DATA BASES

$$\left[\begin{array}{lll} \text{Sales} & + \text{Margins} & + \text{Taxes} \\ (\tilde{A}+\tilde{B}+\tilde{C}+\tilde{D}+\tilde{E}) & (\tilde{K}_1,\ldots,\tilde{K}_g + \tilde{L}_1,\ldots,\tilde{L}_g & (\tilde{K}_{g+1} + \tilde{L}_{g+1} \\ & +\tilde{M}_1,\ldots,\tilde{M}_g + \tilde{N}_1,\ldots,\tilde{N}_g & +\tilde{M}_{g+1} + \tilde{N}_{g+1} \\ & +\tilde{O}_1,\ldots,\tilde{O}_g) & +\tilde{O}_{g+1}) \end{array}\right] \Big/ [\text{Sales } (\tilde{A}+\tilde{B}+\tilde{C}+\tilde{D}+\tilde{E})]$$

		ORANI 1968-69 Data Base	ORANI 1974-75 Data Base	ORANI 1977-78 Data Base	AVERAGE
1.	Wool	1.1852	1.3398	1.1751	1.2334
2.	Sheep	1.1594	1.1658	1.2080	1.1777
3.	Wheat	1.3513	1.1676	1.2340	1.2510
4.	Barley	1.3707	1.1692	1.1998	1.2466
5.	Other Cereal Grains	1.3516	1.1710	1.1726	1.2317
6.	Meat Cattle	1.0896	1.1792	1.2107	1.1598
7.	Milk Cattle and Pigs	1.0145	1.0747	1.0657	1.0516
8.	Other Farming (Sugar Cane, Fruit and Nuts)	1.2959	1.1297	1.2491	1.2249
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	1.4195	1.4428	1.3690	1.4104
10.	Poultry	1.3204	1.1972	1.1679	1.2285

TABLE 3.5 : 'TYPICAL-YEAR' SHARES OF THE BASIC VALUE OF EXPORTS OF AGRICULTURAL COMMODITIES IN THE BASIC VALUE OF SALES OF AGRICULTURAL COMMODITIES

		'Typical-Year' Share of Exports F.O.B. in Value of Production at Principal Markets[a] (Exports F.O.B.) / (Production Principal Markets) [A]	'Typical-Year' Share of the Basic Value of Exports in Exports F.O.B.[b] (Exports (basic value)) / (Exports F.O.B.) [B]	'Typical-Year' Share of the Purchasers Value of Sales in the Basic Value of Sales[c] (Sales (purchasers' value)) / (Sales (basic value)) [C]	'Typical-Year' Share of the Basic Value of Exports in the Basic Value of Sales (Exports (basic value)) / (Sales (basic value)) [A]x[B]x[C]
1.	Wool	0.8655	0.8137	1.2334	0.8686
2.	Sheep	0.4157	0.8274	1.2080	0.4155
3.	Wheat	0.7176	0.8008	1.2510	0.7189
4.	Barley	0.7951	0.8301	1.1998	0.7919
5.	Other Cereal Grains	0.3641	0.8204	1.2317	0.3679
6.	Meat Cattle	0.0078	0.8737	1.1598	0.0079
7.	Milk Cattle and Pigs	0.0028	0.7970	1.0516	0.0023
8.	Other Farming (Sugar Cane, Fruit and Nuts)	0.0825	0.7616	1.2249	0.0770
9.	Other Farming (Vegetables, Cotton Oilseeds and Tobacco)	0.0712	0.7808	1.4104	0.0784
10.	Poultry	0.0057	0.8744	1.2285	0.0061

a These shares are taken from Table 3.2. For commodities 1, 3 and 5 to 10 they are an 'average' share from data spanning the period 1967-68 to 1982-83. For commodities 2 and 4 the shares are in-sample 'projections' for 1982-83. For more details see Table 3.2.

b These shares are taken from Table 3.3. For commodities 1, 3 and 5 to 10 they are an average share from the ORANI 1968-69, 1974-75 and 1977-78 data bases. For commodities 2 and 4 they are the shares obtained from the ORANI 1977-78 data base.

c These shares are taken from Table 3.4. For commodities 1, 3 and 5 to 10 they are an average share from the ORANI 1968-69, 1974-75 and 1977-78 data bases. For commodities 2 and 4 they are the shares obtained from the ORANI 1977-78 data base.

TABLE 3.6 : ADJUSTED EXPORT LEVELS OF AGRICULTURAL COMMODITIES TO BE IMPLEMENTED IN THE ORANI 1977-78 DATA BASE SUCH THAT THE 'TYPICAL-YEAR' EXPORT SHARES ARE IMPOSED

	Commodity	Adjusted Exports[a] $\tilde{D}$ ($m. 1977-78 prices)	Total Sales (calculated using the adjusted export levels) $\tilde{A} + \tilde{B} + \tilde{C} + \tilde{D} + \tilde{E}$ ($m. 1977-78 prices)
1.	Wool	1166.654 (0.8686)[b]	1343.143
2.	Sheep	248.553 (0.4155)	598.202
3.	Wheat	387.631 (0.7189)	539.200
4.	Barley	289.529 (0.7919)	365.613
5.	Other Cereal Grains	116.418 (0.3679)	316.439
6.	Meat Cattle	8.267 (0.0079)	1046.428
7.	Milk Cattle and Pigs	1.609 (0.0023)	699.730
8.	Other Farming (Sugar Cane, Fruit and Nuts)	52.729 (0.0770)	684.794
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	74.793 (0.0784)	953.994
10.	Poultry	2.386 (0.0061)	391.185

a These export levels are required as data inputs for the AGCID computer program listed in Figure A.1.

b The shares of exports (basic value) in total sales (basic value) are given in parentheses. Note that these shares correspond to those listed in the final column of Table 3.5.

exports to the export flow as observed in the 1977-78 ORANI data base. This decision was based on the assumption that the most recent information on these relationships, which is contained in the 1977-78 ORANI data base, should be incorporated in the typical-year data base. The ratios of margins and taxes associated with the flow of exports to the export flow as observed in the 1977-78 ORANI data base are listed in Table 3.7. The level of margins and taxes associated with the flow of adjusted exports, as listed in Table 3.6, were then calculated to impose the ratios observed in the 1977-78 ORANI data base. The results of these calculations, along with the non-export sales and associated margins and taxes in the 1977-78 ORANI data base, are presented in Table 3.8.

The preparation of the appropriate values of margins and taxes associated with sales of agricultural commodities requires marginal intervention. This is due to the mechanics of the computer programs used to implement the typical-year data base. The HAMMER computer program, listed in Figure A.2, balances total sales of an industry with inputs to its current production. It will preserve the typical-year sales shares, as given in Table 3.8; however it is necessary to compute manually the typical-year margins and taxes associated with the typical-year sales of agricultural commodities. To do this the basic value sales listed in Table 3.8 must first be scaled in proportion such that the total sales of each agricultural commodity equals its total output as given in the typical-year product-mix matrix ($\tilde{Y}$) (see Table 2.4). Once this scaling is done the typical-year margins and taxes can be calculated by imposing the ratios observed in the 1977-78 ORANI data base between these and the associated sales, as listed in Table 3.8. The results of these manual computations are

TABLE 3.7 : EXPORT LEVELS AND THE MARGINS AND TAXES ASSOCIATED WITH THESE EXPORTS IN THE 1977-78 ORANI DATA BASE ($m. 1977-78 prices)

	Commodity	Exports $\tilde{(D)}$	Margins used to Facilitate the Flow of Exports $\tilde{(N_1,\ldots,N_g)}$	Tax Associated with the Exports $\tilde{(N_{g+1})}$
1.	Wool	847.924	80.374 (.0948)[a]	68.303 (.0806)[b]
2.	Sheep	72.532	14.928 (.2058)	0.200 (.0028)
3.	Wheat	798.575	216.928 (.2716)	-23.458 (-.0294)
4.	Barley	101.154	20.698 (.2046)	0.000 (.0000)
5.	Other Cereal Grains	57.130	9.001 (.1576)	0.000 (.0000)
6.	Meat Cattle	8.817	1.475 (.1673)	0.139 (.0158)
7.	Milk Cattle and Pigs	0.050	0.003 (.0600)	0.000 (.0000)
8.	Other Farming (Sugar Cane, Fruit and Nuts)	64.193	18.209 (.2837)	-0.387 (-.0060)
9.	Other Farming (Vegetables, Cotton, and Tobacco)	19.898	5.101 (.2564)	0.000 (.0000)
10.	Poultry	12.123	1.936 (.1597)	-1.574 (-.1298)

a The ratios of margins to exports for each commodity are given in parentheses.

b The ratios of tax to exports for each commodity are given in parentheses.

TABLE 3.8 : SALES OF DOMESTIC AGRICULTURAL COMMODITIES AND ASSOCIATED MARGINS AND TAXES IN THE 1977-78 ORANI DATA BASE WITH THE ADJUSTED EXPORT LEVELS, EXPORT MARGINS AND EXPORT TAXES*

($m. 1977-78 prices)

		Sales to Domestic Industries for Current Production ($\tilde{A}$)	Margins used to Facilitate the Flow of Sales to Domestic Industries for Current Production ($\tilde{K}_1,\ldots,\tilde{K}_g$)	Tax Associated with the Sales to Domestic Industries for Current Production ($\tilde{K}_{g+1}$)	Sales to Domestic Industries for Capital Formation ($\tilde{B}$)	Margins used to Facilitate the Flow of Sales to Domestic Industries for Capital Formation ($\tilde{L}_1,\ldots,\tilde{L}_g$)	Tax Associated with the Sales to Domestic Industries for Capital Formation ($\tilde{L}_{g+1}$)
1.	Wool	176.489 [.1314][a]	16.733 (.0948)[b]	14.223 (.0806)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
2.	Sheep	329.757 [.5512]	67.814 (.2056)	0.736 (.0022)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
3.	Wheat	151.569 [.2811]	32.849 (.2167)	-4.018 (-.0265)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
4.	Barley	76.084 [.2081]	16.542 (.2174)	-1.824 (-.0240)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
5.	Other Cereal Grains	190.861 [.6032]	35.186 (.1844)	-3.955 (-.0207)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
6.	Meat Cattle	1025.059 [.9796]	200.411 (.1955)	16.141 (.0157)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
7.	Milk Cattle and Pigs	667.266 [.9536]	43.456 (.0651)	0.759 (.0011)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
8.	Other Farming (Sugar Cane, Fruit and Nuts)	534.299 [.7802]	83.139 (.1556)	1.219 (.0023)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	557.730 [.5846]	101.136 (.1813)	1.096 (.0020)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
10.	Poultry	213.749 [.5464]	23.757 (.1111)	-10.225 (-.0478)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)

TABLE 3.8 (continued)

($m. 1977-78 prices)

Commodity	Sales to Household Consumption $(\tilde{C})$	Margins used to Facilitate the Flow of Sales to Household Consumption[a] $(\tilde{M}_1,\ldots,\tilde{M}_g)$	Tax Associated with the Sales to Household Consumption[a] $(\tilde{M}_{g+1})$	Exports $(\tilde{D})$	Margins used to Facilitate the Flow of Exports $(\tilde{N}_1,\ldots,\tilde{N}_g)$	Tax Associated with the Exports[a] $(\tilde{N}_{g+1})$
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1166.654 [.8686]	110.599 (.0948)	94.032 (.0806)
2. Sheep	19.892 [.0333]	4.091 (.2057)	0.045 (.0023)	248.553 [.4155]	51.152 (.2058)	0.696 (.0028)
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	387.631 [.7189]	105.281 (.2716)	-11.396 (-.0294)
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	289.529 [.7919]	59.238 (.2046)	0.000 (.0000)
5. Other Cereal Grains	9.160 [.0289]	3.142 (.3430)	-0.063 (-.0069)	116.418 [.3679]	18.347 (.1576)	0.000 (.0000)
6. Meat Cattle	13.102 [.0125]	2.192 (.1673)	0.207 (.0158)	8.267 [.0079]	1.383 (.1673)	0.131 (.0158)
7. Milk Cattle and Pigs	30.855 [.0441]	1.716 (.0556)	-0.089 (-.0029)	1.609 [.0023]	0.097 (.0600)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	97.766 [.1428]	60.990 (.6238)	-0.600 (-.0061)	52.729 [.0770]	14.959 (.2837)	-0.316 (-.0060)
9. Other Farming (Vegetables, Cotton, and Tobacco)	321.471 [.3370]	213.368 (.6637)	-1.051 (-.0033)	74.793 [.0784]	19.177 (.2564)	0.000 (.0000)
10. Poultry	175.050 [.4475]	52.203 (.2982)	1.181 (.0067)	2.386 [.0061]	0.381 (.1597)	-0.310 (-.1298)

TABLE 3.8 (continued)

($m. 1977-78 prices)

Commodity	Sales to Other Final Demands $(\tilde{E})$	Margins used to Facilitate the Flow of Sales to Other Final Demands $(\tilde{O}_1,\ldots,\tilde{O}_g)$	Tax Associated with the Sales to Other Final Demands $(\tilde{O}_{g+1})$	TOTAL BASIC VALUE SALES
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1343.143 [1.0000]
2. Sheep	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	598.202 [1.0000]
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	539.200 [1.0000]
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	365.613 [1.0000]
5. Other Cereal Grains	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	316.439 [1.0000]
6. Meat Cattle	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1046.428 [1.0000]
7. Milk Cattle and Pigs	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	699.730 [1.0000]
8. Other Farming (Sugar Cane, Fruit and Nuts)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	684.794 [1.0000]
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	953.994 [1.0000]
10. Poultry	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	391.185 [1.0000]

* The adjusted export levels were calculated such that the 'typical-year' export shares are imposed, see Table 3.6. The adjusted export margins and export taxes are calculated to maintain the 1977-78 ratio of export margins and export taxes, respectively, to export levels. These ratios were calculated in Table 3.7.

a The basic-value sales shares are given in the square brackets.

b The ratios of associated margins and taxes, respectively, to each sale are given in parentheses. Note that for the export margins and export taxes these ratios are the same as those listed in Table 3.7.

presented in Table 3.9 which contains our 'best-guess' about the sales pattern of the agricultural commodities likely to be generated by the HAMMER program. Table 3.9 will not exactly match the output of HAMMER due to the existence of sales of agricultural commodities to agricultural industries;[9] however, it is a close first approximation. The margins and taxes presented in Table 3.9 are 'manually' implemented in the data base by the AGCID computer program, listed in Figure A.1, prior to the running of the HAMMER program.

Finally the imports of agricultural commodities and associated margins and taxes in the 1977-78 ORANI data base are presented in Table 3.10. The figures listed in Table 3.10 are our 'best guess' as to their final values after being processed by the HAMMER program.[10] Table 3.10 will be used to check that the actual figures after the running of the HAMMER program have not significantly changed from their values in the 1977-78 ORANI data base.

TABLE 3.9 : SALES OF DOMESTIC AGRICULTURAL COMMODITIES AND ASSOCIATED MARGINS AND TAXES WITH THE TOTAL OUTPUT OF EACH COMMODITY BEING EQUAL TO ITS OUTPUT IN THE 'TYPICALIZED' 1977-78 PRODUCT-MIX MATRIX ($\tilde{Y}$)*

($m. 1977-78 prices)

Commodity	Sales to Domestic Industries for Current Production ($\tilde{A}$)	Margins used to Facilitate the Flow of Sales to Domestic Industries for Current Production[a] ($\tilde{K}_1,\ldots,\tilde{K}_g$)	Tax Associated with the Sales to Domestic Industries for Current Production[a] ($\tilde{K}_{g+1}$)	Sales to Domestic Industries for Capital Formation ($\tilde{B}$)	Margins used to Facilitate the Flow of Sales to Domestic Industries for Capital Formation[a] ($\tilde{L}_1,\ldots,\tilde{L}_g$)	Tax Associated with the Sales to Domestic Industries for Capital Formation[a] ($\tilde{L}_{g+1}$)
1. Wool	198.248 [.1314][b]	18.794 (.0948)[c]	17.961 (.0806)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
2. Sheep	318.965 [.5512]	65.579 (.2056)	0.702 (.0022)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
3. Wheat	258.912 [.2811]	56.106 (.2167)	-6.861 (-.0265)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
4. Barley	36.732 [.2081]	7.986 (.2174)	-0.882 (-.0240)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
5. Other Cereal Grains	97.501 [.6032]	17.979 (.1844)	-2.018 (-.0207)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
6. Meat Cattle	787.198 [.9796]	153.897 (.1955)	12.359 (.0157)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
7. Milk Cattle and Pigs	939.296 [.9536]	61.148 (.0651)	1.033 (.0011)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	981.238 [.7802]	152.681 (.1556)	2.257 (.0023)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	559.235 [.5846]	101.389 (.1813)	1.118 (.0020)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
10. Poultry	218.790 [.5464]	24.308 (.1111)	-10.458 (-.0478)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)

TABLE 3.9 (continued)

($m. 1977-78 prices)

Commodity	Sales to Household Consumption $(\tilde{C})$	Margins used to Facilitate the Flow of Sales to Household Consumption[a] $(\tilde{M}_1,\ldots,\tilde{M}_g)$	Tax Associated with the Sales to Household Consumption[a] $(\tilde{M}_{g+1})$	Exports $(\tilde{D})$	Margins used to Facilitate the Flow of Exports[a] $(\tilde{N}_1,\ldots,\tilde{N}_g)$	Tax Associated with the Exports[a] $(\tilde{N}_{g+1})$
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1310.491 [.8686]	124.235 (.0948)	105.626 (.0806)
2. Sheep	19.270 [.0333]	3.964 (.2057)	0.044 (.0023)	240.439 [.4155]	49.482 (.2058)	0.673 (.0028)
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	662.155 [.7189]	179.841 (.2716)	-19.467 (-.0294)
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	139.779 [.7919]	28.599 (.2046)	0.000 (.0000)
5. Other Cereal Grains	4.671 [.0289]	1.602 (.3430)	-0.032 (-.0069)	59.467 [.3679]	9.372 (.1576)	0.000 (.0000)
6. Meat Cattle	10.045 [.0125]	1.681 (.1673)	0.159 (.0158)	6.348 [.0079]	1.062 (.1673)	0.100 (.0158)
7. Milk Cattle and Pigs	43.439 [.0441]	2.415 (.0556)	-0.126 (-.0029)	2.266 [.0023]	0.136 (.0600)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	179.596 [.1428]	112.032 (.6238)	-1.096 (-.0061)	96.841 [.0770]	27.474 (.2837)	-0.581 (-.0060)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	322.378 [.3370]	213.962 (.6637)	-1.064 (-.0033)	74.998 [.0784]	19.229 (.2564)	0.000 (.0000)
10. Poultry	179.188 [.4475]	53.434 (.2982)	1.201 (.0067)	2.443 [.0061]	0.390 (.1597)	-0.317 (-.1298)

TABLE 3.9 (continued)

($m. 1977-78 prices)

Commodity	Sales to Other Final Demands ($\tilde{\varepsilon}$)	Margins used to Facilitate the Flow of Sales to Other Final Demands[a] ($\tilde{0}_1,\ldots,\tilde{0}_g$)	Tax Associated with the Sales to Other Final Demands[a] ($\tilde{0}_{g+1}$)	TOTAL BASIC VALUE SALES
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1508.739 [1.0000]
2. Sheep	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	578.673 [1.0000]
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000	921.067 [1.0000]
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	176.511 [1.0000]
5. Other Cereal Grain	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	161.639 [1.0000]
6. Meat Cattle	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	803.591 [1.0000]
7. Milk Cattle and Pigs	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	985.000 [1.0000]
8. Other Farming (Sugar Cane, Fruit and Nuts)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1257.675 [1.0000]
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	956.612 [1.0000]
10. Poultry	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	400.421 [1.0000]

* The 'typicalized' 1977-78 product-mix matrix is presented in Table 2.4. The figures presented here are estimates of the values these variables would have taken in 1977-78 had experience in the agricultural seccor been typical in that year. These figures are also our best guess as to their final values after being processed by the HAMMER program listed in Figure A.2.

a These data are required as data inputs by the AGCID program listed in Figure A.1.

b The basic-value sales shares are given in the square brackets. Note that these shares are the same as those given in Table 3.8.

c The ratios of associated margins and taxes, respectively, to each sale are given in parentheses. Note that these ratios are the same as those listed in Table 3.8.

TABLE 3.10 : SALES OF IMPORTED AGRICULTURAL COMMODITIES AND ASSOCIATED MARGINS AND TAXES IN THE 1977-78 ORANI DATA BASE*

Commodity	Imports to Domestic Industries for Current Production $(\tilde{F})$	Margins used to Facilitate the Flow of Imports to Domestic Industries for Current Production[a] $(\tilde{P}_1,\ldots\tilde{P}_g)$	Tax Associated with the Imports the Domestic Industries for Current Production[a] $(\tilde{P}_{g+1})$	Imports to Domestic Industries for Capital Formation $(\tilde{G})$	Margins used to Facilitate the Flow of Imports to Domestic Industries for Capital Formation[a] $(\tilde{Q}_1,\ldots,\tilde{Q}_g)$	Tax Associated with the Imports to Domestic Industries for Capital Formation[a] $(\tilde{Q}_{g+1})$
1. Wool	0.401 [1.0000][b]	0.038 (.0948)[c]	0.033 (.0823)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
2. Sheep	0.172 [.9451]	0.035 (.2035)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
5. Other Cereal Grains	12.904 [.8031]	2.379 (.1844)	-0.267 (-.0207)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
6. Meat Cattle	1.720 [.9874]	0.336 (.1953)	0.027 (.0157)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
7. Milk Cattle and Pigs	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	19.944 [.5308]	3.103 (.1556)	0.046 (.0023)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	77.987 [.8098]	14.142 (.1813)	0.153 (.0020)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
10. Poultry	0.006 [.0526]	0.001 (.1667)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)

TABLE 3.10 (continued)

($m. 1977-78 prices)

Commodity	Imports to Household Consumption $(\tilde{H})$	Margins used to Facilitate the Flow of Imports to Household Consumption[a] $(\tilde{R}_1,\ldots,\tilde{R}_g)$	Tax Associated with the Imports to Household Consumption[a] $(\tilde{R}_{g+1})$
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
2. Sheep	0.010 [.0549]	0.002 (.2000)	0.000 (.0000)
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
5. Other Cereal Grains	3.164 [.1969]	1.085 (.3429)	-0.022 (.0070)
6. Meat Cattle	0.022 [.0126]	0.004 (.1818)	0.000 (.0000)
7. Milk Cattle and Pigs	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	17.631 [.4692]	11.000 (.6239)	-0.107 (-.0061)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	18.320 [.1902]	12.156 (.6635)	-0.060 (-.0033)
10. Poultry	0.106 [.9474]	0.031 (.2870)	0.001 (.0093)

TABLE 3.10 (continued)

($m. 1977-78 prices)

Commodity	Imports to Other Final Demands $(\tilde{v})$	Margins used to Facilitate the Flow of Imports to Other Final Demands[a] $(\tilde{T}_1,\ldots,\tilde{T}_g)$	Tax Associated with the Imports to Other Final Demands[a] $(\tilde{T}_{g+1})$	TOTAL BASIC VALUE IMPORTS
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.401 [1.0000]
2. Sheep	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.182 [1.0000]
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [0.0000]
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [0.0000]
5. Other Cereal Grains	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	16.068 [1.0000]
6. Meat Cattle	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1.742 [1.0000]
7. Milk Cattle and Pigs	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [0.0000]
8. Other Farming (Sugar Cane, Fruit and Nuts)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	37.575 [1.0000]
9. Other Farming (Vegetables, Cotton Oilseeds and Tobacco)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	96.307 [1.0000]
10. Poultry	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.114 [1.0000]

* These figures are also our best guess as to their final values after being processed by the HAMMER program listed in Figure A.2.

a These data are required as data inputs by the AGCID program listed in Figure A.1.

b The basic-value shares of imports by each agent in total imports for each commodity are given in the square brackets.

c The ratios of associated margins and taxes, respectively, to each import are given in parentheses. Note that in the ORANI data base margins and taxes associated with flows of commodities are allocated between the flows of domestic and imported commodities in proportion to the relative value of each of these sales. Therefore these ratios will match, allowing for rounding errors, the ratios listed in Table 3.8.

4. PREPARATION OF THE ORANI 1977-78 DATA ON INPUTS TO CURRENT PRODUCTION IN AGRICULTURAL INDUSTRIES

This section is concerned with the imposition of typical-year relationships between various elements of the data base associated with inputs to current production in the agricultural industries, without regard for the constraint that inputs to current production in each industry should equal its sales. The inputs to current production for the agricultural industries in the 1977-78 ORANI data base are listed in Table 4.1. For each agricultural industry Adams (1984b) collected a time-series of data (1967-68 through 1979-80) on five of the nine input categories shown in Table 4.1 with the remaining categories being aggregated into 'other inputs to current production'. The typical-year shares of inputs to current production were declared to be the average of the corresponding input shares calculated from Adams' time-series data. These typical-year input shares are listed in Table 4.2.

To impose the typical-year input shares, listed in Table 4.2, the first step was to calculate the size of total inputs to current production such that the share of existing inputs in the 1977-78 ORANI data base that fall under the category of 'other inputs to current production' in total inputs to current production corresponds to its typical-year input share. That is, the level of total inputs to current production in industry j, say $TICP_j$, that would give rise to the typical-year input share of 'other inputs to current production', as listed in Table 4.2, for industry j, say S_j, when combined with the inputs in the 1977-78 ORANI data base that fall under 'other inputs to current production' in industry j, say

TABLE 4.1 : INPUTS TO CURRENT PRODUCTION IN THE AGRICULTURAL INDUSTRIES IN THE 1977-78 ORANI DATA BASE
($m. 1977-78 prices)

	Industry	Domestic Commodities	Imported Commodities	Total Margins	Labour ($\tilde{U}$)	
		($\tilde{A}$)	($\tilde{F}$)	($\tilde{K}_1,\tilde{P}_1,..,\tilde{K}_{g+1},\tilde{P}_{g+1}$)	Returns to Owner-Operators' Labour[a]	Payments to Other Labour
1.	Pastoral Zone	165.389	11.530	16.651	131.887	48.610
2.	Wheat-Sheep Zone	693.772	57.945	105.084	577.512	189.705
3.	High Rainfall Zone	351.261	22.871	30.771	262.848	101.018
4.	Northern Beef	147.378	8.581	1.636	50.885	24.035
5.	Milk Cattle and Pigs	312.290	8.270	52.886	178.789	42.699
6.	Other Farming (Sugar Cane, Fruit and Nuts)	184.044	13.421	27.963	148.263	70.692
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	206.525	15.060	31.378	166.343	79.314
8.	Poultry	188.630	1.253	40.113	36.416	42.841

TABLE 4.1 (continued)

	Industry	Returns to Fixed Capital $\tilde{V}$	Returns to Land $\tilde{W}$	Other Costs Tickets ($\tilde{X}$)		Total Inputs to Current Production[b]
				Returns to Working Capital	Indirect Taxes n.e.c. and Sales by Final Buyers	
1.	Pastoral Zone	26.909	32.727	7.856	10.396	451.955
2.	Wheat-Sheep Zone	110.618	211.074	21.629	52.977	2020.316
3.	High Rainfall Zone	33.559	105.117	8.320	20.085	935.850
4.	Northern Beef	19.647	21.087	7.754	0.007	281.010
5.	Milk Cattle and Pigs	34.005	102.805	6.853	21.789	760.386
6.	Other Farming (Sugar Cane, Fruit and Nuts)	73.351	102.355	24.051	19.014	663.154
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	87.608	121.204	15.307	21.332	744.071
8.	Poultry	50.624	0.000	19.492	21.551	400.920

a Obtained from Adams and Higgs (1983, Table A.2).

b These data are required as data inputs for the AGCID program listed in Figure A.1.

TABLE 4.2 : 'TYPICAL-YEAR' SHARES OF INPUTS TO CURRENT PRODUCTION IN TOTAL INPUTS TO CURRENT PRODUCTION IN THE ORANI AGRICULTURAL INDUSTRIES*

	Industry	'Typical-Year' Share in the Total Inputs to Current Production of:					
		Returns to Owner-Operators' Labour [S_1]	Payments to Other Labour [S_2]	Returns to Fixed Capital [S_3]	Returns to Land [S_4]	Returns to Working Capital [S_5]	Other Inputs to Current Production [S_6]
1.	Pastoral Zone	0.0936	0.3155	0.1683	0.1907	0.0325	0.1994
2.	Wheat-Sheep Zone	0.1271	0.1792	0.1334	0.2586	0.0215	0.2802
3.	High Rainfall Zone	0.1707	0.2067	0.0842	0.2384	0.0157	0.2843
4.	Northern Beef	0.1058	0.2396	0.1316	0.2352	0.0219	0.2659
5.	Milk Cattle and Pigs	0.1889	0.2015	0.0752	0.1965	0.0130	0.3249
6.	Other Farming (Sugar Cane, Fruit and Nuts)	0.1261	0.3266	0.0740	0.1381	0.0256	0.3096
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.0712	0.3919	0.0480	0.0857	0.0169	0.3863
8.	Poultry	0.0517	0.1015	0.1028	0.0000	0.0530	0.6910

* The 'typical-year' shares are averages of the corresponding shares calculated from data collected by Adams (1984b) from 1967-68 to 1979-80; these data are listed in Appendix Table A.3.

$OICP_j$, can be calculated from:

$$S_j = OICP_j/TICP_j \quad . \qquad j=1,\ldots,8 \qquad (4.1)$$

The adjusted total inputs to current production levels calculated using equation (4.1) are given in Table 4.3. The adjusted input levels for each industry j of the five input categories, say I_{kj}, distinguished by Adams (1984b) that will give rise to the typical-year input shares, listed in Table 4.2, when combined with the adjusted total inputs to current production, given in Table 4.3, can be calculated from:

$$I_{kj} = S_{kj}\, TICP_j \quad , \qquad j=1,\ldots,8 \qquad k=1,\ldots,5 \qquad (4.2)$$

where S_{kj} is the typical-year input share of category k (see Table 4.2) into industry j. These adjusted inputs along with the existing inputs in the 1977-78 ORANI data base that fall under 'other inputs to current production' are presented in Table 4.4. Note that the shares of inputs in total inputs to current production in Table 4.4 correspond to the typical-year input shares listed in Table 4.2.

The next step was to adjust the labour matrix to be consistent with the information given in Table 4.4 on returns to owner-operators' labour and payments to other labour. The labour matrix ($\tilde{U}$) in the ORANI data base distinguishes ten occupational categories. In the ORANI 1977-78 data base the returns to owner-operators' labour were allocated to occupation 9, rural workers. The strategy here was to first subtract the

TABLE 4.3 : CALCULATION OF THE TOTAL INPUTS TO CURRENT PRODUCTION IN EACH AGRICULTURAL INDUSTRY SUCH THAT THE 'TYPICAL-YEAR' INPUT SHARES CAN BE IMPOSED

	Industry	Commodity, Margin and Indirect Taxes n.e.c. plus Sales by Final Buyers Input to Current Production in the 1977-78 ORANI Data Base ($m. 1977-78 prices) $(\tilde{A} + \tilde{F} + \tilde{K}_1\tilde{P}_1, \ldots, \tilde{K}_{g+1}\tilde{P}_{g+1} + \tilde{X}\ (part))$	'Typical-Year' Share of Commodity, Margin and Indirect Taxes n.e.c. plus Sales by Final Buyers Input in Total Inputs to Current Production	Total Inputs to Current Production Such that the 'Typical-Year' Input Shares can be Imposed ($m. 1977-78 prices)
		[1]	[2]	[1]/[2]
1.	Pastoral Zone	203.966	0.1994	1022.899
2.	Wheat-Sheep Zone	909.778	0.2802	3246.888
3.	High Rainfall Zone	424.988	0.2843	1494.858
4.	Northern Beef	157.602	0.2659	592.712
5.	Milk Cattle and Pigs	395.235	0.3249	1216.482
6.	Other Farming (Sugar Cane, Fruit and Nuts)	244.442	0.3096	789.541
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	274.295	0.3863	710.057
8.	Poultry	251.547	0.6910	364.033

TABLE 4.4 : ADJUSTED INPUTS TO CURRENT PRODUCTION IN THE AGRICULTURAL INDUSTRIES SUCH THAT THE 'TYPICAL-YEAR' INPUT SHARES ARE IMPOSED
($m. 1977-78 prices)

	Industry	Domestic Commodities	Imported Commodities	Total Margins	Labour $\tilde{U}$	
		$(\tilde{A})$	$(\tilde{F})$	$(\tilde{K}_1,\tilde{P}_1,..,\tilde{K}_{g+1},\tilde{P}_{g+1})$	Returns to Owner-Operators' Labour	Payments to Other Labour
1.	Pastoral Zone	165.389[b] (.1617)[b]	11.530 (.0113)	16.651 (.0163)	95.743 (.0936)	322.725 (.3155)
2.	Wheat-Sheep Zone	693.772 (.2137)	57.945 (.0178)	105.084 (.0324)	412.679 (.1271)	581.842 (.1792)
3.	High Rainfall Zone	351.261 (.2350)	22.871 (.0153)	30.771 (.0206)	255.172 (.1707)	308.987 (.2067)
4.	Northern Beef	147.378 (.2487)	8.581 (.0145)	1.636 (.0028)	62.709 (.1058)	142.014 (.2396)
5.	Milk Cattle & Pigs	312.290 (.2567)	8.270 (.0068)	52.886 (.0435)	229.793 (.1889)	245.121 (.2015)
6.	Other Farming (Sugar Cane, Fruit and Nuts)	184.044 (.2331)	13.421 (.0170)	27.963 (.0354)	99.561 (.1261)	257.864 (.3266)
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	206.525 (.2909)	15.060 (.0212)	31.378 (.0442)	50.556 (.0712)	278.271 (.3919)
8.	Poultry	188.630 (.5182)	1.253 (.0034)	40.113 (.1102)	18.821 (.0517)	36.949 (.1015)

TABLE 4.4 (continued)

	Industry	Returns to Fixed Capital[a] ($\tilde{V}$)	Returns to Land[a] ($\tilde{W}$)	Other Costs Tickets ($\tilde{X}$)[a]		Total Inputs to Current Production[a]
				Returns to Working Capital	Indirect Taxes n.e.c. and Sales by Final Buyers	
1.	Pastoral Zone	172.154 (.1683)	195.067 (.1907)	33.244 (.0325)	10.396 (.0102)	1022.899 (1.0000)
2.	Wheat-Sheep Zone	433.135 (.1334)	839.645 (.2586)	69.808 (.0215)	52.977 (.0163)	3246.888 (1.0000)
3.	High Rainfall Zone	125.867 (.0842)	356.374 (.2384)	23.469 (.0157)	20.085 (.0134)	1494.858 (1.0000)
4.	Northern Beef	78.001 (.1316)	139.406 (.2352)	12.980 (.0219)	0.007 (.0000)	592.712 (1.0000)
5.	Milk Cattle and Pigs	91.479 (.0752)	239.039 (.1965)	15.814 (.0130)	21.789 (.0179)	1216.482 (1.0000)
6.	Other Farming (Sugar Cane, Fruit and Nuts)	58.426 (.0740)	109.036 (.1381)	20.212 (.0256)	19.014 (.0241)	789.541 (1.0000)
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	34.083 (.0480)	60.852 (.0857)	12.000 (.0169)	21.332 (.0300)	710.057 (1.0000)
8.	Poultry	37.423 (.1028)	0.000 (.0000)	19.294 (.0530)	21.551 (.0592)	364.033 (1.0000)

a These data are required as data inputs for the AGCID computer program listed in Figure A.1.

b The shares in total inputs to current production are given in parentheses. Note that these shares correspond to those listed in Table 4.2.

1977-78 returns to owner-operators' labour from occupation 9 (see Table 4.5). Next the 1977-78 shares of employment across occupations, without the returns to owner-operators' labour component, were calculated. These were then used to split the adjusted levels of payments to other labour, listed in Table 4.4, into employment by occupation. The adjusted employment levels and the 1977-78 shares of employment across occupations, without the returns to owner-operators' labour component, are given in Table 4.6. Finally the adjusted returns to owner-operators' labour, listed in Table 4.4, were added to the employment levels of occupation 9 shown in Table 4.6 to produce the adjusted labour matrix (see Table 4.7).

TABLE 4.5 : RETURN TO OWNER-OPERATORS' LABOUR AND PAYMENTS TO OTHER RURAL WORKERS IN THE 1977-78 DATA BASE
($m. 1977-78 prices)

	Industry	Payments to Rural Workers (Occupation 9) in the 1977-78 Data Base [1]	Return to Owner-Operators' Labour in the 1977-78 Data Base[a] [2]	Payments to Other Rural Workers[b] in the 1977-78 Data Base [1 - 2]
1.	Pastoral Zone	175.246	131.887	43.359
2.	Wheat-Sheep Zone	744.898	577.512	167.386
3.	High Rainfall Zone	353.281	262.848	90.433
4.	Northern Beef	72.740	50.885	21.855
5.	Milk Cattle and Pigs	215.045	178.789	36.256
6.	Other Farming (Sugar Cane, Fruit and Nuts)	212.585	148.263	64.322
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	238.510	166.343	72.167
8.	Poultry	69.654	36.416	33.238

a Obtained from Adams and Higgs (1983, Table A.2).

b Payments to 'Other Rural Workers' consists of wages, salaries and supplements paid to hired labour of the occupational category rural workers plus imputed returns to the labour of family helpers and all other unpaid workers including shareholders apart from the nominated owner-operator.

TABLE 4.6 : THE ADJUSTED* 1977-78 EMPLOYMENT LEVELS AND THE 1977-78 SHARES OF EMPLOYMENT BY OCCUPATION WITHOUT THE RETURNS TO OWNER-OPERATORS' LABOUR COMPONENT ($m. 1977-78 prices)

Occupation[a] / Industry	1.Pastoral Zone	2.Wheat-Sheep Zone	3.High Rainfall Zone	4.Northern Beef	5.Milk Cattle and Pigs	6. Other Farming (Sugar Cane Fruit and Nuts)	7. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	8.Poultry
1. Professional White Collar	2.1300 (.0066)	4.1893 (.0072)	1.9775 (.0064)	0.7811 (.0055)	2.2551 (.0092)	1.4183 (.0055)	1.5305 (.0055)	0.5542 (.0150)
2. Para-professional	2.0654 (.0064)	4.0147 (.0069)	1.9157 (.0062)	0.7669 (.0054)	2.1816 (.0089)	1.3667 (.0053)	1.4748 (.0053)	0.1515 (.0041)
3. Skilled White Collar	0.0968 (.0003)	0.1746 (.0003)	0.0927 (.0003)	0.0284 (.0002)	0.0980 (.0004)	0.0774 (.0003)	0.0835 (.0003)	0.0406 (.0011)
4. Semi and Unskilled White Collar	7.4549 (.0231)	14.6042 (.0251)	6.9213 (.0224)	2.7551 (.0194)	7.8929 (.0322)	4.9768 (.0193)	5.3706 (.0193)	1.7699 (.0479)
5. Skilled Blue Collar Metal and Electrical	4.0341 (.0125)	7.9712 (.0137)	3.7696 (.0122)	1.4911 (.0105)	4.2896 (.0175)	2.7076 (.0105)	2.9218 (.0105)	0.9644 (.0261)
6. Skilled Blue Collar Building	1.7750 (.0055)	3.4911 (.0060)	1.6376 (.0053)	0.6533 (.0046)	1.8874 (.0077)	1.1862 (.0046)	1.2800 (.0046)	0.2291 (.0062)
7. Skilled Blue Collar Other	2.9368 (.0091)	5.7602 (.0099)	2.7191 (.0088)	1.0793 (.0076)	3.1130 (.0127)	1.9598 (.0076)	2.1149 (.0076)	0.1035 (.0028)
8. Semi and Unskilled Blue Collar	14.3613 (.0445)	28.2193 (.0485)	13.3482 (.0432)	5.3113 (.0374)	15.2465 (.0622)	9.5668 (.0371)	10.3239 (.0371)	4.4745 (.1211)
9. Rural Workers	287.8707 (.8920)	513.4174 (.8824)	276.6053 (.8952)	129.1475 (.9094)	208.1569 (.8492)	234.6044 (.9098)	253.1710 (.9098)	28.6613 (.7757)
10. Armed Services	0.0000 (.0000)	0.0000 (.0000)	0.0000 (.0000)	0.0000 (.0000)	0.0000 (.0000)	0.0000 (.0000)	0.0000 (.0000)	0.0000 (.0000)
Total	322.7250 (1.0000)	581.8420 (1.0000)	308.9870 (1.0000)	142.0140 (1.0000)	245.1210 (1.0000)	257.8640 (1.0000)	278.2710 (1.0000)	36.9490 (1.0000)

* The adjusted figures are estimated by taking the 'payments to other labour' values from Table 4.4 and splitting them across the 10 occupational categories according to the shares of employment by occupation without the returns to owner-operators' labour component, calculated from the 1977-78 ORANI data base. These shares are given in parentheses.

a For definitions of these occupational categories see Tulpulé, Mannion and Strzelecki (1981, Appendix A).

TABLE 4.7 : THE ADJUSTED* 1977-78 LABOUR MATRIX ($\tilde{U}$) FOR THE AGRICULTURAL INDUSTRIES
($m. 1977-78 prices)

Occupation[a] \ Industry	1.Pastoral Zone	2.Wheac-Sheep Zone	3.High Rainfall Zone	4.Northern Beef	5.Milk Cattle and Pigs	6. Other Farming (Sugar Cane Fruit and Nuts)	7. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	8.Poultry
1. Professional White Collar	2.1300	4.1893	1.9775	0.7811	2.2551	1.4183	1.5305	0.5542
2. Para-professional	2.0654	4.0147	1.9157	0.7669	2.1816	1.3667	1.4748	0.1515
3. Skilled White Collar	0.0968	0.1746	0.0927	0.0284	0.0980	0.0774	0.0835	0.0406
4. Semi and Unskilled White Collar	7.4549	14.6042	6.9213	2.7551	7.8929	4.9768	5.3706	1.7699
5. Skilled Blue Collar Metal and Electrical	4.0341	7.9712	3.7696	1.4911	4.2896	2.7076	2.9218	0.9644
6. Skilled Blue Collar Building	1.7750	3.4911	1.6376	0.6533	1.8874	1.1862	1.2800	0.2291
7. Skilled Blue Collar Other	2.9368	5.7602	2.7191	1.0793	3.1130	1.9598	2.1149	0.1035
8. Semi and Unskilled Blue Collar	14.3613	28.2193	13.3482	5.3113	15.2465	9.5668	10.3239	4.4745
9. Rural Workers	383.6137	926.0964	531.7773	191.8565	437.9499	334.1654	303.7270	47.4823
10. Armed Services	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	418.4680	994.5210	564.1590	204.7230	474.9140	357.4250	328.8270	55.7700

* These adjusted figures are obtained by taking the figures in Table 4.6 and adding the return to owner-operators' labour listed in Table 4.4 to occupational category 9, rural workers. These data are required as data inputs for the AGCID computer program listed in Figure A.1.

a For definitions of these occupational categories see Tulpulé, Mannion and Strzelecki (1981, Appendix A).

5. THE ORANI 1977-78 'TYPICALIZED' SALES OF AGRICULTURAL COMMODITIES AND INPUTS TO AGRICULTURAL INDUSTRIES

This section is concerned with the agricultural part of the second and final stage of the implementation of the typical-year data base. In the preceding sections typical-year relationships between various elements of the data base were imposed by the AGCID computer program. Now the data base is balanced by the HAMMER computer program such that total sales by an industry are equal to its inputs to current production, preserving the typical-year relationships imposed by the AGCID program. For the agricultural sector this balancing was ensured by setting sales of agricultural commodities equal to their output in the 'typicalized' product-mix matrix ($\tilde{Y}$) (see Table 2.4) and setting inputs to current production in agricultural industries equal to their total output as given by the 'typicalized' product-mix matrix.

The sales of domestic agricultural commodities and associated margins and taxes in the 'typicalized' 1977-78 ORANI data base (i.e., the data base produced by the HAMMER computer program) are presented in Table 5.1. There are three points to note about Table 5.1. The first is that the total basic-value sales of each agricultural commodity equals its output as given in the 'typicalized' product-mix matrix (see Table 2.4). The second point to note is that the sales shares contained in Table 5.1 are the same, in most cases to two decimal places, as the typical-year sales shares given in Table 3.9. These shares are not the same to four decimal places due to the existence of sales of agricultural commodities to agricultural industries.[11] Finally, the third point to note is that the ratios of

TABLE 5.1 : SALES OF DOMESTIC AGRICULTURAL COMMODITIES AND ASSOCIATED MARGINS AND TAXES IN THE 'TYPICALIZED' 1977-78 ORANI DATA BASE*

($m. 1977-78 prices)

Commodity	Sales to Domestic Industries for Current Production ($\tilde{A}$)	Margins used to Facilitate the Flow of Sales to Domestic Industries for Current Production ($\tilde{K}_1,\ldots,\tilde{K}_g$)	Tax Associated with the Sales to Domestic Industries for Current Production ($\tilde{K}_{g+1}$)	Sales to Domestic Industries for Capital Formation ($\tilde{B}$)	Margins used to Facilitate the Flow of Sales to Domestic Industries for Capital Formation ($\tilde{L}_1,\ldots,\tilde{L}_g$)	Tax Associated with the Sales to Domestic Industries for Capital Formation ($\tilde{L}_{g+1}$)
1. Wool	186.085 [.1233][a]	17.580 (.0945)[b]	16.663 (.0895)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
2. Sheep	325.578 [.5626]	69.463 (.2134)	0.736 (.0023)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
3. Wheat	222.174 [.2412]	45.595 (.2052)	-5.761 (-.0259)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
4. Barley	29.988 [.1699]	6.252 (.2085)	-0.667 (-.0222)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
5. Other Cereal Grains	94.384 [.5839]	16.515 (.1750)	-1.783 (-.0189)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
6. Meat Cattle	787.476 [.9799]	163.576 (.2077)	12.950 (.0164)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
7. Milk Cattle and Pigs	933.168 [.9474]	54.944 (.0589)	1.082 (.0012)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	937.467 [.7454]	131.011 (.1397)	1.830 (.0020)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	530.406 [.5545]	92.523 (.1744)	1.174 (.0022)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
10. Poultry	223.040 [.5570]	25.608 (.1148)	-10.920 (-.0490)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)

TABLE 5.1 (continued)

($m. 1977-78 prices)

Commodity	Sales to Household Consumption ($\tilde{C}$)	Margins used to Facilitate the Flow of Sales to Household Consumption ($\tilde{M}_1,\ldots,\tilde{M}_g$)	Tax Associated with the Sales to Household Consumption ($\tilde{M}_{g+1}$)	Exports ($\tilde{D}$)	Margins used to Facilitate the Flow of Exports ($\tilde{N}_1,\ldots,\tilde{N}_g$)	Tax Associated with the Exports ($\tilde{N}_{g+1}$)
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1322.626 [.8766]	125.239 (.0947)	105.626 (.0799)
2. Sheep	18.740 [.0324]	4.007 (.2138)	0.044 (.0023)	234.168 [.4047]	50.014 (.2136)	0.673 (.0029)
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	698.860 [.7588]	181.805 (.2601)	-19.467 (-.0279)
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	146.518 [.8301]	28.904 (.1973)	0.000 (.0000)
5. Other Cereal Grains	4.904 [.0303]	1.640 (.3344)	-0.033 (-.0067)	62.330 [.3856]	9.484 (.1522)	0.000 (.0000)
6. Meat Cattle	9.604 [.0120]	1.705 (.1775)	0.159 (.0166)	6.060 [.0075]	1.077 (.1777)	0.100 (.0165)
7. Milk Cattle and Pigs	48.362 [.0491]	2.453 (.0507)	-0.126 (-.0026)	2.522 [.0026]	0.138 (.0547)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	207.596 [.1651]	113.873 (.5485)	-1.109 (-.0053)	111.965 [.0890]	27.742 (.2478)	-0.581 (-.0052)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	345.648 [.3613]	215.780 (.6243)	-1.067 (-.0031)	80.418 [.0841]	19.417 (.2415)	0.000 (.0000)
10. Poultry	174.873 [.4367]	53.691 (.3070)	1.201 (.0069)	2.384 [.0060]	0.394 (.1653)	-0.317 (-.1330)

TABLE 5.1 (continued)

($m. 1977-78 prices)

Commodity	Sales to Other Final Demands[c] ($\tilde{E}$)	Margins used to Facilitate the Flow of Sales to Other Final Demands ($\tilde{O}_1,\ldots,\tilde{O}_g$)	Tax Associated with the Sales to Other Final Demands ($\tilde{O}_{g+1}$)	TOTAL BASIC VALUE SALES
1. Wool	0.028 [.0000]	0.000 (.0000)	0.000 (.0000)	1508.739 [1.0000]
2. Sheep	0.186 [.0003]	0.000 (.0000)	0.000 (.0000)	578.672 [1.0000]
3. Wheat	0.033 [.0000]	0.000 (.0000)	0.000 (.0000)	921.067 [1.0000]
4. Barley	0.006 [.0000]	0.000 (.0000)	0.000 (.0000)	176.512 [1.0000]
5. Other Cereal Grains	0.021 [.0001]	0.000 (.0000)	0.000 (.0000)	161.639 [1.0000]
6. Meat Cattle	0.450 [.0006]	0.000 (.0000)	0.000 (.0000)	803.590 [1.0000]
7. Milk Cattle and Pigs	0.947 [.0010]	0.000 (.0000)	0.000 (.0000)	984.999 [1.0000]
8. Other Farming (Sugar Cane, Fruit and Nuts)	0.646 [.0005]	0.000 (.0000)	0.000 (.0000)	1257.674 [1.0000]
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.139 [.0001]	0.000 (.0000)	0.000 (.0000)	956.611 [1.0000]
10. Poultry	0.124 [.0003]	0.000 (.0000)	0.000 (.0000)	400.421 [1.0000]

* The 'typicalized' figures are estimates of the values these variables would have taken in 1977-78 had experience in the agricultural sector been typical that year.

a The sales shares are given in the square brackets.

b The ratios of associated margins and taxes, respectively, to each sale are given in parentheses.

c To ensure that the total output of each industry exactly equals its inputs to current production the difference between these two values (which is constrained to be no more than one tenth of one per cent of output) is added to sales to other final demands in the last iteration of the HAMMER program. More details on this point are given in section 6.

associated margins and taxes to each sale are the same, again in most cases to two decimal places, as those observed in the 1977-78 ORANI data base (see Table 3.9).

The imports of agricultural commodities and associated margins and taxes in the 'typicalized' 1977-78 ORANI data base are given in Table 5.2. The thing to observe about Table 5.2 is that it is not significantly different from Table 3.10 which contains the corresponding information from the original 1977-78 ORANI data base. This is reassuring as no new information was obtained on the imports of agricultural commodities; therefore, the original 1977-78 data are our best-guess as to the appropriate values for these data.

The inputs to current production in the agricultural industries in the 'typicalized' 1977-78 ORANI data base are listed in Table 5.3. There are two aspects of Table 5.3 worth noting. The first is that the total input to current production in each agricultural industry is equal to the output of the industry as given in the 'typicalized' product-mix matrix (see Table 2.4). The second is that the input shares are the same, in most cases to two decimal places, as the typical-year input shares listed in Table 4.4.

The 'typicalized' 1977-78 labour matrix for the agricultural industries is presented in Table 5.4. The employment by occupation in each industry is such that if the occupational employment shares were to be calculated they would be the same as the typical-year occupational shares observed in Table 4.7.

TABLE 5.2 : SALES OF IMPORTED AGRICULTURAL COMMODITIES AND ASSOCIATED MARGINS AND TAXES IN THE 'TYPICALIZED' 1977-78 ORANI DATA BASE*

Commodity	Imports to Domestic Industries for Current Production $(\tilde{F})$	Margins used to Facilitate the Flow of Imports to Domestic Industries for Current Production $(\tilde{P}_1,\ldots\tilde{P}_g)$	Tax Associated with the Imports to Domestic Industries for Current Production $(\tilde{P}_{g+1})$	Imports to Domestic Industries for Capital Formation $(\tilde{G})$	Margins used to Facilitate the Flow of Imports to Domestic Industries for Capital Formation $(\tilde{Q}_1,\ldots,\tilde{Q}_g)$	Tax Associated with the Imports to Domestic Industries for Capital Formation $(\tilde{Q}_{g+1})$
1. Wool	0.373 [1.0000][a]	0.035 (.0938)[b]	0.033 (.0885)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
2. Sheep	0.180 [.9474]	0.038 (.2111)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
5. Other Cereal Grains	12.995 [.8042]	2.274 (.1750)	-0.246 (-.0189)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
6. Meat Cattle	1.803 [.9879]	0.375 (.2080)	0.030 (.0166)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
7. Milk Cattle and Pigs	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	18.890 [.5172]	2.640 (.1398)	0.037 (.0020)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	74.247 [.8021]	12.952 (.1744)	0.164 (.0022)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
10. Poultry	0.006 [.0526]	0.001 (.1667)	0.000 (.0000)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)

TABLE 5.2 (continued)

($m. 1977-78 prices)

Commodity	Imports to Household Consumption ($\tilde{H}$)	Margins used to Facilitate the Flow of Imports to Household Consumption ($\tilde{R}_1,\ldots,\tilde{R}_g$)	Tax Associated with the Imports to Household Consumption ($\tilde{R}_{g+1}$)
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
2. Sheep	0.010 [.0526]	0.002 (.2000)	0.000 (.0000)
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
5. Other Cereal Grains	3.164 [.1958]	1.058 (.3344)	-0.021 (-.0066)
6. Meat Cattle	0.022 [.0121]	0.004 (.1818)	0.000 (.0000)
7. Milk Cattle and Pigs	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	17.631 [.4828]	9.671 (.5485)	-0.094 (-.0053)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	18.320 [.1979]	11.437 (.6243)	-0.057 (-.0031)
10. Poultry	0.108 [.9474]	0.033 (.3056)	0.001 (.0093)

TABLE 5.2 (continued)

($m. 1977-78 prices)

Commodity	Imports to Other Final Demands ($\tilde{J}$)	Margins used to Facilitate the Flow of Imports to Other Final Demands ($\tilde{T}_1,\ldots,\tilde{T}_g$)	Tax Associated with the Imports to Other Final Demands ($\tilde{T}_{g+1}$)	TOTAL BASIC VALUE IMPORTS
1. Wool	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.373 [1.0000]
2. Sheep	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.190 [1.0000]
3. Wheat	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]
4. Barley	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]
5. Other Cereal Grains	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	16.159 [1.0000]
6. Meat Cattle	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	1.825 [1.0000]
7. Milk Cattle and Pigs	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.000 [.0000]
8. Other Farming (Sugar Cane, Fruit and Nuts)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	36.521 [1.0000]
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	92.567 [1.0000]
10. Poultry	0.000 [.0000]	0.000 (.0000)	0.000 (.0000)	0.114 [1.0000]

* These figures differ slightly from their original values, listed in Table 3.10, due to the balancing of the ORANI data base performed in the HAMMER program.

a The shares of imports by agents in total imports for each commodity are given in the square brackets.

b The ratios of associated margins and taxes, respectively, to each import are given in parentheses.

TABLE 5.3 : INPUTS TO CURRENT PRODUCTION IN THE AGRICULTURAL INDUSTRIES IN THE 'TYPICALIZED' 1977-78 ORANI DATA BASE*
($m. 1977-78 prices)

	Industry	Domestic Commodities	Imported Commodities	Total Margins	Labour $\tilde{U}$	
		$(\tilde{A})$	$(\tilde{F})$	$(\tilde{K}_1,\tilde{P}_1,..,\tilde{K}_{g+1},\tilde{P}_{g+1})$	Returns to Owner-Operators' Labour[a]	Payments to Other Labour
1.	Pastoral Zone	88.911 (.1729)[c]	5.712 (.0111)	8.628 (.0168)	47.431 (.0923)	159.878 (.3110)
2.	Wheat-Sheep Zone	546.279 (.2295)	41.548 (.0175)	79.100 (.0332)	295.900 (.1243)	417.193 (.1752)
3.	High Rainfall Zone	296.066 (.2493)	17.805 (.0150)	25.040 (.0211)	198.655 (.1673)	240.550 (.2026)
4.	Northern Beef	54.659 (.2626)	2.954 (.0142)	0.703 (.0034)	21.588 (.1037)	48.890 (.2349)
5.	Milk Cattle & Pigs	259.282 (.2705)	6.386 (.0067)	41.733 (.0435)	177.450 (.1852)	189.287 (.1975)
6.	Other Farming (Sugar Cane, Fruit and Nuts)	313.243 (.2511)	20.671 (.0166)	44.919 (.0360)	153.347 (.1229)	397.171 (.3183)
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	265.565 (.3113)	17.525 (.0205)	38.080 (.0446)	58.830 (.0690)	323.811 (.3796)
8.	Poultry	211.307 (.5277)	1.351 (.0034)	43.290 (.1081)	20.286 (.0507)	39.825 (.0995)

TABLE 5.3 (continued)

($m.1977-78 prices)

	Industry	Returns to Fixed Capital ($\tilde{V}$)	Returns to Land ($\tilde{W}$)	Other Costs Tickets ($\tilde{X}$)		Total Inputs to Current Production
				Returns to Working Capital[b]	Indirect Taxes n.e.c. and Sales by Final Buyers	
1.	Pastoral Zone	85.285 (.1659)	96.636 (.1880)	16.469 (.0320)	5.150 (.0100)	514.100 (1.0000)
2.	Wheat-Sheep Zone	310.567 (.1305)	602.043 (.2529)	50.054 (.0210)	37.985 (.0160)	2380.669 (1.0000)
3.	High Rainfall Zone	97.989 (.0825)	277.442 (.2336)	18.271 (.0154)	15.636 (.0132)	1187.454 (1.0000)
4.	Northern Beef	26.853 (.1290)	47.992 (.2306)	4.469 (.0215)	0.001 (.0000)	208.109 (1.0000)
5.	Milk Cattle and Pigs	70.642 (.0737)	184.590 (.1926)	12.212 (.0127)	16.826 (.0176)	958.408 (1.0000)
6.	Other Farming (Sugar Cane, Fruit and Nuts)	89.990 (.0721)	167.941 (.1346)	31.131 (.0250)	29.286 (.0235)	1247.699 (1.0000)
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	39.661 (.0465)	70.811 (.0830)	13.964 (.0164)	24.823 (.0291)	853.070 (1.0000)
8.	Poultry	40.336 (.1007)	0.000 (.0000)	20.796 (.0519)	23.228 (.0580)	400.419 (1.0000)

* The 'typicalized' figures are estimates of the values these variables would have taken in 1977-78 had experience in the agricultural sector been typical that year.

a Returns to owner-operators' labour were calculated by splitting the 'typicalized' 1977-78 payment to rural workers (occupation 9) into returns to owner-operators' labour and payments to other rural workers in proportion to the levels listed for these variables in Tables 4.4 and 4.6. For example, the returns to owner-operators' labour in the Pastoral Zone is equal to 190.042 (the 'typicalized' 1977-78 payment to rural workers, listed in Table 5.4) times 95.743 (the returns to owner-operators' labour inflated to give the typical-year input share, listed in Table 4.4) divided by 383.6137 (the total payment to rural workers inflated to give the typical-year input share, listed in Table 4.7) which equals 47.431.

b Returns to working capital were calculated by splitting the 'typicalized' 1977-78 other-costs-tickets values into returns to working capital and indirect taxes n.e.c. and sales by final buyers in proportion to the levels listed for these variables in Table 4.4.

c The shares of each input in total inputs to the sector are given in parentheses.

TABLE 5.4 : THE 'TYPICALIZED' 1977-78 LABOUR MATRIX ($\tilde{U}$) FOR THE AGRICULTURAL INDUSTRIES*
($m. 1977-78 prices)

Occupation[a] \ Industry	1.Pastoral Zone	2.Wheat-Sheep Zone	3.High Rainfall Zone	4.Northern Beef	5.Milk Cattle and Pigs	6. Other Farming (Sugar Cane, Fruit and Nuts)	7. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	8.Poultry
1. Professional White Collar	1.055	3.004	1.540	0.269	1.741	2.185	1.781	0.597
2. Para-professional	1.023	2.879	1.491	0.264	1.685	2.105	1.716	0.163
3. Skilled White Collar	0.048	0.125	0.010	0.010	0.076	0.119	0.097	0.044
4. Semi-and Unskilled White Collar	3.693	10.472	5.388	0.948	6.095	7.665	6.250	1.908
5. Skilled Blue Collar Metal and Electrical	1.998	5.716	2.935	0.513	3.313	4.170	3.400	1.039
6. Skilled Blue Collar Building	0.879	2.503	1.275	0.225	1.457	1.827	1.489	0.247
7. Skilled Blue Collar Other	1.455	4.130	2.117	0.372	2.404	3.019	2.461	0.112
8. Semi-and Unskilled Blue Collar	7.115	20.234	10.392	1.828	11.774	14.735	12.013	4.823
9. Rural Workers	190.042	664.031	413.995	66.049	338.192	514.693	353.433	51.178
10. Armed Services	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	207.309	713.093	439.205	70.478	336.737	550.518	382.640	60.111

* The 'typicalized' figures are estimates of the values these variables would have taken in 1977-78 had experience in the agricultural sector been typical that year.

a For definitions of these occupational categories see Tulpulé, Mannion and Strzelecki (1983, Appendix A).

Finally, in addition to the input-output data depicted in Figure 1.6, there exist three ORANI data-base matrices which were 'typicalized'. These matrices contain data on the employment of occupational hours in each industry; the number of people employed by occupation in each industry; and the capital stocks in each industry. These data were 'typicalized' in the sense that if the size of an industry say, doubled, in the 'typicalized' 1977-78 data base as compared with its size in the 1977-78 data base, then the data in these matrices associated with the industry also doubled.

6. THE BALANCING ALGORITHM: INSIDE PROGRAM 'HAMMER'

This section is largely directed towards highlighting distortions introduced into the data base by the process of 'typicalization' as described in the preceding sections. Distortions in this context refer to unwanted changes in commodity sales shares or industry input shares that occur as a 'side-effect' of implementing a balanced typical-year data base. The key to understanding how distortions are created is the row and column factors used in the HAMMER computer program. These factors scale the rows of agricultural commodity sales and columns of inputs to agricultural industries as specified in the data base created by the AGCID program, such that row and column totals equal their respective values as given by the 'typicalized' product-mix matrix (see Table 2.4).

An iterative approach is used in the HAMMER program. In iteration one, for example, the program reads the total basic-value sales of wheat as specified in the data base created by the AGCID program, i.e., 539.200 ($m. 1977-78 prices) (see Table 3.8). It then divides the output of wheat in the 'typicalized' product-mix matrix, i.e., 921.0667 ($m. 1977-78 prices) (see Table 2.4), by this value to determine the iteration-one scaling factor for the commodity wheat. This scaling factor (i.e., 921.0667/539.200 = 1.708) is used to scale up all the basic-value sales of wheat in the $\tilde{A}$, $\tilde{B}$, $\tilde{C}$, $\tilde{D}$ and $\tilde{E}$ matrices (see Figure 1.6) that were produced in the AGCID program. This scaling preserves the desired sales shares of wheat and sets the total basic-value of sales of wheat equal to the required 921.0667 ($m. 1977-78 prices). A similar scaling operation is

performed on the sales of the other agricultural commodities. The HAMMER program then goes on to scale industry inputs in the $\tilde{A}$, $\tilde{F}$, $\tilde{K}_1$, $\tilde{P}_1$,., $\tilde{K}_{g+1}\tilde{P}_{g+1}$, $\tilde{U}$, $\tilde{V}$, $\tilde{W}$ and $\tilde{X}$ matrices (see Figure 1.6) such that the total input to an agricultural industry is equal to the output of the industry as specified in the 'typicalized' 1977-78 ORANI product-mix matrix. The scaling of industry inputs preserves the input shares that existed after commodity sales were scaled. Distortions may be introduced at this step depending on the extent of sales of domestic agricultural commodities to agricultural industries. To continue the example, the sales of wheat to agricultural industries were first scaled as described above. These adjusted sales of wheat were then used in the calculation of industry inputs. Industry inputs are next scaled preserving the changed input shares of wheat. Furthermore the input shares of agricultural commodities in non-agricultural industries are also changed by this procedure. When sales of agricultural commodities were scaled as described above this affected the total inputs to all industries which purchased agricultural commodities. Industry inputs in the non-agricultural sector were also scaled in the HAMMER program such that their changed agricultural input shares were preserved.[12]

After industry inputs have been scaled the total basic-value sales of agricultural commodities will no longer exactly equal their outputs as specified in the 'typicalized' product-mix matrix (see Table 2.4). The second iteration of the HAMMER program divides the iteration-one total basic-value sales of agricultural commodities by the total commodity outputs as specified in the 'typicalized' product-mix matrix and then multiplies these values by the iteration-one commodity-row scaling factors. This produces the iteration-two commodity-row scaling factors. These are

then used to scale the sales of agricultural commodities as specified in the data base previously created by the AGCID program (and used in iteration one). Industry costs are next scaled along the lines of iteration one. Subsequent iterations of the HAMMER program continue this process of updating the commodity-row scaling factors until the total basic-value of agricultural commodity sales differ from the total commodity outputs as specified in the 'typicalized' product-mix matrix by no more than tenth of one per cent after the scaling of industry costs.[13] The final scaling parameters used in the HAMMER program are presented in Table 6.1. Note that for wheat the final scaling parameter is 1.803 which is close to the iteration-one scaling parameter described above of 1.708.

The largest distortions introduced into the data base by the process of 'typicalization' occurred in sales of domestic agricultural commodities to agricultural industries for use in current production. The values of these sales in the 1977-78 ORANI data base and the 'typicalized' 1977-78 ORANI data base are presented in Tables 6.2 and 6.3, respectively. The sales in Table 6.3 were created in the HAMMER program by first multiplying the sales in Table 6.2 by the commodity row scaling factors and then by the industry column scaling factors listed in Table 6.1.[14] For example the sale of wheat to the Pastoral Zone in Table 6.2 of 9.049 ($m. 1977-78 prices) is first multiplied by the scaling factor for wheat, 1.803, and then multiplied by the scaling factor for the Pastoral Zone, 0.495, which produces the value in Table 6.3 of 8.082 ($m. 1977-78 prices).[15]

To highlight the distortions introduced the following shares are contained in Tables 6.2 and 6.3:

TABLE 6.1 : SCALING FACTORS USED BY THE HAMMER COMPUTER PROGRAM TO BALANCE THE AGRICULTURAL SECTOR IN THE 'TYPICALIZED' 1977-78 ORANI DATA BASE

	Commodity	Scaling Factor Applied to the Commodity Row [a]
1.	Wool	1.134
2.	Sheep	0.942
3.	Wheat	1.803
4.	Barley	0.506
5.	Other Cereal Grains	0.535
6.	Meat Cattle	0.733
7.	Milk Cattle and Pigs	1.567
8.	Other Farming (Sugar Cane, Fruit and Nuts)	2.123
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	1.075
10.	Poultry	0.999

	Industry	Scaling Factor Applied to the Industry Column [b]
1.	Pastoral Zone	0.495
2.	Wheat-Sheep Zone	0.717
3.	High Rainfall Zone	0.779
4.	Northern Beef	0.344
5.	Milk Cattle and Pigs	0.772
6.	Other Farming (Sugar Cane, Fruit and Nuts)	1.540
7.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	1.164
8.	Poultry	1.078

a These scaling factors are the ones used by the HAMMER computer program in its final iteration. They are approximately equal to the total basic-value sales of each agricultural commodity listed in Table 3.8 divided by the respective total commodity output as given in the 'typicalized' product-mix matrix in Table 2.4.

b These scaling factors are the ones used by the HAMMER computer program in its final iteration. They are approximately equal to the total inputs to current production for each agricultural industry listed in Table 4.4 divided by the respective industry outputs as given in the 'typicalized' product-mix matrix in Table 2.4.

TABLE 6.2 : SALES OF DOMESTIC AGRICULTURAL COMMODITIES TO AGRICULTURAL INDUSTRIES FOR USE IN CURRENT PRODUCTION IN THE 1977-78 ORANI DATA BASE

($m. 1977-78 basic-value prices)

	COMMODITY / INDUSTRY	1. Pastoral Zone	2. Wheat-Sheep Zone	3. High Rainfall Zone	4. Northern Beef
1.	Wool	0.000 [.000][a] (.000)[b]	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
2.	Sheep	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
3.	Wheat	9.049 [.060] (.055)	49.119 [.324] (.071)	16.526 [.109] (.047)	3.358 [.022] (.023)
4.	Barley	5.125 [.067] (.031)	22.565 [.297] (.033)	10.045 [.132] (.029)	2.900 [.038] (.020)
5.	Other Cereal Grains	4.590 [.024] (.028)	17.382 [.091] (.025)	9.650 [.051] (.027)	2.595 [.014] (.018)
6.	Meat Cattle	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
7.	Milk Cattle and Pigs	0.000 [.000] (.000)	0.082 [.000] (.000)	0.031 [.000] (.000)	0.000 [.000] (.000)
8.	Other Farming (Sugar Cane, Fruit and Nuts)	0.735 [.001] (.004)	2.544 [.005] (.004)	2.256 [.004] (.006)	1.332 [.002] (.009)
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	10.998 [.020] (.066)	30.662 [.055] (.044)	26.226 [.047] (.075)	13.165 [.024] (.089)
10.	Poultry	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)

TABLE 6.2 (continued)

($m. 1977-78 basic-value prices)

COMMODITY \ INDUSTRY	5.Milk Cattle and Pigs	6.Other Farming (Sugar Cane, Fruit and Nuts)	7.Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	8.Poultr
1. Wool	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
2. Sheep	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
3. Wheat	19.211 [.127] (.062)	2.149 [.014] (.012)	2.412 [.016] (.012)	9.002 [.059] (.048)
4. Barley	12.838 [.169] (.041)	0.258 [.003] (.001)	0.289 [.004] (.001)	6.001 [.079] (.032)
5. Other Cereal Grains	15.609 [.082] (.050)	3.009 [.016] (.016)	3.377 [.018] (.016)	9.402 [.049] (.050)
6. Meat Cattle	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
7. Milk Cattle and Pigs	1.345 [.002] (.004)	0.000 [.000] (.000)	0.000 [.000] (.000	0.000 [.000] (.000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	4.902 [.009] (.016)	5.261 [.010] (.028)	5.903 [.011] (.029)	0.000 [.000] (.000)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	52.909 [.095] (.169)	9.503 [.017] (.052)	10.664 [.019] (.052)	0.000 [.000] (.000)
10. Poultry	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)

a The basic value sales shares of each commodity in total basic-value sales of that commodity to domestic industries for use in current production are given in the square brackets.

b The input shares to each industry of each commodity in total basic-value inputs of domestic commodities for use in current production are given in parentheses.

TABLE 6.3 : SALES OF DOMESTIC AGRICULTURAL COMMODITIES TO AGRICULTURAL INDUSTRIES FOR USE IN CURRENT PRODUCTION IN THE 'TYPICALIZED' 1977-78 ORANI DATA-BASE

($m. 1977-78 basic-value prices)

COMMODITY \ INDUSTRY	1. Pastoral Zone	2. Wheat-Sheep Zone	3. High Rainfall Zone	4. Northern Beef
1. Wool	0.000[a] [.000][b] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
2. Sheep	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
3. Wheat	8.082 [.036] (.091)	63.497 [.286] (.116)	23.196 [.104] (.078)	2.084 [.009] (.038)
4. Barley	1.285 [.043] (.014)	8.188 [.273] (.015)	3.957 [.132] (.013)	0.505 [.017] (.009)
5. Other Cereal Grains	1.217 [.013] (.014)	6.673 [.071] (.012)	4.022 [.043] (.014)	0.478 [.005] (.009)
6. Meat Cattle	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)
7. Milk Cattle and Pigs	0.000 [.000] (.000)	0.092 [.000] (.000)	0.037 [.000] (.000)	0.000 [.000] (.000)
8. Other Farming (Sugar Cane, Fruit and Nuts)	0.774 [.001] (.009)	3.873 [.004] (.007)	3.729 [.004] (.013)	0.974 [.001] (.018)
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	5.858 [.011] (.066)	23.639 [.045] (.043)	21.953 [.041] (.074)	4.873 [.009] (.089)
10. Poultry	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)

TABLE 6.3 (continued)

($m. 1977-78 basic-value prices)

INDUSTRY / COMMODITY	5.Milk Cattle and Pigs	6.Other Farming (Sugar Cane, Fruit and Nuts)	7.Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	8.Poult
1. Wool	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.00 [.000 (.000
2. Sheep	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.00 [.000 (.000
3. Wheat	26.746 [.120] (.103)	5.969 [.027] (.019)	5.060 [.023] (.019)	17.49 [.079 (.083
4. Barley	5.017 [.167] (.019)	0.201 [.007] (.001)	0.170 [.006] (.001)	3.27 [.109 (.015
5. Other Cereal Grains	6.453 [.068] (.025)	2.481 [.026] (.008)	2.104 [.022] (.008)	5.42 [.057 (.026
6. Meat Cattle	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.00 [.000 (.000
7. Milk Cattle and Pigs	1.628 [.002] (.006)	0.000 [.000] (.000)	0.000 [.000] (.000	0.00 [.000 (.000
8. Other Farming (Sugar Cane, Fruit and Nuts)	8.038 [.009] (.031)	17.205 [.018] (.055)	14.586 [.016] (.055)	0.00 [.000 (.000
9. Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	43.930 [.083] (.169)	15.738 [.030] (.050)	13.343 [.025] (.050)	0.00 [.000 (.000
10. Poultry	0.000 [.000] (.000)	0.000 [.000] (.000)	0.000 [.000] (.000)	0.00 [.000 (.000

a The basic value sales shares of each commodity in total basic-value sales of that commodity to domestic industries for use in current production are given in the square brackets.

b The input shares to each industry of each commodity in total basic-value inputs of domestic commodities for use in current production are given in parentheses.

(i) The basic value sales shares of each commodity in total basic value sales of that commodity to domestic industries for use in current production (these are given in the square brackets); and

(ii) The input shares of each commodity in total basic value inputs of domestic commodities to each industry for current production (these are given in parentheses).

By comparing the two tables it can be seen that the sales shares of agricultural commodities to the Northern Beef industry in Table 6.3 are approximately half their corresponding values in Table 6.2. This distortion in sales shares is due to the scaling factor applied to the inputs to the Northern Beef industry being significantly different from one. In fact it is equal to 0.344 (see Table 6.1). The next in rank among scaling factors applied to industry inputs which differ substantially from one is 1.540, the scaling factor for the Other Farming (Sugar Cane, Fruit and Nuts) industry. In consequence, the sales shares of agricultural commodities to the Other Farming (Sugar Cane, Fruit and Nuts) industry in Table 6.3 are approximately double their respective values in Table 6.2.

The input shares of barley and other cereal grains in the agricultural industries are approximately half their values in Table 6.3 by comparison with Table 6.2. This distortion in input shares is due to the substantial deviations from unity of the scaling factors (0.506 and 0.535 respectively) applied to the sales of barley and other cereal grains. The scaling factor of 2.123 applied to sales of the commodity other farming

(sugar cane, fruit and nuts) results in the input shares of other farming (sugar cane, fruit and nuts) in the agricultural industries assuming values in Table 6.3 approximately double the corresponding figures in Table 6.2.

The scaling factors applied to sales of agricultural commodities that are significantly different from one will also distort input shares of agricultural commodities in the non-agricultural industries. The non-agricultural industries for which domestic agricultural commodities are significant domestic commodity inputs to current production are listed in Table 6.4. In this table the input shares of each agricultural commodity in total basic-value inputs of domestic commodities to these industries are given, as calculated from both the 1977-78 ORANI data base and the 'typicalized' 1977-78 ORANI data base. The commodities which will be the worst offenders in terms of distorting input shares can be anticipated by examining the scaling factors applied to their commodity rows as listed in Table 6.1. As a rough first approximation, if the scaling factor for the commodity row is say 1.134, as it is for wool, then the input shares will be 1.134 times larger in the 'typicalized' data base. Thus the largest distortions of input shares would be expected from inputs of commodities 3, 4, 5, 7 and 8 which are the commodities whose scaling factors differ most significantly from one (see Table 6.1). By examining Table 6.4 it can be seen that these expectations are fulfilled. For example, the scaling factor for the commodity other farming (sugar cane, fruit and nuts) is 2.123 and the input shares of this commodity have approximately doubled.

When evaluating the severity of the distortions in Table 6.4 it is important to note that the input shares are presented relative to total

TABLE 6.4 : NON-AGRICULTURAL INDUSTRIES FOR WHICH DOMESTIC AGRICULTURAL COMMODITIES ARE SIGNIFICANT DOMESTIC COMMODITY INPUTS IN CURRENT PRODUCTION IN THE 1977-78 ORANI DATA BASE AND THE 'TYPICALIZED' 1977-78 ORANI DATA BASE

Non-Agricultural Industries for which Domestic Agricultural Commodities are Significant Domestic Commodity Inputs in Current Production	Percentage of Total Basic Value of Domestic Commodity Inputs to Current Production in the:	
	1977-78 ORANI Data Base	'Typicalized' 1977-78 ORANI Data Base
Domestic WOOL		
30. Cotton Ginning	69.1	70.4
33. Worsted and Woollen Yarns	31.0	33.6
79. Leather Products	15.9	17.7
Domestic SHEEP		
18. Meat Products	12.0	12.1
Domestic WHEAT		
22. Flour Mill and Cereal Food Products	10.2	17.8
Domestic BARLEY		
27. Beer and Malt	2.6	1.3
Domestic OTHER CEREAL GRAINS		
21. Margarine, Oils and Fats n.e.c.	20.4	12.0
22. Flour Mill and Cereal Food Products	15.4	8.1
Domestic MEAT CATTLE		
18. Meat Products	37.3	29.2
Domestic MILK CATTLE AND PIGS		
18. Meat Products	7.1	11.9
19. Milk Products	45.8	56.0
Domestic OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)		
20. Fruit and Vegetables	9.8	18.2
23. Bread, Cakes and Biscuits	3.9	7.9
25. Other Food Products	37.8	55.9
109. Entertainment, Recreation	3.8	7.7
Domestic OTHER FARMING (VEGETABLES, COTTON, OILSEEDS AND TOBACCO)		
20. Fruit and Vegetables	24.9	23.4
28. Other Alcoholic Beverages	38.5	38.9
29. Tobacco Products	33.5	34.9
30. Cotton Ginning	28.3	27.3
Domestic POULTRY		
18. Meat Products	7.4	7.9

basic-value domestic commodity inputs. The industry input technology specified in the ORANI model is depicted in Figure 6.1. By examining level one of Figure 6.1 it can be seen that the important input share from the perspective of the industry activity level is the share of an effective commodity input (i.e., a CES combination of the purchasers' value of the commodity from domestic and imported sources) in total inputs to current production.[16] The shares of effective agricultural commodity inputs in total production to the non-agricultural industries for which agricultural commodities are significant inputs are presented in Table 6.5 from which the reader can judge the severity of the distortions introduced by the process of 'typicalization' as described in this paper.[17]

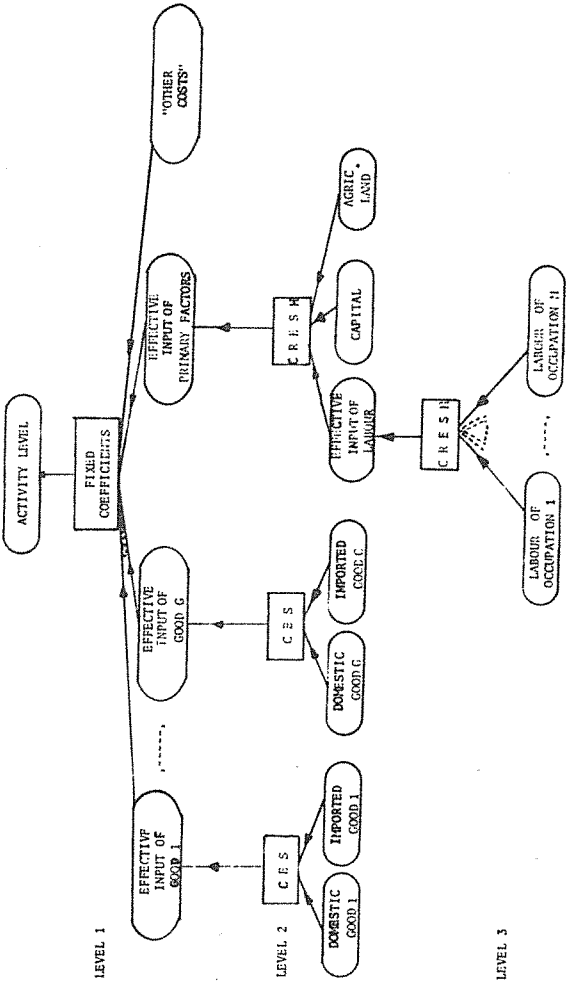


FIGURE 6.1 : SPECIFICATION OF THE INDUSTRY INPUT TECHNOLOGY IN THE ORANI MODEL

TABLE 6.5 : NON-AGRICULTURAL INDUSTRIES FOR WHICH AGRICULTURAL COMMODITIES ARE SIGNIFICANT INPUTS IN CURRENT PRODUCTION IN THE 1977-78 ORANI DATA BASE AND THE 'TYPICALIZED' 1977-78 ORANI DATA BASE

Non-Agricultural Industries for which Agricultural Commodities are Significant Inputs in Current Production	Percentage of Purchasers' Value of Commodity Input in Total Inputs to Current Production in the:	
	1977-78 ORANI Data Base	'Typicalized' 1977-78 ORANI Data Base
WOOL		
30. Cotton Ginning	61.9	65.0
33. Worsted and Woollen Yarns	15.2	16.9
79. Leather Products	9.2	10.4
SHEEP		
18. Meat Products	9.8	9.8
WHEAT		
22. Flour Mill and Cereal Food Products	7.6	13.3
BARLEY		
27. Beer and Malt	1.7	0.8
OTHER CEREAL GRAINS		
21. Margarine, Oils and Fats n.e.c.	15.7	9.6
22. Flour Mill and Cereal Food Products	11.5	6.1
MEAT CATTLE		
18. Meat Products	30.7	23.8
MILK CATTLE AND PIGS		
18. Meat Products	5.1	8.4
19. Milk Products	33.4	43.7
OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)		
20. Fruit and Vegetables	7.1	13.6
23. Bread, Cakes and Biscuits	2.5	4.9
25. Other Food Products	25.3	41.9
109. Entertainment, Recreation	1.9	3.4
OTHER FARMING (VEGETABLES, COTTON, OILSEEDS AND TOBACCO)		
20. Fruit and Vegetables	18.6	18.2
28. Other Alcoholic Beverages	25.5	26.2
29. Tobacco Products	34.0	34.7
30. Cotton Ginning	23.8	23.4
POULTRY		
18. Meat Products	5.3	5.4

7. CONCLUDING REMARKS

Two avenues for further work stem naturally from this paper:

(a) the incorporation of Adams' typical year for the agricultural sector within future updates of the ORANI data base; and

(b) the prospect of producing a typical year data base for the whole economy, rather than imbedding typical-year data for a subset of the economy within a data base for a particular year of record.

The great detail in which the 'typicalization' of the 1977-78 ORANI data base has been described in this document is justified, therefore, not only on grounds of reproducibility, but also as providing a manual which would allow (a) to be put onto a routine basis. Hopefully some insights into task (b) have also been provided.

FOOTNOTES

* The author is very grateful to Alan Powell for editorial and general guidance. Thanks are also due to Ian Bruce, Brian Parmenter, Mike Kenderes, John Sutton and David Vincent for comments and assistance at various stages of this project. The remaining errors are the author's.

1. See Adams (1984b) Tables 3.1 and 3.2 for a comprehensive description of the agricultural industries and commodities modelled in ORANI.

2. See Dixon, Parmenter, Powell and Vincent (1983) for a complete description of the modelling of the agricultural sector in ORANI.

3. See Adams (1984a) for a comparison between the responses of agricultural industries to policy shocks with the ORANI 1968-69 and 1977-78 data bases.

4. It is worth noting at this point that in 1977-78 in seven out of the eight agricultural industries the returns to the fixed factors, agricultural land and fixed capital, in total inputs to current production, as depicted in Figure 1.1, were below the average share for the period 1967-68 to 1979-80.

5. The product-mix matrix for the agricultural industries in the 'typicalized' 1977-78 ORANI data base is presented in Table 2.4.

6. The ORANI model has been supported by 1968-69, 1974-75 and 1977-78 data bases, for which official input-output accounts are available (Australian Bureau of Statistics (1977), (1981) and (1983), respectively). The creation of the ORANI agricultural data bases for the years 1968-69 and 1974-75 is documented in Vincent (1977), Vincent and Parmenter (1978), Bright (1982) and Stevenson (1981) (or for a summary of these papers see Adams and Higgs (1983)). The 1977-78 ORANI agricultural data base is documented in Bruce (1984) and Cox (1984).

7. An overview of the algorithm used to balance the ORANI data base is presented in section 6. Specific details can be found in the listing of the HAMMER computer program contained in the Appendix in Figure A.2.

8. The two stage approach of first imposing typical-year relationships between various elements of the data base and then to balance the data base was initially suggested by Sutton (1982).

9. A detailed discussion of this point is contained in section 6.

10. Imports of agricultural commodities and associated margins and taxes will be slightly changed by the HAMMER program as it balances the entire data base to ensure that total inputs to current production equal the basic-value output for all industries.

11. A detailed discussion of this point is contained in section 6.

12. Note that the HAMMER program ensures that total inputs to current production equal the basic-value output for all industries in the data base.

13. Only five iterations of the HAMMER program were required to meet this criterion. To ensure that total inputs to current production exactly equal the basic-value output for each industry the difference between these two values is added to sales to other final demands, i.e., the $\tilde{E}$ vector, in the last iteration. This can be seen for the agricultural sector by comparing sales of domestic agricultural commodities to other final demands in the 'typicalized' 1977-78 ORANI data base, see Table 5.1, with the 1977-78 ORANI data base, see Table 3.8.

14. Note that the $\tilde{A}$ matrix is the same in the data base created by the AGCID program as it is in the ORANI 1977-78 data base.

15. The value in Table 6.3 of 8.082 ($m. 1977-78 prices) is obtained exactly when using the scaling factors to their full decimal place values.

16. Note that sales of imported agricultural commodities to industries for current production are generally small relative to the corresponding sales of domestic agricultural commodities, see Tables 3.8, 3.10, 5.1 and 5.2. The exception to this being imports of other farming (vegetables, cotton, oilseeds and tobacco). Distortions introduced to the import versus domestic input share of this commodity, see level two of Figure 6.1, can be thought of as the appropriate import versus domestic input share when domestic production of the commodity is at the 'typicalized' 1977-78 level and imports of the commodity are at their 1977-78 level.

17. Of course the distortions presented earlier with respect to sales of agricultural commodities to agricultural industries should also be considered. Note that the largest absolute distortion to the shares of agricultural commodities in total household consumption was an increase in the share of other farming (sugar cane, fruit and nuts) from 0.0028 to 0.0054.

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APPENDIX : MISCELLANEOUS TABLES OF AGRICULTURAL DATA AND LISTINGS OF COMPUTER PROGRAMS INVOLVED

This appendix contains three tables of agricultural data. The first of these, Table A.1 presents product-mix matrices for the agricultural sector from 1967-68 to 1979-80. Next is Table A.2 which shows the data on sales of agricultural commodities with the associated margins and taxes as contained in the 1968-69, 1974-75 and 1977-78 ORANI data bases. Finally Table A.3 reproduces Adams (1984b) data on inputs to current production for each of the ORANI agricultural industries from 1967-68 to 1979-80. The appendix also contains listings of the AGCID and HAMMER programs. These are presented in Figures A.1 and A.2 respectively.

TABLE A.1 : PRODUCT-MIX MATRICES AND SHARES OF COMMODITY BY INDUSTRY OUTPUTS IN THE TOTAL OUTPUT FOR THE AGRICULTURAL SECTOR FROM 1967-68 TO 1979-80*

PRODUCT-MIX MATRIX FOR 1967-68

$m. 1967-68 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	163.500	35.770	6.810	.090	.320	22.050	.230	.200	5.260		234.230
	(.0535)[a]	(.0117)	(.0022)	(.0000)	(.0001)	(.0072)	(.0001)	(.0001)	(.0017)		(.0767)
2. WHEAT-SHEEP ZONE	293.410	124.850	243.960	7.640	64.510	68.600	20.960	1.040	12.690		837.660
	(.0960)	(.0409)	(.0798)	(.0025)	(.0211)	(.0225)	(.0069)	(.0003)	(.0042)		(.2742)
3. HIGH RAINFALL ZONE	253.900	72.280	6.640	6.310	38.450	82.290	9.610	2.670	21.980		494.130
	(.0831)	(.0237)	(.0022)	(.0021)	(.0126)	(.0269)	(.0031)	(.0009)	(.0072)		(.1617)
4. NORTHERN BEEF						50.620					50.620
						(.0166)					(.0166)
5. MILK CATTLE AND PIGS						18.790	403.950				422.740
						(.0061)	(.1322)				(.1384)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								520.650			520.650
								(.1704)			(.1704)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									343.590		343.590
									(.1125)		(.1125)
8. POULTRY										151.700	151.700
										(.0497)	(.0497)
TOTAL OUTPUT BY COMMODITY	710.810	232.900	257.410	14.040	103.280	242.350	434.750	524.560	383.520	151.700	3055.321
	(.2326)	(.0762)	(.0842)	(.0046)	(.0338)	(.0793)	(.1423)	(.1717)	(.1255)	(.0497)	(1.0000)

TABLE A.1 [Continued]

PRODUCT-MIX MATRIX FOR 1968-69 — $m. 1968-69 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	188.000 (.0513)[a]	55.110 (.0150)	23.720 (.0065)	.540 (.0001)	.420 (.0001)	28.880 (.0079)	.297 (.0001)	.267 (.0001)	6.820 (.0019)		304.054 (.0830)
2. WHEAT-SHEEP ZONE	335.760 (.0917)	135.710 (.0371)	508.020 (.1387)	28.130 (.0077)	46.530 (.0127)	83.350 (.0228)	29.690 (.0081)	1.480 (.0004)	17.970 (.0049)		1186.640 (.3240)
3. HIGH RAINFALL ZONE	291.470 (.0796)	92.030 (.0251)	16.890 (.0046)	11.360 (.0031)	36.670 (.0100)	114.360 (.0312)	11.760 (.0032)	3.260 (.0009)	26.900 (.0073)		604.700 (.1651)
4. NORTHERN BEEF						81.240 (.0222)					81.240 (.0222)
5. MILK CATTLE AND PIGS						28.560 (.0078)	404.610 (.1105)				433.170 (.1183)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								520.650 (.1422)			520.650 (.1422)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									399.290 (.1090)		399.290 (.1090)
8. POULTRY										132.390 (.0362)	132.390 (.0362)
TOTAL OUTPUT BY COMMODITY	815.230 (.2226)	282.850 (.0772)	548.630 (.1498)	40.030 (.0109)	83.620 (.0228)	336.390 (.0919)	446.357 (.1219)	525.657 (.1435)	450.980 (.1231)	132.390 (.0362)	3662.134 (1.0000)

TABLE A.1 (Continued)

PRODUCT-MIX MATRIX FOR 1969-70

$m. 1969-70 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	144.380	32.480	14.320	.220	.640	35.660	.230	.200	5.240		233.370
	(.0457)[a]	(.0103)	(.0045)	(.0001)	(.0002)	(.0113)	(.0001)	(.0001)	(.0017)		(.0739)
2. WHEAT-SHEEP ZONE	314.910	139.310	256.860	38.880	39.220	110.100	23.210	1.160	14.050		937.700
	(.0998)	(.0441)	(.0814)	(.0123)	(.0124)	(.0349)	(.0074)	(.0004)	(.0045)		(.2971)
3. HIGH RAINFALL ZONE	273.270	117.630	8.980	14.020	35.790	123.100	11.970	3.320	27.380		615.460
	(.0866)	(.0373)	(.0028)	(.0044)	(.0113)	(.0390)	(.0038)	(.0011)	(.0087)		(.1950)
4. NORTHERN BEEF						81.240					81.240
						(.0257)					(.0257)
5. MILK CATTLE AND PIGS						32.560	461.290				493.850
						(.0103)	(.1462)				(.1565)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								349.950			349.950
								(.1109)			(.1109)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									318.710		318.710
									(.1010)		(.1010)
8. POULTRY										125.610	125.610
										(.0398)	(.0398)
TOTAL OUTPUT BY COMMODITY	732.560	289.420	280.160	53.120	75.650	382.660	496.700	354.630	365.380	125.610	3155.890
	(.2321)	(.0917)	(.0888)	(.0168)	(.0240)	(.1213)	(.1574)	(.1124)	(.1158)	(.0398)	(1.0000)

TABLE A.1 [Continued]

PRODUCT-MIX MATRIX FOR 1970-71 — $m. 1970-71 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	94.900 [.0324][a]	13.540 [.0046]	8.380 [.0029]	.260 [.0001]	.800 [.0003]	41.840 [.0143]	.160 [.0001]	.140 [.0000]	3.670 [.0013]		163.690 [.0559]
2. WHEAT-SHEEP ZONE	234.640 [.0801]	92.160 [.0315]	228.940 [.0781]	53.260 [.0182]	63.570 [.0217]	144.840 [.0494]	21.330 [.0073]	1.060 [.0004]	12.920 [.0044]		852.720 [.2910]
3. HIGH RAINFALL ZONE	200.950 [.0686]	71.630 [.0244]	5.850 [.0020]	6.410 [.0022]	25.660 [.0088]	150.500 [.0514]	9.630 [.0033]	2.670 [.0009]	22.040 [.0075]		495.340 [.1691]
4. NORTHERN BEEF						81.240 [.0277]					81.240 [.0277]
5. MILK CATTLE AND PIGS						35.670 [.0122]	468.860 [.1600]				504.530 [.1722]
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								355.450 [.1213]			355.450 [.1213]
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									351.360 [.1199]		351.360 [.1199]
8. POULTRY										125.750 [.0429]	125.750 [.0429]
TOTAL OUTPUT BY COMMODITY	530.490 [.1810]	177.330 [.0605]	243.170 [.0830]	59.930 [.0205]	90.030 [.0307]	454.090 [.1550]	499.980 [.1706]	359.320 [.1226]	389.990 [.1331]	125.750 [.0429]	2930.080 [1.0000]

TABLE A.1 (Continued)

PRODUCT-MIX MATRIX FOR 1971-72

$m. 1971-72 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	129.800	14.510	15.100	.700	2.510	62.300	.230	.202	5.170		230.522
	(.0368)[a]	(.0041)	(.0043)	(.0002)	(.0007)	(.0177)	(.0001)	(.0001)	(.0015)		(.0654)
2. WHEAT-SHEEP ZONE	270.220	69.230	267.200	70.360	72.070	150.080	23.470	1.170	14.210		938.010
	(.0767)	(.0196)	(.0758)	(.0200)	(.0204)	(.0426)	(.0067)	(.0003)	(.0040)		(.2662)
3. HIGH RAINFALL ZONE	215.830	77.140	6.070	5.700	28.500	181.630	10.760	2.990	24.610		553.230
	(.0612)	(.0219)	(.0017)	(.0016)	(.0081)	(.0515)	(.0031)	(.0008)	(.0070)		(.1570)
4. NORTHERN BEEF						115.330					115.330
						(.0327)					(.0327)
5. MILK CATTLE AND PIGS						38.780	476.420				515.200
						(.0110)	(.1352)				(.1462)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								616.720			616.720
								(.1750)			(.1750)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									380.830		380.830
									(.1081)		(.1081)
8. POULTRY										174.380	174.380
										(.0495)	(.0495)
TOTAL OUTPUT BY COMMODITY	615.850	160.880	288.370	76.760	103.080	548.120	510.880	621.082	424.820	174.380	3524.222
	(.1747)	(.0456)	(.0818)	(.0218)	(.0292)	(.1555)	(.1450)	(.1762)	(.1205)	(.0495)	(1.0000)

TABLE A.1 [Continued]

PRODUCT-MIX MATRIX FOR 1972-73 $m. 1972-73 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUITS & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	254.080 [.0551][a]	19.170 [.0042]	6.530 [.0014]	.360 [.0001]	4.700 [.0010]	60.980 [.0132]	.350 [.0001]	.310 [.0001]	7.950 [.0017]		354.430 [.0768]
2. WHEAT-SHEEP ZONE	528.180 [.1145]	150.690 [.0327]	219.960 [.0477]	59.180 [.0128]	52.000 [.0113]	154.200 [.0334]	30.390 [.0066]	1.510 [.0003]	18.360 [.0040]		1214.470 [.2632]
3. HIGH RAINFALL ZONE	478.970 [.1038]	130.780 [.0283]	5.700 [.0012]	7.720 [.0017]	25.750 [.0056]	170.330 [.0369]	17.120 [.0037]	4.750 [.0010]	39.160 [.0085]		880.280 [.1908]
4. NORTHERN BEEF						112.840 [.0245]					112.840 [.0245]
5. MILK CATTLE AND PIGS						47.990 [.0104]	515.990 [.1118]				563.980 [.1222]
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								868.420 [.1882]			868.420 [.1882]
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									433.720 [.0940]		433.720 [.0940]
8. POULTRY										185.250 [.0402]	185.250 [.0402]
TOTAL OUTPUT BY COMMODITY	1261.230 [.2734]	300.640 [.0652]	232.190 [.0503]	67.260 [.0146]	82.450 [.0179]	546.340 [.1184]	563.850 [.1222]	874.990 [.1897]	499.190 [.1082]	185.250 [.0402]	4613.390 [1.0000]

TABLE A.1 (Continued)

PRODUCT-MIX MATRIX FOR 1973-74

$m. 1973-74 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	216.620 (.0386)[a]	75.150 (.0134)	32.340 (.0058)	1.360[b] (.0002)	1.480[b] (.0003)	68.210 (.0121)	.400 (.0001)	.360 (.0001)	9.090 (.0016)		405.010 (.0721)
2. WHEAT-SHEEP ZONE	516.380 (.0919)	284.710 (.0507)	381.980 (.0680)	81.930[b] (.0146)	88.890[b] (.0158)	213.620 (.0380)	40.910 (.0073)	2.040 (.0004)	24.770 (.0044)		1635.230 (.2911)
3. HIGH RAINFALL ZONE	421.080 (.0750)	210.490 (.0375)	5.810 (.0010)	18.670[b] (.0033)	20.260[b] (.0036)	219.670 (.0391)	18.730 (.0033)	5.200 (.0009)	42.830 (.0076)		962.740 (.1714)
4. NORTHERN BEEF						135.970 (.0242)					135.970 (.0242)
5. MILK CATTLE AND PIGS						49.770 (.0089)	534.980 (.0952)				584.750 (.1041)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								1071.730 (.1908)			1071.730 (.1908)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									560.270 (.0997)		560.270 (.0997)
8. POULTRY										262.210 (.0467)	262.210 (.0467)
TOTAL OUTPUT BY COMMODITY	1154.080 (.2054)	570.350 (.1015)	420.130 (.0748)	101.960 (.0181)	110.630 (.0197)	687.240 (.1223)	595.020 (.1059)	1079.330 (.1921)	636.960 (.1134)	262.210 (.0467)	5617.910 (1.0000)

TABLE A.1 (Continued)

PRODUCT-MIX MATRIX FOR 1974-75

$m. 1974-75 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	161.690	39.530	56.070	2.350	6.250	18.800	1.240	.260	6.580		292.770
	(.0356)[a]	(.0087)	(.0123)	(.0005)	(.0014)	(.0041)	(.0003)	(.0001)	(.0014)		(.0644)
2. WHEAT-SHEEP ZONE	325.560	126.250	690.310	94.630	94.380	80.990	38.640	1.890	22.920		1475.570
	(.0716)	(.0278)	(.1519)	(.0208)	(.0208)	(.0178)	(.0085)	(.0004)	(.0050)		(.3247)
3. HIGH RAINFALL ZONE	242.100	102.260	5.380	7.150	16.570	88.030	7.900	2.720	22.440		494.550
	(.0533)	(.0225)	(.0012)	(.0016)	(.0036)	(.0194)	(.0017)	(.0006)	(.0049)		(.1088)
4. NORTHERN BEEF						75.870					75.870
						(.0167)					(.0167)
5. MILK CATTLE AND PIGS						32.160	522.220				554.380
						(.0071)	(.1149)				(.1220)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								815.840			815.840
								(.1795)			(.1795)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									549.270		549.270
									(.1209)		(.1209)
8. POULTRY										286.410	286.410
										(.0630)	(.0630)
TOTAL OUTPUT BY COMMODITY	729.350	268.040	751.760	104.130	117.200	295.850	570.000	820.710	601.210	286.410	4544.660
	(.1605)	(.0590)	(.1654)	(.0229)	(.0258)	(.0651)	(.1254)	(.1806)	(.1323)	(.0630)	(1.0000)

TABLE A.1 (Continued)

PRODUCT-MIX MATRIX FOR 1975-76

$m. 1975-76 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	175.350	19.300	78.910	3.270	7.050	41.010	.370	.290	7.480		333.030
	(.0385)[a]	(.0042)	(.0173)	(.0007)	(.0015)	(.0090)	(.0001)	(.0001)	(.0016)		(.0731)
2. WHEAT-SHEEP ZONE	58.850	148.350	791.800	143.270	94.900	77.150	36.750	1.760	21.350		1374.180
	(.0129)	(.0326)	(.1738)	(.0314)	(.0208)	(.0169)	(.0081)	(.0004)	(.0047)		(.3016)
3. HIGH RAINFALL ZONE	290.130	85.430	12.170	11.480	11.290	87.240	15.070	2.970	24.510		540.290
	(.0637)	(.0187)	(.0027)	(.0025)	(.0025)	(.0191)	(.0033)	(.0007)	(.0054)		(.1186)
4. NORTHERN BEEF						80.990					80.990
						(.0178)					(.0178)
5. MILK CATTLE AND PIGS						32.160	522.220				554.380
						(.0071)	(.1146)				(.1217)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								800.800			800.800
								(.1758)			(.1758)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									567.270		567.270
									(.1245)		(.1245)
8. POULTRY										305.350	305.350
										(.0670)	(.0670)
TOTAL OUTPUT BY COMMODITY	524.330	253.080	882.880	158.020	113.240	318.550	574.410	805.920	620.610	305.350	4556.390
	(.1151)	(.0555)	(.1938)	(.0347)	(.0249)	(.0699)	(.1261)	(.1769)	(.1362)	(.0670)	(1.0000)

TABLE A.1 [Continued]

PRODUCT-MIX MATRIX FOR 1976-77 — $m. 1976-77 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	198.370	35.790	68.900	63.680	6.310	31.020	.110	.000	39.940		444.120
	(.0357)[a]	(.0064)	(.0124)	(.0115)	(.0011)	(.0056)	(.0000)	(.0000)	(.0072)		(.0800)
2. WHEAT-SHEEP ZONE	411.490	112.840	1036.780	170.550	42.890	51.040	57.670	2.680	35.090		1921.030
	(.0741)	(.0203)	(.1867)	(.0307)	(.0077)	(.0092)	(.0104)	(.0005)	(.0063)		(.3460)
3. HIGH RAINFALL ZONE	346.790	145.820	47.370	21.640	17.860	78.190	14.970	.740	36.630		710.010
	(.0625)	(.0263)	(.0085)	(.0039)	(.0032)	(.0141)	(.0027)	(.0001)	(.0066)		(.1279)
4. NORTHERN BEEF						72.270					72.270
						(.0130)					(.0130)
5. MILK CATTLE AND PIGS						14.540	509.450				523.990
						(.0026)	(.0918)				(.0944)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								922.890			922.890
								(.1662)			(.1662)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									621.930		621.930
									(.1120)		(.1120)
8. POULTRY										335.770	335.770
										(.0605)	(.0605)
TOTAL OUTPUT BY COMMODITY	956.650	294.450	1153.050	255.870	67.060	247.060	582.200	926.310	733.590	335.770	5552.011
	(.1723)	(.0530)	(.2077)	(.0461)	(.0121)	(.0445)	(.1049)	(.1668)	(.1321)	(.0605)	(1.0000)

TABLE A.1 [Continued]

PRODUCT-MIX MATRIX FOR 1977-78

$m. 1977-78 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING [SUGAR CANE, FRUIT & NUTS]	9.OTHER FARMING [VEGS, COTTON, OILSEEDS & TOBACCO]	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	319.850	32.830	2.980	.420	.000	42.990	.000	.000	.590		399.660
	[.0557][a]	[.0057]	[.0005]	[.0001]	[.0000]	[.0075]	[.0000]	[.0000]	[.0001]		[.0696]
2. WHEAT-SHEEP ZONE	601.250	251.400	488.880	142.270	61.220	101.600	43.720	1.710	31.640		1723.690
	[.1047]	[.0438]	[.0851]	[.0248]	[.0107]	[.0177]	[.0076]	[.0003]	[.0055]		[.3001]
3. HIGH RAINFALL ZONE	412.680	214.500	6.820	12.140	9.170	131.270	18.120	5.570	48.600		858.870
	[.0718]	[.0373]	[.0012]	[.0021]	[.0016]	[.0228]	[.0032]	[.0010]	[.0085]		[.1495]
4. NORTHERN BEEF						120.950					120.950
						[.0211]					[.0211]
5. MILK CATTLE AND PIGS						20.110	614.950				635.060
						[.0035]	[.1071]				[.1106]
6. OTHER FARMING [SUGAR CANE, FRUIT AND NUTS]								936.100			936.100
								[.1630]			[.1630]
7. OTHER FARMING [VEGS, COTT., OILSEEDS & TOB.]									678.440		678.440
									[.1181]		[.1181]
8. POULTRY										391.010	391.010
										[.0681]	[.0681]
TOTAL OUTPUT BY COMMODITY	1333.780	498.730	498.680	154.830	70.390	416.920	676.790	943.380	759.270	391.010	5743.781
	[.2322]	[.0868]	[.0868]	[.0270]	[.0123]	[.0726]	[.1178]	[.1642]	[.1322]	[.0681]	[1.0000]

TABLE A.1 (Continued)

PRODUCT-MIX MATRIX FOR 1978-79

$m. 1978-79 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	192.510 [.0259][a]	45.120 [.0061]	6.520 [.0009]	.850 [.0001]	.060 [.0000]	59.980 [.0081]	.030 [.0000]	1.040 [.0001]	.080 [.0000]		306.190 [.0411]
2. WHEAT-SHEEP ZONE	662.690 [.0890]	425.000 [.0571]	953.920 [.1281]	181.150 [.0243]	53.740 [.0072]	243.610 [.0327]	68.800 [.0092]	1.120 [.0002]	25.100 [.0034]		2615.130 [.3513]
3. HIGH RAINFALL ZONE	381.940 [.0513]	275.060 [.0369]	14.170 [.0019]	13.340 [.0018]	11.810 [.0016]	217.150 [.0292]	26.870 [.0036]	12.380 [.0017]	37.880 [.0051]		990.600 [.1331]
4. NORTHERN BEEF						267.870 [.0360]					267.870 [.0360]
5. MILK CATTLE AND PIGS						26.190 [.0035]	741.470 [.0996]				767.660 [.1031]
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								1267.390 [.1703]			1267.390 [.1703]
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									830.470 [.1116]		830.470 [.1116]
8. POULTRY										398.890 [.0536]	398.890 [.0536]
TOTAL OUTPUT BY COMMODITY	1237.140 [.1662]	745.180 [.1001]	974.610 [.1309]	195.340 [.0262]	65.610 [.0088]	814.800 [.1095]	837.170 [.1125]	1281.930 [.1722]	893.530 [.1200]	398.890 [.0536]	7444.200 [1.0000]

TABLE A.1 (Continued)

PRODUCT-MIX MATRIX FOR 1979-80 $m. 1979-80 prices

COMMODITY / INDUSTRY	1.WOOL	2.SHEEP	3.WHEAT	4.BARLEY	5.OTHER CEREAL GRAINS	6.MEAT CATTLE	7.MILK CATTLE AND PIGS	8.OTHER FARMING (SUGAR CANE, FRUIT & NUTS)	9.OTHER FARMING (VEGS, COTTON, OILSEEDS & TOBACCO)	10.POULTRY	TOTAL OUTPUT BY INDUSTRY
1. PASTORAL ZONE	199.160	14.520	7.000	4.330	.800	47.720	.000	.000	.000		273.530
	(.0221)[a]	(.0016)	(.0008)	(.0005)	(.0001)	(.0053)	(.0000)	(.0000)	(.0000)		(.0303)
2. WHEAT-SHEEP ZONE	752.890	521.550	1281.830	261.230	72.450	254.650	68.010	7.220	54.220		3274.050
	(.0835)	(.0578)	(.1421)	(.0290)	(.0080)	(.0282)	(.0075)	(.0008)	(.0060)		(.3629)
3. HIGH RAINFALL ZONE	514.410	349.520	43.270	22.130	9.780	284.950	12.330	4.140	57.780		1298.310
	(.0570)	(.0387)	(.0048)	(.0025)	(.0011)	(.0316)	(.0014)	(.0005)	(.0064)		(.1439)
4. NORTHERN BEEF						640.120					640.120
						(.0710)					(.0710)
5. MILK CATTLE AND PIGS						60.220	824.810				885.030
						(.0067)	(.0914)				(.0981)
6. OTHER FARMING (SUGAR CANE, FRUIT AND NUTS)								1257.660			1257.660
								(.1394)			(.1394)
7. OTHER FARMING (VEGS, COTT., OILSEEDS & TOB.)									899.600		899.600
									(.0997)		(.0997)
8. POULTRY										493.270	493.270
										(.0547)	(.0547)
TOTAL OUTPUT BY COMMODITY	1466.460	885.590	1332.100	287.690	83.030	1287.660	905.150	1269.020	1011.600	493.270	9021.571
	(.1626)	(.0982)	(.1477)	(.0319)	(.0092)	(.1427)	(.1003)	(.1407)	(.1121)	(.0547)	(1.0000)

Footnotes for TABLE A.1

* The product-mix matrices are taken from Adams (1984b, Table 3.7).

a The shares of commodity production by industry in total output of the agricultural sector are given in parentheses.

b For 1973-74 Adams (1984b, Table 3.7) only presented production figures of the commodities barley and other cereal grains aggregated together. These aggregated figures were split in proportion to the production figures of barley and other cereal grains for 1973-74 given in BAE (1980, Table 4).

TABLE A.2 : SALES OF DOMESTIC AGRICULTURAL COMMODITIES AND THE MARGINS AND TAXES ASSOCIATED WITH THESE SALES IN THE 1968-69, 1974-75 AND 1977-78 ORANI DATA BASES

THE ORANI 1968-69 DATA BASE

($m. 1968-69 prices)

		Sales to Domestic Industries for Current Production $(\tilde{A})$	Margins used to Facilitate the Flow of Sales to Domestic Industries for Current Production $(\tilde{K}_1,\ldots,\tilde{K}_g)$	Tax Associated with the Sales to Domestic Industries for Current Production $(\tilde{K}_{g+1})$	Sales to Domestic Industries for Capital Formation $(\tilde{B})$	Margins used to Facilitate the Flow of Sales to Domestic Industries for Capital Formation $(\tilde{L}_1,\ldots,\tilde{L}_g)$	Tax Associated with the Sales to Domestic Industries for Capital Formation $(\tilde{L}_{g+1})$
1.	Wool	74.625	12.054	1.601	0.000	0.000	0.000
2.	Sheep	198.394	31.525	0.993	0.000	0.000	0.000
3.	Wheat	87.434	35.486	-4.808	0.000	0.000	0.000
4.	Barley	33.390	13.786	-1.148	0.000	0.000	0.000
5.	Other Cereal Grains	46.556	18.942	-2.568	0.000	0.000	0.000
6.	Meat Cattle	382.058	34.182	0.571	0.000	0.000	0.000
7.	Milk Cattle and Pigs	534.674	34.957	-26.861	0.000	0.000	0.000
8.	Other Farming (Sugar Cane, Fruit and Nuts)	198.881	17.432	0.015	0.000	0.000	0.000
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	135.292	19.832	-5.947	0.000	0.000	0.000
0.	Poultry	57.786	4.712	-0.079	0.000	0.000	0.000

TABLE A.2 (continued)

THE ORANI 1968-69 DATA BASE ($m. 1968-69 prices)

	Commodity	Sales to Household Consumption $(\tilde{C})$	Margins used to Facilitate the Flow of Sales to Household Consumption $(\tilde{M}_1,\ldots,\tilde{M}_g)$	Tax Associated with the Sales to Household Consumption $(\tilde{M}_{g+1})$	Exports $(\tilde{D})$	Margins used to Facilitate the Flow of Exports $(\tilde{N}_1,\ldots,\tilde{N}_g)$	Tax Associated with the Exports $(\tilde{N}_{g+1})$
1.	Wool	6.600	0.000	0.000	618.976	102.703	13.316
2.	Sheep	6.000	0.000	0.000	2.486	0.412	0.053
3.	Wheat	0.000	0.000	0.000	191.138	77.965	-10.768
4.	Barley	0.000	0.000	0.000	13.508	5.510	-0.761
5.	Other Cereal Grains	0.000	0.000	0.000	12.877	5.253	-0.725
6.	Meat Cattle	5.782	0.000	0.000	0.483	0.042	-0.001
7.	Meat Cattle and Pigs	25.387	0.000	0.000	0.287	0.658	-0.638
8.	Other Farming (Sugar Cane, Fruit and Nuts)	85.217	64.023	-0.119	44.089	15.349	0.422
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	118.311	92.672	-0.173	0.000	0.000	0.000
10.	Poultry	103.501	48.426	-0.154	5.470	0.518	-0.002

TABLE A.2 (continued)

THE ORANI 1968-69 DATA BASE ($m. 1968-69 prices)

	Commodity	Sales to Other Final Demands $(\tilde{E})$	Margins used to Facilitate the Flow of Sales to Other Final Demands $(\tilde{O}_1,\ldots,\tilde{O}_g)$	Tax Associated with the Sales to Other Final Demands $(\tilde{O}_{g+1})$	TOTAL BASIC VALUE SALES	TOTAL MARGINS	TOTAL TAX
1.	Wool	0.001	0.000	0.000	700.202	114.757	14.917
2.	Sheep	0.001	0.000	0.000	206.881	31.937	1.046
3.	Wheat	0.001	0.000	0.000	278.574	113.451	-15.576
4.	Barley	0.001	0.000	0.000	46.900	19.296	-1.909
5.	Other Cereal Grains	0.001	0.000	0.000	59.440	24.195	-3.293
6.	Meat Cattle	0.001	0.000	0.000	388.324	34.224	0.570
7.	Milk Cattle and Pigs	0.001	0.000	0.000	560.349	35.615	-27.499
8.	Other Farming (Sugar Cane, Fruit and Nuts)	0.001	0.000	0.000	328.188	96.804	0.318
9.	Other Farming (Vegetables, Cotton Oilseeds and Tobacco)	0.001	0.000	0.000	253.604	112.504	-6.120
10.	Poultry	0.001	0.000	0.000	166.758	53.656	-0.235

TABLE A.2 (continued)

THE ORANI 1974-75 DATA BASE ($m. 1974-75 prices)

		Sales to Domestic Industries for Current Production $(\tilde{A})$	Margins used to Facilitate the Flow of Sales to Domestic Industries for Current Production $(\tilde{K}_1,\ldots,\tilde{K}_g)$	Tax Associated with the Sales to Domestic Industries for Current Production $(\tilde{K}_{g+1})$	Sales to Domestic Industries for Capital Formation $(\tilde{B})$	Margins used to Facilitate the Flow of Sales to Domestic Industries for Capital Formation $(\tilde{L}_1,\ldots,\tilde{L}_g)$	Tax Associated with the Sales to Domestic Industries for Capital Formation $(\tilde{L}_{g+1})$
1.	Wool	69.516	15.953	9.210	0.000	0.000	0.000
2.	Sheep	180.314	26.368	1.058	0.000	0.000	0.000
3.	Wheat	219.319	38.930	-0.804	0.000	0.000	0.000
4.	Barley	71.658	12.725	-0.094	0.000	0.000	0.000
5.	Other Cereal Grains	86.729	15.547	-0.276	0.000	0.000	0.000
6.	Meat Cattle	449.191	78.789	1.769	0.000	0.000	0.000
7.	Milk Cattle and Pigs	620.048	46.585	-0.315	0.000	0.000	0.000
8.	Other Farming (Sugar Cane, Fruit and Nuts)	579.099	37.332	-1.568	0.000	0.000	0.000
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	378.191	53.843	-4.395	0.000	0.000	0.000
10.	Poultry	131.621	4.845	-0.052	0.000	0.000	0.000

TABLE A.2 (continued)

THE ORANI 1974-75 DATA BASE ($m. 1974-75 prices)

	Commodity	Sales to Household Consumption $(\tilde{C})$	Margins used to Facilitate the Flow of Sales to Household Consumption $(\tilde{M}_1,\ldots,\tilde{M}_g)$	Tax Associated with the Sales to Household Consumption $(\tilde{M}_{g+1})$	Exports $(\tilde{D})$	Margins used to Facilitate the Flow of Exports $(\tilde{N}_1,\ldots,\tilde{N}_g)$	Tax Associated with the Exports $(\tilde{N}_{g+1})$
1.	Wool	0.000	0.000	0.000	506.855	119.978	50.733
2.	Sheep	11.093	1.404	0.000	17.564	4.094	1.731
3.	Wheat	0.000	0.000	0.000	878.221	147.161	-1.306
4.	Barley	0.000	0.000	0.000	159.035	26.636	-0.236
5.	Other Cereal Grains	0.000	0.000	0.000	90.125	15.113	-0.135
6.	Meat Cattle	5.768	1.010	0.000	2.572	0.449	-0.009
7.	Milk Cattle and Pigs	29.572	2.228	0.000	0.020	0.003	0.016
8.	Other Farming (Sugar Cane, Fruit and Nuts)	46.773	36.142	-0.035	52.600	15.758	0.341
9.	Other Farming (Vegetables, Cotton Oilseeds and Tobacco)	325.743	264.625	-0.260	15.301	4.586	0.099
10.	Poultry	147.851	49.443	-0.099	6.252	2.217	-0.003

TABLE A.2 (continued)

THE ORANI 1974-75 DATA BASE ($m. 1974-75 prices)

	Commodity	Sales to Other Final Demands $(\tilde{E})$	Margins used to Facilitate the Flow of Sales to Other Final Demands $(\tilde{O}_1,\ldots,\tilde{O}_g)$	Tax Associated with the Sales to Other Final Demands $(\tilde{O}_{g+1})$	TOTAL BASIC-VALUE SALES	TOTAL MARGINS	TOTAL TAX
1.	Wool	0.000	0.000	0.000	576.371	135.931	59.943
2.	Sheep	0.000	0.000	0.000	208.971	31.866	2.789
3.	Wheat	0.000	0.000	0.000	1097.540	186.091	-2.110
4.	Barley	0.000	0.000	0.000	230.693	39.361	-0.330
5.	Other Cereal Grains	0.000	0.000	0.000	176.854	30.660	-0.411
6.	Meat Cattle	0.000	0.000	0.000	457.531	80.248	1.760
7.	Milk Cattle and Pigs	0.000	0.000	0.000	649.640	48.816	-0.299
8.	Other Farming, (Sugar Cane, Fruit and Nuts)	0.000	0.000	0.000	678.472	89.232	-1.262
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.000	0.000	0.000	719.235	323.054	-4.556
10.	Poultry	0.000	0.000	0.000	285.724	56.505	-0.154

TABLE A.2 (continued)

THE ORANI 1977-78 DATA BASE ($m. 1977-78 prices)

		Sales to Domestic Industries for Current Production ($\tilde{A}$)	Margins used to Facilitate the Flow of Sales to Domestic Industries for Current Production ($\tilde{K}_1,\ldots,\tilde{K}_g$)	Tax Associated with the Sales to Domestic Industries for Current Production ($\tilde{K}_{g+1}$)	Sales to Domestic Industries for Capital Formation ($\tilde{B}$)	Margins used to Facilitate the Flow of Sales to Domestic Industries for Capital Formation ($\tilde{L}_1,\ldots,\tilde{L}_g$)	Tax Associated with the Sales to Domestic Industries for Capital Formation ($\tilde{L}_{g+1}$)
1.	Wool	176.489	16.733	14.223	0.000	0.000	0.000
2.	Sheep	329.757	67.814	0.738	0.000	0.000	0.000
3.	Wheat	151.569	32.849	-4.018	0.000	0.000	0.000
4.	Barley	76.084	16.542	-1.824	0.000	0.000	0.000
5.	Other Cereal Grains	190.861	35.186	-3.955	0.000	0.000	0.000
6.	Meat Cattle	1025.059	200.411	16.141	0.000	0.000	0.000
7.	Milk Cattle and Pigs	667.266	43.456	0.759	0.000	0.000	0.000
8.	Other Farming (Sugar Cane, Fruit and Nuts)	534.299	83.139	1.219	0.000	0.000	0.000
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	557.730	101.136	1.096	0.000	0.000	0.000
10.	Poultry	213.749	23.757	-10.225	0.000	0.000	0.000

TABLE A.2 (continued)

THE ORANI 1977-78 DATA BASE ($m. 1977-78 prices)

	Commodity	Sales to Household Consumption $(\tilde{C})$	Margins used to Facilitate the Flow of Sales to Household Consumption[a] $(\tilde{M}_1,\ldots,\tilde{M}_g)$	Tax Associated with the Sales to Household Consumption $(\tilde{M}_{g+1})$	Exports $(\tilde{D})$	Margins used to Facilitate the Flow of Exports $(\tilde{N}_1,\ldots,\tilde{N}_g)$	Tax Associated with the Exports $(\tilde{N}_{g+1})$
1.	Wool	0.000	0.000	0.000	847.924	80.374	68.303
2.	Sheep	19.892	4.093	0.045	72.532	14.928	0.200
3.	Wheat	0.000	0.000	0.000	798.575	216.928	-23.458
4.	Barley	0.000	0.000	0.000	101.154	20.698	0.000
5.	Other Cereal Grains	9.160	4.227	-0.085	57.130	9.001	0.000
6.	Meat Cattle	13.102	2.196	0.207	8.817	1.475	0.139
7.	Milk Cattle and Pigs	30.855	1.716	-0.089	0.050	0.003	0.000
8.	Other Farming (Sugar Cane, Fruit and Nuts)	97.766	71.990	-0.707	64.193	18.209	-0.387
9.	Other Farming (Vegetables, Cotton Oilseeds and Tobacco)	321.471	225.524	-1.111	19.898	5.101	0.000
10.	Poultry	175.050	52.234	1.182	12.123	1.936	-1.574

TABLE A.2 (continued)

THE ORANI 1977-78 DATA BASE ($m. 1977-78 prices)

	Commodity	Sales to Other Final Demands $(\tilde{E})$	Margins used to Facilitate the Flow of Sales to Other Final Demands $(\tilde{O}_1,\ldots,\tilde{O}_g)$	Tax Associated with the Sales to Other Final Demands $(\tilde{O}_{g+1})$	TOTAL BASIC-VALUE SALES	TOTAL MARGINS	TOTAL TAX
1.	Wool	0.000	0.000	0.000	1024.413	97.107	82.256
2.	Sheep	0.000	0.000	0.000	422.181	86.835	0.983
3.	Wheat	0.000	0.000	0.000	950.144	249.777	-27.476
4.	Barley	0.000	0.000	0.000	177.238	37.240	-1.824
5.	Other Cereal Grains	0.000	0.000	0.000	257.151	48.414	-4.040
6.	Meat Cattle	0.000	0.000	0.000	1046.978	204.082	16.487
7.	Milk Cattle and Pigs	0.000	0.000	0.000	698.171	45.175	0.670
8.	Other Farming (Sugar Cane, Fruit and Nuts)	0.000	0.000	0.000	696.258	173.338	0.125
9.	Other Farming (Vegetables, Cotton, Oilseeds and Tobacco)	0.000	0.000	0.000	899.099	331.761	-0.015
10.	Poultry	0.000	0.000	0.000	400.922	77.927	-10.617

TABLE A.3: ADAMS' DATA ON INPUTS TO CURRENT PRODUCTION FOR EACH OF THE ORANI AGRICULTURAL INDUSTRIES FROM 1967-68 TO 1979-80*

ORANI Industry No.1 PASTORAL ZONE $m. current prices

YEAR	Returns to Land	Returns to Fixed Capital	Returns to Owner-Operators' Labour	Payments to Other Labour	Returns to Working Capital	Other Inputs to Current Production
1967-68	32.02 (0.1801)[a]	29.96 (0.1685)	14.88 (0.0837)	57.45 (0.3231)	4.53 (0.0255)	38.96 (0.2191)
1968-69	61.46 (0.2497)	57.06 (0.2318)	15.22 (0.0618)	62.63 (0.2544)	9.00 (0.0366)	40.80 (0.1657)
1969-70	27.14 (0.1538)	25.15 (0.1425)	15.63 (0.0886)	62.39 (0.3536)	3.97 (0.0225)	42.15 (0.2389)
1970-71	13.15 (0.1056)	12.13 (0.0975)	15.89 (0.1277)	50.08 (0.4023)	1.59 (0.0128)	31.63 (0.2541)
1971-72	41.42 (0.2274)	34.90 (0.1916)	16.53 (0.0907)	51.63 (0.2834)	4.94 (0.0271)	32.74 (0.1797)
1972-73	94.68 (0.3205)	78.78 (0.2667)	17.16 (0.0581)	52.54 (0.1778)	11.84 (0.0401)	40.43 (0.1369)
1973-74	107.63 (0.2947)	89.18 (0.2442)	21.23 (0.0581)	76.18 (0.2086)	15.43 (0.0423)	55.53 (0.1521)
1974-75	47.10 (0.1764)	38.56 (0.1444)	28.28 (0.1059)	92.35 (0.3459)	7.46 (0.0279)	53.25 (0.1994)
1975-76	49.72 (0.1795)	44.34 (0.1601)	29.65 (0.1071)	94.15 (0.3399)	8.42 (0.0304)	50.68 (0.1830)
1976-77	51.26 (0.1880)	48.62 (0.1783)	33.86 (0.1242)	69.79 (0.2559)	9.74 (0.0357)	59.43 (0.2179)
1977-78	15.35 (0.0566)	13.84 (0.0510)	36.45 (0.1344)	132.85 (0.4900)	4.55 (0.0168)	68.07 (0.2511)
1978-79	39.84 (0.1674)	36.62 (0.1539)	22.19 (0.0932)	85.01 (0.3572)	11.45 (0.0481)	42.88 (0.1802)
1979-80	50.82 (0.1791)	44.55 (0.1570)	23.72 (0.0836)	87.95 (0.3100)	16.00 (0.0564)	60.64 (0.2138)
AVERAGE	(0.1907)	(0.1683)	(0.0936)	(0.3156)	(0.0325)	(0.1994)

TABLE A.3 (Continued)

ORANI Industry No.2 WHEAT-SHEEP ZONE $m. current prices

YEAR	Returns to Land	Returns to Fixed Capital	Returns to Owner-Operators' Labour	Payments to Other Labour	Returns to Working Capital	Other Inputs to Current Production
1967-68	156.09 (0.2163)[a]	82.13 (0.1138)	103.10 (0.1429)	137.96 (0.1912)	11.04 (0.0153)	231.41 (0.3206)
1968-69	327.43 (0.3143)	173.78 (0.1668)	105.50 (0.1013)	155.76 (0.1495)	25.71 (0.0247)	253.47 (0.2433)
1969-70	185.17 (0.2339)	99.50 (0.1257)	108.35 (0.1368)	156.31 (0.1974)	13.70 (0.0173)	228.77 (0.2889)
1970-71	183.85 (0.2407)	93.94 (0.1230)	108.72 (0.1424)	145.95 (0.1911)	12.54 (0.0164)	218.67 (0.2863)
1971-72	189.17 (0.2280)	96.23 (0.1160)	114.66 (0.1382)	175.82 (0.2119)	14.01 (0.0169)	239.98 (0.2892)
1972-73	313.06 (0.2985)	167.02 (0.1592)	112.82 (0.1076)	162.95 (0.1554)	24.52 (0.0234)	268.50 (0.2560)
1973-74	533.71 (0.3544)	280.34 (0.1861)	133.51 (0.0887)	193.48 (0.1285)	47.74 (0.0317)	317.24 (0.2106)
1974-75	403.72 (0.2976)	199.91 (0.1474)	180.84 (0.1333)	199.02 (0.1467)	35.88 (0.0265)	337.09 (0.2485)
1975-76	384.56 (0.2620)	215.09 (0.1465)	199.81 (0.1361)	251.14 (0.1711)	35.77 (0.0244)	381.50 (0.2599)
1976-77	437.15 (0.2538)	253.45 (0.1471)	219.84 (0.1276)	312.82 (0.1816)	38.34 (0.0223)	461.10 (0.2677)
1977-78	200.48 (0.1372)	112.16 (0.0767)	245.77 (0.1681)	372.17 (0.2546)	16.53 (0.0113)	514.62 (0.3521)
1978-79	627.21 (0.2729)	201.09 (0.0875)	284.83 (0.1239)	413.83 (0.1800)	57.96 (0.0252)	713.71 (0.3105)
1979-80	710.53 (0.2530)	388.11 (0.1382)	296.52 (0.1056)	478.33 (0.1703)	68.26 (0.0243)	866.87 (0.3086)
AVERAGE	(0.2586)	(0.1334)	(0.1271)	(0.1792)	(0.0215)	(0.2802)

TABLE A.3 (Continued)

ORANI Industry No.3 HIGH RAINFALL ZONE $m. current prices

YEAR	Returns to Land	Returns to Fixed Capital	Returns to Owner-Operators' Labour	Payments to Other Labour	Returns to Working Capital	Other Inputs to Current Production
1967-68	107.22 (0.2278)[a]	40.66 (0.0864)	70.94 (0.1507)	89.62 (0.1904)	6.90 (0.0147)	155.41 (0.3301)
1968-69	130.08 (0.2616)	49.85 (0.1002)	72.59 (0.1460)	98.29 (0.1976)	8.40 (0.0169)	138.12 (0.2777)
1969-70	137.70 (0.2726)	53.97 (0.1069)	74.55 (0.1476)	99.05 (0.1961)	8.74 (0.0173)	131.08 (0.2595)
1970-71	61.32 (0.1626)	23.86 (0.0633)	72.73 (0.1929)	99.14 (0.2630)	3.56 (0.0094)	116.41 (0.3088)
1971-72	122.71 (0.2666)	42.02 (0.0913)	75.22 (0.1634)	93.59 (0.2034)	6.69 (0.0145)	119.99 (0.2607)
1972-73	283.12 (0.3839)	94.45 (0.1281)	70.93 (0.0962)	109.04 (0.1478)	18.62 (0.0252)	161.41 (0.2188)
1973-74	330.35 (0.4299)	104.25 (0.1357)	83.07 (0.1081)	129.74 (0.1688)	23.45 (0.0305)	97.52 (0.1269)
1974-75	59.76 (0.1302)	16.94 (0.0369)	112.10 (0.2442)	127.74 (0.2782)	3.30 (0.0072)	139.27 (0.3033)
1975-76	68.41 (0.1337)	24.83 (0.0485)	108.63 (0.2123)	147.05 (0.2874)	4.29 (0.0084)	158.48 (0.3097)
1976-77	118.37 (0.2222)	41.78 (0.0784)	132.85 (0.2494)	36.18 (0.0679)	6.88 (0.0129)	196.72 (0.3692)
1977-78	119.70 (0.1630)	41.92 (0.0571)	152.44 (0.2076)	190.41 (0.2593)	7.95 (0.0108)	221.86 (0.3021)
1978-79	185.07 (0.2176)	68.25 (0.0802)	139.91 (0.1645)	181.89 (0.2138)	15.06 (0.0177)	260.44 (0.3062)
1979-80	261.56 (0.2275)	93.28 (0.0811)	157.42 (0.1369)	245.72 (0.2137)	21.13 (0.0184)	370.58 (0.3223)
AVERAGE	(0.2384)	(0.0842)	(0.1707)	(0.2067)	(0.0157)	(0.2843)

TABLE A.3 (Continued)

ORANI Industry No.4 NORTHERN BEEF $m. current prices

YEAR	Returns to Land	Returns to Fixed Capital	Returns to Owner-Operators' Labour	Payments to Other Labour	Returns to Working Capital	Other Inputs to Current Production
1967-68	19.46 (0.2529)[a]	11.16 (0.1450)	5.49 (0.0713)	14.42 (0.1874)	1.53 (0.0199)	24.89 (0.3235)
1968-69	26.70 (0.3153)	15.39 (0.1817)	5.79 (0.0684)	15.69 (0.1853)	2.11 (0.0249)	19.01 (0.2245)
1969-70	26.70 (0.3153)	15.39 (0.1817)	5.79 (0.0684)	15.69 (0.1853)	2.11 (0.0249)	19.01 (0.2245)
1970-71	26.70 (0.3153)	15.39 (0.1817)	5.79 (0.0684)	15.69 (0.1853)	2.11 (0.0249)	19.01 (0.2245)
1971-72	25.50 (0.3084)	11.61 (0.1404)	6.03 (0.0729)	16.24 (0.1964)	1.89 (0.0229)	21.41 (0.2590)
1972-73	41.54 (0.3553)	22.61 (0.1934)	5.87 (0.0502)	16.42 (0.1404)	3.40 (0.0291)	27.08 (0.2316)
1973-74	36.79 (0.2591)	23.69 (0.1669)	13.49 (0.0950)	35.83 (0.2524)	3.30 (0.0232)	28.88 (0.2034)
1974-75	11.21 (0.1244)	5.72 (0.0635)	11.89 (0.1319)	32.05 (0.3556)	0.97 (0.0108)	28.30 (0.3140)
1975-76	4.12 (0.0379)	2.72 (0.0250)	19.10 (0.1758)	46.58 (0.4287)	0.41 (0.0038)	35.73 (0.3288)
1976-77	47.04 (0.2154)	28.83 (0.1320)	26.63 (0.1220)	47.37 (0.2169)	6.58 (0.0301)	61.91 (0.2835)
1977-78	10.65 (0.0634)	5.72 (0.0341)	38.02 (0.2265)	56.96 (0.3394)	1.24 (0.0074)	55.26 (0.3292)
1978-79	82.56 (0.2397)	44.54 (0.1293)	39.92 (0.1159)	85.36 (0.2479)	12.66 (0.0368)	79.32 (0.2303)
1979-80	98.99 (0.2549)	53.04 (0.1366)	42.34 (0.1090)	75.44 (0.1943)	10.17 (0.0262)	108.31 (0.2789)
AVERAGE	(0.2352)	(0.1316)	(0.1058)	(0.2396)	(0.0219)	(0.2659)

TABLE A.3 (Continued)

ORANI Industry No.5 MILK CATTLE AND PIGS $m. current prices

YEAR	Returns to Land	Returns to Fixed Capital	Returns to Owner-Operators' Labour	Payments to Other Labour	Returns to Working Capital	Other Inputs to Current Production
1967-68	102.55 (0.2372)[a]	43.68 (0.1010)	68.75 (0.1590)	68.09 (0.1575)	6.97 (0.0161)	142.26 (0.3291)
1968-69	99.24 (0.2279)	42.28 (0.0971)	69.33 (0.1592)	70.39 (0.1617)	6.98 (0.0160)	147.14 (0.3380)
1969-70	138.38 (0.2765)	58.93 (0.1178)	72.09 (0.1441)	74.79 (0.1495)	9.88 (0.0197)	146.33 (0.2924)
1970-71	146.60 (0.2921)	50.14 (0.0999)	73.78 (0.1470)	79.14 (0.1577)	7.98 (0.0159)	144.21 (0.2874)
1971-72	148.58 (0.2952)	44.66 (0.0887)	73.69 (0.1464)	83.49 (0.1659)	6.84 (0.0136)	146.05 (0.2902)
1972-73	148.40 (0.2760)	44.60 (0.0830)	84.59 (0.1573)	87.95 (0.1636)	7.64 (0.0142)	164.49 (0.3059)
1973-74	128.93 (0.2318)	37.99 (0.0683)	98.37 (0.1769)	108.31 (0.1947)	7.11 (0.0128)	175.50 (0.3155)
1974-75	57.28 (0.1131)	29.18 (0.0576)	117.02 (0.2311)	123.35 (0.2436)	3.84 (0.0076)	175.65 (0.3469)
1975-76	57.28 (0.1131)	29.18 (0.0576)	117.02 (0.2311)	123.35 (0.2436)	3.84 (0.0076)	175.65 (0.3469)
1976-77	4.92 (0.0108)	1.95 (0.0043)	135.68 (0.2973)	138.39 (0.3032)	0.37 (0.0008)	175.13 (0.3837)
1977-78	33.19 (0.0583)	11.66 (0.0205)	147.54 (0.2594)	164.35 (0.2889)	2.54 (0.0045)	209.56 (0.3684)
1978-79	102.54 (0.1447)	60.65 (0.0856)	140.92 (0.1989)	162.42 (0.2292)	10.69 (0.0151)	231.31 (0.3265)
1979-80	263.93 (0.2772)	92.05 (0.0967)	141.02 (0.1481)	152.62 (0.1603)	24.22 (0.0254)	278.24 (0.2922)
AVERAGE	(0.1965)	(0.0752)	(0.1889)	(0.2015)	(0.0130)	(0.3249)

TABLE A.3 (Continued)

ORANI Industry No.6 OTHER FARMING (SUGAR CANE, FRUIT AND NUTS) $m. current prices

YEAR	Returns to Land	Returns to Fixed Capital	Returns to Owner-Operators' Labour	Payments to Other Labour	Returns to Working Capital	Other Inputs to Current Production
1967-68	105.96 (0.1996)[a]	42.92 (0.0808)	57.11 (0.1076)	149.72 (0.2820)	16.06 (0.0303)	159.12 (0.2997)
1968-69	105.96 (0.1996)	42.92 (0.0808)	57.11 (0.1076)	149.72 (0.2820)	16.06 (0.0303)	159.12 (0.2997)
1969-70	108.33 (0.1712)	56.95 (0.0900)	59.08 (0.0934)	182.60 (0.2886)	18.35 (0.0290)	207.49 (0.3279)
1970-71	103.90 (0.1647)	54.62 (0.0866)	57.08 (0.0905)	188.90 (0.2994)	17.60 (0.0279)	208.91 (0.3311)
1971-72	58.22 (0.1097)	36.23 (0.0682)	66.21 (0.1247)	152.41 (0.2871)	10.69 (0.0201)	207.19 (0.3902)
1972-73	122.36 (0.1646)	70.50 (0.0948)	72.74 (0.0979)	186.81 (0.2513)	23.57 (0.0317)	267.36 (0.3597)
1973-74	134.72 (0.1456)	71.51 (0.0773)	88.15 (0.0952)	276.88 (0.2992)	32.30 (0.0349)	321.99 (0.3479)
1974-75	99.16 (0.1457)	48.47 (0.0712)	80.34 (0.1180)	229.78 (0.3375)	20.78 (0.0305)	202.20 (0.2970)
1975-76	40.65 (0.0604)	27.26 (0.0405)	121.24 (0.1802)	250.22 (0.3720)	9.27 (0.0138)	224.03 (0.3330)
1976-77	99.49 (0.1315)	39.48 (0.0522)	126.15 (0.1667)	298.74 (0.3949)	7.61 (0.0101)	185.07 (0.2446)
1977-78	82.32 (0.0875)	58.97 (0.0627)	140.66 (0.1495)	439.41 (0.4671)	20.13 (0.0214)	199.25 (0.2118)
1978-79	82.93 (0.0812)	60.25 (0.0590)	157.81 (0.1546)	375.00 (0.3673)	22.29 (0.0218)	322.67 (0.3160)
1979-80	158.55 (0.1347)	115.06 (0.0978)	180.09 (0.1530)	374.55 (0.3183)	35.94 (0.0305)	312.64 (0.2657)
AVERAGE	(0.1381)	(0.0740)	(0.1261)	(0.3266)	(0.0256)	(0.3096)

TABLE A. 3 (Continued)

ORANI Industry No.7 OTHER FARMING (VEGETABLES, COTTON, OILSEEDS AND TOBACCO) $m. current prices

YEAR	Returns to Land	Returns to Fixed Capital	Returns to Owner-Operators' Labour	Payments to Other Labour	Returns to Working Capital	Other Inputs to Current Production
1967-68	62.99 (0.1315)[a]	25.51 (0.0533)	31.92 (0.0667)	165.17 (0.3449)	9.55 (0.0199)	183.70 (0.3836)
1968-69	87.77 (0.1392)	35.55 (0.0564)	35.14 (0.0557)	217.45 (0.3450)	13.31 (0.0211)	241.12 (0.3825)
1969-70	46.68 (0.0965)	26.11 (0.0539)	28.66 (0.0592)	170.90 (0.3531)	8.41 (0.0174)	203.22 (0.4199)
1970-71	48.74 (0.0934)	25.62 (0.0491)	26.39 (0.0505)	191.60 (0.3670)	8.25 (0.0158)	221.49 (0.4242)
1971-72	29.25 (0.0650)	18.20 (0.0405)	33.13 (0.0737)	148.83 (0.3309)	5.37 (0.0119)	214.97 (0.4780)
1972-73	44.42 (0.0934)	25.59 (0.0538)	36.05 (0.0758)	144.52 (0.3038)	8.56 (0.0180)	216.52 (0.4552)
1973-74	53.21 (0.0836)	28.24 (0.0444)	50.54 (0.0794)	221.34 (0.3477)	12.76 (0.0200)	270.45 (0.4249)
1974-75	58.79 (0.0808)	28.74 (0.0395)	48.69 (0.0669)	300.01 (0.4125)	12.32 (0.0169)	278.82 (0.3833)
1975-76	33.35 (0.0486)	22.36 (0.0326)	62.36 (0.0909)	293.81 (0.4284)	7.60 (0.0111)	266.34 (0.3884)
1976-77	52.65 (0.0677)	35.16 (0.0452)	59.63 (0.0767)	383.17 (0.4927)	11.60 (0.0149)	235.53 (0.3028)
1977-78	67.36 (0.0624)	48.25 (0.0447)	65.54 (0.0607)	599.19 (0.5551)	16.47 (0.0153)	282.69 (0.2619)
1978-79	55.01 (0.0535)	39.97 (0.0389)	81.55 (0.0793)	443.57 (0.4314)	14.79 (0.0144)	393.24 (0.3825)
1979-80	108.80 (0.0986)	78.96 (0.0715)	99.66 (0.0903)	422.84 (0.3831)	24.66 (0.0223)	368.80 (0.3341)
AVERAGE	(0.0857)	(0.0480)	(0.0712)	(0.3919)	(0.0169)	(0.3863)

TABLE A.3 (Continued)

ORANI Industry No.8 POULTRY $m. current prices

YEAR	Returns to Land	Returns to Fixed Capital	Returns to Owner-Operators' Labour	Payments to Other Labour	Returns to Working Capital	Other Inputs to Current Production
1967-68	0.00 (0.0000)[a]	11.09 (0.0941)	7.34 (0.0623)	11.96 (0.1015)	5.76 (0.0489)	81.74 (0.6934)
1968-69	0.00 (0.0000)	8.07 (0.0737)	8.08 (0.0737)	10.24 (0.0935)	3.93 (0.0359)	79.25 (0.7233)
1969-70	0.00 (0.0000)	12.41 (0.1208)	7.27 (0.0708)	9.08 (0.0884)	6.53 (0.0636)	67.40 (0.6563)
1970-71	0.00 (0.0000)	6.56 (0.0689)	7.60 (0.0799)	10.98 (0.1154)	3.51 (0.0369)	66.52 (0.6990)
1971-72	0.00 (0.0000)	11.36 (0.0969)	7.02 (0.0599)	11.88 (0.1013)	5.90 (0.0503)	81.06 (0.6915)
1972-73	0.00 (0.0000)	17.63 (0.1062)	7.63 (0.0459)	16.93 (0.1020)	9.15 (0.0551)	114.72 (0.6908)
1973-74	0.00 (0.0000)	22.40 (0.1107)	7.92 (0.0391)	20.68 (0.1022)	11.63 (0.0575)	139.68 (0.6904)
1974-75	0.00 (0.0000)	24.53 (0.1111)	8.46 (0.0383)	22.59 (0.1023)	12.74 (0.0577)	152.55 (0.6907)
1975-76	0.00 (0.0000)	25.45 (0.1078)	10.35 (0.0439)	24.07 (0.1020)	13.21 (0.0560)	162.91 (0.6903)
1976-77	0.00 (0.0000)	28.20 (0.1118)	10.89 (0.0432)	26.48 (0.1050)	14.65 (0.0581)	172.06 (0.6820)
1977-78	0.00 (0.0000)	33.20 (0.1100)	12.39 (0.0410)	30.82 (0.1021)	15.72 (0.0521)	209.80 (0.6949)
1978-79	0.00 (0.0000)	34.17 (0.1110)	12.00 (0.0390)	31.46 (0.1022)	17.73 (0.0576)	212.46 (0.6902)
1979-80	0.00 (0.0000)	43.16 (0.1136)	13.25 (0.0349)	38.90 (0.1024)	22.40 (0.0590)	262.18 (0.6901)
AVERAGE	(0.0000)	(0.1028)	(0.0517)	(0.1015)	(0.0530)	(0.6910)

* These data were obtained from Adams (1984b, Tables 3.5 and 3.6).

a The share of each input in total inputs to current production in that year are given in parentheses.

FIGURE A.1 : A LISTING OF THE AGCID COMPUTER PROGRAM

FILE: AGCID PAGE 001

```
AGCID(P1000,MS140000,ML300,T5)
COMMENT.
COMMENT.    AGCID UPDATES THE ORANI 1977/78 DATA BASE TO
COMMENT.    INCORPORATE  TYPICAL-YEAR AGRICULTURAL DATA.
COMMENT.    THE OUTPUT OF THIS PROGRAM IS REQUIRED AS
COMMENT.        DATA INPUT BY THE HAMMER PROGRAM.
COMMENT.
COMMENT.             (PETER HIGGS OCTOBER 1984)
COMMENT.
GETSET,DTB1070.
GETSET,DTB2344.
GETSET,DTB3006.
COMMON.
ATTACH,LIB,OMORANI78LIB,ID=DIAXON,SN=DTB3006,MR=1.
LIBRARY,LIB,*.
ATTACH,TAPE1,JS78114CID,ID=DTBGJS,SN=DTB2344,PW=LC.
REQUEST,TAPE2,*PF,SN=COMMON.
FTN,SL,ER,T,D,R=3,P.
LGO.
PURGE,TEMCID,ID=UMDXPH,SN=COMMON,PW=ORANTK,*****.
PURGE,TEMCID,ID=UMDXPH,SN=COMMON,PW=ORANTK,*****.
EXIT,U.
CATALOG,TAPE2,TEMCID,ID=UMDXPH,SN=COMMON,TK=ORANTK,XR=*****.
*EOS
      PROGRAM AGCID(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE1,TAPE2,
     &                DEBUG=OUTPUT)
C$    DEBUG
C$    CALLS
C$    ARRAYS
C
      INTEGER  INDIN(100),INDOUT(100),NAM(4),INT(10),SKIP(100)
      REAL     VECTOR(116),MAT(116,116),SUM(116)
      REAL     MAT1(116,116),WAGES(12,12)
      DATA     LUIN,LUOUT/1,2/
C-----------------------------------------------------------------------
C     OPEN OLD CID FILE
C-----------------------------------------------------------------------
      LNDIN = 0
      CALL OPENRA(LUIN,INDIN,LNDIN)
C-----------------------------------------------------------------------
C     OPEN NEW CID FILE
C-----------------------------------------------------------------------
      LNDOUT = LNDIN
      CALL OPENRA(LUOUT,INDOUT,LNDOUT)
C-----------------------------------------------------------------------
C     INTIALIZE SKIP
C-----------------------------------------------------------------------
      DO 1133 I = 1,LNDIN
1133  SKIP(I) = 0
      SKIP(34) = 1
      SKIP(35) = 1
C-----------------------------------------------------------------------
C     UPDATE THE EXPORT VECTOR (D)
C-----------------------------------------------------------------------
      READ(5,2343)IDUM
2343  FORMAT(8A10)
```

```
      MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1090  CONTINUE
1080  CONTINUE
      SKIP(23) = 1
      CALL POTRAS(LUOUT,23,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C-----------------------------------------------------------------------
C     UPDATE EXPORT TAX VECTOR
C-----------------------------------------------------------------------
      READ(5,2343)IDUM
      NR=0
      NC=0
      CALL REDRAS(LUIN,24,NR,NC,1,1,0,VECTOR,116,1,INDIN,LNDIN,NAM)
      READ(5,100)(VECTOR(I),I=1,10)
      SKIP(24) = 1
      CALL POTRAS(LUOUT,24,NR,NC,1,1,0,VECTOR,116,1,INDOUT,LNDOUT,NAM)
C-----------------------------------------------------------------------
C     UPDATE PERSONS HOURS MATRIX
C-----------------------------------------------------------------------
      READ(5,2343)IDUM
      DO 2000 I=1,10
      READ(5,100)(WAGES(I,J),J=1,8)
2000  CONTINUE
      NR=0
      NC=0
      CALL REDRAS(LUIN,10,NR,NC,1,1,0,MAT1,116,116,INDIN,LNDIN,NAM)
      NR=0
      NC=0
      CALL REDRAS(LUIN,30,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
      DO 2010 I=1,10
      DO 2020 J=1,8
      IF(MAT(I,J).EQ.0.0)GO TO 2020
      MAT(I,J)=MAT(I,J)*WAGES(I,J)/MAT1(I,J)
2020  CONTINUE
2010  CONTINUE
      SKIP(30) = 1
      CALL POTRAS(LUOUT,30,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C-----------------------------------------------------------------------
C     UPDATE PERSONS MATRIX
C-----------------------------------------------------------------------
      READ(5,2343)IDUM
      DO 2030 I=1,10
      READ(5,100)(WAGES(I,J),J=1,8)
2030  CONTINUE
      NR=0
      NC=0
      CALL REDRAS(LUIN,10,NR,NC,1,1,0,MAT1,116,116,INDIN,LNDIN,NAM)
      NR=0
      NC=0
      CALL REDRAS(LUIN,31,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
      DO 2040 I=1,10
      DO 2050 J=1,8
      IF(MAT(I,J).EQ.0.0)GO TO 2050
      MAT(I,J)=MAT(I,J)*WAGES(I,J)/MAT1(I,J)
2050  CONTINUE
2040  CONTINUE
      SKIP(31) = 1
```

```
        CALL POTRAS(LUOUT,31,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C-------------------------------------------------------------------------
C       UPDATE CAPITAL STOCKS MATRIX
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        READ(5,100)(VECTOR(J),J=1,8)
        READ(5,2343)IDUM
        READ(5,100)(SUM(J),J=1,8)
        NR=0
        NC=0
        CALL REDRAS(LUIN,32,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        DO 2060 I=1,114
        DO 2070 J=1,8
        IF(MAT(I,J).EQ.0.0)GO TO 2070
        MAT(I,J)=MAT(I,J)*VECTOR(J)/SUM(J)
2070    CONTINUE
2060    CONTINUE
        SKIP(32) = 1
        CALL POTRAS(LUOUT,32,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C-------------------------------------------------------------------------
C       UPDATE TAXES ON SALES TO DOMESTIC INDUSTRIES FOR USE
C                    IN CURRENT PRODUCTION
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
        CALL REDRAS(LUIN,51,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        READ(5,100)(VECTOR(I),I=1,10)
        DO 1100 I=1,10
        TOT=0.0
        DO 1110 J=1,112
        TOT=TOT+MAT(I,J)
1110    CONTINUE
        SUM(I)=TOT
1100    CONTINUE
        DO 1120 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1120
        DO 1130 J=1,112
        MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1130    CONTINUE
1120    CONTINUE
        SKIP(51) = 1
        CALL POTRAS(LUOUT,51,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C-------------------------------------------------------------------------
C       UPDATE MARKUPS ON SALES TO DOMESTIC INDUSTRIES FOR USE
C                      IN CURRENT PRODUCTION
C-------------------------------------------------------------------------
C
C-------------------------------------------------------------------------
C       MARKUP 1.
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
        CALL REDRAS(LUIN,55,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        READ(5,100)(VECTOR(I),I=1,10)
```

```
        READ(5,2343)IDUM
        READ(5,100)(SUM(I),I=1,10)
        DO 1160 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1160
        DO 1170 J=1,112
        MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1170    CONTINUE
1160    CONTINUE
        SKIP(55) = 1
        CALL POTRAS(LUOUT,55,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C
C-------------------------------------------------------------------------
C       MARKUP 2.
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
        CALL REDRAS(LUIN,59,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        READ(5,100)(VECTOR(I),I=1,10)
        READ(5,2343)IDUM
        READ(5,100)(SUM(I),I=1,10)
        DO 1200 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1200
        DO 1210 J=1,112
        MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1210    CONTINUE
1200    CONTINUE
        SKIP(59) = 1
        CALL POTRAS(LUOUT,59,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C
C-------------------------------------------------------------------------
C       MARKUP 3.
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
        CALL REDRAS(LUIN,63,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        READ(5,100)(VECTOR(I),I=1,10)
        READ(5,2343)IDUM
        READ(5,100)(SUM(I),I=1,10)
        DO 1240 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1240
        DO 1250 J=1,112
        MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1250    CONTINUE
1240    CONTINUE
        SKIP(63) = 1
        CALL POTRAS(LUOUT,63,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C
C-------------------------------------------------------------------------
C       MARKUP 4.
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
        CALL REDRAS(LUIN,67,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
```

```
        READ(5,100)(VECTOR(I),I=1,10)
        READ(5,2343)IDUM
        READ(5,100)(SUM(I),I=1,10)
        DO 1280 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1280
        DO 1290 J=1,112
        MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1290    CONTINUE
1280    CONTINUE
        SKIP(67) = 1
        CALL POTRAS(LUOUT,67,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C
C-------------------------------------------------------------------------
C       MARKUP 5.
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
        CALL REDRAS(LUIN,71,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        READ(5,100)(VECTOR(I),I=1,10)
        READ(5,2343)IDUM
        READ(5,100)(SUM(I),I=1,10)
        DO 1320 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1320
        DO 1330 J=1,112
        MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1330    CONTINUE
1320    CONTINUE
        SKIP(71) = 1
        CALL POTRAS(LUOUT,71,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C
C-------------------------------------------------------------------------
C       MARKUP 6.
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
        CALL REDRAS(LUIN,75,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        READ(5,100)(VECTOR(I),I=1,10)
        READ(5,2343)IDUM
        READ(5,100)(SUM(I),I=1,10)
        DO 1360 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1360
        DO 1370 J=1,112
        MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1370    CONTINUE
1360    CONTINUE
        SKIP(75) = 1
        CALL POTRAS(LUOUT,75,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C
C-------------------------------------------------------------------------
C       MARKUP 7.
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
```

```
        CALL REDRAS(LUIN,79,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        READ(5,100)(VECTOR(I),I=1,10)
        READ(5,2343)IDUM
        READ(5,100)(SUM(I),I=1,10)
        DO 1400 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1400
        DO 1410 J=1,112
        MAT(I,J)=MAT(I,J)* VECTOR(I)/SUM(I)
1410    CONTINUE
1400    CONTINUE
        SKIP(79) = 1
        CALL POTRAS(LUOUT,79,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C
C-------------------------------------------------------------------------
C       MARKUP 8.
C-------------------------------------------------------------------------
        READ(5,2343)IDUM
        NR=0
        NC=0
        CALL REDRAS(LUIN,83,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        READ(5,100)(VECTOR(I),I=1,10)
        READ(5,2343)IDUM
        READ(5,100)(SUM(I),I=1,10)
        DO 1440 I=1,10
        IF(SUM(I).EQ.0.0)GO TO 1440
        DO 1450 J=1,112
        MAT(I,J)=MAT(I,J)# VECTOR(I)/SUM(I)
1450    CONTINUE
1440    CONTINUE
        SKIP(83) = 1
        CALL POTRAS(LUOUT,83,NR,NC,1,1,0,MAT,116,116,INDOUT,LNDOUT,NAM)
C-------------------------------------------------------------------------
C       COPY ACROSS REMAINING POSITIONS.
C-------------------------------------------------------------------------
        DO 50 IPOS = 1,LNDIN
        IF(INDIN(IPOS).EQ.0) GO TO 50
        IF (SKIP(IPOS).NE.0) GO TO 50
        NR=0
        NC=0
        CALL REDRAS(LUIN,IPOS,NR,NC,1,1,0,MAT,116,116,INDIN,LNDIN,NAM)
        CALL POTRAS(LUOUT,IPOS,NR,NC,1,1,0,MAT,116,116,INDOUT,
     &                  LNDOUT,NAM)
50      CONTINUE
        IPOS = 34
        NR=0
        NC=0
        CALL REDRIS(LUIN,IPOS,NR,NC,1,1,0,INT,10,1,INDIN,LNDIN,NAM)
        CALL WRTRIS(LUOUT,IPOS,NR,NC,1,1,0,INT,10,1,INDOUT,LNDOUT,NAM)
        IPOS = 35
        NR=0
        NC=0
        CALL REDRIS(LUIN,IPOS,NR,NC,1,1,0,INT,10,1,INDIN,LNDIN,NAM)
        CALL WRTRIS(LUOUT,IPOS,NR,NC,1,1,0,INT,10,1,INDOUT,LNDOUT,NAM)
 100    FORMAT(5F10.2)
C-------------------------------------------------------------------------
C       CLOSE NEW FILE
```

```
C-----------------------------------------------------------------------
      CALL ENDRA(LUOUT,INDOUT,LNDOUT)
      STOP
      END
C-----------------------------------------------------------------------
C-----------------------------------------------------------------------
      SUBROUTINE POTRAS(LU,IPOS,NR,NC,I1,I2,I3,A,
     &                  IR,IC,INDEX,LINDEX,NAME)
      REAL A(IR,IC)
      REAL COLTOT(116)
      REAL ROWTOT(116)
      INTEGER NAME(4)
      INTEGER INDEX(LINDEX)
C     ------------------------------------------------------------------
C     IF MATRIX NUMBER IS LESS THAN 10 OR IF IT IS 23 OR 24 THEN THE
C     CONVENTION WE ADOPTED WAS TO ADD $1 TO EACH FLOW
C     ------------------------------------------------------------------
      IF(IPOS.LE.9) GO TO 50
      IF(IPOS.EQ.23) GO TO 50
      IF(IPOS.EQ.24) GO TO 50
      GO TO 200
50    CONTINUE
      DO 100 II = 1,NR
      DO 100 JJ = 1,NC
100   A(II,JJ) = A(II,JJ) + .000001
200   CALL WRTRAS(LU,IPOS,NR,NC,1,1,0,A,IR,IC,INDEX,LINDEX,NAME)
      TOTAL = 0.0
      DO 300 I=1,NR
300   ROWTOT(I)=0.0
      DO 500 J=1,NC
      TOT = 0.0
      DO 400 I=1,NR
      TIT = A(I,J)
      TOT = TOT + TIT
400   ROWTOT(I) = ROWTOT(I) + TIT
      TOTAL = TOTAL + TOT
500   COLTOT(J) = TOT
      WRITE(6,7777)IPOS,NR,NC,TOTAL,(NAME(K),K=1,4)
      IF(NR.EQ.1) GO TO 3214
      WRITE(6,8888)
      WRITE(6,9999)(K,ROWTOT(K),K=1,NR)
3214  IF(NC.EQ.1) RETURN
      WRITE(6,1112)
      WRITE(6,9999)(K,COLTOT(K),K=1,NC)
7777  FORMAT(1X,/,1X,*POS*,I4,* SIZE*,I4,* ROWS,*,I4,
     & *COLUMNS, TOTAL:*,F10.3,4X,4A10)
8888  FORMAT(1X,*ROW TOTALS:*)
1112  FORMAT(1X,*COL TOTALS:*)
9999  FORMAT(5(1X,I3,F10.3,6X))
      RETURN
      END
C-----------------------------------------------------------------------
C-----------------------------------------------------------------------
*EOS
EXPORTS FOR FIRST 10 COMMODITIES (5F10.2)
1166.654  248.553   387.631   289.529   116.418
```

```
8.267     1.609     52.729    74.793    2.386
LABOUR MATRIX, EMP. BY OCCUPATION IN THE FIRST EIGHT INDUSTRIES (5F10.2)
2.1300    4.1893    1.9775    .7841     2.2551
1.4183    1.5305    .5542
2.0654    4.0147    1.9157    .7669     2.1816
1.3667    1.4748    .1515
.0968     .1746     .0927     .0284     .0980
.0774     .0835     .0406
7.4549    14.6042   6.9213    2.7551    7.8929
4.9768    5.3706    1.7699
4.0341    7.9712    3.7696    1.4911    4.2896
2.7076    2.9218    .9644
1.7750    3.4911    1.6376    .6533     1.8874
1.1862    1.2800    .2291
2.9368    5.7602    2.7191    1.0793    3.1130
1.9598    2.1149    .1035
14.3613   28.2193   13.3482   5.3113    15.2465
9.5668    10.3239   4.4745
383.6137  926.0964  531.7773  191.8565  437.9499
334.1654  303.7270  47.4823
0.0       0.0       0.0       0.0       0.0
0.0       0.0       0.0
RETURNS TO FIXED CAPITAL FOR FIRST EIGHT INDUSTRIES (5F10.2)
172.154   433.135   125.867   78.001    91.479
58.426    34.083    37.423
RETURNS TO LAND FOR FIRST EIGHT INDUSTRIES (5F10.2)
195.067   839.645   356.374   139.406   239.039
109.036   60.852    0.000
OTHER COSTS FOR FIRST EIGHT INDUSTRIES (5F10.2)
43.640    122.785   43.554    12.987    37.603
39.226    33.332    40.845
MAKE MATRIX, COMMODITY PRODUCTION BY THE FIRST SEVEN INDUSTRIES (5F10.2)
314.0900  647.7047  546.9446  0.0       0.0
0.0       0.0
57.2808   295.5930  225.7988  0.0       0.0
0.0       0.0
42.8015   856.8674  21.3978   0.0       0.0
0.0       0.0
8.4807    148.5002  19.5302   0.0       0.0
0.0       0.0
4.0809    113.6947  43.8638   0.0       0.0
0.0       0.0
73.4903   218.2814  245.7927  208.1089  57.9175
0.0       0.0
.5211     60.4960   23.4925   0.0       900.4899
0.0       0.0
.4165     2.9984    6.5614    0.0       0.0
1247.6984 0.0
12.9375   36.5334   54.0716   0.0       0.0
0.0       853.0691
CONSUMPTION MARKUP
0.000     3.966     0.000     0.000     2.687
1.685     2.415     123.032   226.118   53.465
CONSUMPTION TAX
0.000     0.044     0.000     0.000     -0.054
0.159     -0.126    -1.203    -1.124    1.202
```

```
EXPORT MARKUP
124.235    49.482    179.841    28.599     9.372
1.062      0.136     27.474     19.229     0.390
EXPORT TAX
105.626    0.673     -19.467    0.000      0.000
0.100      0.000     -0.581     0.000      -0.317
LABOUR MATRIX, EMP. BY OCCUPATION IN THE FIRST EIGHT INDUSTRIES (5F10.2)
2.1300     4.1893    1.9775     .7811      2.2551
1.4183     1.5305    .5542
2.0654     4.0147    1.9157     .7669      2.1816
1.3667     1.4748    .1515
.0968      .1746     .0927      .0284      .0980
.0774      .0835     .0406
7.4549     14.6042   6.9213     2.7551     7.8929
4.9768     5.3706    1.7699
4.0341     7.9712    3.7696     1.4911     4.2896
2.7076     2.9218    .9644
1.7750     3.4911    1.6376     .6533      1.8874
1.1862     1.2800    .2291
2.9368     5.7602    2.7191     1.0793     3.1130
1.9598     2.1149    .1035
14.3613    28.2193   13.3482    5.3113     15.2465
9.5668     10.3239   4.4745
383.6137   926.0964  531.7773   191.8565   437.9499
334.1654   303.7270  47.4823
0.0        0.0       0.0        0.0        0.0
0.0        0.0       0.0
LABOUR MATRIX, EMP. BY OCCUPATION IN THE FIRST EIGHT INDUSTRIES (5F10.2)
2.1300     4.1893    1.9775     .7811      2.2551
1.4183     1.5305    .5542
2.0654     4.0147    1.9157     .7669      2.1816
1.3667     1.4748    .1515
.0968      .1746     .0927      .0284      .0980
.0774      .0835     .0406
7.4549     14.6042   6.9213     2.7551     7.8929
4.9768     5.3706    1.7699
4.0341     7.9712    3.7696     1.4911     4.2896
2.7076     2.9218    .9644
1.7750     3.4911    1.6376     .6533      1.8874
1.1862     1.2800    .2291
2.9368     5.7602    2.7191     1.0793     3.1130
1.9598     2.1149    .1035
14.3613    28.2193   13.3482    5.3113     15.2465
9.5668     10.3239   4.4745
383.6137   926.0964  531.7773   191.8565   437.9499
334.1654   303.7270  47.4823
0.0        0.0       0.0        0.0        0.0
0.0        0.0       0.0
INFLATED (TO IMPOSE APPROPRIATE SHARES) AGRICULTURAL INDUSTRY OUTPUTS
1022.899   3246.888  1494.858   592.712    1216.482
789.541    710.057   364.033
1977-78 ORANI AGRICULTURAL INDUSTRY OUTPUTS
451.955    2020.316  935.850    281.010    760.386
663.154    744.071   400.920
TAX ON DOM+IMP SALES TO INDUSTRIES FOR USE IN INTERMEDIATE PRODUCTION
17.994     0.702     -6.861     -0.882     -2.285
```

```
12.386     1.033      2.303      1.271     -10.458
MARGINS ASSOC. WITH DOM+IMP SALES TO IND. FOR USE IN INTERMEDIATE PRODN
18.832     65.614     56.106     7.986      20.358
154.233    61.148     155.784    115.531    24.309
TOTAL MARGINS 1977-78 ORANI ON DOM+IMP SALES TO IND FOR USE IN INT. PDN
16.771     67.849     32.849     16.542     37.565
200.747    43.456     86.242     115.278    23.758
MARGINS ASSOC. WITH DOM+IMP SALES TO IND. FOR USE IN INTERMEDIATE PRODN
18.832     65.614     56.106     7.986      20.358
154.233    61.148     155.784    115.531    24.309
TOTAL MARGINS 1977-78 ORANI ON DOM+IMP SALES TO IND FOR USE IN INT. PDN
16.771     67.849     32.849     16.542     37.565
200.747    43.456     86.242     115.278    23.758
MARGINS ASSOC. WITH DOM+IMP SALES TO IND. FOR USE IN INTERMEDIATE PRODN
18.832     65.614     56.106     7.986      20.358
154.233    61.148     155.784    115.531    24.309
TOTAL MARGINS 1977-78 ORANI ON DOM+IMP SALES TO IND FOR USE IN INT. PDN
16.771     67.849     32.849     16.542     37.565
200.747    43.456     86.242     115.278    23.758
MARGINS ASSOC. WITH DOM+IMP SALES TO IND. FOR USE IN INTERMEDIATE PRODN
18.832     65.614     56.106     7.986      20.358
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TOTAL MARGINS 1977-78 ORANI ON DOM+IMP SALES TO IND FOR USE IN INT. PDN
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200.747    43.456     86.242     115.278    23.758
MARGINS ASSOC. WITH DOM+IMP SALES TO IND. FOR USE IN INTERMEDIATE PRODN
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154.233    61.148     155.784    115.531    24.309
TOTAL MARGINS 1977-78 ORANI ON DOM+IMP SALES TO IND FOR USE IN INT. PDN
16.771     67.849     32.849     16.542     37.565
200.747    43.456     86.242     115.278    23.758
MARGINS ASSOC. WITH DOM+IMP SALES TO IND. FOR USE IN INTERMEDIATE PRODN
18.832     65.614     56.106     7.986      20.358
154.233    61.148     155.784    115.531    24.309
TOTAL MARGINS 1977-78 ORANI ON DOM+IMP SALES TO IND FOR USE IN INT. PDN
16.771     67.849     32.849     16.542     37.565
200.747    43.456     86.242     115.278    23.758
MARGINS ASSOC. WITH DOM+IMP SALES TO IND. FOR USE IN INTERMEDIATE PRODN
18.832     65.614     56.106     7.986      20.358
154.233    61.148     155.784    115.531    24.309
TOTAL MARGINS 1977-78 ORANI ON DOM+IMP SALES TO IND FOR USE IN INT. PDN
16.771     67.849     32.849     16.542     37.565
200.747    43.456     86.242     115.278    23.758
*EOS
*EOP
```

FIGURE A.2 : A LISTING OF THE HAMMER COMPUTER PROGRAM


```
HAMMER,P0100,T50,MS140000.
COMMENT.          ******************************************
COMMENT.          *       MARK HORRIDGE 1/9/84/            *
COMMENT.          *   SPECIAL VERSION OF HAMMER MADE       *
COMMENT.          *   TO IMPLEMENT THE TYPICAL-YEAR        *
COMMENT.          *       AGRICULTURAL DATA BASE           *
COMMENT.          ******************************************
GETSET,DTB3006.
COMMON.
GETSET,DTB1070.
GETSET,DTB2344.
TRYLIB,OLD.
ATTACH,TAPE1,TEMCID,ID=UMDXPH,SN=COMMON,PW=ORANTK,*****.
ATTACH,TAPE2,JS78114PARAMS,ID=DTBGJS,SN=DTB2344,PW=LC.
ATTACH,OMLIB,OMORANI78LIB,ID=DIAXOM,SN=DTB3006,PW=ORANTK.
LIBRARY,OMLIB,*.
REQUEST,TAPE3,*PF,SN=DTB1070.
FTN,SL,R=3,P,T,ER.
LGO.
CATALOG,TAPE3,TYAG778CID,ID=UMDXOM,SN=DTB1070,PW=ORANTK,*****,RP=999.
*EOS
      PROGRAM HAMMER(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE1,
     &                TAPE2,TAPE3)
C_____________________________________________________________________
C   THIS PROGRAM TAKES A CANBERRA CID FILE AND CREATES A REVISED VERSION
C   OF IT WHICH ELIMINATES INCONSISTENCIES BETWEEN USAGE OF DOMESTICALLY
C   PRODUCED  COMMODITIES  AND  OUTPUTS  OF  INDUSTRIES.  A  METHOD  OF
C   BIPROPORTIONAL ADJUSTMENT IS USED TO PRESERVE THE PATTERN  OF  COSTS
C   AND  SALES  SHARES  AS  MUCH  AS  POSSIBLE.  BY CONVENTION, INDUSTRY
C   VECTORS ARE SUBSCRIPTED (J),AND COMMODITY VECTORS SUBSCRIPTED (I).
C
C                FOR VARIOUS REASONS,THE COMMODITY OUTPUTS WILL NOT EQUAL
C   THE USAGES OF DOMESTIC COMMODITIES.  TWO  MAIN  REASONS  ARE  :  THE
C   ELIMINATION  OF  INVENTORIES,  AND THE FORCED DIAGONALISATION OF THE
C   NON-AGRICULTURAL MAKE MATRIX.
C     .A REFERENCE VECTOR - REFCOM(I) - IS FORMED  BY  TAKING VALUES FROM
C      THE MAKE MATRIX (AS SPECIFIED BY THE AGCID PROGRAM), THE VALUE FOR
C      POULTRY PRODUCTION (SPECIFIED IN THIS PROGRAM) AND FOR THE NON-AG
C      SECTOR SOME  MEAN  OF  USAGE  AND  OUTPUTS.
C   REFCOM(I) IS TRANSPOSED INTO  REFIND(J)  -  A  REFERENCE  VECTOR  OF
C   INDUSTRY COSTS.THE PROGRAM THEN STARTS A RAS-LIKE PROCESS, USING TWO
C   VECTORS OF SCALING FACTORS:
C
C        ROWFAC(I) SCALES USAGES TO MATCH REFCOM(I)
C        COLFAC(J) SCALES COSTS TO MATCH REFIND(J)
C
C   MARGINS  ARE  ADJUSTED BY THE ROWFAC(I) FOR THEIR OWN COMMODITY-NO.,
C   NOT BY THE FACTOR FOR THE COMMODITY ON WHICH THEY ARE A MARGIN.  ALL
C   INDUSTRY  COSTS AND MARGINS ON SUPPLIES TO INDUSTRY(J) ARE SCALED BY
C   THE INDUSTRY SPECIFIC  FACTOR  COLFAC(J).  MARGINS  ON  SUPPLIES  TO
C   INDUSTRY(J)  ARE  ALSO  SCALED  BY  THE  FACTOR  FOR  INDUSTRY(J)  -
C   COLFAC(J). NOTE THAT  FLOWS  COMMON  TO  BOTH  COMMODITY  USAGE  AND
C   INDUSTRY   COSTS  WILL  BE  SCALED  TWICE  -  THIS  APPLIES  TO  THE
C   INTERMEDIATE FLOWS(DOMESTIC) AND TO SOME MARGINS
C
C       IN MORE DETAIL, THE RAS WORKS AS FOLLOWS:
```

```
C
C                SET ROWFAC(I),COLFAC(J) TO UNITY
C                FIND COMMODITY USAGES, USING UNIT ROWFAC AND COLFAC, AND
C                   CALL THEM USAGE(I)
C                FIND  INDUSTRY  COSTS, USING UNIT ROWFAC AND COLFAC, AND
C                   CALL THEM COSTS(J)
C                USING MAKE MATRIX,DEFINE REFIND(J),REFCOM(J)
C             START ITERATIVE LOOP:
C                SET ROWFAC(I) = ROWFAC(I)*REFCOM(I)/USAGE(I)
C                FIND INDUSTRY COSTS, USING CURRENT  ROWFAC  AND  COLFAC,
C                   AND CALL THEM COSTS2(J)
C                SET COLFAC(J) = COLFAC(J)*REFIND(J)/COSTS2(J)
C                FIND COMMODITY USAGES USING CURRENT ROWFAC AND COLFAC,
C                   AND CALL THEM USAGE2(I)
C                SET DIFF(I) = REFCOM(I) - USAGE(I)
C                SET ADJUST(I) = REFCOM(I) - USAGE2(I)
C                SET CONVERG(I) = ADJUST(I)/DIFF(I)
C                SET FRACT(I) = ADJUST(I)/REFCOM(I)
C                PRINT ITERATION NO, DIFSUM, DIFABS ,  DIFSQU  ,  ADJSUM,
C                   ADJABS, AND ADJSQU.
C                PRINT WITH INDUSTRY LABELS REFIND(J),COSTS(J),COSTS2(J),
C                   AND COLFAC(J)
C                PRINT  WITH COMMODITY LABELS REFCON(I),USAGE(I),DIFF(I),
C                   USAGE2(I) ROWFAC(I),ADJUST(I),CONVRG(I) AND FRACT(I).
C                SET USAGE(I) TO USAGE2(I)
C             END ITERATIVE LOOP
C                USING CURRENT ROWFAC AND COLFAC WRITE NEW CID FILE
C
C    AFTER EACH ITERATION USAGE(I) - THE SCALED  USAGES  OF  DOMESTICALLY
C    PRODUCED  COMMODITIES  -  WILL  ONCE  AGAIN  BE  DIFFERENT  FROM THE
C    REFERENCE  OUTPUTS  -  REFCOM(I),  BUT  THE  DIFFERENCES  SHOULD  BE
C    PROGRESSIVELY  SMALLER.  ONE  EFFECT OF THE SCALING OPERATION ON THE
C    DATA  BASE  IS  TO  DISTRIBUTE  THE  ORIGINAL  DIFF(I)  AMONG  THE
C    COMMODITIES ALLOWING SOME OF THEM TO CANCEL EACH OTHER OTHER OUT.THE
C    LARGER  THE  ITEMS THAT ARE SCALED TWICE, THE SLOWER THE CONVERGENCE
C    TO  COMPLETE  IO  BALANCE.  THUS,  ALTHOUGH  THE  SCALING  DOES  NOT
C    ELIMINATE INCONSISTENCIES ALTOGETHER , THEY ARE REDUCED BY ORDERS OF
C    MAGNITUDE.  IN  FACT,  THE  IOTABLE  WILL BE IN NEAR PERFECT BALANCE
C    AFTER ONLY TWO OR THREE ITERATIONS.THUS IT IS SATISACTORY TO  IGNORE
C    THE  RESIDUAL DIFFERENCES - ADJUST(I). THE REVISED MATRICES ARE THEN
C    WRITTEN TO A NEW CID FILE.SUCCESS IS JUDGED BY  EXAMINATION  OF  THE
C    VECTORS DIFF(I) AND ADJUST(I), AND THEIR PLAIN SUMS,SUMS OF ABSOLUTE
C    VALUES,  AND  SUMS  OF  SQUARES  (DIFSUM,ADJSUM,DIFABS,ADJABS,DIFSQU,
C    ADJSQU).FOR ALL THREE TYPES OF SUM,THAT FOR ADJUST(I) SHOULD BE LESS
C    THAN  THAT  FOR DIFF(I).VECTORS FRACT(I) AND CONVRG(I) - SEE ABOVE -
C    ALSO SERVE AS DIAGNOSTICS.
C
C    TO UNDERSTAND THE OUTPUT BEAR IN MIND THAT:
C        THESE VARIABLE ARE THE SAME AT EVERY ITERATION:
C                COSTS(I)...ORIGINAL INDUSTRY COSTS
C                REFIND(J)..REFERENCE VECTOR OF INDUSTRY COSTS
C                REFCOM(J)..REFERENCE VECTOR OF COMMODITY USAGES/OUTPUTS
C         THESE VARIABLES SHOW THE POSITION BEFORE THE CURRENT ITERATION:
C                USAGE(I)...COMMODITY USAGE
C                DIFF(I)....COMMODITY DISCREPANCY
C         THESE VARIABLES SHOW THE POSITION AFTER THE CURRENT ITERATION:
```

```
C                USAGE2(I)..COMMODITY USAGE
C                ROWFAC(I)..COMMODITY SCALE FACTOR
C                COLFAC(I)..INDUSTRY SCALE FACTOR
C                ADJUST(I)..COMMODITY DISCREPANCY
C                FRACT(I)...WAY OF PRESENTING ADJUST(I)
C          THIS VARIABLE SHOWS THE POSITION MIDWAY THROUGH THE ITERATION:
C                COSTS2(I)..COSTS AFTER ROW SCALING ONLY
C          THIS VARIABLE COMPARES DISCREPANCIES BEFORE AND AFTER:
C                CONVRG(I)..RATIO DIFF(I) AND ADJUST(I)
C
C
C    THE FOLLOWING NOTES ARE FOR PROGRAMMERS PURPOSES
C
C        *    MANY IMPORTANT PARAMETERS ARE PASSED IN COMMON
C
C        *    NOTWITHSTANDING SOME APPEARANCES,PROGRAM EXPECTS:
C                OLD CID FILE ON TAPE1
C                PARAMS FILE ON TAPE2
C                NEW CID FILE ON TAPE3
C
C        *    AN EFFORT HAS BEEN MADE TO BE GENERAL:TO USE  THIS  PROGRAM
C                FOR  A  CID  FILE OTHER THAN THE 778LC, DECLARATIONS MAY
C                HAVE TO BE REVISED.OTHERWISE,SEARCH THROUGH FOR  COMMENT
C                LINES BEGINNING "CMOD".
C
C        *    SOME VECTORS ARE PASSED AS  PARAMETERS, THEN  REDIMENSIONED
C                USING CONSTANTS IN THE SUBROUTINE.
C
C-------------------------------------------------------------------------
C
C-------------------------------------------------------------------------
C
C    DECLARATIONS
C    ************
C
CMOD DIMENSION-LENGTH=115 = NO AS BIG AS NO OF COMMODITIES OR INDUSTRIES
C
C    INTEGER VECTORS FOR FILE HANDLING
C-------------------------------------------------------------------------
        INTEGER IND1(100),IND2(100)
        INTEGER NAME(4),DIMENS(6),MARNUM(10)
        INTEGER COMLAB(3,115),INDLAB(3,115),G,H,R
C-------------------------------------------------------------------------
C    USEFUL WORK AREA
C-------------------------------------------------------------------------
        REAL    HANDY(115,115)
        REAL    WORK(115)
C-------------------------------------------------------------------------
C    REFERENCE VECTORS
C-------------------------------------------------------------------------
        REAL    REFCOM(115),REFIND(115)
C-------------------------------------------------------------------------
C    ROW AND COLUMN MULTIPLIERS FOR RESCALING
C-------------------------------------------------------------------------
        REAL    ROWFAC(115),COLFAC(115)
C-------------------------------------------------------------------------
```

```
C   MAKE MULTIPRODUCT MATRIX
C-----------------------------------------------------------------------
      REAL   MAKE(12,12)
C-----------------------------------------------------------------------
C   DISCREPANCY AND DIAGNOSTIC VECTORS
C-----------------------------------------------------------------------
      REAL   DIFF(115),ADJUST(115),FRACT(115),CONVRG(115)
C-----------------------------------------------------------------------
C   ROW AND COLUMN INDICATOR FOR POSSIBLE POSITION ALTERATIONS
C-----------------------------------------------------------------------
      INTEGER  ROWALT(115),COLALT(115)
C-----------------------------------------------------------------------
C   OTHER REAL VECTORS
C-----------------------------------------------------------------------
      REAL   COSTS(115),COSTS2(115),USAGE(115),USAGE2(115)
      REAL   COMPRD(115),USAGE0(115)
C-----------------------------------------------------------------------
C   DEBUG FLAG
C-----------------------------------------------------------------------
      INTEGER LDEBUG
C
      COMMON /MUTUAL/ROWALT,ROWFAC,COLALT,COLFAC,MAKE,ADJUST,MARNUM,
     &       IND1,LDEBUG,HANDY,LIND1,G,H
C-----------------------------------------------------------------------
CMOD   LEN = DIMLENGTH(MOST VECTORS AND ARRAYS)
C-----------------------------------------------------------------------
      DATA LEN/115/,LDEBUG/0/,NITER/5/
C#######################################################################
C-----------------------------------------------------------------------
C   SECTION ZERO - INITIALIZE ROW AND COLUMN MULTIPLIERS TO UNITY
C   AND SET UP ROWALT AND COLALT
C-----------------------------------------------------------------------
C#######################################################################
      DO 500 K = 1,LEN
         ROWFAC(K) = 1.00
         COLFAC(K) = 1.00
         COLALT(K) = 0
         ROWALT(K) = 0
500   CONTINUE
C-----------------------------------------------------------------------
C   VALUES OF COLALT(J) AND ROWALT(I) DETERMINE HOW THE VARIOUS
C   MATRICES ARE FORMATTED AND MANIPULATED.IF COLALT(IPOS) IS
C   NONZERO THEN THE MATRIX AT IPOS FIGURES IN INDUSTRY COSTS
C   AND WILL BE SCALED BY THE VECTOR COLFAC(J)
C
C   COLALT(IPOS) = 1 IFF THE ROWS OF THE MATRIX AT THAT POSITION
C                    CONTRIBUTE TO THE COSTS OF AN INDUSTRY
C   ROWALT(IPOS) = 1 IFF THE ROWS OF THE MATRIX AT THAT POSITION
C                    CONTRIBUTE DIRECTLY TO USAGE OF A DOMESTIC COMMODIT
C   ROWALT(IPOS) = 2 IFF THE ROWS OF THE MATRIX AT THAT POSITION
C                    ARE ALL THE SAME MARGIN COMMODITY
C   ROWALT(IPOS) = 3 IFF THE COLUMNS OF THE MATRIX AT THAT POSITION
C                    ARE DIFFERENT MARGIN COMMODITIES
CMOD   VALUES BELOW DEPEND ON FILE STRUCTURE
C-----------------------------------------------------------------------
      ROWALT( 1) = 1
```

```
       ROWALT( 3) = 1
       ROWALT( 5) = 1
       ROWALT( 7) = 1
       ROWALT( 8) = 1
       ROWALT(19) = 3
       ROWALT(23) = 3
       ROWALT(25) = 3
       ROWALT(55) = 2
       ROWALT(57) = 2
       ROWALT(59) = 2
       ROWALT(61) = 2
       ROWALT(63) = 2
       ROWALT(65) = 2
       ROWALT(67) = 2
       ROWALT(69) = 2
       ROWALT(71) = 2
       ROWALT(73) = 2
       ROWALT(75) = 2
       ROWALT(77) = 2
       ROWALT(79) = 2
       ROWALT(81) = 2
       ROWALT(83) = 2
       ROWALT(85) = 2
C
       COLALT( 1) = 1
       COLALT( 2) = 1
       COLALT(10) = 1
       COLALT(11) = 1
       COLALT(12) = 1
       COLALT(13) = 1
       COLALT(51) = 1
       COLALT(55) = 1
       COLALT(59) = 1
       COLALT(63) = 1
       COLALT(67) = 1
       COLALT(71) = 1
       COLALT(75) = 1
       COLALT(79) = 1
       COLALT(83) = 1
C##############################################################################
C______________________________________________________________________________
C   SECTION ONE - OPEN FILES: 1 = CID, 2 = PARAMS
C______________________________________________________________________________
C##############################################################################
       LIND1 = 0
       CALL OPENRA(1,IND1,LIND1)
       LIND2 = 0
       CALL OPENRA(2,IND2,LIND2)
C##############################################################################
C______________________________________________________________________________
C   SECTION TWO - GET MATRIX DIMENSIONS, MARGIN COMMODITY NOS
C   AND LABELS
C
C   GET MATRIX DIMENSIONS
CMOD  IPOS DEPENDS ON FILE STRUCTURE
C______________________________________________________________________________
```

```
C#########################################################################
      CALL REDRIS(1,34,6,1,1,1,0,DIMENS,6,1,IND1,LIND1,NAME)
C_________________________________________________________________________
C       G = NUMBER OF COMMODITIES
C       H = NUMBER OF INDUSTRIES
C       R = NUMBER OF MARGIN COMMODITIES
C_________________________________________________________________________
       G = DIMENS(1)
       H = DIMENS(2)
       R = DIMENS(4)
C_________________________________________________________________________
C   GET COMMODITY NOS OF MARGINS
CMOD  IPOS DEPENDS ON FILE STRUCTURE
C_________________________________________________________________________
       CALL REDRIS(1,35,R,1,1,1,0,MARNUM,10,1,IND1,LIND1,NAME)
C_________________________________________________________________________
C   GET COMMODITY LABELS
CMOD  IPOS DEPENDS ON FILE STRUCTURE
C_________________________________________________________________________
       CALL REDRIS(2,11,3,G,1,1,0,COMLAB,3,LEN,IND2,LIND2,NAME)
C_________________________________________________________________________
C   GET INDUSTRY LABELS
CMOD  IPOS DEPENDS ON FILE STRUCTURE
C_________________________________________________________________________
       CALL REDRIS(2,12,3,H,1,1,0,INDLAB,3,LEN,IND2,LIND2,NAME)
C_________________________________________________________________________
C   DEBUG OUTPUT
C_________________________________________________________________________
       IF(LDEBUG.GT.0)
     &       WRITE(6,8765)G,H,R
8765   FORMAT(1X,* G = *,I6,* H = *,I6,* R = *,I6)
       IF(LDEBUG.GT.0)
     &       WRITE(6,8764)MARNUM
8764   FORMAT(1X,*MARGIN NOS *,12(I4,3X))
C#########################################################################
C_________________________________________________________________________
C   SECTION THREE - DEFINE REFERENCE VECTORS FOR RAS
C          REFCOM(I)....VECTOR OF COMMODITY OUTPUTS/USAGE
C          REFIND(J)....VECTOR OF INDUSTRY COSTS
C
C   GET MAKE MATRIX OFF FILE
C_________________________________________________________________________
C#########################################################################
       MAKENR = 0
       MAKENC = 0
C_________________________________________________________________________
CMOD  IPOS DEPENDS ON FILE STRUCTURE
C_________________________________________________________________________
       CALL REDRAS(1,14,MAKENR,MAKENC,1,1,0,MAKE,12,12,IND1,LIND1,NAME)
C
        WRITE(6,6656)
        DO 6657 I=1,MAKENR
6657    WRITE(6,6653)(MAKE(I,J),J=1,MAKENC)
6656    FORMAT(1X,*MAKE MATRIX.......*)
6653    FORMAT(1X,10(F11.3))
C_________________________________________________________________________
```

```
C    IN THIS VERSION OF HAMMER THE ORIGINAL MAKE MATRIX IS PRESERVED
C    ITS ROW TOTALS BECOME THE FIRST FEW ENTRIES OF REFCOM(I)
C    ITS COL TOTALS BECOME THE FIRST FEW ENTRIES OF REFIND(J)
C
C    FOR THE AGRICULTURAL SECTOR THE ROW TOTALS OF THE MAKE MATRIX
C    SERVE AS REFERENCE COMMODITY SALES AND THE COLUMN TOTALS AS
C    THE REFERENCE INDUSTRY COSTS
C
C    THE REMAINDER OF THE INDUSTRY/COMMODITIES ARE TREATED AS NORMAL
C    (EXCEPT FOR POULTRY)
C
C    PUT COLUMN TOTALS OF MAKE MATRIX INTO REFIND
C-------------------------------------------------------------------------
        CALL COLTOT(REFIND,LEN,MAKE,12,12)
C-------------------------------------------------------------------------
C    PUT ROW TOTALS OF MAKE MATRIX INTO REFCOM
C-------------------------------------------------------------------------
        CALL ROWTOT(REFCOM,LEN,MAKE,12,12)
C-------------------------------------------------------------------------
C    ADD UP USAGE OF DOMESTICALLY PRODUCED COMMODITIES
C-------------------------------------------------------------------------
        CALL COMUSE(USAGE,LEN)
        INAME = 10HUSAGE(COM)
        CALL CHECK(USAGE,LEN,INAME,1)
C-------------------------------------------------------------------------
C    SAVE USAGE FOR COMPARISON AT END AS USAGEO
C-------------------------------------------------------------------------
         DO 1113 I = 1,G
1113     USAGEO(I) = USAGE(I)
C-------------------------------------------------------------------------
C    ADD UP COSTS OF INDUSTRIES.
C-------------------------------------------------------------------------
        CALL INDCST(COSTS,LEN)
        INAME = 10HCOSTS(IND)
        CALL CHECK(COSTS,LEN,INAME,1)
C-------------------------------------------------------------------------
C    FOR THE NON-AGRICULTURAL SECTOR REFERENCE SALES ARE A MEAN OF
C    EXISTING SALES AND COSTS
C-------------------------------------------------------------------------
        ISTART = MAKENR + 1
        DO 120 I = ISTART,G
              COMPRD(I) = COSTS(I - MAKENR + MAKENC)
               REFCOM(I) = 0.5*(COMPRD(I) + USAGE(I))
120     CONTINUE
C-------------------------------------------------------------------------
C    EXCEPT THAT :
C    EXISTING SALES OF MARGIN COMMODITIES ARE TAKEN AS REFERENCE SALES
C-------------------------------------------------------------------------
        DO 1372 L=1,R
        I=MARNUM(L)
        COMPRD(I)=COSTS(I-MAKENR+MAKENC)
        REFCOM(I)=USAGE(I)
1372    CONTINUE
C*************************************************************************
C************                                                  ************
C************  SPECIFY THE VALUE OF POULTRY PRODUCTION         ************
```

```
C*************                                                  *************
C*****************************************************************************
C
          REFCOM(10) = 400.4210
C
C*****************************************************************************
        INAME = 10HCOMPRD....
        CALL CHECK(COMPRD,LEN,INAME,1)
C
        INAME = 10HREFCOM....
        CALL CHECK(REFCOM,LEN,INAME,1)
         ISTART = MAKENC + 1
C_____________________________________________________________________________
C   REFERENCE VECTOR OF INDUSTRY COSTS FOR NON-AGRICULTURAL
C   INDUSTRIES IS SET EQUAL TO THEIR REFERENCE SALES
C_____________________________________________________________________________
        DO 147 J = ISTART,H
              REFIND(J) = REFCOM(J + MAKENR - MAKENC)
147     CONTINUE
        INAME = 10HREFIND....
        CALL CHECK(REFIND,LEN,INAME,1)
C#############################################################################
C_____________________________________________________________________________
C   SECTION 4  ITERATIVE RAS PROCESS.....LOOP STARTS HERE
C_____________________________________________________________________________
C#############################################################################
         DO 932 ITER = 1,NITER
C_____________________________________________________________________________
C   DEFINE NEW ROW MULTIPLIERS - ROWFAC(I) - TO SCALE USAGES TO
C   MATCH REFCOM(I) - THE REFERENCE VECTOR OF INDUSTRY COSTS
C_____________________________________________________________________________
        DO 148 I = 1,G
148        ROWFAC(I) = ROWFAC(I)*REFCOM(I)/USAGE(I)
        INAME = 10HROWFAC....
        CALL CHECK(ROWFAC,LEN,INAME,LDEBUG)
C_____________________________________________________________________________
C   FIND INDUSTRY COSTS USING REVISED ROWFAC(I)
C_____________________________________________________________________________
        CALL INDCST(COSTS2,LEN)
C_____________________________________________________________________________
C   DEFINE NEW COLUMN MULTIPLIERS - COLFAC(J) - TO SCALE THESE COSTS TO
C   MATCH REFIND(J) - THE REFERENCE VECTOR OF INDUSTRY COSTS
C_____________________________________________________________________________
        DO 150 J = 1,H
150              COLFAC(J) = COLFAC(J)*REFIND(J)/COSTS2(J)
        INAME = 10HCOLFAC....
        CALL CHECK(COLFAC,LEN,INAME,LDEBUG)
C_____________________________________________________________________________
C   FIND USAGE WITH NEW MULTIPLIERS - ROWFAC(I) AND COLFAC(J)
C_____________________________________________________________________________
        CALL COMUSE(USAGE2,LEN)
        INAME = 10HUSAGE.....
        CALL CHECK(USAGE,LEN,INAME,LDEBUG)
C_____________________________________________________________________________
C   NOW   WE   FIND  THE  VECTOR  OF  DIFFERENCES  BETWEEN  PREITERATION
C   PRODUCTION AND USAGE - DIFF(I),THE SUM OF ITS ELEMENTS  -  DIFSUM  ,
```

```
C   THE  SUM  OF  THE ABSOLUTE VALUES OF THE ELEMENTS - DIFABS - AND THE
C   SUM OF SQUARES - DIFSQU. POSTITERATION COMMODITY USAGES -  USAGE2(I)
C   -  WILL  NO  LONGER EQUAL COMMODITY OUTPUTS - REFCOM(I).IN A SIMILAR
C   WAY, WE FIND THE VECTOR OF DIFFERENCES -  ADJUST(I)  -  AND  VARIOUS
C   TOTALS  OF  ITS ELEMENTS : THE SUM - ADJSUM, THE SUM OF THE ABSOLUTE
C   VALUES  OF  THE ELEMENTS - ADJABS , AND THE SUM OF SQUARES - ADJSQU.
C   THE DIAGNOSTIC VECTORS FRACT(I) AND CONVERG(I) ARE ALSO FOUND.  NOTE
C   THAT   AFTER  EACH  ITERATION  INDUSTRY  COSTS  WILL  EXACTLY  EQUAL
C   REFIND(J).DISCREPANCIES ARE  CONFINED  TO  THOSE  BETWEEN  COMMODITY
C   USAGE AND REFCOM(I) - WHICH IS MERELY REFIND(J) TRANSPOSED USING THE
C   MAKE MATRIX.
C
C   INITIALIZE TOTALS
C_____________________________________________________________________
      DIFABS = 0.0
      DIFSUM = 0.0
      DIFSQU = 0.0
      ADJABS = 0.0
      ADJSUM = 0.0
      ADJSQU = 0.0
C_____________________________________________________________________
C   FIND  DIFF(I),ADJUST(I), AND THE VARIOUS TOTALS. CONVRG(I) SHOWS HOW
C   QUICKLY THE DIFF(I) ARE REDUCING, WHILE FRACT(I) SHOWS ADJUST(I)  AS
C   A PROPORTION OF REFCOM(I)
C_____________________________________________________________________
      DO 160 I = 1,G
         DIFF(I) = REFCOM(I) - USAGE(I)
         X = DIFF(I)
         DIFSUM = DIFSUM + X
         DIFSQU = DIFSQU + X*X
         IF(X.GT.0.0) DIFABS = DIFABS + X
         IF(X.LT.0.0) DIFABS = DIFABS - X
         ADJUST(I) = REFCOM(I) - USAGE2(I)
         Y = ADJUST(I)
         ADJSUM = ADJSUM + Y
         ADJSQU = ADJSQU + Y*Y
         IF(Y.GT.0.0) ADJABS = ADJABS + Y
         IF(Y.LT.0.0) ADJABS = ADJABS - Y
         IF((X*X).LT.0.000001) GO TO 160
         CONVRG(I) = ADJUST(I)/DIFF(I)
         IF(REFCOM(I).EQ.0) GO TO 160
         FRACT(I) = ADJUST(I)/REFCOM(I)
160   CONTINUE
C######################################################################
C ------------------------------------------------------------------
C   SECTION 5: WRITE OUT RESULTS FOR CURRENT ITERATION
C
C   WRITE OUT SCALAR RESULTS
C   ************************
C_____________________________________________________________________
C######################################################################
      WRITE(6,291)ITER
      WRITE(6,292)DIFSUM,DIFABS,DIFSQU,ADJSUM,ADJABS,ADJSQU
291   FORMAT(1H1,*RESULTS ITERATION NO.*,I3)
292   FORMAT(1X,*DIFSUM=*,F12.4,*  DIFABS=*,F12.4,*  DIFSQU=*,F12.4,/,
     &       1X,*ADJSUM=*,F12.4,*  ADJABS=*,F12.4,*  ADJSQU=*,F12.4,/)
```

```
C_____________________________________________________________________
C   WRITE OUT INDUSTRY RESULTS
C   **************************
C
C   WRITE TITLES,INITIALIZE TOTALS
C_____________________________________________________________________
      WRITE(6,294)
      T1 = 0.0
      T2 = 0.0
      T3 = 0.0
      T4 = 0.0
C_____________________________________________________________________
C   WRITE INDUSTRY DATA AND COMPUTE TOTALS
C_____________________________________________________________________
      DO 371 J = 1,H
        WRITE(6,295)J,(INDLAB(K,J),K=1,3),REFIND(J),COSTS(J),COSTS2(J),
     &     COLFAC(J)
        T1 = T1 + REFIND(J)
        T2 = T2 + COSTS(J)
        T3 = T3 + COSTS2(J)
        T4 = T4 + COLFAC(J)*COSTS(J)
371   CONTINUE
295   FORMAT(1X,I3,1X,3A10,8(2X,F10.3))
294   FORMAT(1H1,*IND. NO.*,6X,*DESCRIPTION*,14X,*REFIND*,6X,
     & * COSTS*,6X,*COSTS2*,6X,*COLFAC*,/)
C_____________________________________________________________________
C   T4 IS A WEIGHTED MEAN:
C_____________________________________________________________________
      T4 = T4/T2
      NAMTOT = 10HOVERALL...
      WRITE(6,295)0,0,0,NAMTOT,T1,T2,T3,T4
C_____________________________________________________________________
C   WRITE OUT COMMODITY RESULTS
C   ***************************
C
C   WRITE TITLES,INITIALIZE TOTALS
C_____________________________________________________________________
      WRITE(6,291)ITER
      T1 = 0.0
      T2 = 0.0
      T3 = 0.0
      T4 = 0.0
      T5 = 0.0
      T6 = 0.0
      T7 = 0.0
      WRITE(6,296)
296   FORMAT(1X,*COM. NO.*,6X,*DESCRIPTION*,14X,*REFCOM*,6X,
     & *USAGE *,6X,* DIFF *,6X,*USAGE2*,6X,*ROWFAC*,6X,*ADJUST*,
     & 6X,*CONVRG*,6X,* FRACT*,/)
C_____________________________________________________________________
C   WRITE COMMODITY RESULTS AND COMPUTE TOTALS
C_____________________________________________________________________
      DO 372 I = 1,G
        WRITE(6,295)I,(COMLAB(K,I),K = 1,3),REFCOM(I),USAGE(I),DIFF(I),
     &     USAGE2(I),ROWFAC(I),ADJUST(I),CONVRG(I),FRACT(I)
        T1 = T1 + REFCOM(I)
```

```
          T2 = T2 + USAGE(I)
          T3 = T3 + DIFF(I)
          T4 = T4 + USAGE2(I)
          T5 = T5 + ROWFAC(I)*USAGE(I)
          T6 = T6 + ADJUST(I)
          T7 = T7 + CONVRG(I)*ADJUST(I)
          T8 = T8 + FRACT(I)*REFCOM(I)
372     CONTINUE
C_____________________________________________________________________
C    T5,T7 AND T8 ARE WEIGHTED MEANS
C_____________________________________________________________________
        T5 = T5/T2
        T7 = T7/T6
        T8 = T8/T1
C
        WRITE(6,295)0,0,0,NAMTOT,T1,T2,T3,T4,T5,T6,T7,T8
C_____________________________________________________________________
C    RESET USAGE TO USAGE2 FOR NEXT ITERATION
C_____________________________________________________________________
         DO 931 I = 1,G
931      USAGE(I) = USAGE2(I)
C_____________________________________________________________________
C    END ITERATION LOOP
C_____________________________________________________________________
932      CONTINUE
C_____________________________________________________________________
C    WRITE OUT BEFORE AND AFTER COMPARISON OF RESULTS
C
C    WRITE OUT INDUSTRY RESULTS
C    **************************
C
C    WRITE TITLES,INITIALIZE TOTALS
C_____________________________________________________________________
        WRITE(6,3294)
        T1 = 0.0
        T2 = 0.0
        T3 = 0.0
        T4 = 0.0
C_____________________________________________________________________
C    WRITE INDUSTRY DATA AND COMPUTE TOTALS
C_____________________________________________________________________
        DO 3371 J = 1,H
          IF(J.EQ.57) WRITE(6,3294)
          DEL = REFIND(J) - COSTS(J)
          RAT = DEL/REFIND(J)
          WRITE(6,3295)J,(INDLAB(K,J),K=1,3),COSTS(J),REFIND(J),DEL,RAT
          T1 = T1 + COSTS(J)
          T2 = T2 + REFIND(J)
          T3 = T3 + DEL
          T4 = T4 + RAT*REFIND(J)
3371     CONTINUE
3295     FORMAT(1X,I3,1X,3A10,2(F15.3,5X),F15.5,5X,F15.7)
3294     FORMAT(1H1,*IND. NO.*,6X,*DESCRIPTION*,9X,
     &          * ORIGINAL IND.COSTS *,
     &          *  FINAL IND.COSTS   *,
     &          *     DIFFERENCE     *,
```

```
     &          *       DIFF/FINAL     *)
C_____________________________________________________________________
C    T4 IS A WEIGHTED MEAN:
C_____________________________________________________________________
       T4 = T4/T2
       NAMTOT = 10HOVERALL...
       WRITE(6,3295)0,0,0,NAMTOT,T1,T2,T3,T4
C_____________________________________________________________________
C    WRITE OUT COMMODITY RESULTS
C    ***************************
C
C    WRITE TITLES,INITIALIZE TOTALS
C_____________________________________________________________________
       T1 = 0.0
       T2 = 0.0
       T3 = 0.0
       T4 = 0.0
       WRITE(6,3296)
3296    FORMAT(1H1,*COM. NO.*,6X,*DESCRIPTION*,9X,
     &          * ORIGINAL COM.SALES *,
     &          *  FINAL COM.SALES   *,
     &          *     DIFFERENCE     *,
     &          *      DIFF/FINAL    *)
C_____________________________________________________________________
C    WRITE COMMODITY RESULTS AND COMPUTE TOTALS
C_____________________________________________________________________
       DO 3372 I = 1,G
         IF(I.EQ.58) WRITE(6,3296)
         DEL = USAGE(I) - USAGE0(I)
         RAT = DEL/USAGE(I)
         WRITE(6,3295)I,(COMLAB(K,I),K=1,3),USAGE0(I),USAGE(I),DEL,RAT
         T1 = T1 + USAGE0(I)
         T2 = T2 + USAGE(I)
         T3 = T3 + DEL
         T4 = T4 + RAT*USAGE(I)
3372    CONTINUE
C_____________________________________________________________________
C    T4 IS A WEIGHTED MEAN
C_____________________________________________________________________
       T4 = T4/T2
C
       WRITE(6,3295)0,0,0,NAMTOT,T1,T2,T3,T4
C_____________________________________________________________________
C    WRITE NEW CID FILE
C_____________________________________________________________________
       CALL NEW
C
       STOP
       END
C*********************************************************************
       SUBROUTINE CHECK(VECTOR,LEN,INAME,LDEBUG)
C
C    PRINTS OUT VECTOR FOR DEBUGGING PURPOSES
       INTEGER LDEBUG
       REAL   VECTOR(115)
C
```

```
      IF(LDEBUG.EQ.0)RETURN
      WRITE(6,100)INAME
      WRITE(6,150)(K,VECTOR(K),K = 1,LEN)
      TOT = 0.0
       DO 50 K = 1,LEN
50     TOT = TOT + VECTOR(K)
      WRITE(6,51)TOT
51    FORMAT(1X,/,1X,*VECTOR TOTAL = *,F16.5)
      RETURN
100   FORMAT(1H1,*VALUES OF *,A10)
150   FORMAT(5(3X,I3,*...*,F11.6))
      END
C*************************************************************************
      SUBROUTINE INDCST(COSTS,LEN)
C
C   SUBROUTINE INDCST ADDS UP COSTS OF EACH INDUSTRY
C   AS DEFINED BY THE CID INPUT FILE AND THE CURRENT VALUES
C   OF THE ROW AND COLUMN MULTIPLIERS.
C
      REAL   COSTS(115),WORK(115)
      REAL   ROWFAC(115),COLFAC(115),ADJUST(115),MAKE(12,12)
      REAL   HANDY(115,115)
      INTEGER IND1(100),ROWALT(115),COLALT(115),MARNUM(10),H,G
      COMMON /MUTUAL/ROWALT,ROWFAC,COLALT,COLFAC,MAKE,ADJUST,MARNUM,
     &       IND1,LDEBUG,HANDY,LIND1,G,H
C
C   INITIALIZE COSTS VECTOR
      DO 100 J = 1,H
100   COSTS(J) = 0.0
C
C   PICK OUT MATRICES WHICH FORM INDUSTRY COSTS AND ADD THEIR
C   COLUMN SUMS TO COSTS.  NOTE THAT ELEMENTS OF THE MATRICES
C   WILL BE ALTERED, WHERE APPROPRIATE, BY THE CURRENT VALUES
C   OF THE ROW AND COLUMN MULTIPLIERS
      DO 300 IPOS = 1,LIND1
        IF(IND1(IPOS).EQ.0) GO TO 300
        IF(COLALT(IPOS).EQ.0) GO TO 300
        CALL COLSUM(1,IPOS,WORK,LEN)
        DO 200 J = 1,H
          COSTS(J) = COSTS(J) + WORK(J)
200     CONTINUE
300   CONTINUE
      RETURN
      END
C*************************************************************************
      SUBROUTINE COMUSE(USAGE,LEN)
C
C   SUBROUTINE COMUSE ADDS UP USAGE OF EACH DOMESTIC COMMODITY
C   AS DEFINED BY THE CID INPUT FILE AND THE CURRENT VALUES
C   OF THE ROW AND COLUMN MULTIPLIERS.
C
      REAL   USAGE(115),WORK(115),HANDY(115,115)
      REAL   ROWFAC(115),COLFAC(115),ADJUST(115),MAKE(12,12)
      INTEGER IND1(100),ROWALT(115),COLALT(115),MARNUM(10),G,H
      COMMON /MUTUAL/ROWALT,ROWFAC,COLALT,COLFAC,MAKE,ADJUST,MARNUM,
     &       IND1,LDEBUG,HANDY,LIND1,G,H
```

```
C
C   INITIALIZE USAGE VECTOR
       DO 100 I = 1,G
100    USAGE(I) = 0.0
C
C   PICK OUT MATRICES WHICH FORM COMMODITY USAGE AND ADD THEIR
C   ROW SUMS TO USAGE.       NOTE THAT ELEMENTS OF THE MATRICES
C   WILL BE ALTERED, WHERE  APPROPRIATE, BY THE CURRENT VALUES
C   OF THE ROW AND COLUMN MULTIPLIERS
       DO 300 IPOS = 1,LIND1
         IF(IND1(IPOS).EQ.0) GO TO 300
         IF(ROWALT(IPOS).EQ.0) GO TO 300
         CALL ROWSUM(1,IPOS,WORK,LEN)
         DO 200 I = 1,G
           USAGE(I) = USAGE(I) + WORK(I)
200      CONTINUE
300    CONTINUE
       RETURN
       END
C*********************************************************************
       SUBROUTINE COLSUM(LU,IPOS,VECTOR,LEN)
C
C   THIS SUBROUTINE FINDS THE COLUMN SUMS OF THE MATRIX HANDY (STORED AT
C   IPOS  ON TAPE1) USING APPROPRIATE SCALING FACTORS, AND RETURNS IT IN
C   VECTOR(115). THE FILE ON TAPE1 MUST HAVE BEEN OPENED  BY  AN  OPENRA
C   CALL,USING IND1,LIND1.
C
CMOD   THIS IS A TRICKY ROUTINE WHICH SHOULD BE CHANGED WITH CARE
C
       REAL   VECTOR(115),HANDY(115,115)
       REAL   ROWFAC(115),COLFAC(115),ADJUST(115),MAKE(12,12)
       INTEGER IND1(100),ROWALT(115),COLALT(115),MARNUM(10),G,H
       INTEGER NAME(4)
       COMMON /MUTUAL/ROWALT,ROWFAC,COLALT,COLFAC,MAKE,ADJUST,MARNUM,
     &       IND1,LDEBUG,HANDY,LIND1,G,H
C
C   DEBUG OUTPUT
        IF(LDEBUG.EQ.0) GO TO 1532
        WRITE(6,1531)LU,IPOS,LEN
1531    FORMAT(1X,*CALLING COLSUM LU = *,I6,* IPOS = *,I6,* LEN = *,I6)
1532    CONTINUE
C   INITIALIZE VECTOR
      DO 20 J = 1,H
20    VECTOR(J) = 0.0
C
C   TEST - ANYTHING THERE AT IPOS?
      IF(IND1(IPOS).EQ.0) RETURN
      NR = 0
      NC = 0
      CALL REDRAS(LU,IPOS,NR,NC,1,1,0,HANDY,115,115,IND1,LIND1,NAME)
C   DECIDE WHAT SORT OF MATRIX IT IS AND ACT ACCORDINGLY
C        NONMARGIN......ROWALT = 1 OR 0
C        MARGIN.........ROWALT = 3  POS 55 + STORED G*H
       IF(ROWALT(IPOS).EQ.0)GO TO 5611
       IF(ROWALT(IPOS).EQ.1)GO TO 5611
       IF(ROWALT(IPOS).EQ.2)GO TO 5622
```

```
C   ERROR TRAP
        WRITE(6,5601)IPOS,ROWALT(IPOS)
5601    FORMAT(1X,*IN COLSUM BAD ROWALT(*,I6,*) = *,I6,*ABORT*)
        STOP
C ---------------------------------------------------------------------
5611    CONTINUE
C   NONMARGIN MATRIX
        DO 5612 J = 1,NC
           TOT = 0.0
           DO 5613 I = 1,NR
              TIT = HANDY(I,J)
              IF(ROWALT(IPOS).EQ.1)TIT = TIT*ROWFAC(I)
5613       TOT = TOT + TIT
5612    VECTOR(J) = TOT*COLFAC(J)
        RETURN
C ---------------------------------------------------------------------
5622    CONTINUE
C   MARGIN TYPE G*H POS 55 +
CMOD    FOLLOWING TRICK DEPENDS ON FILE STRUCTURE
        MARTYP = (IPOS - 51)/4
        JCOM = MARNUM(MARTYP)
        DO 5623 J = 1,NC
         TOT = 0.0
           DO 5624 I = 1,NR
5624       TOT = TOT + HANDY(I,J)*ROWFAC(JCOM)
5623     VECTOR(J) = TOT*COLFAC(J)
        RETURN
        END
C*********************************************************************
        SUBROUTINE ROWSUM(LU,IPOS,VECTOR,LEN)
C
C   THIS SUBROUTINE FINDS THE CONTRIBUTIONS TO USAGE OF DOMESTIC
C   COMMODITIES OF THE MATRIX HANDY (STORED AT IPOS ON TAPE1) AND
C   RETURNS IT IN VECTOR(115). NOTE THAT THE POSITIONS ON VECTOR ARE
C   ARRANGED BY COMMODITY NO.THIS MEANS SOME JUGGLING OF THE MARGINS.
C   THE FILE ON TAPE1 MUST HAVE BEEN OPENED IN AN OPENRA CALL,WITH
C   IND1,LIND1.
C
        REAL   VECTOR(115),HANDY(115,115)
        REAL   ROWFAC(115),COLFAC(115),ADJUST(115),MAKE(12,12)
        INTEGER IND1(100),ROWALT(115),COLALT(115),MARNUM(10)
        INTEGER NAME(4)
        COMMON /MUTUAL/ROWALT,ROWFAC,COLALT,COLFAC,MAKE,ADJUST,MARNUM,
     &       IND1,LDEBUG,HANDY,LIND1,G,H
C
C   DEBUG OUTPUT
         IF(LDEBUG.EQ.0) GO TO 1532
         WRITE(6,1531)LU,IPOS,LEN
1531    FORMAT(1X,*CALLING ROWSUM LU = *,I6,* IPOS = *,I6,* LEN = *,I6)
1532    CONTINUE
C   INITIALIZE VECTOR
        DO 20 K = 1,LEN
20      VECTOR(K) = 0.0
C
C   TEST - ANYTHING THERE AT IPOS?
        IF(IND1(IPOS).EQ.0) RETURN
```

```
C
C   GET THE MATRIX OFF FILE
       NR = 0
       NC = 0
       CALL REDRAS(LU,IPOS,NR,NC,1,1,0,HANDY,115,115,IND1,LIND1,NAME)
C ---------------------------------------------------------------------------
C   FIND OUT WHAT SORT OF MATRIX IT IS AND ACT ACCORDINGLY
        IF(ROWALT(IPOS).EQ.1)GO TO 5611
       IF(ROWALT(IPOS).EQ.2)GO TO 5622
       IF(ROWALT(IPOS).EQ.3)GO TO 5633
C   ERROR TRAP
       WRITE(6,5601)IPOS,ROWALT(IPOS)
5601   FORMAT(1X,*BAD ROWALT(*,I6,*) = *,I6,*  ABORT*)
       STOP
C ---------------------------------------------------------------------------
5611   CONTINUE
C   ORDINARY NONMARGIN..FIND MODIFIED ROWSUMS
       DO 5612 I = 1,NR
          DO 5613 J = 1,NC
             IF(COLALT(IPOS).EQ.1)HANDY(I,J) = HANDY(I,J)*COLFAC(J)
5613      VECTOR(I) = VECTOR(I) + HANDY(I,J)
5612   VECTOR(I) = VECTOR(I)*ROWFAC(I)
       RETURN
C ---------------------------------------------------------------------------
5622   CONTINUE
C   MUST BE FORMAT G*H OR G*1
C   THE ENTIRE MATRIX SUM,SUITABLY ADJUSTED, IS PLACED IN THE
C   APPROPRIATE POSITION IN VECTOR.
CMOD   FOLLOWING TRICK DEPENDS ON PARTICULAR FILE STRUCTURE
       MARTYP = (IPOS - 51)/4
      JCOM = MARNUM(MARTYP)
      TIT = 0.0
      DO 5623 J = 1,NC
       TOT = 0.0
         DO 5624 I = 1,NR
5624    TOT = TOT + HANDY(I,J)
        IF(COLALT(IPOS).EQ.1)TOT = TOT*COLFAC(J)
5623    TIT = TIT + TOT
        TIT = TIT*ROWFAC(JCOM)
       VECTOR(JCOM) = TIT
         RETURN
C
C ---------------------------------------------------------------------------
5633    CONTINUE
C   MUST BE FORMAT G*R...R = NO OF MATRIX COMMS
CMOD   ANOTHER FILE DEPENDENT TRICK, MAKING USE OF THE FACT THAT
CMOD   THE NUMBER OF MARGINS COMMODITIES IS LESS THAN THE LOWEST
CMOD   MARGIN COMMODITY NO
        CALL COLTOT(VECTOR,115,HANDY,NR,NC)
        DO 5634 J = 1,NC
        JCOM = MARNUM(J)
        VECTOR(JCOM) = VECTOR(J)*ROWFAC(JCOM)
5634    VECTOR(J) = 0.0
        RETURN
        END
C*****************************************************************************
```

```
      SUBROUTINE COLTOT(VECTOR,LEN,MATRIX,NR,NC)
C
C   PUTS COLUMN TOTALS OF MATRIX INTO VECTOR
C
      REAL   VECTOR(LEN),MATRIX(NR,NC)
C
      DO 10 J = 1,NC
            IF(J.GT.LEN)RETURN
            TOT = 0.0
            DO 5 I = 1,NR
                  TOT = TOT + MATRIX(I,J)
5           CONTINUE
            VECTOR(J) = TOT
10    CONTINUE
      RETURN
      END
C*************************************************************************
      SUBROUTINE ROWTOT(VECTOR,LEN,MATRIX,NR,NC)
C
C   PUTS ROW TOTALS OF MATRIX INTO VECTOR
C
      REAL   VECTOR(LEN),MATRIX(NR,NC)
C
      DO 10 I = 1,NR
            IF(I.GT.LEN)RETURN
            TOT = 0.0
            DO 5 J = 1,NC
                  TOT = TOT + MATRIX(I,J)
5           CONTINUE
            VECTOR(I) = TOT
10    CONTINUE
      RETURN
      END
C*************************************************************************
      SUBROUTINE VECTOT(TOT,VECTOR,LEN)
C   PUTS TOTAL SUM OF ELEMENTS OF VECTOR INTO TOT
      REAL   VECTOR(LEN)
      TOT = 0.0
      IF(LEN.EQ.0) RETURN
      DO 100 J = 1,LEN
100   TOT = TOT + VECTOR(J)
      RETURN
      END
C*************************************************************************
      SUBROUTINE NEW
C
C   SUBROUTINE TO WRITE NEW CID FILE
C
C   COPIES ACROSS MATRICES,UPDATING AS APPROPRIATE BY ROWFAC AND
C   COLFAC.THE NEW MAKE IS WRITTEN FROM COMMON.
C
      REAL   ROWFAC(115),COLFAC(115),ADJUST(115),MAKE(12,12)
      REAL   HANDY(115,115)
      INTEGER IND1(100),ROWALT(115),COLALT(115),NAME(4)
      INTEGER MARNUM(10),IND3(100),WHOLE(115),USEFUL(115)
      COMMON /MUTUAL/ROWALT,ROWFAC,COLALT,COLFAC,MAKE,ADJUST,MARNUM,
```

```
     &       IND1,LDEBUG,HANDY,LIND1,G,H
C
       DO 50 J = 1,115
50     WHOLE(J) = 0
CMOD   THESE POSITIONS RELATE TO PARTICULAR FILE
       WHOLE(34) = 1
       WHOLE(35) = 1
C
C   INITIALIZE CHECK TOTALS OF USAGE AND COSTS
       WUSE = 0.0
       WCOST = 0.0
C
C   OPEN NEW RANDOM ACCESS FILE
       LIND3 = LIND1
       CALL OPENRA(3,IND3,LIND3)
C
C   GO THROUGH ALL THE MATRICES IN SUCCESSION,COPYING
C   THEM ACROSS,PERHAPS WITH CHANGES.
       DO 1000 IPOS = 1,LIND3
C
C   IS THERE ANY MATRIX TO COPY ?
       IF(IND1(IPOS).EQ.0) GO TO 1000
C   IF INTEGER COPY STRAIGHT ACROSS
       IF(WHOLE(IPOS).EQ.1) GO TO 800
       NR = 0
       NC = 0
       CALL REDRAS(1,IPOS,NR,NC,1,1,0,HANDY,115,115,IND1,LIND1,NAME)
C
C   IS IT THE MAKE MATRIX ?
CMOD   THESE POSITIONS RELATE TO PARTICULAR FILE
       IF(IPOS.EQ.14) GO TO 200
C   IS THE OTHER DEMANDS DOMESTIC MATRIX ?
       IF(IPOS.EQ.8) GO TO 300
C   IS IT A MARGINS MATRIX WHICH NEEDS TO BE ALTERED ?
       IF(ROWALT(IPOS).GT.1) GO TO 400
C   IS IT A PERSONS OR CAPITAL STOCKS MATRIX WHICH NEEDS TO BE ALTERED ?
       IF((IPOS.GE.30).AND.(IPOS.LE.32))GO TO 600
C   IF NONE OF THESE GO STRAIGHT ON
C ---------------------------------------------------------------------
C   ORDINARY MATRICES
C
       DO 100 J = 1,NC
         DO 90 I = 1,NR
           TIT = HANDY(I,J)
           IF(ROWALT(IPOS).EQ.1) TIT = TIT*ROWFAC(I)
           IF(COLALT(IPOS).EQ.1) TIT = TIT*COLFAC(J)
           IF(ROWALT(IPOS).EQ.1)WUSE = WUSE + TIT
           IF(COLALT(IPOS).EQ.1)WCOST = WCOST + TIT
           HANDY(I,J) = TIT
90       CONTINUE
100    CONTINUE
       GO TO 500
C ---------------------------------------------------------------------
200    CONTINUE
C   THE MAKE MATRIX
C
```

```
      DO 280 J = 1,NC
        DO 270 I = 1,NR
          HANDY(I,J) = MAKE(I,J)
270     CONTINUE
280   CONTINUE
      GO TO 500
C -------------------------------------------------------------------
300   CONTINUE
C   THE OTHER DEMANDS VECTOR
C
      DO 310 I = 1,NR
CMOD  WE BRING ABOUT PERFECT BALANCE
CMOD  AT THE EXPENSE OF A FEW TINY NEGATIVE ENTRIES, THUS:
        HANDY(I,1) = HANDY(I,1)*ROWFAC(I) + ADJUST(I)
        WUSE = WUSE + HANDY(I,1)
310   CONTINUE
      GO TO 500
C -------------------------------------------------------------------
400   CONTINUE
C   THE MARGINS MATRICES
C
CMOD  A FILE DEPENDENT TRICK
      MARTYP = (IPOS - 51)/4
      MARCOM = MARNUM(MARTYP)
      DO 410 I = 1,NR
         DO 405 J = 1,NC
           TIT = HANDY(I,J)
           IF(ROWALT(IPOS).EQ.2)TIT = TIT*ROWFAC(MARCOM)
           IF(ROWALT(IPOS).EQ.3)TIT = TIT*ROWFAC(MARNUM(J))
           IF(COLALT(IPOS).EQ.1)TIT = TIT*COLFAC(J)
           IF(COLALT(IPOS).EQ.1)WCOST = WCOST + TIT
           IF(ROWALT(IPOS).GT.1)WUSE = WUSE + TIT
           HANDY(I,J) = TIT
405      CONTINUE
410   CONTINUE
      GO TO 500
C -------------------------------------------------------------------
C   THE PERSONS AND CAPITAL STOCKS MATRICES
C
600   CONTINUE
      DO 610 J = 1,NC
       FACTOR=COLFAC(J)
        DO 605 I = 1,NR
605       HANDY(I,J) = HANDY(I,J)*FACTOR
610   CONTINUE
      GO TO 500
C -------------------------------------------------------------------
C   WRITE (REVISED,PERHAPS) MATRIX TO FILE - REAL MATRIX
C
500   CALL WRTRAS(3,IPOS,NR,NC,1,1,0,HANDY,115,115,IND3,LIND3,NAME)
      GO TO 1000
C -------------------------------------------------------------------
800    CONTINUE
C   COPY ACROSS INTEGER MATRIX
      NR = 0
      NC = 0
```

```
      CALL REDRIS(1,IPOS,NR,NC,1,1,0,USEFUL,100,1,IND1,LIND1,NAME)
      CALL WRTRIS(3,IPOS,NR,NC,1,1,0,USEFUL,100,1,IND3,LIND3,NAME)
C ------------------------------------------------------------------------
C   END MAIN LOOP
1000  CONTINUE
C   CLOSE FILE
C
       CALL ENDRA(3,IND3,LIND3)
       WRITE(6,1100)WUSE,WCOST
1100   FORMAT(1X,*VALUES AS WRITTEN TO FILE:  *,
     &        *TOTAL USAGE = *,F14.5,*    TOTAL COSTS = *,F14.5)
       RETURN
       END
*EOS
*EOP
```