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An  
Interindustry Study of  
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M. L. Parker



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Institute of Agriculture

AGRICULTURAL ECONOMICS RESEARCH REPORT No. 6

# An Interindustry Study of the Western Australian Economy

M. L. PARKER

Institute of Agriculture and  
John Thomson Agricultural Economics Centre



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## FOREWORD

This interindustry study is an outstanding contribution to the understanding of economic relationships in Western Australia. It is an input-output analysis of the state's economy descending directly from the original work of Wassily Leontief. Such analyses are now being developed by governments of many countries, though in this work Australia is backward.

The great value of the input-output analysis of an economy is that it permits understanding of interindustry relations to depths not otherwise possible. Also, it is a basic tool of economic planning—where such planning is thought of as something more than the sum total of project plans.

This first input-output analysis of Western Australia will come to be recognised as one of the basic economic documents of the state. Many further analyses from its data can and will be made, and further analyses will use this study as their starting point.

Henry P. Schapper

Reader in Agricultural Economics

*University of Western Australia*

*June 1966*

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M. L. Parker

*June 1966*

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## INTRODUCTION

It is true that, from the viewpoint of welfare economics, the part of the annual flow of values which is more or less arbitrarily defined as the national income deserves particular attention. To a more detached observer, however, it may appear to be a mere by-product of the whole highly complex process of production and distribution of economic values.

*Wassily Leontief*

This report concerns the economic interdependence between industries, and between industries and the trade sectors in Western Australia. It makes use of the technique of input-output analysis to describe the distribution of output and of the materials and services used to produce that output. However, input-output is more than a tool for description. It is an approach—a way of viewing the operations of a complex industrial economy—which may be of major assistance in delimiting or in framing sensible questions about a national economy regarded as a set of many interrelated activities, and which may have great suggestive value in the search for solutions.<sup>1</sup>

The Western Australian input-output tables may be viewed as complementing tables constructed at the national level by Cameron<sup>2</sup> and Haig.<sup>3</sup> But a point of departure is the emphasis given to the rural and rural processing industries and their rôle in the economic growth of Western Australia.

The extension of input-output analysis to the regional plane brings with it the problem of regional demarcation. The region selected for this study—namely the State of Western Australia—provides an exceptionally favourable base for regional analysis. Western Australia is geographically isolated from neighbouring regions and access to it is confined to a restricted number of sea, land and air routes. The state is self-sufficient in respect to a wide range of goods and services, and its transactions with neighbouring regions are readily identified and recorded. Within the state, lines of communication and flows of goods tend to radiate from

<sup>1</sup>W. Duane Evans, 'Input-output Computations', T. Barna (ed.), *The Structural Interdependence of the Economy* (New York, 1954), p. 53.

<sup>2</sup>Burgess Cameron, 'The 1946-47 Transactions Table', *Economic Record*, vol. 33, no. 66 (1957), p. 353; 'New Aspects of Australia's Industrial Structure', *op. cit.* vol. 34, no. 69 (1958), p. 362; 'Inter-sector Accounts, 1955-56', *op. cit.* vol. 36, no. 74 (1960), p. 269.

<sup>3</sup>Commonwealth Bureau of Census and Statistics, 'Input-output Table, 1958-59' (mimeo, Canberra, 1964).

restricted centres of economic activity, with a heavy concentration about Perth and the port of Fremantle. Statistical data relating to economic transactions within the region are of good quality and, apart from some severe restrictions imposed by the Statistics Act, are available for research. Finally, Western Australia is an economic unit which coincides with the unit of political control and which has considerable political autonomy within limits imposed by the federal constitution and commonwealth-state financial relations.

This report firstly reviews part of the literature on input-output analysis, with particular reference to its regional application. Other chapters briefly outline the methods used to construct Western Australian input-output tables. Readers interested in a more detailed account of the methods used should refer to the supplement to this report.<sup>4</sup> Finally, the completed input-output tables and their applications show the transactions between 54 industries, of which 27 are manufacturing, 13 cover sections of agriculture, fishing, forestry and mining, and 14 cover the state's building and servicing industries.

<sup>4</sup>M. L. Parker, 'An Interindustry Study of the Western Australian Economy' (mimeo, University of Western Australia, Institute of Agriculture, 1956).

## CHAPTER 1

### INPUT-OUTPUT MODELS

Input-output analysis views the interdependence within an economy conceived as consisting of a number of reasonably homogeneous producing industries or sectors. The interdependence of the system is created by the sales between sectors and their deliveries outside the productive system. In the open, static input-output model developed by Leontief, the output of each sector is distributed as an input to some or all of the producing sectors and to final demand. In this study, this final demand consists of personal consumption, private fixed capital, public authority expenditure, changes in stocks, and foreign and eastern states trade. This distribution of output between intermediate and final demand can be expressed as

$$X_i = \sum_j x_{ij} + Y_i \quad (i = 1 \dots n) \quad (1)$$

where

$X_i$  = total output of sector  $i$ .

$x_{ij}$  = output of sector  $i$  used by sector  $j$ .

$Y_i$  = final demand for output  $i$ .

Conversely, for any sector the total output is equated to the value of inputs from other sectors plus the value added in production.

$$X_j = \sum_i x_{ij} + V_j \quad (j = 1 \dots n) \quad (2)$$

where

$V_j$  = value added in sector  $j$ .

For the purpose of this study, value added is divided between wage and non-wage income, depreciation allowances, and indirect taxes net of subsidies.

The magnitudes of inter-sector flows are explained in terms of the levels of output in each sector, by assuming that at least some part of any output of one sector required by another will vary with the level of activity in the second sector. This relationship between inputs and outputs may be assumed linear over a range of output such that

$$x_{ij} = a_{ij} X_j \quad (3)$$

where

$a_{ij}$  = the input-output coefficient.

By combining the input functions of (3) and the accounting relations of (1), the balance equation for each sector becomes

$$X_i - \sum_j a_{ij} X_j = Y_i \quad (i = 1 \dots n) \quad (4)$$

In matrix notation, the system of  $n$  equations expressed in (4) becomes

$$X - AX = Y \quad (5)$$

where

$X$  and  $Y$  are the column vectors of sector outputs and sector final demand deliveries, respectively, and  $A$  is the matrix of input-output coefficients.

This can be solved to obtain the relation between levels of final demand for each sector and the required output of each sector.

$$X = (I - A)^{-1} Y \quad (6)$$

where

$I$  denotes the identity matrix.

The elements ( $z_{ij}$ ) of the matrix  $(I - A)^{-1}$  are interdependence coefficients expressing the amount of product from sector  $i$  required per unit of final demand for the product of sector  $j$ .

#### INPUT-OUTPUT ASSUMPTIONS

The theoretical basis of input-output analysis is detailed elsewhere.<sup>1</sup> In the model outlined above and used in this study, the flows of goods and services from any producing sector are defined as a function of the final demand for the product of that sector and of the direct and indirect demands of other sectors. In such a model, the concept of a consumption function is replaced by a given final bill of goods.

Simplifying assumptions of the input-output model are that a given product is supplied only by one sector; that there are no joint products; and that the quantity of each input used in production by another sector is a function only of the level of output of that sector.

In practice, the basis of input-output investigation is the *industry* and it is assumed that for any collection of productive factors employed, the potential output is the same irrespective of the number of firms into which the industry is organised. The problems of aggregation which arise when constructing a working model by the consolidation of activities to a discrete number of industries have been outlined elsewhere.<sup>2</sup> The number of commodities involved usually makes the assumption of 'homogeneous' industries unrealistic and the input-output coefficients ( $a_{ij}$ ) then become averages of the coefficients of the component parts.

Leontief interpreted the  $a_{ij}$  parameters as fixed coefficients of production which were technologically determined so that a minimum amount of *each* input

<sup>1</sup>Wassily Leontief, *The Structure of the American Economy 1919-39*, 2nd ed. (New York, 1951).

<sup>2</sup>See, for example, Isamu Yamadu, *Theory and Application of Interindustry Analysis* (Tokyo, 1961).

is required for a given output. Formulated in this way, the production function excludes substitution among inputs—an assumption accepted in input-output analysis as a first approximation though it does not deny the existence of continuously substitutable inputs. On practical grounds, technical substitution is assumed to be discontinuous in the belief that 'the significant opportunity for choice in productive activity is characteristically not a choice between continuously substitutable factors (which can be solved by the equi-marginal productivity condition), but a choice between a finite number of methods of production each of which is associated with certain capital equipment and fairly closely specified rates of flow of inputs'.<sup>3</sup>

An indirect test of the constancy of input coefficients was provided by Arrow *et al.*, using time series to fit a model in which changes in input coefficients were related to other economic variables.<sup>4</sup> It was concluded that at the level of aggregation used, input coefficients show variations over time which are of significant magnitude and which can be explained by a set of variables which influence the entire economic system. Other tests have involved either the comparison of output projections (computed from an input-output table) with known outputs at a point in time, or the direct comparisons of individual input ratios at different points in time. From observation of fifty-six Australian industry sub-classes employing 6.22 per cent of the total Australian workforce, Cameron found little evidence of materials or price substitution.<sup>5</sup> Where definite evidence of substitution was found this appeared to be associated with a change in the nature of the product.

The assumptions of constancy of input-output coefficients, linearity and proportionality of relationships have received considerable criticism; however the writer agrees with Goldman that 'while the usefulness of input-output would be enhanced if the simplifying assumptions originally made were proven to be operationally valid, the value of the system does not hinge upon these assumptions. Input-output can be considered an approach to economic analysis involving an excellent descriptive device and requiring explicit recognition of the factors affecting the results'.<sup>6</sup>

### REGIONAL MODELS

Input-output analysis provides a useful tool for national accounting and by far the greater number of applications have dealt with national economies. At the regional level, the various models which have been proposed or applied may be distinguished by the degree to which interdependence *between* regions is specified

<sup>3</sup>Burgess Cameron, 'The Future of Interindustry Analysis', *Economic Record*, vol. 31, no. 61 (1955), p. 235.

<sup>4</sup>K. M. Arrow *et al.*, *A Time Series Analysis of Interindustry Demands* (Amsterdam, 1959).

<sup>5</sup>Burgess Cameron, 'The Production Function in Leontief Models', *Review of Economic Studies*, vol. 20 (1953), pp. 62-9.

<sup>6</sup>Morris R. Goldman, 'Operations Research Seminar' (mimeo, Washington, Office of Business Economics, 1959), p. 5.

in their design, and their reliance upon predetermined national input coefficients.

In a model proposed by Leontief<sup>7</sup> and implemented by Isard, the solution of a national model is disaggregated into regional components. The national economy is assumed to be composed of a specified number of regions, each producing 'regional' or 'national' commodities. The former commodities are consumed only within the region in which they are produced; the latter are traded between regions and their consumption and production are balanced only within the nation as a whole. Input coefficients in all regions are assumed to be the same as the national coefficients, and for national industries it is assumed that each producing region will supply a constant proportion of the demand in each consuming region. The model could be applied to the determination of the differential regional impact of a change in the final demand for the products of the national economy, but because of the assumptions of proportional expansion and contraction in all regions it was interpreted by Leontief as being intra-national rather than interregional.

Isard has proposed an interregional model consisting of a national input-output table composed of a number of regional tables.<sup>8</sup> The model would depict the flow of goods and services between industries in the same region or between regions, as well as the interindustry flow of goods and services for the nation as a whole. By assuming that the commodities produced in any one region are distinguished from the same commodities produced in other regions, the regional division of production can be determined by the location of demand rather than by the existing supply conditions as in the Leontief model. The assumption of constant production coefficients remains onerous, however. Any change in final demand will require proportional changes not only in each industry input, but also in each industry input from each region. In effect, constant production coefficients in terms of interarea-industry relations mean constant (or fixed) patterns of supply areas or channels. Or, in terms of an individual industry of a particular region, they may be interpreted to mean constant resource use, region by region.<sup>9</sup>

Moses proposed a version of the Isard model in which sources of supply were fixed for all uses of a commodity in a given region and were not dependent upon the direction of use.<sup>10</sup> With this assumption, data on total interregional flows of each commodity could be used without specifying the supply pattern for particular uses. In another model formulated to cover international trade and applied as a regional model for northern and southern Italy, Chenery<sup>11</sup> incorporated capacity restrictions. As any industry reached capacity following a change in final

<sup>7</sup>Wassily Leontief *et al.*, *Studies in the Structure of the American Economy* (New York, 1953), ch. 9.

<sup>8</sup>Walter Isard, 'Inter-regional and Regional Input-output Analysis: A Model of a Space Economy', *Review of Economics and Statistics*, vol. 33 (1951), pp. 318-28.

<sup>9</sup>*Ibid.* p. 323.

<sup>10</sup>P. L. N. Moses, 'The Stability of Inter-regional Trading Patterns and Input-output Analysis', *American Economic Review*, vol. 45 (1955), pp. 803-32.

<sup>11</sup>Hollis B. Chenery, 'Inter-regional and International Input-output Analysis', T. Barna (ed.), *Structural Interdependence of the Economy* (New York, 1954).



demand deliveries, a change in the supply pattern was imposed. A limitation on this procedure was the need to work through iterative solutions rather than through a general solution applicable to any final demand. A model applicable to international trade and subject to capacity constraints has since been applied to an analysis of Canadian-United States dependence.<sup>12</sup>

Recent work on interregional analysis has extended to a multiregional model<sup>13</sup> consisting of a set of regional interindustrial input-output systems integrated with a separately constructed system of interregional relationships. For the most part, however, the empirical application of interregional models has been restricted by the dearth of information on the flow of goods and services between regions. As a consequence, it has often been assumed that input coefficients from a national matrix apply regionally; the net regional flows of imports and exports are then imputed from a comparison of the regional supply and demand for each commodity.

In general, the lack of relevant data has led to the application of regional models requiring considerably less information. A form which has been widely applied is that in which all trade with other regions is consolidated in either an export column or an import row. This design is analogous to a national interindustry model but for many uses it has severe limitations unless the region is substantially independent of trade.

An example of this form is a study of Utah by Moore and Petersen.<sup>14</sup> Monetary control totals for the gross output of each industrial sector of Utah were derived, and as a first approximation of interindustry flows, national input coefficients for 1947 were applied to these totals. The table was then refined 'in the light of differences in regional productive processes, marketing practices, or product mix'.<sup>15</sup> The household sector of final demand was estimated by assuming that Utah consumption patterns were similar to the national patterns; Utah income payments were used in conjunction with national consumption relationships to estimate consumer expenditures. The remaining final demand sectors were derived from national input coefficients supplemented by independent estimates for Utah. In order to identify the locational origin of interindustry flows, the estimated demand in Utah for the product of any industry was deducted from the estimates of gross output. A positive residual for any industry was treated as an exportable surplus; if the residual was negative, imports were assumed to be necessary. This procedure implied that input requirements would be met first from locally produced goods, and that where imports were necessary, each firm would satisfy its input requirements proportionately between Utah production and imports. The further assumption was made that given small changes in the demand for Utah

<sup>12</sup>R. J. Wonnacott, *Canadian-American Dependence* (Amsterdam, 1961).

<sup>13</sup>W. Leontief & A. Strout, 'Multi-regional Input-output Analysis', T. Barna (ed.), *Structural Interdependence and Economic Development* (London, 1963).

<sup>14</sup>F. T. Moore & J. W. Petersen, 'Regional Analysis: An Interindustry Model of Utah', *Rev. Econ. and Stat.*, vol. 37 (1955), p. 368.

<sup>15</sup>*Ibid.* p. 371.

output, the proportion between Utah produced output and total requirements of particular commodities would remain stable.

Other regional tables have been even more dependent upon pre-existing national input coefficients.<sup>16</sup> This implies that production processes are geographically invariant, although Hirsch has shown for the St Louis metropolitan region that there can be significant differences between national and regional coefficients.<sup>17</sup>

Empirical data for Hirsch's study was drawn mainly from the records of a sample of firms in the St Louis metropolitan area. A regional input-output table similarly dependent upon an independent survey and production data filed with state agencies, rather than national input coefficients, was constructed by Kirksey for the Sabine-Neches area of Texas.<sup>18</sup> This is also the procedure used in the present study.

#### INPUT OUTPUT MODELS AND REGIONAL GROWTH

The potential contribution of regional input-output models to the analysis of regional growth has been formalised by Hirsch.<sup>19</sup> Assuming that an initial internal or external stimulus to a regional economy has produced known changes in final demand, the effect upon the output of all other sectors which directly or indirectly supply this sector can be traced through a model such as that depicted above in equation 6. In this form the inverse matrix  $(I - A)^{-1}$  is computed with the household and investment sectors included in final demand, and the direct and indirect stimulus to the economy is calculated by applying the new final demand deliveries to the elements of this matrix. This is the form of the model used in the present study.

A second formulation assumes a linear and homogeneous income-consumption function and thereby makes allowance for adjustments in consumer expenditure following changes in the level of output. These adjustments in turn lead to a sequence of interindustry reactions on income, output and, once more, on consumer expenditures. In this form, the inverse matrix is computed with households incorporated as an endogenous sector. A refinement to this is a third formulation in which the linear income-consumption function is replaced by an empirically derived curvilinear function. An iterative solution is then used to determine output reactions to direct, indirect and induced income changes.

Several formulations of a regional model were used by Moore and Petersen<sup>20</sup> in applying an input-output table for Utah comprising twenty-four intermediate and seven final demand sectors. A consolidated version of this table was inverted

<sup>16</sup>See, for example, W. Isard, 'Regional Commodity Balances and Inter-regional Commodity Flows', *Amer. Econ. Rev. Papers and Proceedings*, vol. 43 (1953), pp. 167-80.

<sup>17</sup>W. Z. Hirsch, 'An Application of Area Input-output Analysis', *Papers and Proceedings of the Regional Science Association*, vol. 5 (1959), p. 79.

<sup>18</sup>C. D. Kirksey, *An Interindustry Study of the Sabine-Neches Area of Texas* (Austin, 1959).

<sup>19</sup>W. Z. Hirsch, 'A General Structure for Regional Economic Analysis', W. Hochwald (ed.), *Design of Regional Accounts* (Baltimore, 1961).

<sup>20</sup>Moore & Petersen, 'Regional Analysis: An Interindustry Model of Utah'.

and used to determine an income multiplier for each of seven industry classifications within the intermediate sectors. This multiplier was used to show how total regional income would change with unit reductions in income for any of the industry classifications, assuming all other final demands remained unchanged. As a refinement to show the induced effects on income of changes in the output of each industry, the household row and column were introduced into the endogenous part of the model. This procedure implies that consumer expenditures on the output of each industry are directly proportionate to income. The associated assumption of a high marginal propensity to consume was considered by Moore and Petersen to overstate the induced effects on income; consequently the alternative procedure was adopted of using independently derived consumption functions, and calculating income reactions in an iterative fashion.

Employment multipliers were derived by calculating the direct and indirect effects of changes in final demand on the production requirements of each Utah industry and then applying estimates of the appropriate employment-production function. Finally the employment effects associated with the induced consumption-income reactions were taken into account and a total employment multiplier computed for each industry.

A more specific application to regional growth was a study by Isard and Kuenne of the impact of steel production upon the Greater New York-Philadelphia industrial region.<sup>21</sup> The regional model in this case was based upon national input coefficients with the household sector positioned within the structural matrix to incorporate the local income multiplier effect, and with the construction and maintenance sector removed from the structural matrix. The effects of any change in output of other regions directly or indirectly supplying the region studied, were ignored, and the regional impact of a new steel and steel fabricating industry of a predetermined size was examined by an iterative procedure.

A framework for the use of input-output tables in regional growth studies by the incorporation of comparative cost and industrial complex analyses has been formulated by Isard and Smolensky.<sup>22</sup> This procedure gives cognisance to the fact that major industrial developments can be vertically and circularly integrated, and it combines input-output analysis with an appraisal of the factors leading to regional differences in costs and revenues.

#### INPUT-OUTPUT TABLES FOR WESTERN AUSTRALIA

Interregional input-output analyses linking production in the various states of Australia appear to be possible only by the use of indirect evidence of interregional trade based upon the regional demand and supply of commodities.

<sup>21</sup>W. Isard & R. E. Kuenne, 'The Impact of Steel upon the Greater New York-Philadelphia Industrial Region: A Study in Agglomeration Projection', *Rev. Econ. and Stat.*, vol. 35 (1953).

<sup>22</sup>W. Isard & W. Smolensky, 'Application of Input-output Techniques to Regional Science', T. Barna (ed.), *Structural Interdependence and Economic Development*.

Statistics of Western Australia's interstate trade are recorded by states of destination and supply and, separately, by commodity classification. For Tasmania, sea-borne trade is classified by states of destination and supply, with aggregates only for airborne trade. Interstate trade for Queensland, on the other hand, is classified by commodity, but not by origin or destination. For the remaining states, the recorded statistics of trade are meagre. Tonnages of shipping in interstate trade are known together with interstate movements of principal commodities for some ports. Tonnages of interstate rail freight are available and also incomplete and intermittent records of tonnages carried interstate by road.

For the more isolated states - Western Australia, Tasmania and possibly Queensland - the available statistics may permit regional input-output tables to be constructed and integrated with national tables. Apart from the present regional model, however, the only completed tables are those of Cameron and Haig, and these relate to Australia as a whole.

Despite the quality of the Western Australian trade statistics, it has not been possible to distinguish, by location, the origin of goods consumed in Western Australia. The model does not identify the transactions between industries within Western Australia, but rather the total requirements of each industry, regardless of source. Imports are identified as being of eastern states or overseas origin and are distributed along with locally produced commodities.

In constructing the two open and static input-output tables for Western Australia, emphasis has been placed upon identification of the cost structure of local industries, with minimal recourse to national input coefficients. The design has also given greater cognisance to the primary industries than has been the case in preceding tables for Australia as a whole.

## CHAPTER 2

### PROCEDURE AND STATISTICAL SOURCES

Interindustry transactions within Western Australia have been identified by first delineating the production, supply and usage of commodities during each of the years 1953-54 and 1958-59. The twelve months ended 30th June was selected in each period because trade and most manufacturing statistics were available on this basis. Some adjustments were necessary in the mining and agricultural sectors where statistics refer to the calendar year and the year ended 31st March, respectively. In the case of agricultural industries the period selected tended to divorce some farming operations from the crop derived from the same operation. Consequently some adjustments were made to ensure that a single and continuous production cycle was described.

#### PROCEDURE

The construction of a transactions table, using Western Australian statistics, can be viewed as a process of adjusting and disaggregating the cost structure of each manufacturing industry recorded in statistical registers of Western Australia. Subsequent steps involve the assembly of similar details for the rural, mining, construction and servicing industries. Seven steps in this procedure have been outlined by Cameron.<sup>1</sup>

1. Compilation of a 'control' table summarising the annual supply and usage of commodities produced, consumed or traded.
2. Assignment of the total output of each commodity to the several industries producing that commodity. (The assignment check.)
3. Equation of the total costs of each industry, as published in the official statistics, and the total value of all commodities produced by the industry. (The joint production check.)
4. Equation of final demand and national income.
5. Allocation of the total available supplies of each commodity to purchasing sectors and to final demand.

<sup>1</sup>Burgess Cameron, 'Report Accompanying the Australian Transactions Table 1946-47' (mimeo, Australian National University, 1956).

6. Independent inquiry into the total costs including profit of each industry and their equation with the total value of output. This analysis of the cost structure of each industry provides a check on the allocation of total available supplies of each commodity.

7. Consistent valuation of all sales on the basis of producers' (or purchasers') value.

The task of constructing input-output tables for Western Australia was approached with the above framework in mind.<sup>2</sup> With the sources of information available, however, it was found to be impossible to proceed to a consistent progression and the majority of steps were carried out concurrently.

Separate commodity worksheets for 1954 and 1959 were used to itemise in value terms (and quantities where possible) the local production, imports and exports (eastern states and overseas trade separately distinguished) for each of 234 commodity groupings. At this stage, because of the range in statistical sources, items were variously valued ex-factory, ex-farm, f.o.b. port of shipment, 'landed cost', etc. Consistent valuation was established in a second set of commodity worksheets incorporating the freight, handling and insurance adjustments for commodities imported. At the same time, aggregate supplies were converted to purchasers' value by the inclusion of transport, customs, primage, excise, sales tax and commercial charges. In effect this involved the consolidation, for individual commodities, of work already undertaken in regard to each charge. Using the same commodity worksheets the total supplies of each commodity were then allocated at purchasers' values to intermediate industries and to final demand.

Much of the information on the supply and usage of commodities was obtained only after investigation of the output and cost structure of each of the fifty-four intermediate industries was well advanced. The classification of each industry is shown in the Appendix. Separate files were kept for each industry and for each of the two years examined. The assignment check was carried out, at producers' values, using industry worksheets in which the value of output of each sub-class of industry was separately identified. If the assignment check revealed that the recorded production of any commodity required adjustment, this adjustment was carried over to the appropriate commodity worksheet. A second set of industry worksheets was used to assemble (at purchasers' values) the components of the total cost of each industry. This step also involved the consolidation, for individual industries, of previous analyses of labour and non-labour income, fuels used, repairs and non-returnable containers.

A final set of industry worksheets was used to aggregate commodity flows so that transactions were represented as sales between industries. This was again carried out at purchasers' values. For each industry the value of each commodity produced had previously been identified at producers' values. These were converted to purchasers' values by transferring transport and commercial charges and indirect taxes from the individual commodity worksheets.

<sup>2</sup>Grateful acknowledgement is made to Professor Cameron for reports relating to the design, construction and use of Australian transaction tables.

## STATISTICAL DEFICIENCIES

The statistics available in Western Australia are far less comprehensive than for Australia as a whole. Firstly, not all of the information assembled is published. For certain factory statistics such as fuel consumption, depreciation and work done on commission, this information can be obtained from the Deputy Commonwealth Statistician. However to comply with the secrecy requirements of the Statistics Act, information is withheld where publication would disclose details of any one establishment or where it is necessary to protect establishments which predominate in other states. The available statistics are published as Australian totals; thus to guarantee the anonymity of a Tasmanian establishment, for example, similar information for Western Australia or for some other state may be suppressed.

The establishment and the industry are often synonymous in Western Australia and few of the major industries comprise more than two establishments. In such cases the total cost of each industry and individual items of production or materials used are not released. This has the further effect that sub-classes are combined by the Statistician prior to publication and in so doing the statistics for other industries lose their identity.

To overcome statistical deficiencies of this type, manufacturers were requested to release information in the form in which it had previously been submitted to the Statistician. By this means, statistical coverage was achieved for nine major industries for which no details had previously been available and in the case of a further eight, complete data were obtained from one of the two establishments in the industry or partial information was obtained for the entire industry. Resort to independent inquiry was also necessary to obtain confidential details of individual items produced or used by establishments within sub-classes for which information was otherwise available.

This method of direct inquiry was time consuming, however one advantage was that additional details could be obtained of items of cost and transport and the market for the firm's product. The completed tables therefore show, for the first time, an overall view of the type, size and interdependence of economic activity in Western Australia.

## COMMODITY COVERAGE

Figures for the total cost (value of output) of each industry, as recorded by the Government Statistician, were generally accepted as the most comprehensive statistics available. One measure of the commodity coverage, therefore, was the extent to which the total value of all commodities produced by each industry sub-class approached the known value of output of that sub-class.

The diversified output and the amount of assembly work done in many Western Australian factories, preclude their satisfactory classification within any one sub-class. Consequently the recorded statistics indicating the major industry producing each commodity, for Australia as a whole, were found to be inadequate as a basis for the assignment of commodities produced in Western Australia.

To overcome this problem, the assignment of commodities was completed with the assistance of the Government Statistician. This assignment is believed to be quite accurate, but some upward adjustment was necessary to complete the coverage of commodities where full details were not collected in the annual factory census, or where confidential data was not published or could not be obtained from the establishments concerned.

#### WORK DONE ON COMMISSION

For 1954, work done on commission amounted to \$40.1 million and accounted for 14.9 per cent of the total recorded value of output of the manufacturing industries. Where the form of commission work could be identified this was classified to the appropriate commodity grouping together with an estimate of the value of any materials used. However, the nature of commission work was not always apparent from the official industry sub-classes. It was known that some commission work in sub-classes 9.18 (condiments, etc.), 9.19 (ice and refrigeration), 9.27 (bottling), and 3.2 (pharmaceutical), consisted of wholesaling activities but the costs associated with each activity could not be identified in sufficient detail to permit their transfer to the commercial sector. The procedure eventually adopted was to treat the value added in fruit packing as a sale to farming. The value added in the packaging, bottling and blending of other foodstuffs, chemicals and pharmaceuticals was treated as a sale to commerce.

#### COMMODITY ALLOCATION

For the most part it was possible to allocate individual commodities by identifying at least the major purchasing industries. In several cases this allocation was made in broad groups and it was therefore not possible to achieve a complete reconciliation between the supply and usage of individual commodities. The residual amounts of commodities remaining after all sources of information had been exhausted were sold to the dummy industry 'Unallocated'. As a row, this industry distributed its output to other industries for which there were unidentified costs.

#### INDUSTRY COSTS

The major task in identifying the cost structure of manufacturing industries was the disaggregation of the official figures for the values of materials, fuels, containers, and tools and repairs used. For the primary, tertiary and building industries, information concerning even broad aggregates was usually less detailed and independent analysis of the total cost of each industry provided the only means of identifying the industry disposition of many commodities. The use of national input coefficients was kept to a minimum. However, for commerce, personal and government services, business services and water supply, coefficients based upon the work of Cameron and Haig provided the major source of information.



Output of the 'Unallocated' dummy industry was used as the balancing item wherever the sum of commodity expenditure failed to equate the known total for an industry's expenditure on materials.

#### INDUSTRY AGGREGATION

The industry classification used was largely determined by the availability of data. Industries in the manufacturing sector were specified by the aggregation of statistical sub-classes, but to preserve anonymity many of these had previously been consolidated by the Government Statistician. Even where it was possible to disaggregate sub-classes by independent survey, the need to disguise confidential details and the absence of complete information restricted the classification. Where possible, a similarity of input structure was observed as the basis for aggregation.

#### SECONDARY PRODUCTS

A number of manufacturing industries produce subsidiary products which are the principal output of other industries. Information was not always available to permit these secondary activities to be transferred to the major industry producing a corresponding output; but because of the establishment (rather than enterprise) classification used in the recorded statistics and the degree of aggregation within the table, this was not a severe problem. Where secondary products were of minor importance it was usually possible to identify the appropriate purchasing industry. In the case of secondary production of ferrous wire and pipe, vehicle repair services and electricity, these were transferred to their major industries where they inflated the total output and were further distributed to purchasing industries.

#### NET ACTIVITY LEVELS

Intra-industry transactions are of three types. Firstly, where commodities are produced and used in own works they are not included in the value of output or as items of cost in the annual factory census.<sup>3</sup> No attempt has been made to specify this type of internal sale, if only because unpublished details of output and of materials used were obtained from the Commonwealth Statistician in selected commodity combinations and the inclusion of commodities used in own works would have precluded identification of external sales. Secondly, internal sales are involved where transactions occur between establishments which are recorded, by the Statistician, in the same industry sub-class. Thirdly, internal sales can involve transactions between establishments classified to different sub-classes which have been consolidated as a single industry in this study.

Intra-industry transactions have been eliminated in the final input-output tables. However, the magnitude of these transactions—involving sales external to the establishment producing the commodity—can be seen as the difference between the gross and net output for each industry shown in input-output Table B1.

<sup>3</sup>Exceptions are goods 'in process' as in the brewing and oil refining industries.

## DISTRIBUTION COEFFICIENTS

Following Cameron,<sup>4</sup> transport and commerce services have been treated in terms of distribution coefficients rather than input coefficients. That is, in the transport and commerce rows, coefficients refer to the distribution of the product from each industry and not to the distribution costs associated with input into the industry. Where competitive imports are involved, the coefficients are defined in relation to the distribution of the total product of each industry together with competitive imports. 'Competitive imports have to be included in order that the demand for say rail services arising from the existence of imports can be brought into subsequent analysis. Justification for the method employed rests on the assumption that the volume of competitive imports bears a known relation (the 'import coefficient') to home production.'<sup>5</sup>

## COMPETITIVE AND NON-COMPETITIVE IMPORTS

The commodity classification used in this study was partly determined by the extent to which individual commodities could be distinguished in the trade statistics. For the most part there was no difficulty in recoding items of trade to conform to a more aggregated commodity classification, although for confidential items such as raw sugar, estimates had to be made from quantities used or produced within the state.

Imports from the eastern states and overseas were both classified as competitive or non-competitive. Competitive imports were defined as those having a locally produced counterpart. The distinction was necessarily an arbitrary one, and was made difficult by the possibility of substitution between commodities.

Competitive imports were charged to consuming industries through domestic industries producing the counterpart domestic output. Thus the value of imported butter was added to the output of the milk processing industry and the inputs into that industry were inflated by a corresponding amount representing the purchase from the eastern states trade sectors. The transport and commercial services applicable to the industry were those involved in the distribution of the output of the local industry together with the competitive imports. An implicit assumption is that under changed demand conditions the proportion of total supplies comprising competitive imports will remain unchanged.

Non-competitive imports which find intermediate usage as raw materials were charged directly to the industry where they first enter domestic production and where they were included at c.i.f. values in the cost of inputs of these industries. The commercial and transport costs associated with non-competitive imports were likewise charged directly to industries using these imports. Exceptions to this were small amounts of fabrics sold to final demand for which commercial and transport costs were charged to the clothing industry.

This treatment of imports requires an assessment as to whether or not there is a comparable local product. In Western Australia, non-competitive imports

<sup>4</sup>Cameron, 'The 1946-47 Transactions Table' (1957), p. 353.

<sup>5</sup>*Ibid.* p. 357.

could be defined to cover motor vehicles, tyres, steel and other metals and a wide range of engineering and textile products. Whether or not an import is competitive depends also upon the direction in which it is used; thus for some purposes imported coal and coke do not directly compete with the locally produced commodities. In actual fact the imports classified as 'non-competitive' have been restricted to crude oil, crude rubber, sulphur, phosphate rock, raw sugar, refined lead and tin, steel billets, newsprint, cotton and other yarns, cotton and synthetic fabrics, and outside packaging. Although imprecisely defined, these are mainly raw materials for which there are no comparable local products.

#### OVERSEAS IMPORTS

Imports from overseas are recorded in the official statistics f.o.b. port of shipment. Interstate imports on the other hand are valued at 'landed cost' and there is an increasing tendency for values to be 'free into store'. For the purpose of this study it was necessary to convert the value of individual commodities imported to a common c.i.f. basis.

Imports from overseas were adjusted by the addition of insurance and shipping charges. Insurance payments were estimated by allocating to Western Australia part of the Australian total marine insurance, in proportion to the f.o.b. value of overseas imports. The nominal payment involved was distributed between commodities in proportion to the f.o.b. value of each import. Shipping charges were added by applying the appropriate freight rate to the tonnage of major commodities entering Western Australian ports from overseas. Freight rates for 1958-59 were supplied by the major shipping agents,<sup>6</sup> on whose advice the corresponding rates for 1953-54 were assumed to be 13 per cent below the 1958-59 level. For major commodities this information was supplemented by data from tariff reports, government enquiries, and industry sources. Where a specific freight rate was not known, the general cargo rate for the appropriate port, or region of shipment, was applied.

The freight and insurance charges on overseas imports are shown in Table 1. The substantial increase in 1959 is due largely to the importation of crude petroleum.

TABLE 1  
ADJUSTMENTS FOR FREIGHT, HANDLING AND WHARFAGE PAID ON  
IMPORTS

Western Australia, \$m.

Year	<i>Freight on direct overseas imports</i>	<i>Marine insurance on direct overseas imports</i>	<i>WAGR freight on eastern states imports (goods only)</i>	<i>Handling and wharfage on imports from the eastern states</i>
1953-54	10.94	0.26	0.46	1.48
1958-59	24.53	0.36	0.87	1.71

<sup>6</sup>Independent rates were obtained for the major items imported from the United States, Europe, India, Hong Kong, Japan, Malaya and New Zealand. An attempt was made to take account of discounts applying to the nominal rates but there was no way of accurately checking the freight payments estimated in this way.

## EASTERN STATES IMPORTS

Although imports from the eastern states are officially recorded at 'landed cost', these costs can include some rail and road transport for which payment does not leave Western Australia. In 1958-59 \$2.4 million (73 per cent) of rail freight on goods was paid to the Commonwealth and other rail systems. In order to isolate these payments from transport payments made within the state, the 'landed costs' of imports from the eastern states were adjusted by the amount of rail freight payments made to the Western Australian Government Railways. The amount paid on each commodity was estimated by applying a rate per ton (Kalgoorlie to Perth) to the quantity imported by rail, and apportioning the total payment according to this distribution.<sup>7</sup>

No adjustment was made to the landed cost of goods imported by road. In 1953-54 such goods were valued at only \$1.2 million. Similar details could not be distinguished for 1958-59, owing to the introduction of the 'piggyback' method of road-rail transport.

In the case of imports by sea from the eastern states, the official estimate at 'landed cost' was adjusted by the deduction of wharfage and handling charges paid within Western Australia.

## C.I.F. VALUATION

The estimates of freight and marine insurance on overseas imports, together with handling and wharfage charges and Western Australian Government Railways freight earnings on imports from the eastern states, are shown in Table 1.

## THE BUSINESS UNIT

A conceptual problem which remains largely unresolved is the discrepancy between the business unit (the enterprise) used to calculate non-labour income, and the business unit (the establishment) on which details of productive activity are mainly recorded and on which the cost structure of the manufacturing and mining industries has been based. The enterprise unit is likely to cover the commercial activities of selling and distribution in addition to the manufacturing or other industrial activities of a firm. Moreover, because the enterprise unit can embrace a variety of activities, establishments which are classified to one industry in the factory statistics may be included in another industry in an enterprise classification.

There is no direct source of information available to reconcile the two bases of classification. The doubtful accuracy of the Western Australian estimates for non-labour income, based upon the enterprise classification—particularly the estimates for company income—did not warrant the assumption that any discrepancy between these figures and others based on an establishment classification would reflect only differences in classification. Consequently, although a number of minor adjustments were made for known differences in classification, a complete reconciliation was not possible.

<sup>7</sup>Unpublished details of commodities imported by rail and road were supplied by the Deputy Commonwealth Statistician.

## CHAPTER 3

### FINAL DEMAND AND VALUE ADDED

Much of the work of constructing input-output tables for Western Australia involved the estimation of state totals comparable with national aggregates for personal consumption, public and private investment, investment in stocks, and current expenditure by governments. These totals, together with eastern states and overseas exports, accounted for the aggregate final demand expenditures identified in this study. A further preliminary investigation involved the estimation of wage and non-wage components of Western Australian community income, consistent with these final demand expenditures.

#### PERSONAL CONSUMPTION

Personal consumption is defined to cover all consumption expenditures by Western Australians—including expenditures overseas and in the eastern states. Interstate travel receipts (other than fares) are assumed to be offset by interstate travel payments, and consequently no adjustment is made for the personal expenditure of interstate visitors to Western Australia.

In the initial stages of commodity allocation, personal consumption expenditures were calculated as the residual sales of individual commodities. These were checked against estimates of retail sales based upon the 1952-53 and 1956-57 census. Following the release of the Australian National Accounts detailing for the first time, in broad aggregates, the components of personal expenditure in each state, these final demand allocations were further refined.

Wherever the sum of the preliminary consumption allocations for a group of commodities exceeded the total personal expenditure for the relevant category, the excess was reallocated from one or more commodities to 'Stock Change' or to an 'Unallocated' sector. For foodstuffs, household durables, and other goods, the totals of the component commodities in at least one year were not adjusted to fully conform to the estimate derived from the national accounts. Relative to the annual variation in each category, any discrepancy between the two estimates is small; moreover, because of the range of commodities within each category, any adjustment would have involved the arbitrary selection of the commodities adjusted and would have led to unexplained differences in the allocation of commodities between the two years.

The methods used to disaggregate the recorded totals into their component commodities are outlined in a supplementary report.

#### PUBLIC AUTHORITY INVESTMENT

Ninety per cent of public authority investment expenditure in Western Australia in 1954 and 1959 was undertaken by state, semi-government and local government authorities. The amounts involved were obtained from the Commonwealth Statistician.

Commonwealth government investment expenditure in Western Australia in 1958-59 was taken from the trial balance sheets of the Commonwealth Sub-Treasury. No provision was made for capital expenditure of the Commonwealth Railways, the Australian National Airlines Commission, or Qantas Empire Airways Ltd. For 1954, a comparable total was estimated by allocating to Western Australia a proportion of the total investment undertaken by the Postmaster-General's Department, Commonwealth Shipping Line, Civil Aviation, Immigration Department and other commonwealth departments. Details of capital expenditure in Western Australia by the Postmaster-General's Department were obtained from the *Transport and Communication Bulletin*. For the remaining commonwealth departments, capital expenditure represented less than 2 per cent of total government investment expenditure in Western Australia, and this was estimated from Kerr's<sup>1</sup> 1952-53 figures by reference to changes in the capital expenditure of each department for Australia as a whole.

The building and non-building components of public authority investment expenditure were estimated independently for the Postmaster-General's Department, Railways, Housing and Education—using the published reports of the relevant authorities. For the remaining public authorities, expenditures on fixed investment were assigned to their building and construction, and equipment components in the proportion calculated for Australia by Haig.<sup>2</sup> The motor vehicle and furnishing components of equipment were subsequently distinguished from the residual engineering items.

#### PRIVATE INVESTMENT

Official figures for private investment expenditures were not available for individual states and there appeared to be no means of accurately estimating the item. For 1952-53 and earlier years, trends in the major components of private investment were estimated by Kerr<sup>3</sup> by allocating to Western Australia part of the corresponding commonwealth totals. The accuracy of this method is limited by the absence of reliable allocators, and for a number of items it assumes uniform rates of investment in the Western Australian and Australian economies. The same method was used in this study to estimate investment in private

<sup>1</sup>A. M. Kerr & J. Nevile, 'Income and Investment in Western Australia' (mimeo, Perth, University of Western Australia, 1957).

<sup>2</sup>Commonwealth Bureau of Census and Statistics, 'Input-output Tables, 1958-59', p. 23.

<sup>3</sup>Kerr & Nevile, 'Income and Investment in Western Australia'.

dwellings and motor vehicles, but for other components it appeared to understate expenditures in 1953-54 and to overstate expenditures in 1958-59. For these, the preliminary figures obtained by reference to the national totals were revised to take account of the estimates independently obtained in the allocation of commodities. Changes in stocks of engineering goods were subsequently used to meet the investment totals shown in Tables 2 and 3.

TABLE 2  
GROSS INVESTMENT IN WESTERN AUSTRALIA

<i>Class of investment</i>	1953-54	1958-59
<i>Private investment</i>	\$m.	\$m.
Dwelling construction	32.92	34.10
Construction other than dwellings	10.00	15.56
Motor vehicles	18.07	18.66
Other private capital equipment	44.00	47.20
<i>Public authority</i>		
State and local government	57.92	66.95
Commonwealth government	5.08	7.20
Total gross investment	167.99	189.67

TABLE 3  
PUBLIC AND PRIVATE EXPENDITURE ON CAPITAL EQUIPMENT  
BY TYPE OF ASSET

<i>Asset</i>	<i>Purchasers' values (\$m.)</i>	
	1953-54	1958-59
Dwellings	42.85	36.55
Other building	42.91	67.92
Motor vehicles	19.45	20.25
Furniture and textiles	3.71	4.38
All other	59.07	60.57
Total gross investment	167.99	189.67

#### INVESTMENT IN STOCKS

Major commodities influencing the level of stocks in Western Australia are farm produce, refined gold and petroleum products. For each of these, stock changes were calculated from the reasonably comprehensive details of supplies, exports and domestic usage. Other changes in the level of stocks were normally derived as balancing items in the allocation of individual commodities, although for a number of commodities for which the domestic usage was known to be stable, a further guide was the annual variation in the quantity or value of the commodity imported.

#### EXPORTS

Exports were charged as sales by the Western Australian industries of final fabrication, to the eastern states or overseas trade sectors, with no adjustment for re-exports. The practice of distinguishing re-exports in the published statistics of trade was discontinued after 1953-54, and it was therefore found impracticable to make any adjustment for 1958-59. As a consequence no allowance was made

for re-exports in either year, other than the export of a small amount of non-competitive imports.

The *overall* discrepancy occasioned by the failure to adjust for re-exports may be seen from the fact that 9 per cent of the value of Western Australia's exports to the eastern states in 1953-54 was comprised of goods which were not produced in Western Australia. The error is likely to be more serious with regard to some *components* of exports.

Exports were valued f.o.b. Consequently for commodities railed to the eastern states an allowance should be made for that part of the rail charge payable to the West Australian Government Railways. In actual fact this adjustment was made for very few commodities but the error is known to be quite small.

#### COMMUNITY INCOME

Apart from the total wage bill and farm income, official estimates of income are recorded only at the national level. For the purposes of this study it was therefore necessary to derive estimates for wages and salaries, wage supplements, company income, unincorporated income, net rent and interest, and the surplus of public authority undertakings. The methods used to derive these estimates are outlined in the supplement to this report.

The components of income accruing to major sectors of the economy are summarised in Table 4. There is no direct check on the accuracy of the figures other than that they account for 6.5 per cent and 6.0 per cent of national income in 1953-54 and 1958-59 respectively.

TABLE 4  
COMMUNITY INCOME, BY INDUSTRY  
\$m.

Industry	1953-54			1958-59		
	Wages, salaries & supplements	Non-wage income	Total	Wages, salaries & supplements	Non-wage income	Total
Fishing	1.21	1.53	2.74	1.92	3.61	5.53
Farm., trap., etc.	18.89	76.65	95.54	22.37	60.47	82.84
Forestry	2.04	1.16	3.20	2.43	0.79	3.22
Mining & quarrying	17.47	4.59	22.06	18.49	4.23	22.72
Manufacturing	67.39	28.53	95.92	84.17	49.04	133.21
Building & construction	29.01	9.22	38.23	29.10	8.02	37.12
Water supply & sewerage	1.89	-0.02	1.87	2.55	0.22	2.77
Transport	32.09	-0.28	31.81	39.50	0.88	40.38
Communication	6.92	-0.39	6.53	9.92	-0.10	9.82
Finance & property	9.90	6.01	15.91	14.35	7.14	21.49
Commerce	51.93	39.08	91.01	65.40	47.29	112.69
Public admin.	39.97	—	39.97	57.26	—	57.26
Professions, personal services, etc.	22.89	15.58	38.47	25.98	20.23	46.21
	301.60	181.66	483.26	373.44	201.82	575.26
Dwelling rent			15.40			27.40
Community income			498.66			602.66



## OTHER COMPONENTS OF VALUE ADDED

*(i) Depreciation*

Depreciation allowances were assessed from a variety of official sources. Unpublished details for the manufacturing industries and for state and local government business undertakings were made available by the Commonwealth Statistician and supplemented by the annual reports of various undertakings. For the farming industries, depreciation allowances recorded in the National Accounts were allocated to individual industries by reference to farm surveys. A tentative figure for Western Australian mining industries was compiled with the assistance of the Commonwealth Statistician. For other industries, depreciation was estimated by allocating to Western Australia part of the amount allowed for comparable Australian industries in the National Accounts.

*(ii) Subsidies*

Subsidy payments in Western Australia are of three types: those paid by the commonwealth government and administered by the state or its agencies; those paid by the state government; and those paid by the consumer under equalisation arrangements such as that for the overseas and local sales of butter and cheese.

Subsidies paid in Western Australia during 1954 and 1959 are shown in Table 5. The general procedure has been to disregard direct subsidies in determining industry costs and the value of output, but to incorporate them as a charge against taxes paid by the industry concerned. In the case of the sulphuric acid bounty, for example, the official value of superphosphate produced has been reduced by the amount of the bounty and indirect taxes paid by the fertilizer industry have been reduced by the same amount.

TABLE 5  
SUBSIDIES PAID IN WESTERN AUSTRALIA

\$m.

<i>Nature of payment</i>	1953-54	1958-59
Dairy industry subsidy	1.17	0.90
Tractor bounty	0.26	0.35
Sulphuric acid bounty	—	0.42
Price stabilisation (tea, coal)	0.61	—
Gold subsidy	—	1.28
Copper and ore cartage subsidies	0.01	0.03
Road transport subsidies, grain, fertilizer and other	0.03	0.20
Aircraft service subsidies, beef and perishables	0.03	0.09
Flax fibre, nitrogenous fertilizer, wheat bounties	0.07	0.04
Total	2.18	3.31

TABLE 6  
NET INDIRECT TAXES PAID IN WESTERN AUSTRALIA

\$m.

<i>Nature of payment</i>	1953-54	1958-59
Commonwealth taxation		
Customs duties	10.46	4.18
Excise duties	19.43	32.15
Primage duties	1.19	0.22
Sales tax	11.74	14.35
Payroll tax	5.18	5.66
Wool tax	0.16	0.30
Export charges	0.01	0.80
Stevedoring industry charge(a)	0.29	0.88
Entertainment tax	0.23	—
Other taxes and levies	0.93	1.61
Total Commonwealth:	49.62	60.15
State and local government authorities		
Land tax	0.59	2.48
Local government rates	4.31	7.27
Motor taxes	2.68	4.65
Liquor taxes	0.54	0.89
Racing taxes	0.84	1.25
Stamp duties n.e.i.	2.40	2.96
Entertainment tax n.e.i.	0.33	0.58
Lottery revenue	1.01	1.02
Licences and taxes n.e.i.	0.33	0.25
Other local government revenue	0.39	0.68
Total state and local:	13.42	22.03
Total indirect taxes	63.04	82.18

(a) Subsequently reduced by the amount returned to the industry in the form of wage supplements.

The largest single subsidy is that paid to the dairy industry. It amounted to \$1.17 million in 1954 and \$0.90 million in 1959. As a result of the Australia-wide equalisation of returns on butter and cheese sold locally and overseas however, 6 per cent of this payment from Commonwealth Consolidated Revenue in 1954, and 77 per cent in 1959, was absorbed by Western Australia's payment to the Commonwealth Dairy Produce Equalisation Committee. The net benefit of the subsidy to the *state* was therefore reduced to \$0.20 million in 1959, although Western Australian *dairy farmers* received the full subsidy. The net equalisation payment, representing the difference between the factory value of butter and cheese and the value to the Western Australian consumer (after allowing for all commercial and transport charges) was made by Western Australian consumers. The direct subsidy was therefore treated as a charge against indirect taxes paid by dairy farmers whereas the net equalisation payment was added to

the value of output of butter factories and offset by an equal increment to the indirect taxes paid by this industry.

A similar conceptual problem arose in regard to the valuation of wheat. Approximately 86 per cent of Western Australia's 1959 crop (excluding seed and local feed wheat) was sold overseas, compared with 64 per cent of the sales for Australia as a whole. This difference in the market for wheat, together with different prices received on home consumption and overseas sales, results in an annual transfer of funds between states. The amount of this transfer in Western Australia is the difference between the revenue paid to Western Australian growers and that received from the disposal of the Western Australian crop. This amount, estimated at \$0.88 million in 1959, represented a net payment to Western Australia from eastern states' growers (there being no government subsidy). Consequently, to equate the market demand with the value of output of wheat, the output in 1959 was reduced by \$0.88 million and this amount was treated as a subsidy to Western Australian growers. For 1954 the net transfer *from* Western Australia, of \$1.66 million, was added to the value of output and a similar amount was added to the indirect taxes paid by Western Australian wheatgrowers.

TABLE 7

## WESTERN AUSTRALIAN AND AUSTRALIAN PRODUCTION ACCOUNTS

Item	1953-54			1958-59		
	Aust.	W.A.	W.A. as proportion of Aust.	Aust.	W.A.	W.A. as proportion of Aust.
	\$m.	\$m.	%	\$m.	\$m.	%
Wages, salaries, supplements	4,512	301.6	6.7	6,212	373.4	6.0
Business surplus	3,590	240.0	6.7	4,846	309.7	6.4
Indirect taxes less subsidies	8,102 916	541.6 62.5	6.7 6.8	11,058 1,386	683.1 78.4	6.2 5.7
Gross national product	9,018	604.1	6.7	12,444	761.5	6.1
Imports	1,600	267.8	16.7	1,944	325.7	16.8
Total goods and services	10,618	871.9	8.2	14,388	1087.2	7.6
Personal consumption	5,806	415.5	7.2	7,960	526.9	6.6
Private investment	1,310	105.0	8.0	1,898	115.5	6.1
Public authority expenditure	1,754	117.6	6.7	2,420	156.6	6.5
Stock	44	46.0	104.5	332	30.9	9.3
Statistical discrepancy	-82			-66		
Gross national expenditure	8,832	684.1	7.7	12,544	829.9	6.6
Exports	1,786	187.8	10.5	1,844	257.3	14.0
Total market expenditure	10,618	871.9	8.2	14,388	1087.2	7.6

*(iii) Indirect taxes*

Indirect taxes can be classified according to the point at which they are levied. Excise, customs and primage duties and sales taxes are paid by the domestic user and are included in the price, at purchasers' value, of commodities purchased by industry or by final demand. Payroll tax, land tax, motor taxes, stamp duties, rates and other taxes and a number of special industry taxes, on the other hand, are included in the value of production of individual industries and must be deleted in order to obtain an estimate of each industry's contribution to state income.

Individual commodity and industry taxes collected by commonwealth, state and local authorities in Western Australia are shown in Table 6.

## MARKET SUPPLIES AND EXPENDITURE

The reconciliation between total market supplies—comprising the above estimates of gross domestic product, plus imports—and the previous estimates of total market expenditure, is shown in Table 7. For purposes of comparison, the major components are shown also as a proportion of the corresponding national figures.

## CHAPTER 4

### INDUSTRY STUDIES

The methods used to estimate the cost structure and markets for particular industries are detailed in a supplement to this report. This chapter deals only with aspects which affect the interpretation of the completed input-output tables.

#### MISCELLANEOUS MANUFACTURING COSTS

Independently of the calculation of non-labour income accruing to the manufacturing sector, a further estimate was obtained by deducting wages, salaries and supplements, depreciation and payroll tax from the official figure for net production in this sector.<sup>1</sup> The resulting sub-total exceeded the previous estimate for non-labour income by \$11.54 million in 1954 and \$16.81 million in 1959. This discrepancy accounted for land tax, rates, motor and other taxes, stamp duties, licences, bank, insurance and legal charges, postal and telephone charges, accounting and other professional expenses, advertising, bad debts, building repairs and office supplies.

Short of an independent survey, it was not possible to accurately identify each of these items of cost. Consequently the building repairs component was derived from estimates by Haig and the remaining costs needed to reduce net production to the required level of non-labour income were distributed between rates and taxes and miscellaneous business services by reference to estimates by Cameron.<sup>2</sup>

This method of derivation is summarised in Table 8. Miscellaneous costs and taxes represent 7.5 per cent and 7.2 per cent respectively, of the cost of materials, containers, repairs, fuels, lubricants, water and miscellaneous charges paid by the manufacturing sector in 1954 and 1959. The method involves the reconciliation of accounts which are themselves of unknown accuracy and subject to disparities in definition, however the outcome is supported by Salter's<sup>3</sup> finding that these outstanding items represent 6-10 per cent of material costs for Western Australian manufacturers.

<sup>1</sup>The recorded figure for net production was first adjusted to extend the coverage for meat and crayfish processing, salt refining, printing, gas and electricity.

<sup>2</sup>Cameron, 'Report Accompanying the Australian Transactions Table, 1946-47' (1956). Also Cameron, 'Supplement to the Australian Transactions Table, 1946-47' (mimeo, Australian National University, 1957).

<sup>3</sup>W. E. G. Salter, 'The Measurement of Factor Income Generated by Productive Sectors in Western Australia, 1947-48 to 1950-51' (mimeo, Perth, University of Western Australia, 1953), p. 10.

TABLE 8  
NON-LABOUR INCOME AND MISCELLANEOUS COSTS  
MANUFACTURING INDUSTRIES (a)

	1953-54		1958-59	
	\$m.		\$m.	
Net production - factory census	110.29		157.52	
<i>Add</i> adjustment for distribution, meat and crayfish processing, salt works	4.92		8.57	
		115.21		166.09
<i>Deduct</i> factory census wages and salaries	63.18		77.46	
supplements to wages	1.35		2.15	
adjustment for distribution	3.51		5.21	
		68.04		84.82
		47.17		81.27
<i>Deduct</i> electricity produced and used	0.25		0.11	
		46.92		81.16
<i>Deduct</i> depreciation factory census	4.47		11.95	
adjustment for distribution	0.68		1.46	
		5.15		13.41
		41.77		67.75
<i>Deduct</i> non-labour income	28.75		49.45	
Miscellaneous costs (residual)		13.02		18.30
Payroll tax		1.46		1.48
Land tax and rates		0.73		1.07
Other taxes and licences		0.19		0.27
Business services		9.93		14.55
Building repairs		0.71		0.93
Total miscellaneous costs		13.02		18.30

(a) Including dry cleaning and dyeing works subsequently transferred to the personal services industry.

#### MEAT PROCESSING

This industry incorporates the Statistician's three sub-classes - meat and fish preserving (9.17), sausage skins (9.31) and bacon curing (9.12). These have been adjusted to incorporate the commercial slaughter and dressing of all livestock, together with an estimate of the value added in crayfish processing.

The classification of sub-class 9.17 is not standardised between states. In Western Australia it includes meat and fish preserving, egg pulping, and smallgoods manufacture, together with poultry and livestock slaughtering in the major abattoirs. Smallgoods manufacture and livestock slaughtering are included also in sub-class 9.12. For 1954 the recorded coverage for slaughtering in the major

abattoirs was found to be incomplete, particularly for livestock killed on commission, whereas for 1959 only country butchers had been omitted. For the purpose of this study, all livestock slaughtered commercially were passed through the meat processing industry. This involved an increase in the value of output of the recorded factory statistics by \$14.50 million in 1954 and \$22.12 million in 1959. These amounts represent the value of meats, offal, hides and skins produced on commission and in country butcheries. An equal adjustment was made to total costs, representing the value 'on the hoof' of the livestock slaughtered, together with the labour and material costs incurred. To avoid double counting, factory earnings for commission slaughtering were deleted.

### MINERAL OILS

Mineral oil refining at Kwinana did not commence until February 1955, although the factory statistics record an output of \$0.56 million as early as 1954. On the advice of officers of the Bureau of Census and Statistics, this was reduced to \$0.17 million—representing the value added by four establishments engaged in packing, purifying and blending lubrication oils. The recorded figure of \$0.39 million for materials used was eliminated.

Figures for refinery costs and output in 1959 were obtained directly from BP Refinery (Kwinana) Limited. This information was in the detail assembled for the factory census, except that quantities only were disclosed for crude oil and a number of marketable products. The values applied to each were estimated from statistics of trade, commodity prices and overseas shipping rates supplied by the refinery, and average Australian prices for petroleum products shown in production bulletins. Details of the quantities of petroleum products consumed in Western Australia were provided by the Department of National Development; unpublished details of sales to factories, farming and mining were made available by the Commonwealth Statistician.

### ENGINEERING INDUSTRIES

The recorded statistics are less comprehensive for engineering than for any other industry. It was therefore necessary to use total cost figures to estimate the value of output of many engineering commodities, although the official classification, by industry sub-classes, was found to be deficient as a guide to the type of production within each sub-class. This deficiency is one outcome of the small scale and diversified output of establishments in Western Australia; it is also emphasised by the amount of steel fabrication undertaken by all classes of engineering as a means of utilising surplus plant capacity.

Further problems arose in regard to the recorded details of assembly work. The definition of 'value of output' was found to vary widely between firms engaged in assembly work. The 'value added' concept was not always adhered to, and for 1954, the value of work done in assembling some imported agricultural machinery and rolling stock appeared to be based on the value of the finished

commodities. Other anomalies were found in regard to motor vehicle assembly.

In order to obtain details which were not released in the published statistics, an independent survey was made of the major engineering firms in Western Australia. This enabled fairly reliable estimates to be made of the cost structure of the ferrous pipe, ferrous wire, motor vehicle assembly and iron and steel industries. However, much of the engineering work undertaken in Western Australia was found to be common to a range of sub-classes; consequently, although it was possible also to distinguish the cost structure of sub-classes 4.24 (sheet metal working) and 4.2 (ferrous founding), each was found to embrace only part of the state's sheet metal and founding activities, and each covered other branches of engineering. Insufficient information was available to enable a reclassification of homogeneous activities and consequently all other forms of engineering were included in the 'other engineering' industry for which the cost structure should be regarded as extremely tentative.

#### MOTOR VEHICLE ASSEMBLY

Private expenditure on motor vehicles was estimated by allocating the corresponding Australian total. Figures for commercial and non-commercial vehicles were obtained independently, using for each class of vehicle an allocator based on the ratio between new registrations in Western Australia and in Australia as a whole.

After allowing for retail sales of caravans and trailers the estimated value of new motor vehicles was \$37.47 million in 1954 and \$42.34 million in 1959. An attempt was then made to identify the components of each figure—namely the value added in assembly within Western Australia, the value of imported and locally produced vehicles and components, and commercial charges.

The motor vehicle assembly industry was initially defined to cover sub-classes 4.9 (motor vehicle construction and assembly) and 4.11 (motor bodies). Forty-six per cent of the factory output of the composite industry in 1959 involved the production of tractors and agricultural implements; the value added in motor vehicle assembly in sub-class 4.9 accounted for a further 21 per cent; and the remainder comprised motor body building and assembly, panel beating and vehicle repairs in sub-class 4.11. Duplicate factory returns were obtained from four firms producing 96 per cent of the output of the confidential sub-class 4.9 (motor vehicle construction and assembly) in 1959. These enabled tractor and farm implement production to be identified and transferred to the general engineering industry.

The recorded value of materials used in motor vehicle assembly relates only to tyres, batteries, paint and minor components purchased in Western Australia. Imported motor accessories are also used by vehicle repair, motor body and other industries, so that, although motor accessories were recorded in detail in the trade statistics for 1954 (but not for 1959), it was not possible to accurately assess the proportion used in the assembly of motor vehicles. Likewise it was found impracticable to estimate this component by first identifying the sales of



motor accessories to other industries and to final demand, using the retail sales category 'motor accessories, parts, tyres and tubes, etc.' The retail sales figure was known to include an unknown proportion of motor accessory sales accompanying motor vehicle repairs.

The value of imported components used in the assembly of motor vehicles was eventually imputed as the difference between total sales of motor vehicles and the value of imported and locally produced vehicles, together with the value added in local assembly. This procedure necessarily assumed a genuine relationship between the value of completed motor vehicles, on the one hand, and the book value applied to imported components and local assembly, on the other.

#### IRON AND STEEL

In 1954, the iron and steel industry in Western Australia was limited to the Wundowie Charcoal Iron & Steel establishment, producing 10,500 tons of pig iron from Western Australian iron ore. By 1959 the output from this source had increased to 24,300 tons and an additional 47,000 tons of merchant steel were produced from imported steel billets, by a rolling mill established at Kwinana in 1956. In both years, details of factory costs and output were obtained directly from the firms concerned. Details of output from the steel rolling mill were limited to the tonnage of each item of production, however average factory values were estimated from price schedules in Tariff Board reports and production bulletins.

#### FERROUS WIRE

The cost structure of this industry was reconstructed from factory details provided by three establishments engaged in wire drawing and working. Their total output in 1959 accounted for 60 per cent of the output of sub-class 4.26. Steel posts and reinforcing rods were dispersed through the ferrous wire industry, together with imported products of wire. Sales to investment in the input-output tables comprise prefabricated buildings and part of the cost of materials used in the erection of new farm fences. The latter component was derived from estimates of the average cost of fencing materials per acre and the number of acres 'newly cleared and prepared' in the year preceding 1954 or 1959. The residual value of fencing materials (excluding timber) in each year was treated as an annual replacement cost charged to the farming sectors through the building and construction industry.

#### CLOSED MANUFACTURING INDUSTRIES

For the glass, woollen mills, ice-cream, confectionery and brewing industries no details could be obtained even by direct inquiry of the firms concerned. In such cases the immediate problem was to establish an accurate figure for the total cost of each industry. Preliminary totals were obtained by independent inquiry to progressively eliminate the total costs of other sub-classes with which

these industries were consolidated in the published statistics. Various checks such as the quantity of beer excised, or the average Australian consumption of ice-cream were applied to verify these preliminary totals. The cost structure of each industry was likewise approximated, firstly from the known supplies of major inputs such as soda ash, glass sands, or malt, and secondly, by the insertion of coefficients derived from Australian totals recorded in production bulletins.

#### GAS AND ELECTRICITY

Unpublished details of the production and factory usage of gas and electricity were provided by the Deputy Commonwealth Statistician. The output of gas-works was defined to include the value of reticulation services at \$0.55 million and \$0.79 million in 1954 and 1959, respectively, and reticulation costs at \$2.42 million and \$5.18 million were added to the output of electricity. Small quantities of electricity generated and sold by factories other than the major generating stations were treated as sales to the electricity industry for further distribution. However the value of electricity generated and used in the same factories is also included, by the Western Australian Statistician, in the value of output of these industries. Amounts of \$0.25 million in 1954 and \$0.11 million in 1959 were therefore treated as sales from factories to the electricity industry, for further distribution, and debited to the same factories as additional items of cost.

#### BUILDING AND CONSTRUCTION

The greater part of the output of this industry was derived in the estimation of private and public investment expenditures and personal consumption. Expenditures on building maintenance were derived by apportioning to Western Australia part of Haig's estimates for Australia.

An independent estimate of the total cost of the building and construction industry was provided by the sales of commodities to the industry and the previous estimates of labour and non-labour income. The cost structure of the industry should nevertheless be regarded as tentative, as the industry was generally regarded as the residual purchaser of building materials.

#### RAIL TRANSPORT

Details of railway freight earnings in respect of coal, ores and minerals, fire-wood, timber, wool, fertilizers, wheat, other grains, chaff, grain products, potatoes, fruit and vegetables, livestock, and oil in tank wagons are given in the annual reports of the Western Australian Government Railways. In 1958-59 these accounted for 72 per cent of the total freight earnings of the government railways, excluding freight carried ex-transcontinental. The remaining freight earnings were derived from goods classified as 'A', 'B', 'C', 'First', 'Second', 'Miscellaneous' or 'Other'. The range of commodities within each class was known, together with the tonnages consigned from each station within Western

Australia. Consequently, with the assistance of officers of the Railways Department it was possible to identify the tonnages of a range of major commodities within each class, and to apply an approximate rail freight rate to each.

Prior to 1964, part of the railway system in Western Australia was conducted by the Midland Railway Company. The freight schedules for the two systems were identical, however, and sufficient information was obtained from the Midland Company to enable its freight earnings to be assigned to major commodities.

The cost structure of the industry was derived from annual reports of the Western Australian Government Railways and from information provided by the Midland Railways. Apart from wages paid to Western Australian employees of the Trans-Australian Railway no allowance was made for that part of the commonwealth railway operated in Western Australia. For the timber lines operated in Western Australia, estimates were based upon information in statistical registers.

In the case of the Western Australian Government Railways the annual reports were adjusted in several respects. Firstly, saw-milling and canvas goods activities were eliminated because these had previously been incorporated in the manufacturing sector. Secondly, employment and wages classified to the capital account of the Western Australian Government Railways were incorporated in the building and construction industry. Finally, adjustments were made to eliminate engineering activities classified in the factory statistics as sub-class 4.7 'construction and repair of tramway and railway rolling stock'.

#### ROAD TRANSPORT

This industry covers motor buses, taxis, hire cars, tramways, ferries, school bus services and carrying and cartage services. By definition, the haulage component of the industry is confined to long and medium haul deliveries. For the purpose of this study, the distinction between short and long haul deliveries was based upon a size classification of commercial vehicles.

The number of vehicles with a loading capacity in excess of 4 tons, operating in Western Australia, represented 5.8 per cent of the Australian total in this category in 1955. This percentage was applied to Australian<sup>4</sup> estimates of the number and running costs of commercial vehicles in excess of five tons, to derive a total cost figure for long distance transport in Western Australia. Using this procedure, the number of vehicles incorporated in the road transport sector represented 15.4 per cent of all commercial vehicles operating in Western Australia in 1955. The cost components of the industry were derived by reference to Australian<sup>5</sup> estimates for each class of vehicle. The estimated total cost for 1954 represents 9 per cent of a similar estimate for Australia as a whole. When

<sup>4</sup>Australian Transport Advisory Council, 'Transport Costs in Australia' (mimeo, Sydney, 1959).

<sup>5</sup>Australian Transport Advisory Council, *Report of Committee of Transport: Economic Research Relating to Road and Rail Transport*, pt 1, 'Road Transport Costs and Road Construction and Maintenance' (Sydney, 1956). Also Cameron, 'New Aspects of Australia's Industrial Structure'.

geographical differences are taken into account, together with differences in definition, this ratio appears to be in general agreement with other indicators of Western Australia's status within the Australian economy.

The distribution of road transport charges between individual commodities remains extremely tentative. An independent assessment was made for a range of rural and mining products, fertilizers, petroleum, logs and iron and steel. However the remaining earnings of the industry were assigned to the aggregate supplies of other commodities by reference to the road transport charges, per unit, assigned to each in the Australian Transactions Table for 1946-47.<sup>6</sup>

#### AIR TRANSPORT

This industry covers locally based enterprises operated within the state and between Western Australia and the Northern Territory, and activities associated with the servicing of overseas and eastern states air-routes. The total cost of intrastate air transport was based upon information provided by the largest airline company operating within Western Australia, together with an estimate of the cost of aerial agriculture calculated from the acreage treated. An adjustment of 10 per cent was added to total cost to cover intrastate air transport for which details were unknown. The cost structure of the industry was based upon annual company reports.

A conceptual problem in regard to air transport was the treatment of expenditures in Western Australia by eastern states and overseas airlines. Aircraft fuels (estimated as the difference between available supplies and the requirements of intrastate air transport) were treated as direct sales to export from the industry producing. Other business expenses associated with the operation of eastern states and overseas airlines were estimated from the total employment in the industry. These were combined with the total cost of intrastate air transport and subsequently treated as a sale from this industry to the eastern states trade sector, along with the revenue of the major intrastate airline earned in the carriage of freight and passengers from the Northern Territory to Western Australia.

#### SHIPPING

Coastal shipping in Western Australia is largely confined to the State Shipping Service operating between Fremantle and Darwin. From this service, information was obtained detailing in twenty categories the tonnage of goods shipped northward from Fremantle and entering each of the north-west ports. Similar information was obtained for cargo shipped southward from each port, together with details of inter-port movements and total freight and passenger earnings. Freight earnings were assigned to each of the major commodity groupings by reference to the freight rates applying in 1953-54 and 1958-59. Similar details

<sup>6</sup>Burgess Cameron, Commercial and Transport Charges, 'Supplement to the Australian Transactions Table, 1946-47' (mimeo, Australian National University, 1956).

were obtained for cargo shipped to and from north-west ports by the Blue Funnel Line. The freight paid to this company for coastal transport was included in the revenue of the shipping industry but offset by the purchase of a similar service from the overseas import sector.

Part of the shipping industry in Western Australia is concerned with servicing overseas and interstate vessels. As with airline companies, however, the expenditure incurred in Western Australia by non-resident shipping agents is not directly related to their revenue earned within the state. In a preliminary allocation, pilotage, tonnage, stevedoring and other charges paid by shipping owners (excluding payments made by cargo owners and the State Shipping Service) were treated as sales to the export sector. The wages and salaries paid and business expenses incurred by shipping agents were likewise treated as services exported. This implied that such costs were recouped as freight or passenger earnings on overseas and eastern states vessels, and it had the effect of offsetting similar costs incorporated in imports which were valued at landed cost. Part of the output of the shipping industry, however, should be treated as a charge to businesses operating in Western Australia. It was because there was no information to accurately distribute the total output for shipping and air transport that this industry was used to obtain the final balance for the 'Unallocated' row and column.

#### COMMERCE

The total cost of the commerce industry was equated to the value of commercial charges assigned to individual commodities. For a number of primary products these charges were readily obtained from marketing costs assembled by the Deputy Commonwealth Statistician and various marketing authorities, but for the majority of commodities it was necessary to ascertain the wholesale and retail mark-up and to apply these to the available supply and final demand for each commodity. Approximately 14 per cent of retail charges—representing the retailing activities of hotels, cafes, hairdressers, etc.—was treated as receipts of the personal service industry, rather than of commerce. Some indication of the extent of retail sales in the personal service industry was provided by the retail sales census from which it was estimated that part of the retail charge on beer (95 per cent), wines and spirits (5 per cent), confectionery (5 per cent), and tobacco and cigarettes (15 per cent) should be attributed to this industry. The total retail margin accruing to the personal service industry was subsequently treated as a sale to commerce for further distribution between individual industries.

There was no direct check upon the total cost of the Western Australian commerce industry, except that for 1954 it amounted to 6.5 per cent of an Australian estimate by Cameron. A likely source of error could be the application of commercial charges to commodities imported from the eastern states. Where goods are imported directly by Western Australian users or where they involve the transfer of goods between central office and branch agencies, it can

be inappropriate to add further commercial charges to the 'landed value' of imports.

With the exception of a number of items derived in the allocation of commodities, the cost structure of the industry was based initially upon Cameron's Australian estimates.

#### FINANCE AND PROPERTY

This sector includes both financial and trading enterprises. Little direct information was available for Western Australia and it was necessary to derive tentative estimates of the cost structure by apportioning to Western Australia part of the corresponding Australian aggregates published in white papers and finance bulletins. The previously estimated wage and non-wage components of income in this sector, together with monthly payroll tax details of employment and wages paid in the 'banking', 'insurance', and 'other finance and property' categories of the sector, provided the most comprehensive coverage available.

#### BUSINESS SERVICES

Miscellaneous business expenses which were more readily allocated as composite items rather than as the output of individual industries, were treated as sales from the 'dummy' business services industry. The components of this industry are:

	1953-54	1958-59
	\$m.	\$m.
Advertising services	6.36	8.76
Communication services	6.47	9.54
Professional services	4.14	5.30
Finance and property	8.66	10.12
Printing and stationery	2.47	2.90
Fares and freight	1.65	2.90
Building repair services	0.71	0.93
Business expenditure overseas	2.44	3.14
Miscellaneous (meal, service, accommodation, entertainment, etc.)	1.06	1.36
Alcoholic drink	0.70	0.83
Tobacco	0.60	0.80
	<hr/>	<hr/>
Total business services	35.26	46.58
	<hr/>	<hr/>

## PERSONAL AND GOVERNMENT SERVICES

Output of the personal and government services industry covers the current expenditure of public authorities and personal and business expenditures on the following services:

	1953-54	1958-59
	\$m.	\$m.
Entertainment	7.49	9.04
Education	2.22	3.96
Dry cleaning and dyeing	1.46	1.63
Meals, accommodation, etc.	9.00	10.50
Hairdressing	1.51	1.89
Domestic services	1.92	2.40
Hospital and funeral expenses	9.20	14.60
Other professional services	18.90	25.31
Net outlay of public authorities	49.20	73.24
Retail margins (hotels, etc.)	11.68	13.21
	<hr/>	<hr/>
Total	112.58	155.78
	<hr/>	<hr/>

Estimates of the net purchases of goods and services by state and local government authorities in Western Australia were provided by the Commonwealth Statistician. Commonwealth expenditures in Western Australia (excluding business enterprises and capital works) were obtained from an analysis of commonwealth government trial balance sheets provided by Mr N. P. Campbell of the Perth Technical College. This included an assessment of the wages, salaries and supplements paid in 1953-54 and 1958-59, from which estimates of total net expenditure were derived by reference to a more detailed disaggregation of commonwealth expenditures in Western Australia during 1957-58. Adjustments were made to include expenditures by the Commonwealth Scientific and Industrial Research Organisation and to exclude supplements transferred to the Stevedoring Industry Board.

Gross public authority expenditure in Western Australia was obtained by adding the fees and charges accruing to state, local and commonwealth governments, using details provided by the Deputy Government Statistician and information available in finance bulletins and commonwealth trial balance sheets. There was no direct method of calculating the output of the professional and personal services sectors, and the total output of the composite personal and government services' industry was consequently based mainly upon the estimates of personal consumption.

## FORESTRY

Details of the major components of forest output were provided by the Deputy Commonwealth Statistician and were further dissected by reference to the annual reports of the Forests Department. It was necessary to revalue logs

in order to eliminate the transport component included in the Statistician's value 'on mill skids'—the new value for logs being based upon an assessment of royalties and rents paid and expenditures incurred in felling, snigging and loading operations.

	1953-54	1958-59
	\$m.	\$m.
Haulage to mill	1.19	1.56
Royalties and rents	1.20	2.15
Snigging and loading	2.16	2.91
Felling	1.25	0.63
	<hr/>	<hr/>
Gross value of logs on mill skids	5.80	7.25
	<hr/>	<hr/>

#### FISHING

The recorded market and local values were known for the major components of fishing output, together with details of marketing costs and expenses of boat maintenance. Confidential details of whale catches were obtained from the two companies concerned. The cost structure of the industry was based on estimates of cordage sales provided by a Western Australian rope and twine company, a survey of the crayfishing industry by Taylor<sup>7</sup> and the business accounts covering several fishing boats. The wage bill was estimated from payroll tax tabulations and employment figures detailed in Statistical Registers and the population census.

#### MINING

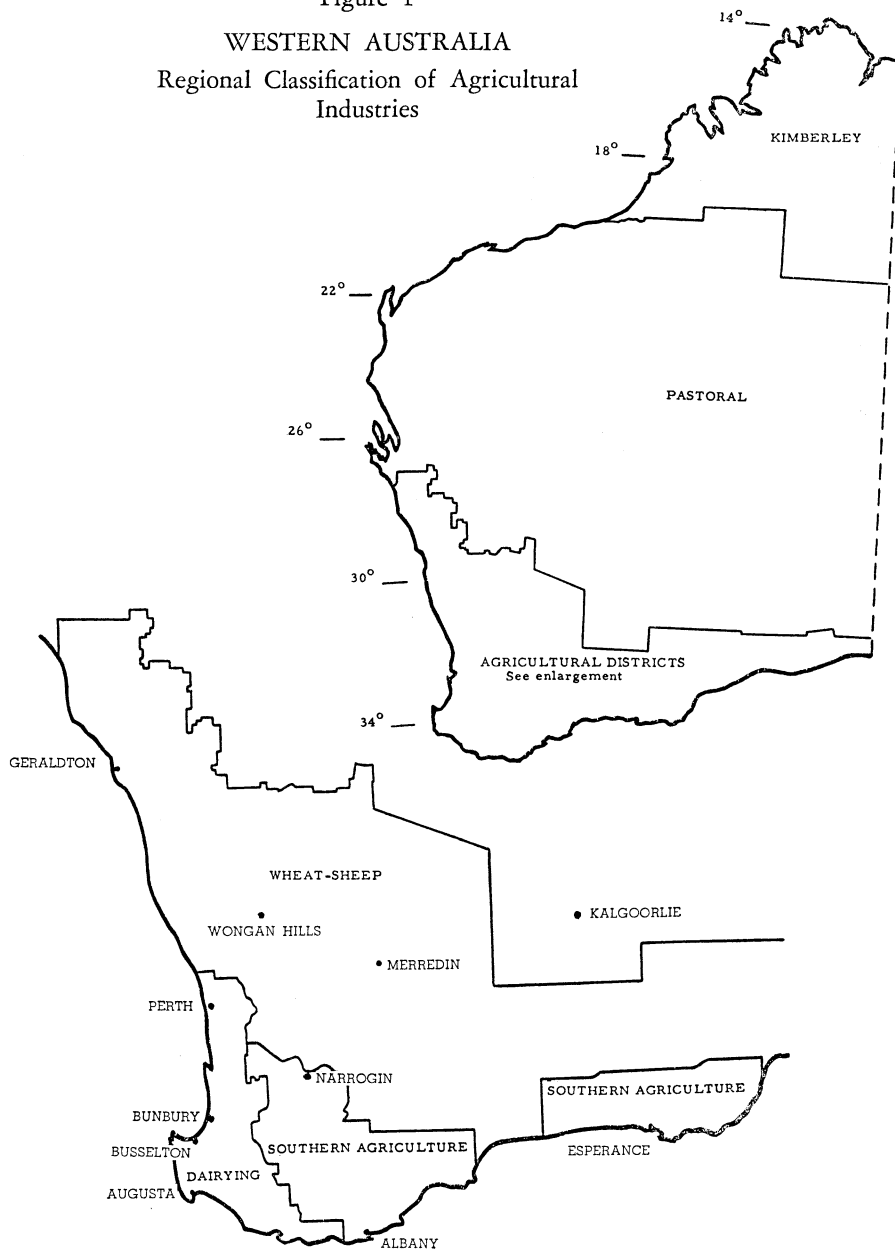
The cost structures of the mining industries were based upon published details in mining bulletins, statistical registers and annual reports of the Mines and Forests Departments, supplemented by unpublished details of fuels used, repairs and depreciation provided by the Deputy Commonwealth Statistician. Officers of the Mines and Railways Departments provided considerable assistance in the estimation of transport charges on mining output.

For 1959, power stations which were operated in association with mining activities were included by the Government Statistician in the annual factory census, and for 1954 they appear to be incorporated also in the mining sector. As a result, purchases of electricity by mines are shown in the published statistics to be much higher in 1959 than in 1954 and purchases of fuels correspondingly lower. To retain consistency, an additional \$1.17 million of electricity in 1954 was treated as a sale to the gold mining and other mining industries. The materials and labour used to produce this amount of electricity were estimated from the factory statistics and deducted from the cost structure of the same mining industries.

<sup>7</sup>S. J. Taylor, 'A Survey of the Western Australian Crayfishing Industry, 1948-55', *University Studies in History and Economics*, vol. ii, no. 4 (1956).



Figure 1  
WESTERN AUSTRALIA  
Regional Classification of Agricultural Industries



## AGRICULTURAL INDUSTRIES

The major agricultural industries in Western Australia can be readily identified by their geographical location. By examination of contiguous statistical districts five regions were defined to identify the major forms of extensive agriculture designated as 'dairying', 'wheat-sheep', 'southern agriculture', 'pastoral' and 'Kimberley'. Their location is illustrated in Figure 1. The more intensive forms of agriculture were aggregated within the industries defined as 'poultry', 'orcharding' and 'market gardening'. They were not regionally defined and their identification as separate industries had the effect of eliminating secondary products from the regionally defined industries.

This method of classifying the agricultural industries on both a commodity and locational basis commends itself in that it identifies eight readily distinguishable branches of farming; it clarifies, for purposes of analysis, those branches which are conventionally accepted as distinct 'industries' in issues of state policy; and it enables full use to be made of the published statistics and various supplementary sources of farming information. The regional classification has the further advantage that it facilitates the interpretation of known spatial flows of commodities. In Western Australia, centres of trade are limited and the port or service points for each agricultural region and the movements of commodities to and from each region can be identified.

Transactions between farms are primarily within contiguous districts and consequently many local transactions—which are difficult to assess—can be assumed to balance out.

A number of agricultural commodities appear to qualify equally well as flows to intermediate industries or to final demand. Wholemilk, fruit, vegetables and eggs, undergo very little processing, and have been consigned directly from the farming industries to final demand. Conversely, livestock slaughtering and the production of animal by-products have been treated as factory activities and meat is consigned to final demand through the meat processing industry. Meat and other produce consumed on the farm, however, are included in the value of farm production.

## CHAPTER 5

### APPLICATIONS OF WESTERN AUSTRALIAN INPUT-OUTPUT TABLES

The attached input-output Table A summarises, at purchasers' values, the economic transactions between fifty-four industries in 1958-59. However the cost structure of each industry is more readily expressed in terms of a common unit-input per unit of output. This is the form of a second table in which the coefficients refer to the direct relationships between industries. Table A2 is then derived as the inverse of an identity matrix less the matrix of input-output coefficients in this second table.

The interdependence coefficients in Table A2 express the essential characteristic of the input-output system—the direct and indirect relationships between industries. Each column shows the total purchases required, directly and indirectly, from each of the industries listed at the left, per unit of sales to final demand of the industry listed for that column.<sup>1</sup> Since competitive imports are distributed through local industries producing a comparable product, the purchases from each industry may be locally produced, imported, or any combination of both. The tables do not identify transactions between industries located in Western Australia, but rather the total requirements of each industry, regardless of source.

#### MARKET ANALYSIS

The total sales from any industry can be expressed in terms of final demand deliveries.

$$X_i = \sum_{j=1}^m z_{ij} x_{jd} \quad (i = 1, 2 \dots m)$$

where:

- $X_i$  = total output of industry  $i$ .
- $z_{ij}$  = interdependence coefficient expressing the output from industry  $i$  required for industry  $j$  to deliver one unit of output to final demand.
- $x_{jd}$  = output of industry  $j$  delivered to final demand.

Given the final demand and processing structure it is possible to determine the extent to which the output of each industry is ultimately dependent on the

<sup>1</sup>An implicit assumption is that the sales of a commodity, in any one row include the same proportion of competitive imports, regardless of the point of sale.

various components of final demand. Thus,  $z_{c,j}x_{j,d}$  could express the total amount of coal (c) required, directly and indirectly, for the 1959 aggregate final demand deliveries from industry j. This was the procedure used to derive Table 9, showing the market for coal, petroleum products, electricity and engineering output. Although computed from a fifty-four-industry classification, the results are consolidated for convenient presentation on a thirty-industry basis.

TABLE 9  
FINAL MARKET FOR FUELS AND ENGINEERING OUTPUT  
WESTERN AUSTRALIA, 1958-59

<i>Industry</i>	<i>Coal</i>	<i>Petroleum products</i>	<i>Electricity</i>	<i>General engineering</i>
	\$'000	\$'000	\$'000	\$'000
1. Cereals-sheep	533	7,743	622	10,145
2. Dairying	48	758	107	1,004
3. Pastoral	21	552	33	792
4. Horticulture	174	1,993	400	1,990
Sub-total (Rural)	776	11,046	1,162	13,931
5. Fishing & forestry	41	1,004	96	1,247
6. Gold & o'r mining	840	1,383	3,226	5,618
7. Coal mining	176	4	6	28
Sub-total (Extractive)	1,057	2,391	3,328	6,893
8. Cereal foods	200	1,428	485	1,690
9. Milk processing	120	611	302	1,081
10. Meat processing	265	2,888	761	3,957
11. Beer & tobacco	228	1,412	490	1,411
12. O'r processed foods	217	901	280	1,893
Sub-total (Food process.)	1,030	7,240	2,318	10,032
13. Woodworking	140	614	275	1,363
14. Paper & printing	29	139	94	204
15. Mineral oil	176	65,741	370	1,463
16. Chem. fertilizer	-3	-6	-6	-28
17. O'r chemicals	62	476	175	498
18. Cement, bricks, etc.	116	183	86	232
19. Woollen mills	95	1,153	203	1,563
20. Clothing & textiles	136	1,559	436	1,176
21. O'r manufactures	35	205	82	326
22. Iron & steel	15	61	44	92
23. Vehicle assembly	75	828	238	2,207
24. Engineering	320	1,463	776	85,738
Sub-total (O'r manufact.)	1,196	72,416	2,773	94,834
25. Gas & electricity	2,273	1,127	6,895	895
26. Building & constr.	726	4,934	1,525	14,280
27. Transport & commun.	240	1,523	132	2,689
28. Commerce	nil	nil	nil	nil
29. Other services	515	2,605	1,357	14,696
Sub-total (Building: Services: Govt)	3,754	10,189	9,909	32,560
30. Unallocated	6	14	19	170
Total sales (a)	7,819	103,296	19,509	158,420

(a) Rounding errors are not included in the final row showing total sales. Due to a fall in stocks in 1959 the market demand for chemical fertilizer is negative.

Column 1 in Table 9 can be interpreted as follows: Sales of coal directly to final demand are negligible—in fact the \$176,000 shown in row 7 is largely an increase in stocks of coal. Sales of coal are largely to other industries which in turn sell their output, directly or indirectly, to final consumers. It is this 'final' market for coal which is shown in column 1. The cereals-sheep industry, for example, was responsible for \$533,000 or 7 per cent of the market for coal—notwithstanding the fact that coal was not used directly by this industry. Other industries responsible for a major part of the coal market were mining, food processing, engineering, gas and electricity, building, and transport.

In the case of petroleum products, the direct demand for petroleum itself accounted for \$64.9 million (of which \$52.1 million represented petroleum exports and bunker oil). Eliminating this direct sale to final demand it can be calculated from Table 9 that the cereals-sheep industry was responsible for 21 per cent of the residual market for petroleum products. This linkage between the rural and petroleum industries is further emphasized by the fact that the final demands for rural products and processed foodstuffs jointly account for \$18.3 million of petroleum sales; if the direct final demand for petroleum is removed this represents 49 per cent of the residual market for petroleum.

The close economic ties between the engineering and agricultural industries is similarly evidenced in column 4. Much of the linkage is not directly apparent, however, because agricultural implements (and all other sales of a capital nature) appear as a direct delivery from the engineering industry to final demand.

A further analysis of the markets created by the rural industries is provided in Table 10. Here the procedure used to derive Table 9 has been applied to identify the direct and indirect inputs required for the rural industries to meet their deliveries to final demand in 1959. Table 10 has been computed from Table B2—a thirty-industry version of Table A2. Comparison of the rural market for fuels in Tables 9 and 10, indicates that the degree of aggregation can substantially influence the result.

Final demand deliveries from the cereals-sheep industry are shown in Table 10 to require an output from this industry of \$113.2 million. This in turn generates a manufacturing output of \$36.6 million—or \$32.3 for each \$100 of cereals-sheep output. But *direct* requirements from the manufacturing industries per \$100 of cereals-sheep output are shown in Table B1 to amount to \$24.2. Hence \$8.1 or 25 per cent of the manufacturing output is generated from indirect flows. Similar measures of the interdependence between the rural industries and other broad sectors of the economy are summarised in Table 11.

#### WAGE AND NON-WAGE CONTENT OF FINAL DEMAND

A further use of the input-output table is to identify relationships between levels of final demand and ultimate inputs in the form of wages, profits, imports and the other forms of value added. For example, if  $a_{vi}$  is the value added in the form of wage and non-wage income per unit of output of industry  $i$ , then  $z_{ij}a_{vi}$  will be the value added per unit of final demand deliveries from industry  $j$ .

The value added by the whole system of industries per unit of final demand deliveries from industry  $j$ , is then represented by

$$\sum_{i=1}^m z_{ij} a_{vi} \quad (j = 1, 2 \dots m)$$

TABLE 10  
DIRECT AND INDIRECT PURCHASES REQUIRED TO MEET THE 1959  
FINAL DEMAND DELIVERIES OF SELECTED INDUSTRIES

<i>Industry</i>	<i>Cereals - sheep</i>	<i>Dairying</i>	<i>Pastoral</i>	<i>Horticulture</i>	<i>Fishing &amp; forestry</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
1. Cereals-sheep	113,232	479	168	1,113	201
2. Dairying	52	12,607	4	75	134
3. Pastoral	13	20	9,760	17	47
4. Horticulture	9	17	—	27,132	17
5. Fishing & forestry	145	33	18	221	12,969
6. Gold & o'r mining	1,074	102	21	158	12
7. Coal mining	350	55	22	145	76
8. Cereal foods	48	933	—	1,861	11
9. Milk processing	118	32	9	85	16
10. Meat processing	105	305	7	250	741
11. Beer & tobacco	35	17	2	20	7
12. O'r proc. foods	149	82	11	889	30
13. Woodworking	510	117	82	1,009	54
14. Paper & printing	716	124	33	404	96
15. Mineral oil	7,854	712	532	1,999	700
16. Chem. fertilizer	11,287	762	23	1,352	36
17. O'r chemicals	2,004	265	88	610	257
18. Cement, bricks, etc.	361	217	72	325	33
19. Woollen mills	50	6	3	13	11
20. Clothing & textiles	1,617	165	93	370	249
21. O'r manufactures	2,144	178	39	333	233
22. Iron & steel	129	24	18	24	15
23. Vehicle assembly	43	5	3	8	8
24. Engineering	9,408	1,052	737	1,810	1,719
25. Gas & electricity	657	114	33	399	143
26. Building & constr.	1,815	509	418	253	42
27. Transport & commun.	9,555	1,269	662	2,219	2,181
28. Commerce	12,270	3,000	958	8,159	1,447
29. O'r services	5,308	853	358	1,928	519
30. Unallocated	1,604	336	74	387	2,362

This was the procedure used to derive Table 12 showing the direct and indirect wage and non-wage content per unit of final demand deliveries from the primary and food processing industries. In this case the  $a_{vi}$  and  $z_{ij}$  coefficients were drawn from Tables A and A2, respectively.

TABLE 11  
DIRECT AND INDIRECT PURCHASES PER \$100 OF RURAL OUTPUT

Industry	Cereals - sheep			Dairying			Pastoral			Horticultural		
	Purchases per \$100 of output	Indirect purchases as % of total	Purchases per \$100 of output	Indirect purchases as % of total	Purchases per \$100 of output	Indirect purchases as % of total	Purchases per \$100 of output	Indirect purchases as % of total	Purchases per \$100 of output	Indirect purchases as % of total	Purchases per \$100 of output	Indirect purchases as % of total
Inputs from:	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct
Other rural	\$ 0.1	—	\$ 4.1	0.1	\$ 1.8	1.7	\$ 4.4	1.5	\$ 4.4	1.5	\$ 4.4	1.5
Extractive (a)	1.4	—	1.5	—	0.6	—	1.9	0.1	1.9	0.1	1.9	0.1
Manufacturing	32.3	24.2	39.6	25.5	18.0	10.5	41.9	29.8	41.9	29.8	41.9	29.8
Construction	1.6	1.3	4.0	3.6	4.3	4.0	7	0.4	7	0.9	7	0.4
Services & govt (b)	26.0	14.8	44.2	27.1	21.4	14.0	35	48.3	35	48.3	35	29.8

(a) Fishing: Forestry: Mining

(b) Gas: Electricity: Transport: Communication: Commerce: Finance and business services: Personal and government services: Unallocated.

Row 1, in Table 12, can be interpreted as follows: Each \$100 of wheat-sheep output delivered to the final consumer, in 1959, embodied an average wage content of \$23; of this, approximately \$8 comprised wages paid directly by farmers and the remaining \$15 was paid in industries directly or indirectly servicing the wheat-sheep industry. A further \$39 of the \$100 was accounted for by non-wage content, of which \$35 represented the return to labour, capital and management of the average wheat-sheep farmer and \$4 represented non-wage payment in other industries servicing the wheat-sheep industry. Similarly, \$100 of processed foods is shown to have a wage and non-wage content of \$21 and \$13, respectively.

Column 5 provides a measure of the change in total domestic income per unit change in the direct wage and non-wage income of each industry. For wheat-sheep, this income multiplier was 1.5. When interpreting column 5 it should be recognised that a unit change in income represents varying changes in outputs in the various industries.

TABLE 12  
WAGE AND NON-WAGE CONTENT PER UNIT OF FINAL DEMAND  
DELIVERIES OF THE PRIMARY AND FOOD PROCESSING INDUSTRIES  
1958-59

Industry	Wage content (a)		Non-wage content		$5 = 1 + 3 / 2 + 4$
	Total 1.	Direct 2.	Total 3.	Direct 4.	
Wheat-sheep	.225	.079	.395	.345	1.5
Southern agric.	.326	.143	.154	.085	2.1
Dairying	.309	.084	.353	.225	2.1
Pastoral & trap.	.429	.294	.212	.149	1.5
Kimberley	.250	.158	.423	.385	1.2
Orchards & vine.	.321	.088	.263	.150	2.5
Market gardens	.319	.067	.304	.181	2.5
Poultry	.305	.027	.390	.167	3.6
Fishing	.330	.184	.444	.346	1.5
Forestry	.407	.183	.272	.221	1.7
Gold mining	.607	.428	.168	.106	1.5
Coal mining	.621	.341	.045	.040	1.8
Other mining	.497	.262	.147	.073	1.9
Grain milling	.305	.058	.310	.044	6.0
Bakeries	.403	.111	.213	.092	3.0
Milk processing	.293	.075	.198	.037	4.4
Meat processing	.382	.084	.299	.019	6.6
Wineries, etc.	.308	.046	.148	.040	5.3
Beer, tobacco	.204	.020	.152	.043	5.7
O'r processed foods	.210	.045	.130	.041	4.0

(a) Excluding wages of owner-operators.



## IMPORT CONTENT OF EXPORTS

If the value of imports ( $o$ ) per unit of total output for each industry is regarded as constant ( $a_{oi}$ ), then the total imports required by the whole system of industries per unit of final demand deliveries from industry  $j$ , can be expressed as

$$\sum_{i=1}^m z_{ij} a_{oi} \quad (j=1, 2 \dots m) \quad (1)$$

The import content of the total deliveries from industry  $j$  to final demand is then

$$\sum_{i=1}^m z_{ij} a_{oi} x_{jd} \quad (j=1, 2 \dots m) \quad (2)$$

Alternatively the net foreign earnings (on current account) of industry  $j$  can be expressed as

$$x_{jo} - \sum_{i=1}^m z_{ij} a_{oi} x_{jd} \quad (j=1, 2 \dots m) \quad (3)$$

where

$x_{jo}$  = output of industry  $j$  delivered to the export sector.

The net foreign exchange embodied in the exports of industry  $j$  can similarly be expressed as

$$x_{jo} - \sum_{i=1}^m z_{ij} a_{oi} x_{jo} \quad (j=1, 2 \dots m) \quad (4)$$

In Table 13, expression (1) has been used to derive the import content (direct and indirect) per unit of final demand deliveries of the primary and food processing industries. The total import content of \$1 million of 'other processed foods', for example, is estimated to be \$0.60 million—the greater part being direct competitive imports from the eastern states (\$0.34 million).

By reference to import coefficients such as those in Table 13 and to the final demand deliveries of individual industries, the total direct and indirect imports required by each industry can be calculated (expression (2)). These are summarised for selected industries in column 1 of Table 14. In the case of the wheat-sheep industry, \$14.8 million of imports were required—notwithstanding the fact that direct imports of a competitive nature amounted only to \$0.9 million. The totals in column 1 can be compared with column 2 showing each industry's exports as recorded in the official trade statistics. The difference between the two indicates the *net* export earnings of each sector.

TABLE 13  
IMPORT CONTENT PER UNIT OF FINAL DEMAND DELIVERIES OF  
PRIMARY AND FOOD PROCESSING INDUSTRIES, 1958-59

Industry	Competitive				Non-competitive	All imports	
	Eastern states		Overseas		Total (a)	Total	Direct
	Total 1.	Direct 2.	Total 3.	Direct 4.			
Wheat-sheep	.07	.01	.03	—	.06	.16	.01
Southern agric.	.08	.01	.05	.02	.10	.23	.03
Dairying	.08	.01	.03	—	.06	.17	.01
Pastoral & trap.	.06	.02	.02	—	.03	.11	.02
Kimberley	.18	.16	.01	—	.03	.22	.16
Orchards & vine.	.15	.06	.04	.01	.06	.25	.07
Market gardens	.13	.08	.05	.02	.07	.25	.10
Poultry	.07	—	.02	—	.05	.14	—
Fishing	.08	.03	.03	.01	.05	.16	.04
Forestry	.10	—	.07	.03	.03	.20	.03
Gold mining	.12	—	.04	—	.03	.19	—
Coal mining	.17	.09	.03	—	.02	.22	.09
Other mining	.10	—	.06	.02	.04	.20	.02
Grain milling	.13	.07	.04	—	.05	.22	.07
Bakeries	.11	.01	.03	—	.05	.19	.01
Milk processing	.30	.24	.02	—	.04	.36	.24
Meat processing	.09	.01	.03	.01	.05	.17	.02
Wineries, etc.	.26	.19	.04	.02	.03	.33	.21
Beer & tobacco	.15	.13	.01	—	.02	.18	.13
O'r processed foods	.38	.34	.09	.08	.13	.60	.53

(a) For the industries shown at the left, the non-competitive import content is entirely indirect with the exception of 'other processed foods' for which the indirect component is .11.

From a national balance of payments viewpoint, however, it is *overseas* trade alone which is important. The net foreign earnings of each industry, after deducting direct and indirect overseas imports<sup>2</sup> are shown in column 5 of Table 14. In column 6 these net earnings are shown as a percentage of the *gross* overseas earnings recorded for each industry.

Table 14 can be interpreted as follows—using as an example the row showing the sub-total for rural industries; in column 1, the imports directly and indirectly embodied in rural deliveries to final demand total \$29.0 million. Rural exports (column 2) amount to \$100.9 million. The difference of \$71.9 million represents the net overseas and eastern states earnings of Western Australia's rural industries. But *overseas* imports embodied in rural deliveries to final demand total

<sup>2</sup>In calculating the direct and indirect overseas imports applying to each industry, the coefficients for non-competitive imports (column 5 of Table 13) were assumed to refer only to overseas trade. Exceptions were the iron and steel and food processing industries where *direct* non-competitive imports were eliminated since they comprised steel billets and raw sugar of eastern states origin. This procedure is likely to overstate the overseas content of non-competitive imports by the small amount of eastern states imports (non-competitive) indirectly embodied in the final demand deliveries of each industry.

TABLE 14  
 EXPORTS AND DIRECT AND INDIRECT IMPORTS  
 Selected Industries, 1958-59

Industry	(1)	(2)	(3)	(4)	(5) = (4-3)	(6)	(7)	(8) = (4-7)	(9)
	\$m.	\$m.	\$m.	\$m.	\$m.	%	\$m.	\$m.	%
Wheat-sheep	14.8	65.8	8.6	65.2	56.6	87	6.0	59.2	91
Southern agric.	4.3	15.8	2.9	15.4	12.5	82	2.4	13.0	84
Dairying	2.1	3.4	1.1	1.2	0.1	7	0.1	1.1	91
Pastoral	1.0	8.1	0.5	7.9	7.4	94	0.4	7.5	94
Kimberley	0.3	0.9	—	0.8	0.8	95	—	0.8	96
Orchards & vine.	2.8	4.7	1.1	4.6	3.5	76	0.5	4.1	90
Market gardens	3.1	1.4	1.5	0.6	- 0.9	Neg	0.1	0.5	88
Poultry	0.6	0.8	0.3	0.8	0.5	61	0.1	0.7	93
Total rural	29.0	100.9	16.0	96.5	80.5	83	9.6	86.9	90
Extractive	8.9	18.3	3.8	33.7	29.9	89	2.5	31.2	92
Manufacturing	230.2	132.9	80.0	75.5	- 4.5	Neg	17.0	58.5	77
Building & services	45.1	5.2	18.8	2.9	-15.9	Neg	0.3	2.6	90
Non-competitive imports	12.4	—	12.4	—	-12.4	Neg	—	—	—
Total	325.6	257.3	131.0	208.6	77.6	37.2	29.4	179.2	86

(a) Gold exports include stock rise. Exports include ships' stores.

only \$16.0 million (column 3). This amount has been deducted from *overseas* exports of \$96.5 million (column 4) to show the net foreign earnings of the rural industries (column 5). These net earnings of \$80.5 million amount to 83 per cent of the official overseas export earnings of the rural industries. Finally, column 7 shows the overseas import content of rural overseas exports. By deduction, an estimate can be obtained of the net foreign exchange earned, on current account, by rural exports.

The import content of primary exports is quite low. From column 9, in Table 14, it is apparent that the net gain on foreign account from \$1 million of most rural exports in 1959 exceeded \$0.9 million. From \$1 million of manufactured products, on the other hand, the net gain was of the order of \$0.68 million. For the mineral oil and engineering components of the manufacturing industries the net gain was \$0.46 million and \$0.86 million respectively. These findings clearly have policy implications since the drive for exports is a drive for net-exports.

#### THE FACTOR CONTENT OF EXPORTS, CONSUMPTION AND INVESTMENT

A further set of calculations concerns the local contribution of *individual* industries to consumption, investment or export. In this case the local contribution (in terms of the 'value added' in Western Australia) is measured as:

$$\sum_{j=1}^m z_{ij} a_{ri} x_{jo} \quad (i = 1, 2 \dots m)$$

where

$a_{ri}$  = the value added as wages, non-wages, depreciation and indirect taxes (net of subsidies) per unit of output of industry  $i$ .

$x_{jo}$  = output of industry  $j$  delivered to the exports sector (or to consumption or investment).

The attempt to specify the factor content of the *components* of final demand introduces the further assumption that, for the same industry, all components of final demand have the same factor content. This is an inadequate assumption and can lead to serious distortion. In the case of petroleum products, for example, the factor content of home demand is likely to differ from that of export demand if only because of the different techniques of distribution. Again, imports and exports are not adjusted for re-exports; consequently the import content of some exports will be understated and the import content of home demand correspondingly overstated. It is in the treatment of competitive consumer goods that the greatest distortion is likely, however. Whereas it is conceivable that imports which are further processed locally may subsequently enter into both home and export demand, many competitive imports are in the form of consumer goods destined solely for the local market. Despite the restrictive assumptions, however, the following analysis is believed to give a reasonable indication of the

factor content of consumption, investment and exports. The accuracy of the analysis is facilitated by the degree to which the major industries in Western Australia specialise in either the local or export market.

Table 15 shows the contribution of selected industries to overseas exports, in 1954 and 1959, where this contribution is measured firstly in terms of the recorded trade statistics, and secondly in terms of the value added locally. Mineral oil exports, for example, accounted for 12 per cent of all overseas exports in 1959, whereas the contribution of this industry in terms of value added was only 6 per cent. On the other hand, although no commercial services were exported this industry contributed 14 per cent of the local content of overseas exports. Imports (overseas and eastern states) are shown to account for 19 per cent of the *total* value of overseas exports in 1954, rising to 25 per cent in 1959.

TABLE 15  
CONTRIBUTION OF SELECTED INDUSTRIES TO OVERSEAS EXPORTS  
(Percentage Distribution)

Industry	1954		1959	
	Export sales	Value added locally	Export sales	Value added locally
Rural	62.6	60.2	52.0	48.6
Extractive	3.5	3.4	5.7	4.9
Processed foods	16.4	3.1	12.2	2.9
Woollen mills	8.3	0.8	9.3	1.1
Mineral oil	3.7	1.6	12.2	5.7
Transport, communications	1.3	6.4	0.8	7.7
Commerce	—	12.5	—	14.1
Other services	0.9	4.8	0.7	5.4
Other industry	3.3	7.2	7.1	9.6
Total	100.0	100.0	100.0	100.0
Import content of overseas exports		19.0		24.5

In Table 16, personal consumption expenditure in Western Australia is shown to have an import content of 34 per cent in 1954, reducing to 32 per cent in 1959. By contrast, the 1954 import content of personal consumption for Australia as a whole was 15 per cent. Western Australia's dependence upon consumer imports is illustrated also by the small contribution to personal consumption (in terms of local value added) of the processed foods, clothing and engineering industries. Processed foods, for example, accounted for 20 per cent of personal consumption in 1959, whereas the contribution of this industry in terms of value added was only 5 per cent. A further outcome of the substantial import content of consumption is the correspondingly large contribution of commerce (21 per cent) to the local content of consumption.

TABLE 16  
CONTRIBUTION OF SELECTED INDUSTRIES TO PERSONAL  
CONSUMPTION  
(Percentage Distribution)

<i>Industry</i>	1954		1959	
	<i>Sales to consumption</i>	<i>Value added locally</i>	<i>Sales to consumption</i>	<i>Value added locally</i>
Rural	6.4	11.1	6.2	8.8
Extractive	0.6	2.3	0.7	1.8
Beer, tobacco	11.0	7.9	10.4	7.7
Other processed foods	20.6	4.6	19.9	5.0
Clothing, textiles	12.7	2.4	11.2	1.9
Engineering, vehicles	10.3	4.9	9.7	5.5
Transport, communication	3.5	8.6	3.2	8.5
Commerce	—	21.5	—	21.2
Other services	19.3	26.1	22.6	28.5
Other industry	13.7	10.6	14.3	11.1
Non-competitive imports	1.9	—	1.8	—
Total	100.0 (a)	100.0	100.0 (a)	100.0
Import content of consumption		34.0		32.1

(a) Excluding small amounts of indirect taxes.

TABLE 17  
CONTRIBUTION OF SELECTED INDUSTRIES TO PRIVATE INVESTMENT  
(Percentage Distribution)

<i>Industry</i>	1954		1959	
	<i>Sales to investment</i>	<i>Value added locally</i>	<i>Sales to investment</i>	<i>Value added locally</i>
Rural, extractive	0.1	4.2	0.1	3.8
Woodworking	2.2	6.8	2.0	6.1
Cement, bricks, etc.	—	4.7	—	4.9
Vehicle assembly	17.2	4.5	16.2	4.7
Other engineering	37.8	19.4	36.1	21.6
Building, construction	40.9	28.5	43.0	25.5
Transport, communication	—	4.7	—	5.0
Commerce	—	17.7	—	17.9
Other services	—	6.3	—	6.4
Other industry	1.1	3.2	1.5	4.1
Non-competitive imports	0.7	—	1.1	—
Total	100.0	100.0	100.0	100.0
Import content of private investment		44.4		40.3

In the case of private investment, the import content in 1954 was as high as 44 per cent, reducing to 40 per cent in 1959 (Table 17). Sixteen per cent of private investment in 1959 comprised motor vehicles, 36 per cent engineering equipment and 43 per cent building and construction. In terms of local value added, however, the contribution of the motor vehicle industry was reduced to 5 per cent and that of the engineering and construction industries to 22 per cent and 26 per cent, respectively. Again, commerce contributed a substantial part (18 per cent) of the total local content of private investment.

#### IMPORT REPLACEMENT

In interpreting the input-output tables for Western Australia it should be recalled that locally produced output has been distributed together with competitive imports. For many industries in Table A, competitive imports account for less than 10 per cent of market supplies. In the case of twelve industries, however, imports exceed 25 per cent of supplies. These are processed foods, paper and printing, chemicals, leather goods, clothing, textiles, other manufactures, iron and steel, ferrous wire, ferrous pipes, vehicle assembly and engineering. In total, imports of \$326 million accounted for 11 per cent of the state's turnover of goods and services in 1958-59. Seventy per cent of imports entered from the eastern states.

Western Australia's balance of trade with the eastern states has been consistently unfavourable—amounting to a recorded deficit of \$133 million in 1958-59 and rising to \$221 million by 1963-64. The recorded surplus on overseas trade, on the other hand, was \$94 million in 1958-59 and \$174 million in 1963-64.

As a measure of the import replacement between 1954 and 1959, the direct and indirect import content per unit of final demand deliveries has been estimated for each of the industries in Table 18. These coefficients are based upon thirty-industry tables at 1959 and 1954 prices, respectively.

From columns 1 and 2 it is apparent that there was little change in the proportion of competitive imports of eastern states origin embodied in the final demand deliveries of most industries. A major exception was the tobacco industry where an increase in import content followed the termination of cigarette manufacturing in Western Australia. In the motor vehicle industry an increase in eastern states import content accompanied the reduction in local assembly. In the case of the iron and steel industry there was a 60 per cent reduction in eastern states' import content following the establishment, in 1956, of a local steel rolling mill. The latter development had little indirect effect on other industries and in the case of the engineering and construction industries the eastern states import content actually increased during this period. This is partly accounted for by the fact that the local mill specialised in a restricted range of merchant bar varying from  $\frac{1}{2}$ " rods to 3" x 3" angles; 46 per cent of the aggregate supply of rolling mill products in 1959 was consequently exported.

TABLE 18  
IMPORT CONTENT PER UNIT OF FINAL DEMAND DELIVERIES  
1954 AND 1959

Industry	Competitive imports				Non-competitive imports		Index of change (all imports) 1954=100
	Eastern states		Overseas		Eastern states & overseas		
	1954	1959	1954	1959	1954	1959	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cereals-sheep	.069	.069	.059	.026	.029	.068	104
Dairying	.097	.081	.068	.026	.026	.051	83
Pastoral	.042	.095	.027	.016	.002	.029	198
Horticulture	.113	.128	.075	.038	.021	.057	107
Fishing & forestry	.090	.094	.085	.051	.013	.037	97
Gold & o'r mining	.112	.112	.090	.042	.008	.028	87
Coal mining	.129	.160	.037	.022	.003	.017	118
Cereal foods	.119	.124	.054	.023	.021	.045	99
Milk processing	.313	.299	.052	.021	.014	.030	92
Meat processing	.095	.088	.066	.030	.017	.044	91
Beer & tobacco	.127	.146	.040	.009	.006	.016	100
O'r processed foods	.334	.348	.111	.077	.100	.101	96
Woodworking	.117	.120	.098	.081	.006	.021	100
Paper & printing	.274	.290	.101	.087	.084	.084	101
Mineral oil	.075	.036	.492	.065	.003	.473	101
Chem. fertilizer	.121	.094	.068	.060	.290	.339	103
O'r chemicals	.522	.490	.084	.101	.005	.015	99
Cement, bricks, etc.	.138	.115	.122	.083	.006	.042	91
Woollen mills	.201	.202	.051	.024	.016	.044	101
Clothing & textiles	.409	.426	.079	.066	.042	.039	100
O'r manufactures	.573	.555	.082	.093	.005	.014	100
Iron & steel	.626	.245	.197	.057	.001	.299	73
Vehicle assembly	.403	.462	.228	.118	.003	.011	93
Engineering	.339	.372	.240	.120	.005	.015	87
Gas & electricity	.077	.070	.096	.021	.003	.064	88
Building & constr.	.131	.137	.098	.056	.005	.039	99
Transport & commun.	.096	.092	.078	.031	.003	.034	88
Commerce	.044	.034	.051	.013	.010	.039	82
O'r services	.059	.062	.035	.020	.029	.037	97
Unallocated	.271	.277	.193	.096	.063	.071	84

With few exceptions there was a reduction in competitive overseas import content. This can be attributed to import replacement, the substitution of eastern states imports and the substitution of non-competitive imports. The direct and indirect components of the competitive overseas import coefficients are separately distinguished in Table 19. The proportion of direct imports increased for some industries, but the proportion of indirect imports fell in all cases—largely as a result of a reduction in imported fuels following the opening of the Kwinana oil refinery in 1955.



TABLE 19  
 COMPETITIVE OVERSEAS IMPORT CONTENT PER UNIT OF FINAL  
 DEMAND, 1954 AND 1959

<i>Industry</i>	1954		1959	
	<i>Indirect</i>	<i>Direct</i>	<i>Indirect</i>	<i>Direct</i>
Cereals-sheep	.054	.005	.023	.003
Dairying	.050	.018	.023	.003
Pastoral	.026	—	.016	—
Horticulture	.060	.015	.025	.013
Fishing & forestry	.067	.019	.029	.022
Gold & o'r mining	.072	.018	.035	.008
Coal mining	.037	—	.022	—
Cereal foods	.053	—	.023	—
Milk processing	.051	.001	.019	.002
Meat processing	.058	.008	.023	.008
Beer & tobacco	.027	.013	.008	.001
O'r processed foods	.029	.081	.012	.064
Woodworking	.037	.061	.019	.062
Paper & printing	.013	.088	.005	.082
Mineral oil	.020	.472	.005	.060
Chem. fertilizer	.048	.020	.020	.040
O'r chemicals	.022	.061	.008	.093
Cement, bricks, etc.	.049	.073	.020	.063
Woollen mills	.041	.009	.019	.005
Clothing & textiles	.024	.055	.008	.058
O'r manufactures	.013	.068	.007	.086
Iron & steel	.017	.180	.011	.046
Vehicle assembly	.022	.205	.010	.108
Engineering	.019	.221	.008	.112
Gas & electricity	.092	.004	.020	.001
Building & constr.	.097	.001	.056	.001
Transport & commun.	.077	.001	.030	.001
Commerce	.051	—	.013	—
O'r services	.035	—	.020	—
Unallocated	.134	.059	.076	.020

#### STRUCTURAL CHANGE

In deriving Table 18, no attempt was made to revalue transactions at constant prices. Subject to this restraint the movements in import content between 1954 and 1959 could be viewed as a measure of economic change.

Leontief considered economic change as either structural change or a dynamic process. In the first case, the variation of the dependent variables is simply related to the underlying changes in some of the basic data; in the second, the law of change itself is considered as given, i.e. built into the structure of the explanatory scheme... A dynamic theory could, for example, treat the data of the less general, static theory as its variables and thus, taking up where the latter

TABLE 20  
COMPARISON OF ACTUAL AND ESTIMATED OUTPUT IN 1954

<i>Industry</i>		<i>Output 1954</i>	<i>1954 Output estimated from 1959 coefficients</i>	<i>Index of change 1954=100</i>
		\$'000 (a)	\$'000 (a)	
1.	Cereals-sheep	95,692	98,046	102
2.	Dairying	22,425	22,408	100
3.	Pastoral	15,171	16,083	106
4.	Horticulture	27,446	26,410	96
5.	Fishing & forestry	18,153	18,721	103
6.	Gold & o'r mining	36,509	37,659	103
7.	Coal mining	8,310	6,320	76
8.	Cereal foods	32,641	30,506	93
9.	Milk processing	17,245	16,967	98
10.	Meat processing	47,085	47,388	101
11.	Beer & tobacco	60,111	60,187	100
12.	O'r processed foods	35,451	36,442	103
13.	Woodworking	46,211	44,827	97
14.	Paper & printing	21,578	22,902	106
15.	Mineral oil	40,744	42,530	104
16.	Chemical fertilizer	13,785	12,914	94
17.	O'r chemicals	27,596	31,230	113
18.	Cement, bricks, etc.	25,631	26,273	103
19.	Woollen mills	14,106	14,666	104
20.	Clothing & textiles	64,075	62,866	98
21.	O'r manufactures	22,166	21,886	99
22.	Iron & steel	5,226	5,283	101
23.	Vehicle assembly	43,428	43,702	101
24.	Engineering	186,676	179,360	96
25.	Gas & electricity	15,095	17,720	117
26.	Building & constr.	121,158	120,020	99
27.	Transport & commun.	76,034	76,229	100
28.	Commerce	150,665	153,716	102
29.	O'r services	212,039	212,847	100
30.	Unallocated	32,913	30,003	91
Total		1,535,365	1,536,111	100

(a) At 1959 prices. Based upon a 30-industry matrix.

leaves off, reduce what in the first instance appeared to be a structural change to a dynamic law.<sup>3</sup> In considering a number of measures of structural change, using the open static input-output model, Rasmussen states that '*a priori*' it would be most surprising if an application of the model would not make it inevitable to make extensive use of 'structural changes' as an 'explanation' of the (expected) deviations between the predictions of the model and the actual observations'.<sup>4</sup>

<sup>3</sup>Leontief *et al.*, 'Studies in the Structure of the American Economy', p. 17.

<sup>4</sup>P. Norregaard Rasmussen, *Studies in Inter-sectoral Relations* (Amsterdam, 1957), p. 129.

TABLE 21  
AVERAGE CHANGES IN INPUT COEFFICIENTS(a)  
1954 relative to 1959

<i>Industry</i>	<i>1</i>	<i>2</i>
1. Cereals-sheep .....	0.1243	-0.0039
2. Dairying .....	0.0030	-0.0012
3. Pastoral .....	0.0604	-0.0004
4. Horticulture .....	-0.0688	-0.0097
5. Fishing & forestry .....	-0.0784	-0.0010
6. Gold & o'r mining .....	0.0187	-0.0009
7. Coal mining .....	-0.0445	0.0002
8. Cereal foods .....	0.0825	-0.0006
9. Milk processing .....	0.0490	-0.0002
10. Meat processing .....	-0.1662	-0.0063
11. Beer and tobacco .....	0.0534	0.0004
12. O'r processed foods .....	-0.0211	0.0047
13. Woodworking .....	-0.0799	-0.0011
14. Paper & printing .....	-0.0179	0.0002
15. Mineral oil .....	0.3703	-0.0365
16. Chem. fertilizer .....	0.0656	-0.0104
17. O'r chemicals .....	-0.0127	-0.0006
18. Cement, bricks, etc. ....	-0.0147	0.0067
19. Woollen mills .....	-0.1187	-0.0064
20. Clothing & textiles .....	-0.0136	0.0000
21. O'r manufactures .....	-0.0651	-0.0012
22. Iron and steel .....	-0.2406	-0.0005
23. Vehicle assembly .....	-0.0348	0.0000
24. Engineering .....	-0.1471	0.0004
25. Gas & electricity .....	0.1796	-0.0056
26. Building & constr. ....	-0.0581	0.0006
27. Transport & commun. ....	0.0613	-0.0005
28. Commerce .....	0.1537	-0.0017
29. O'r services .....	-0.0603	-0.0008
30. Unallocated .....	0.0790	-0.0015

(a) Based on Rasmussen's index of the form:

$$\left[ 2 / \sum_{i=1}^{30} (x'_{ij} + x_{ij}) \right] \left[ \sum_{i=1}^{30} \left\{ (a'_{ij} - a_{ij}) / (a'_{ij} + a_{ij}) \right\} (x'_{ij} + x_{ij}) \right]$$

$j = 1, 2 \dots 30$

where

$a'_{ij}$  = output of industry *i* used per unit output of industry *j* in 1954  
(at 1959 prices).

$a_{ij}$  = output of industry *i* used per unit of output of industry *j* in 1959.

$x'_{ij}$  = output of industry *i* used by industry *j*, in 1954 (at 1959 prices).

$x_{ij}$  = output of industry *i* used by industry *j*, in 1959.

Deviations from zero indicate the average change in input coefficients for each of the industries shown at the left. Column 1 takes into account the changes in coefficients relating to inputs from each of the thirty intermediate industries. In column 2, the index covers inputs from the intermediate industries plus inputs in the form of value added and imports.

The overall change in import content between 1954 and 1959, when non-competitive imports are included, is shown in column 7 of Table 18. The 98 per cent increase in import content of the pastoral industry is accounted for by the movement of cattle from the Northern Territory into the Kimberleys. With the exception of the dairying, iron and steel, and commerce industries, which show a reduction in import content, and the pastoral and coal mining industries which show considerable increases, there was a substantial degree of stability in the total imports embodied in final demand.

As a measure of the overall structural change between 1954 and 1959, Table 20 compares the actual 1954 output of each industry with the output obtained by applying 1954 final demands (at 1959 prices) to the 1959 matrix of interdependence coefficients in Table B2. The deviation in the value of output of the total system of industries amounts to only \$0.75 million, however the standard deviation of the differences between actual and predicted outputs for individual industries is \$2.02 million. The major differences in output requirements shown in Table 20 are those which would be expected to result from technological progress, namely a 24 per cent reduction in coal and a 17 per cent increase in gas and electricity.

A further summary measure of changes in the input coefficients is shown in Table 21. This is based upon an index developed by Rasmussen in which changes in the coefficients are indicated by deviations from zero. In this case the direct coefficients for 1954 and 1959 are compared column by column, using Table B1 and a similar table for 1954 computed at 1959 prices. From the viewpoint of average changes in the input coefficients, the greatest structural changes are shown to have occurred in the mineral oil, iron and steel, and gas and electricity industries.

At least for this interval of five years the results in Tables 20 and 21 appear to confirm the observation that 'while it is difficult to attribute observed changes in the values of input coefficients to particular causes, the general consensus is that changes in technology exert only a gradual influence upon the coefficients and affect principally the inputs of energy and the inputs of primary factors such as labour and capital'.<sup>5</sup>

#### PROJECTIONS

As an aid in developing and implementing economic policy in areas which require a long-range view of future patterns of regional economic growth, projections beyond the present model are desirable. The following estimates of the level of output of each industry in 1970, for example, have been derived to illustrate the activity generated by growth in the rural sector—assuming that final demand deliveries from the non-rural industries were to remain at their 1959 level.

<sup>5</sup>United Nations Report by the Secretary-General. 'Problems of Input-output Tables and Analysis', (mimeo, New York, 1965), p. 11.

The new vector for 1970 final demands has been applied to the 1959 interdependence coefficients of Table A2 to estimate the output required from each industry to meet these demands.

The level of personal consumption in 1970 has been projected from national estimates assuming an increase in productivity of 2.5 per cent per annum. Personal expenditure on foodstuffs and commodities produced by the rural (and fishing) industries were then adjusted to 1969-70 as follows: The Western Australian component of personal expenditure on foodstuffs was calculated as 7 per cent of Coomb's national estimate.<sup>6</sup> The estimate of \$202.6 million (at 1959 prices) for total Western Australian expenditure on food was then distributed to the major classes of food by reference to the linear trend (at constant prices) recorded for each class in the *National Accounts*. The distribution to individual commodities within each class was made in proportion to similar expenditures in 1959. For items of rural output other than foodstuffs, personal outlay was estimated from expenditures per *caput*, assuming a population in 1970 of 909,000.

The volume of farm exports, in 1970, was estimated from a projection of rural output indicating that the likely increase in output from the agricultural districts alone, between 1964 and 1970, is of the order of 18 per cent for cereals and 50 per cent for livestock.<sup>7</sup> Rural exports were calculated as the residual sale after

TABLE 22  
MAJOR RURAL EXPORTS, WITH ESTIMATES FOR 1970  
(1958-59 prices)

Commodity	Exports	Estimated	% Change
	1958-59	exports 1970	1958-59 to 1970
	\$m.	\$m.	%
Wheat	62.28	93.00	49
Barley	2.80	2.80	0
Oats	7.68	4.00	-48
Flour	6.34	4.25	-33
Greasy wool	45.44 (a)	94.28	107
Scoured wool & tops	17.61	19.44	10
Hides & skins	3.47	6.39	84
Livestock	1.25	1.25	0
Fish, crayfish & shell	6.85	8.58	25
Beef & veal	4.81	9.38	95
Mutton & lamb	3.56	3.74	5
Pigmeats	1.54	1.54	0
Orchard & vine fruits	4.64	5.20	12
Market garden produce	1.29	1.80	40
Eggs	0.76	0.76	0
Butter, cheese & proc. milk	1.37	0.56	-59
Total	171.69	256.97	50

(a) Including stocks.

<sup>6</sup>H. C. Coombs, *Some Ingredients for Growth* (Perth, 1963), p. 18.

<sup>7</sup>Parker, 'An Interindustry Study of the Western Australian Economy', Appendix p. ix.

TABLE 23  
ESTIMATES OF SALES FROM THE RURAL INDUSTRIES IN 1970 AND  
ASSOCIATED CHANGES IN OUTPUT OF OTHER INDUSTRIES

Industry	Final demand		Total net output		Incr. to 1970
	1959	1970	1959	1970	
	\$'000	\$'000	\$'000	\$'000	%
1. Wheat-sheep	94,826	133,492	126,263	172,446	37
2. South. agric.	18,319	49,966	27,644	61,679	123
3. Dairying	12,541	17,826	27,729	40,052	44
4. Pastoral	8,558	11,486	11,840	15,289	29
5. Kimberley	1,201	1,356	4,237	6,056	43
6. Orch. & vine.	10,927	14,118	11,578	14,860	28
7. Market gard.	12,122	16,112	12,442	16,443	32
8. Poultry	4,044	5,514	5,469	7,632	40
9. Fishing	9,644	13,154	10,432	14,092	35
10. Forestry	3,301	3,301	13,313	13,639	2
11. Gold mining	27,387	27,387	28,460	29,085	2
12. Coal mining	172	172	7,819	8,464	8
13. Other mining	7,574	7,574	13,897	14,347	3
14. Grain milling	12,412	10,662	20,067	20,060	0
15. Bakeries	16,434	16,434	16,434	16,434	0
16. Milk processing	15,700	20,950	17,501	22,989	31
17. Meat processing	47,660	76,088	50,750	79,743	57
18. Wineries, etc.	9,856	14,032	10,043	14,244	42
19. Beer, tobacco	54,577	54,577	56,548	56,753	0
20. O'r processed foods	28,259	28,259	33,992	35,085	3
21. Animal oils	2,719	2,719	4,664	5,058	8
22. Saw mills	8,509	8,509	33,145	34,193	3
23. Furniture	14,762	14,762	15,545	15,599	0
24. Paper & printing	11,519	11,519	29,408	31,501	7
25. Mineral oil	64,879	64,879	103,296	111,805	8
26. Fertilizers	-279	-279	18,046	28,872	60
27. O'r chemicals	20,693	20,693	40,188	42,392	5
28. Cement goods	217	217	8,664	8,875	2
29. Lime, plaster	267	267	4,113	4,311	5
30. Bricks, glass, etc.	2,945	2,945	12,308	12,625	3
31. Leather goods	12,695	12,695	12,898	12,909	0
32. Woollen mills	22,038	24,098	23,924	25,999	9
33. Clothing	42,381	42,381	45,074	45,350	1
34. O'r textiles	1,534	1,534	6,333	7,990	26
35. O'r manufactures	13,926	13,926	25,211	27,113	8
36. Iron & steel	3,342	3,342	7,949	8,078	2
37. Ferrous wire	997	997	5,080	5,232	3
38. Ferrous pipes	79	79	6,448	6,638	3
39. Vehicle assembly	45,231	45,231	45,988	46,040	0
40. O'r engineering	83,735	83,735	158,420	169,167	7
41. Gas	2,173	2,173	2,921	2,964	1
42. Electricity	6,773	6,773	19,509	20,692	6
43. Water	611	611	6,352	6,668	5
44. Dwelling rent	52,800	52,800	52,800	52,800	0
45. Building, etc.	92,854	92,854	112,000	113,929	2
46. Rail transport	3,380	3,380	29,358	35,211	20
47. Road transport	9,958	9,958	30,555	34,048	11
48. Air & shipping	3,369	3,369	17,349	18,943	9
49. Communication	3,288	3,288	12,827	13,957	9
50. Commerce	—	—	172,650	197,088	14
51. Finance	14,162	14,162	27,308	28,518	4
52. Personal & govt.	133,380	133,380	155,442	158,258	2
53. Business serv.	1,236	1,236	46,580	52,097	12
54. Unallocated	448	448	34,325	36,271	6
Total	1,072,135	1,201,141	1,833,136	2,080,583	13

personal consumption and intermediate demands had been met from the estimated 1970 output of each commodity. For commodities exported in processed form the projection was based upon export trends. An analysis of rural exports revealed that the prices received for the major exports have been consistently higher than the prices applying in 1958-59, but in view of a likely deterioration in the terms of trade the latter prices were retained for the projected 1970 exports. The estimates for major items of rural export (overseas and eastern states) are shown in Table 22. The overall growth, between 1959 and 1970, is shown to be 50 per cent.

The new vector of final demand deliveries was then applied to the interdependence coefficients of Table A2 to derive Table 23 showing the output required from the industries listed at the left to meet the 1970 requirements of the expanded rural and fishing sectors. The projected growth in output of the wheat-sheep industry, between 1959 and 1970, is shown in Table 23 to be 37 per cent. This represents a growth in marketed output of \$46 million (at 1959 prices). For the dairying, pastoral, Kimberley and horticultural industries, production increases of 30 to 40 per cent are indicated. The output generating effect of this expansion upon the rural processing industries and other industries servicing the rural sector is likewise shown in Table 23. The expansion is not confined to industries which directly service the rural industries, however. The output of coal, for example, is shown to increase by 8 per cent, although there are no direct sales of coal to the rural industries. In the manufacturing sector the overall expansion amounts to 10 per cent.

Due to changes in the cost structure of the rural industries, the 60 per cent increase indicated for chemical fertilizers is likely to understate the growth in output of this industry. Nevertheless, Table 23 does provide an index of the stimulus which an expanding rural production will have upon the commercial, transport, manufacturing and services industries. It does not indicate the additional impact of the investment programme needed if each industry is to achieve the higher level of output; nor does it take account of the stimulus of higher levels of income.

Table A2 forms a base on which further work is warranted to project the growth of the entire regional economy. Provision should obviously be made, however, for industries which have commenced operation since 1959 or which are shortly to be established. At the same time, it would be reasonable to anticipate changes in some input coefficients. In the case of the rural industries, for example, there will be changes in the cost structure (and product mix), if only because of the recent adoption of much heavier rates of set stocking. The usefulness and validity of projections beyond the present model will inevitably depend upon the judgment exercised in incorporating adjustments of this nature.

## SUMMARY AND FURTHER DEVELOPMENT

It is now thirty years since the first input-output tables dealing with the United States economy were compiled by Leontief. During this period, many national tables have been constructed for both developed and developing economies, and the technique has been further adapted for the purposes of regional analysis. Although several tables for 1958-59 have been released by the Commonwealth Statistician and work is in progress on a further national table for 1962-63, official interest has lagged in Australia. The input-output tables outlined in this report represent the only attempt to apply the technique at a regional level in Australia. They present, for the first time, an overall view of the type, size and interdependence of economic activity within the state of Western Australia.

Input-output statistics are closely related to systems of national (and regional) income accounting. There are, however, important distinctions. National income statistics deal with the end products of economic activity and show the use made in consumption, investment, etc., of the output of goods and services, together with the distribution of incomes arising from this production. An input-output table, on the other hand, can incorporate the broad aggregates of the national accounts; but it identifies at the same time the multitude of commodity flows between industries, and between industries and the trade sectors, underlying total production. From this point of view the Western Australian input-output tables may be viewed as extending and complementing the pioneering work on regional income undertaken by earlier researchers.

In the input-output tables so far completed for Western Australia, transactions have been identified by either 54 or 30 industrial groupings. Emphasis has been placed upon the primary and primary processing industries and their role in the economic growth of the economy. In Table A, for example, the primary sector has been divided into five regionally defined rural industries; three rural industries classified by commodity; and five extractive industries classified on an establishment basis. The remaining 41 industries in the manufacturing, building and servicing sectors have also been classified on an establishment basis. Of these, 13 are devoted predominantly to processing the products of local rural and extractive industries.

In Table A, the transactions between industries are shown at purchasers' values for the year 1958-59. The net output of each industry is distributed, along the



relevant row, to other industries for further processing and to a final demand comprising personal consumption, private fixed capital, public authority expenditure, inventories and foreign and eastern states exports. Competitive imports have been distributed to consumers and to consuming industries through the domestic industries producing the counterpart local product. Non-competitive imports which find intermediate usage as raw materials, on the other hand, have been charged directly to the industry where they first enter into domestic production. This treatment of competitive imports can be justified on the grounds that information is not available to distinguish the relative proportions of domestic production and imports used by each industry. For a region such as Western Australia, where imports form a high proportion of supplies, however, this distinction can be important. It is hoped that in any further work in this field an attempt will be made to isolate those transactions involving local production.

For a number of industries in the manufacturing field, the classification has been determined by the inadequacy of many of the statistics. In Table A, the failure to further disaggregate 'other chemicals', for example, is due both to the inadequate statistical coverage and the limitations imposed by the secrecy provisions of the statistics act in Western Australia. The present study has nevertheless shown the input-output method to be an important means of integrating, in a meaningful array, the more readily available regional statistics, while providing a framework for later incorporation of data from secondary sources.

In the form of Table A, each column of the input-output matrix identifies the goods and services purchased by the relevant industry, together with the value added by production in that industry. A consolidated version of Table A would show, for example, that the rural industries jointly purchased 6 per cent of the output of the manufacturing industries, 3 per cent of the output of the building and construction industries, and 7 per cent of the output of the service industries. In return, the rural industries jointly depended upon the manufacturing industries for 26 per cent of their sales, and a further 66 per cent went to final consumers, including the export market.

The format of Table A is of limited use, however. Another measure of the interdependence between industries is obtained by describing the cost structure of each industry in terms of a common unit, input per unit of output. Each \$100 of rural output, for example, could be shown to require \$8 of rural inputs; negligible inputs from the extractive industries (fishing, forestry and mining); \$22 of inputs from the manufacturing industries; less than \$2 from building and construction; and \$17 from the service industries. The remaining costs adding up to the \$100 of output are wages, \$9; non-wages, \$24; depreciation, \$14; indirect taxes, \$2; and competitive imports, \$2. These *input-output* coefficients are shown for a matrix of 30 industries in Table B1.

The information contained in each column of Table B1 is confined to the *direct* relationships between industries—the inputs required per unit of output of the selected industry. Having classified transactions in this form, however, it is possible by matrix inversion to derive Table B2 in which the *interdependence* coefficients express the essential characteristics of an input-output table—the

*direct* and *indirect* connections between industries. By reference to these *interdependence* coefficients it could be shown, for example, that although there were no sales of coal to the rural industries in 1959, the cereals-sheep industry was responsible for 7 per cent of the market for coal. In the same way that Table B2 shows the *interdependence* coefficients relating to the 30-industry matrix of Table B1, Table A2 gives the *interdependence* coefficients for Table A covering all 54 industries.

The value of an input-output table lies, initially, in its comprehensive description of the economy. Beyond this, however, it provides a means of identifying the relationships between levels of final demand, the output required from each industry and the ultimate inputs as wages, non-wages, imports and the other forms of value added in the process of production. The Western Australian input-output tables have been used to throw new light on the role of the primary industries in inducing economic growth elsewhere in the economy. Each \$100 increase in final demand for the products of the rural sector, for example, could be shown to directly and indirectly generate about \$32 of manufacturing output and \$33 of services. Elsewhere<sup>1</sup> it is suggested that these inter-relationships, in association with the rapid expansion in the primary sector, underlie Western Australia's past ability to maintain its industrial position, *vis-a-vis* the other Australian states, despite many disadvantages in the industrial sphere.

Other applications in this report have been concerned with an analysis of the final market for selected industries; the import content of exports; the import, wage and non-wage content of the final demand deliveries from each industry; and the gross national product contribution of individual industries to the export, investment and personal consumption bill of goods. In each case the exercise has made use of the input-output tables for 1958-59. Other tables have been compiled for 1953-54 however, and these provided a means of assessing the variance over time in the input coefficients. For this period of five years, changes in coefficients were found to be relatively minor and could be readily explained by seasonal influences or known changes in the industrial structure of the economy.

A final application has made use of a Western Australian input-output table to assess the output required from the system of industries to meet the 1970 requirements of an expanded rural sector. The tables could as easily be used to identify many other aspects of the structure of the state's economy. In particular, there is a need for further and more detailed projections beyond the present model, as an aid in developing and implementing economic policy in areas which require a long range view of future patterns of regional growth. It is hoped that the standardized data collection and special statistical collections needed for national input-output tables will provide the means and incentive for the construction of further regional tables. In Western Australia, further work is warranted to extend and refine the present model as a base from which projections may be made for regional economic planning. There is a tendency for

<sup>1</sup>M. L. Parker and A. G. Yeow, 'Economic Growth in Western Australia', *Australian Journal of Agricultural Economics*, Vol. 10, No. 1, 1966, pp. 39-51.

economic investigation at the state level to centre about specific projects, with little quantitative awareness of their effect on the wider economy. Current examples of project planning in Western Australia concern iron ore extraction, paper milling and irrigated cropping. This *ad hoc* approach to planning is to be expected because of the paucity of statistics and because the scope for wider economic planning is limited by national control of monetary, fiscal, immigration and trade policies. Nevertheless, there is a need to investigate the wider implications of development projects by their integration within the context of the total regional and national economies. The further development of input-output statistics shows promise of providing the necessary framework for this integration of specific and general policies.

## APPENDIX

### INDUSTRY CLASSIFICATION

#### 1. 54 x 54 TABLES

By aggregating the recorded statistics for local government districts, the major forms of extensive agriculture were identified as 'wheat-sheep', 'southern agriculture', 'dairying', 'pastoral' and 'Kimberley'. The regions delineated in this way do not coincide with the official 'statistical divisions', and it was therefore necessary to regroup many of the recorded statistics by reference to unpublished data made available by the Government Statistician.

All other rural and non-rural industries were classified on a commodity or establishment basis as follows:

Industry	Statistical class	Principal activities & commodities covered
1. Wheat-sheep		Wheat, oats, barley, greasy wool, hides, skins, livestock.
2. Southern agriculture		Wheat, oats, barley, greasy wool, livestock, flax, small seeds.
3. Dairying		Milk, livestock, tobacco leaf, greasy wool.
4. Pastoral & trapping		Greasy wool, livestock, hides, skins, rabbit carcasses.
5. Kimberley		Livestock, greasy wool.
6. Orchards & vineyards		Fruit, dried vine fruit, honey.
7. Market gardens		Vegetables, plantation fruits, nursery products.
8. Poultry		Eggs, poultry.
9. Fishing		Fish & crayfish, pearls & pearl shell.
10. Forestry		Logging & all activities of the Forests Department.
11. Gold mining		Refined gold, silver & other minerals.

- |                              |  |  |
|------------------------------|--|--|
| 12. Coal mining              |  | Black coal.  |
| 13. Other mining & quarrying |  | Iron ore, limestone & stone, asbestos, other metal & non-metal mining & quarrying.                                     |
| 14. Grain milling            | 9.1, 9.2, 9.3  | Flour, cereal foods, bran & pollard.   |
| 15. Bakeries                 | 9.5, 9.6   | Bread, biscuits, other bakery products.  |
| 16. Milk processing          | 9.13, 9.14, 9.15, 9.19, 9.30                                 | Butter, cheese, ice cream, ice, refrigeration services & processed milk.   |
| 17. Meat processing          | 9.12, 9.17, 9.31   | Livestock slaughtering & sales of meat, tinned meat & fish, bacon, smallgoods, hides, skins & animal by-products.      |
| 18. Wine & aerated waters    | 9.21, 9.24   | Wine & spirits, fruit juice, aerated waters.   |
| 19. Beer & tobacco           | 9.22, 9.26, 9.28   | Beer, malt & tobacco manufactures.   |
| 20. Other processed foods    | 9.8, 9.9, 9.10, 9.11, 9.16, 9.18, 9.20, 9.27                 | Sugar refining, confectionery, essential oils, margarine, preserved fruit & vegetables, jams & other processed foods.  |
| 21. Animal oils              | 3.7, 3.8   | Whale oil & other animal oils, tallow, animal by-products & fertilizers.   |
| 22. Sawmills                 | 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.10, 10.11       | Sawn timber, dressed timber, floorboards, plywood, hardboard, joinery, boxes, other wood products.                     |
| 23. Furniture                | 10.8, 10.9, 11.1, 11.2, 11.3, 11.4, 11.5                     | Furniture, floor coverings & furnishings.  |
| 24. Paper & printing         | 12.1, 12.2, 12.3, 12.4, 12.6, 12.7, 12.8, 12.9, 12.10, 12.11 | Paper, paper board, stationery paper, cartons. Also printing, publishing, photographic & allied trades.                |
| 25. Mineral oil              | 3.6  | Petroleum products, bitumen.   |
| 26. Chemical fertilizer      | 3.10   | Superphosphate, other fertilizers.   |
| 27. Other chemicals          | 3.1, 3.2, 3.4, 3.5, 3.9, 3.11, 3.12                          | Essential oils, vegetable oils, soaps, explosives, matches, paints, paint pigments, other chemicals & pharmaceuticals. |

28. Cement goods	1.7, 1.8, 1.9	Cement, asbestos cement sheets, other cement goods.
29. Lime & plaster	1.4, 1.5, 1.6, 1.10	Lime, plaster sheets, marble & treated quarry products, other plaster and cement goods.
30. Bricks, glass & pottery	2.1, 2.2, 2.3, 2.4	Clay bricks & tiles, other bricks, pottery, glass bottles, other glass.
31. Leather goods	7.3, 7.4, 7.6, 8.10, 8.11	Leather, leather goods, footwear, shoe repairs.
32. Woollen mills	6.3, 7.2	Scoured wool, wool tops, woollen fabrics, sheep pelts, wool yarn, wool waste.
33. Clothing	6.4, 7.1, 8.1, 8.2, 8.3, 8.4, 8.5, 8.7, 8.8, 8.9, 8.12, 8.13	Clothing, dressed furs.
34. Other textiles	6.7, 6.8, 6.9, 6.10, 6.11	Canvas goods, cordage, flax fibre, bags & sacks.
35. Other manufactures	5.1, 5.2, 5.3, 13.1, 13.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.10	Games & toys, tyres & tubes, rubber goods, tyre retreading, brooms & brushes, jewellery, scientific instruments & other miscellaneous manufactures.
36. Iron & steel	4.1	Pig iron, other steel products.
37. Ferrous wire	4.26	Ferrous wire & wire products, miscellaneous machinery.
38. Ferrous pipes	4.25	Ferrous pipes.
39. Vehicle assembly	4.9 (part), 4.11	Motor body building & motor vehicle assembly.
40. Other engineering	4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9 (part), 4.10, 4.13, 4.14, 4.15, 4.17, 4.18, 4.19, 4.20, 4.22, 4.24, 4.27, 4.30, 4.32, 4.33	Founding & casting, sheet metal working, motor vehicle repairing, marine engineering, assembly & construction of tractors & agricultural machinery, & production, assembly or repair of stoves, refrigerators, domestic machines, mining & earthmoving machinery, machine tools, I.C. engines, electrical equipment, aircraft, rolling stock and miscellaneous machinery.
41. Gas		Manufacture & distribution of gas & by-products.

42. Electricity	Electric light & power generation & supply.
43. Water	Water, irrigation & sanitary services.
44. Dwelling rent	Actual & imputed rent on residential dwellings.
45. Building & construction	All new & repair building & construction including maintenance.
46. Rail transport	
47. Road transport	Including tramways & ferries.
48. Airways & shipping	
49. Communication	
50. Commerce	Including wholesaling, retailing, storage, and marketing of primary products.
51. Finance	Banks & hire purchase companies, life & general insurance and other finance.
52. Personal & govt services	Entertainment, education, hair-dressing, domestic, dry cleaning, meal & accommodation and other professional services, and government current services n.e.i.
53. Business services	Advertising, printing and stationery, accountancy and audit fees, bank charges, postage and telephones, etc.
54. Unallocated	

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## 2. 30 x 30 TABLES

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Industry	Comprising activities classified in 54 x 54 tables as:
1. Cereals-sheep	Wheat-sheep, southern agriculture.
2. Dairying	Dairying.
3. Pastoral	Pastoral, Kimberley.
4. Horticulture	Orchards & vineyards, market gardens, poultry.

5. Fishing & forestry	Fishing, forestry.
6. Gold & o'r mining	Gold mining, other mining & quarrying.
7. Coal mining	Coal mining.
8. Cereal foods	Grain milling, bakeries.
9. Milk processing	Milk processing.
10. Meat processing	Meat processing, animal oils.
11. Beer & tobacco	Beer & tobacco.
12. O'r processed foods	Wine & aerated waters, other processed foods.
13. Woodworking	Sawmills, furniture.
14. Paper & printing	Paper & printing.
15. Mineral oil	Mineral oil.
16. Chemical fertilizer	Chemical fertilizer.
17. Other chemicals	Other chemicals.
18. Cement, bricks, etc.	Cement goods, lime and plaster, bricks, glass & pottery.
19. Woollen mills	Woollen mills.
20. Clothing & textiles	Leather goods, clothing, other textiles.
21. O'r manufactures	Other manufactures.
22. Iron & steel	Iron and steel.
23. Vehicle assembly	Vehicle assembly.
24. Engineering	Other engineering, ferrous wire, ferrous pipes.
25. Gas & electricity	Gas, electricity.
26. Building & construction	Building & construction.
27. Transport & communication	Rail transport, road transport, airways & shipping, communication.
28. Commerce	Commerce.
29. Other services	Water, dwelling rent, finance, personal & government services, business services.
30. Unallocated	Unallocated.



TABLE "A2"  
WESTERN AUSTRALIA 1958 - 59  
DIRECT AND INDIRECT REQUIREMENTS PER \$ OF SALES TO FINAL DEMAND

OUTPUTS OF	No.	INPUTS INTO								INDIRECT REQUIREMENTS PER \$ OF SALES TO FINAL DEMAND																														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31								
		WHEAT/SHEEP	SOUTHERN AGRICULTURE	DAIRYING	PASTORAL & TRAPPING	KIMBERLEY	ORCHARDS & VINEYARDS	MARKET GARDENS	POULTRY	FISHING	FORESTRY	GOLD MINING	COAL MINING	OTHER MINING & QUARRYING	GRAIN MILLING	BAKERIES	MILK PROCESSING	MEAT PROCESSING	WINE & AERATED WATERS	BEER & TOBACCO	OTHER PROCESSED FOODS	ANIMAL OILS	SAW MILLS	FURNITURE	PAPER & PRINTING	MINERAL OIL	CHEMICAL FERTILIZER	OTHER CHEMICALS	CEMENT GOODS	LIME & PLASTER	BRICKS, GLASS & POTTERY	LEATHER GOODS								
WHEAT/SHEEP	1	1.000333	.007048	.042785	.020995	.005256	.006796	.001856	.253177	.027891	.000932	.000468	.000132	.000309	.511985	.113296	.012439	.227880	.000539	.009866	.001940	.026683	.000337	.000527	.000151	.000109	.000250	.000628	.000175	.000367	.000262	.009710								
SOUTH. AGRIC.	2	.002502	1.001240	.007225	.000694	.000165	.000400	.001332	.021992	.008810	.000622	.000316	.000160	.000246	.043844	.010526	.028238	.063373	.000305	.003914	.000501	.008112	.000248	.005530	.000108	.000098	.003173	.000571	.000222	.032017	.000205	.002898								
DAIRYING	3	.000353	.000422	1.001887	.000359	.000180	.000866	.000995	.003758	.023778	.000598	.000408	.000186	.000286	.006290	.007974	.277724	.190754	.001121	.006070	.001234	.022551	.000447	.000998	.000458	.000422	.000273	.001169	.000424	.000247	.000650	.008498								
PASTORAL	4	.000022	.000032	.000070	1.000015	.000008	.000022	.000030	.000071	.001192	.000154	.000070	.000020	.000052	.000056	.000140	.000033	.009654	.000029	.000017	.000017	.001141	.000046	.000077	.000011	.000008	.000045	.000033	.000019	.000022	.000028	.000503								
KIMBERLEY	5	.000020	.000026	.000265	.000017	1.000008	.000040	.000045	.000297	.006968	.000136	.000068	.000016	.000043	.000125	.000734	.000099	.057083	.000056	.000044	.000049	.006665	.000049	.000065	.000020	.000017	.000022	.000129	.000024	.000017	.000040	.002342								
ORCHARDS ETC.	6	.000038	.000050	.000057	.000028	.000015	1.000540	.000057	.000045	.000033	.000065	.000156	.000048	.000055	.000046	.010440	.000162	.000129	.019134	.000060	.006991	.000033	.000037	.000076	.000070	.000025	.000025	.001676	.000036	.000027	.000057	.000051								
MARKET GARD.	7	.000014	.000017	.000028	.000013	.000009	.000642	1.000034	.000034	.000031	.000020	.000028	.000010	.000014	.000030	.000902	.000186	.000138	.000479	.000065	.009211	.000028	.000015	.000034	.000017	.000015	.000010	.000230	.000016	.000010	.000024	.000033								
POULTRY	8	.000008	.000010	.000105	.000007	.000003	.003303	.006207	1.000118	.002772	.000052	.000027	.000006	.000016	.000049	.010067	.000041	.022708	.000088	.000018	.000100	.002651	.000019	.000025	.000008	.000007	.000008	.000058	.000009	.000007	.000016	.000930								
FISHING	9	.000060	.000085	.002913	.000044	.000019	.000141	.000135	.005213	1.000538	.000459	.000251	.000080	.000149	.001915	.000631	.000873	.004104	.000161	.000101	.000390	.133021	.000205	.000480	.000046	.000039	.000111	.000794	.000068	.000051	.000114	.000275								
FORESTRY	10	.001714	.001792	.002600	.002737	.000651	.015269	.009648	.002145	.000551	1.001560	.023847	.024287	.018015	.001488	.002507	.004417	.001803	.003386	.000846	.002757	.001705	.242527	.042645	.000564	.000497	.003289	.008697	.004403	.005997	.006479	.001112								
GOLD MINING	11	.004858	.009946	.003562	.000117	.000171	.001526	.004865	.001464	.000307	.000113	1.000047	.000015	.000050	.002941	.000708	.001258	.002369	.000055	.000114	.000080	.000293	.000035	.000093	.000008	.000009	.057557	.000047	.000018	.000331	.000023	.000125								
COAL MINING	12	.004630	.005129	.003820	.002414	.000679	.004898	.008035	.005599	.001679	.007604	.025840	1.023726	.017423	.007341	.006623	.007658	.005261	.008196	.004169	.004829	.005338	.008603	.004522	.002541	.002719	.012500	.003004	.016472	.010527	.037069	.002821								
OTHER MINING	13	.003254	.005730	.004944	.002535	.000651	.003097	.004141	.002149	.000389	.001099	.002135	.000216	1.000458	.002065	.000866	.001990	.002248	.000976	.000612	.001507	.000454	.000445	.000303	.000164	.000100	.029550	.000280	.175744	.127658	.037078	.000336								
GRAIN MILLING	14	.000383	.000549	.074063	.000041	.000019	.001441	.002363	.367409	.002797	.000070	.000048	.000019	.000032	1.000693	.214672	.021051	.022570	.000237	.000478	.002434	.002660	.000045	.000096	.000076	.000038	.000029	.000168	.000041	.000040	.000062	.000984								
BAKERIES	15	-	-	-	-	-	-	-	-	-	-	-	-	-	1.000000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
MILK PROC.	16	.001020	.001181	.002329	.001072	.000541	.002583	.002994	.003700	.002162	.000518	.000634	.000451	.000495	.004082	.007921	1.002228	.003212	.003345	.003171	.003613	.001348	.000987	.002803	.001391	.001299	.000706	.002655	.001204	.000654	.001833	.002563								
MEAT PROC.	17	.000324	.000436	.004636	.000295	.000138	.000694	.000769	.005199	.122313	.002284	.001142	.000267	.000715	.002166	.012864	.001726	1.002041	.000968	.000757	.000847	.116990	.000834	.001092	.000340	.000302	.000348	.002256	.000405	.000283	.000693	.041013								
WINERIES ETC.	18	.000133	.000159	.000207	.000126	.000078	.000237	.000242	.000246	.000137	.000107	.000157	.000140	.000145	.000199	.000335	.000202	.000271	1.000248	.000222	.000185	.000209	.000198	.000254	.000176	.000130	.000133	.000190	.000231	.000180	.000218	.000206								
BEER, TOBACCO	19	.001220	.001485	.002428	.001075	.000740	.002470	.001486	.001709	.000829	.001575	.001936	.001689	.001806	.001907	.003248	.001902	.002081	.001938	1.001141	.012273	.002124	.002222	.001765	.001558	.000980	.001420	.000986	.002459	.002099	.001910	.001297								
O'R PROC. FOODS	20	.001139	.001415	.002612	.001239	.000874	.069197	.003327	.003482	.003309	.001526	.001089	.000569	.000960	.002959	.098017	.020049	.014754	.051465	.007021	1.003159	.002988	.001361	.003059	.001547	.001434	.000929	.003309	.001474	.000885	.002102	.003270								
ANIMAL OILS	21	.000446	.000632	.021869	.000325	.000139	.001045	.001002	.039210	.000966	.003403	.001862	.000596	.001105	.014396	.004437	.006544	.005642	.001189	.000748	.002925	1.000947	.001529	.003596	.000339	.000289	.000831	.005938	.000501	.000380	.000842	.001038								
SAW MILLS	22	.005215	.004784	.008207	.009789	.002226	.061281	.027352	.007146	.001739	.004485	.007420	.016533	.008991	.004378	.008901	.016598	.005710	.011987	.002614	.010176	.006120	1.004350	.175217	.001502	.001427	.005307	.007172	.005127	.015351	.020932	.003590								
FURNITURE	23	.000249	.000256	.000520	.000419	.000139	.000411	.000484	.000592	.000285	.000110	.000117	.000179	.000110	.000352	.000641	.000397	.000559	.000545	.000498	.000379	.000219	.000194	1.000453	.000224	.000213	.000157	.000418	.000222	.000125	.000303	.000406								
PAPER, PRINT.	24	.011921	.015988	.016012	.009184	.005976	.028818	.016542	.018707	.008636	.015169	.016748	.012694	.014331	.023223	.046285	.023918	.022382	.015473	.012320	.020992	.016982	.017648	.016781	1.012796	.008603	.032117	.022241	.041077	.015860	.017609	.016774								
MINERAL OIL	25	.066190	.080073	.060478	.057684	.048291	.070903	.078245	.066697	.095272	.025950	.035964	.025430	.052554	.053493	.046489	.038912	.056864	.030721	.025867	.021154	.065283	.025627	.026831	.012073	1.013286	.022541	.023009	.079597	.181962	.039901	.021981								
FERTILIZERS	26	.084042	.172482	.061539	.001928	.002851	.026207	.084332	.025227	.005234	.001224	.000563	.000114	.000361	.050816	.012146	.021684	.040901	.000814	.001895	.001305	.004964	.000365	.001139	.000086	.000069	1.000649	.000714	.000150	.005609	.000243	.001928								
O'R CHEMICALS	27	.016522	.022572	.020737	.010409	.004166	.032901	.017725	.009233	.004290	.031619	.088189	.024848	.027439	.012885	.009495	.010957	.012330	.031184	.004276	.013046	.004988	.014164	.030297	.013369	.007368	.009303	1.004080	.011979	.010221	.022803	.014516								
CEMENT GOODS	28	.001141	.000944	.002823	.003755	.000848	.010947	.008369	.002074	.000225	.000153	.008189	.000140	.000154	.000743	.000549	.000929	.001115	.000416	.000204	.000304	.000293	.000192	.000217	.000150	.000108	.000591	.000174	1.000210	.003596	.000356	.000208								
LIME, PLASTER	29	.000602	.000626	.011153	.001626	.000381	.000239	.000273	.001033	.000398	.002717	.001166	.000204	.000773	.000566	.000406	.003299	.002482	.000403	.000269	.000162	.000470	.000781	.000295	.000119	.000088	.000668	.000237	.000268	1.000249	.000448	.000501								
BRICKS, GLASS ETC.	30	.001271	.001077	.002912	.003710	.000886	.005275	.001069	.002217	.000379	.000441	.000510	.000347	.000455	.000957	.001475	.0																							



TABLE "B2"

WESTERN AUSTRALIA 1958 - 59

## DIRECT AND INDIRECT REQUIREMENTS PER \$ OF SALES TO FINAL DEMAND

INPUTS INTO	OUTPUTS OF	INDUSTRIES																								OTHER SERVICES					
		CEREALS-SHEEP	DAIRYING	PASTORAL	HORTICULTURE	FISHING & FORESTRY	GOLD & OTHER MINING	COAL MINING	CEREAL FOODS	MILK PROCESSING	MEAT PROCESSING	BEER & TOBACCO	OTHER PROCESSED FOODS	WOODWORKING	PAPER & PRINTING	MINERAL OIL	CHEMICAL FERTILIZERS	OTHER CHEMICALS	CEMENT, BRICKS, ETC.	WOOLLEN MILLS	CLOTHING & TEXTILES	OTHER MANUFACTURES	IRON & STEEL	VEHICLE ASSEMBLY	ENGINEERING	GAS & ELECTRICITY	BUILDING & CONSTRUCTION	TRANSPORT & COMMUNICATION	COMMERCE	OTHER SERVICES	UNALLOCATED
	No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
CEREALS-SHEEP	1	1.00077	.03823	.01721	.04109	.01553	.00130	.00061	.34040	.03731	.26201	.01382	.00390	.00508	.00030	.00024	.00184	.00263	.00576	.53739	.02294	.00196	.00027	.00039	.00046	.00027	.00223	.00051	.00149	.00066	.00659
DAIRYING	2	.00046	1.00527	.00039	.00276	.01037	.00080	.00042	.00853	.27875	.17696	.00618	.00166	.00258	.00051	.00046	.00054	.00214	.00066	.01435	.00306	.00058	.00024	.00073	.00067	.00022	.00085	.00030	.00338	.00036	.00342
PASTORAL	3	.00012	.00156	1.00008	.00063	.00363	.00027	.00013	.00112	.00051	.06195	.00010	.00048	.00079	.00005	.00004	.00035	.00050	.00012	.12256	.00421	.00047	.00005	.00007	.00008	.00005	.00024	.00010	.00025	.00011	.00145
HORTICULTURE	4	.00008	.00138	.00005	1.00145	.00128	.00022	.00010	.01091	.00075	.02149	.00017	.01709	.00032	.00010	.00005	.00007	.00208	.00010	.00015	.00029	.00006	.00012	.00007	.00008	.00004	.00017	.00006	.00028	.00008	.00060
FISH. & FORESTRY	5	.00128	.00260	.00181	.00817	1.00189	.02153	.02211	.00188	.00348	.01620	.00076	.00223	.17480	.00059	.00046	.00271	.00840	.00514	.00137	.00087	.00054	.00173	.00087	.00177	.00622	.03282	.00282	.00128	.00402	.00315
GOLD & O'R MINING	6	.00949	.00816	.00215	.00584	.00096	1.00126	.00032	.00370	.00369	.00433	.00154	.00219	.00055	.00024	.00016	.08708	.00046	.09685	.00553	.00052	.00216	.03882	.00027	.00090	.00039	.04399	.00038	.00060	.00294	.00343
COAL MINING	7	.00309	.00440	.00222	.00535	.00588	.02398	1.01476	.00632	.00732	.00552	.00374	.00483	.00534	.00257	.00252	.00999	.00289	.02552	.00350	.00263	.00234	.00498	.00200	.00367	.24436	.00791	.02086	.00437	.00352	.01636
CEREAL FOODS	8	.00042	.07437	.00004	.06871	.00087	.00008	.00004	1.00160	.02115	.01467	.00049	.00309	.00022	.00008	.00004	.00005	.00036	.00006	.00128	.00026	.00005	.00003	.00006	.00006	.00002	.00008	.00003	.00029	.00004	.00031
MILK PROCESSING	9	.00104	.00252	.00094	.00313	.00125	.00060	.00037	.00603	1.00227	.00308	.00316	.00355	.00171	.00138	.00129	.00076	.00267	.00142	.00127	.00331	.00151	.00041	.00207	.00171	.00035	.00096	.00052	.00985	.00034	.00139
MEAT PROCESSING	10	.00092	.02434	.00068	.00922	.05724	.00357	.00179	.01607	.00776	1.00652	.00146	.00336	.01200	.00069	.00059	.00171	.00798	.00148	.00399	.01005	.00093	.00072	.00091	.00113	.00070	.00333	.00088	.00371	.00131	.01704
BEER & TOBACCO	11	.00031	.00138	.00024	.00074	.00050	.00054	.00039	.00113	.00083	.00078	1.00043	.00912	.00051	.00036	.00025	.00033	.00035	.00051	.00034	.00043	.00025	.00026	.00028	.00037	.00050	.00043	.00038	.00098	.00614	.00174
O'R PROC. FOODS	12	.00133	.00657	.00116	.03283	.00229	.00105	.00093	.05053	.02124	.01519	.00720	1.00363	.00221	.00159	.00152	.00116	.00345	.00177	.00161	.00382	.00175	.00062	.00234	.00197	.00058	.00125	.00205	.01090	.00101	.00317
WOODWORKING	13	.00451	.00935	.00837	.03725	.00418	.00850	.01123	.00696	.01692	.00744	.00294	.01048	1.00317	.00190	.00159	.00401	.00756	.01447	.00519	.00292	.00194	.00263	.00403	.00850	.00704	.16168	.01300	.00472	.01138	.00994
PAPER & PRINTING	14	.00633	.00987	.00340	.01490	.00743	.00701	.00404	.02594	.01731	.01364	.00766	.01467	.00692	1.00488	.00377	.02500	.01803	.01479	.00575	.00868	.00691	.00373	.00495	.00563	.00474	.00714	.00389	.02028	.05185	.02591
MINERAL OIL	15	.06941	.05676	.05454	.07379	.05408	.04005	.03085	.05081	.03830	.05621	.02644	.02413	.03159	.01208	1.01272	.02301	.02314	.07589	.05142	.02644	.01457	.01783	.01766	.01714	.12977	.05312	.06487	.06742	.01470	.03336
CHEM. FERTIL'S	16	.09976	.06078	.00239	.04989	.00277	.00057	.00014	.03501	.01959	.03719	.00178	.00132	.00080	.00009	.00007	1.00028	.00091	.00074	.05446	.00255	.00031	.00009	.00011	.00017	.00021	.00045	.00011	.00043	.00026	.00407
O'R CHEMICALS	17	.01771	.02112	.00904	.02250	.01984	.06843	.02430	.01184	.01114	.01268	.00431	.01728	.01779	.01366	.00750	.00927	1.00409	.02127	.01642	.00679	.00633	.05281	.00560	.01441	.00873	.04458	.00516	.00865	.01860	.09920
CEMENT, BRICKS, ETC.	18	.00319	.01727	.00742	.01200	.00251	.00744	.00103	.00285	.01553	.00549	.01269	.01134	.00238	.00080	.00058	.00180	.00197	1.00188	.00314	.00121	.00647	.00086	.00077	.00198	.00177	.16912	.00115	.00240	.01143	.01034
WOOLLEN MILLS	19	.00044	.00044	.00029	.00049	.00086	.00040	.00012	.00099	.00025	.00035	.00010	.00221	.00040	.00006	.00004	.00192	.00010	.00024	1.00035	.02883	.00009	.00005	.00006	.00010	.00006	.00026	.00026	.00019	.00020	.00305
CLOTH. & TEXT.	20	.01430	.01320	.00957	.01366	.01923	.00734	.00304	.02950	.00564	.00986	.00210	.00229	.01129	.00156	.00101	.06544	.00211	.00602	.01129	1.00268	.00182	.00111	.00131	.00199	.00149	.00627	.00710	.00427	.00379	.04891
O'R MANUFACTURES	21	.01896	.01419	.00398	.01228	.01799	.01277	.01149	.01074	.00766	.01125	.00402	.00472	.01239	.00231	.00301	.00787	.00409	.00636	.01174	.00603	1.00365	.00351	.01330	.00710	.00430	.01328	.03252	.00831	.01027	.07460
IRON & STEEL	22	.00114	.00187	.00180	.00087	.00118	.00390	.00110	.00076	.00103	.00118	.00039	.00054	.00068	.00025	.00025	.00100	.00029	.00653	.00098	.00032	.00030	1.00040	.00168	.00832	.00083	.02926	.00159	.00050	.00234	.00383
VEHICLE ASSEMB.	23	.00038	.00038	.00035	.00031	.00061	.00080	.00056	.00027	.00031	.00039	.00011	.00021	.00030	.00008	.00010	.00040	.00011	.00033	.00030	.00011	.00011	.00014	1.00023	.00466	.00039	.00088	.00082	.00013	.00037	.00206
ENGINEERING	24	.08315	.08390	.07554	.06682	.13278	.17444	.12209	.05851	.06828	.08427	.02502	.04636	.06595	.01845	.02209	.08676	.02396	.07146	.06604	.02430	.02433	.02963	.05084	1.02009	.08590	.19263	.17879	.02821	.08059	.45089
GAS & ELECT'Y	25	.00581	.00908	.00340	.01474	.01104	.08792	.03598	.01974	.01964	.01573	.00970	.00787	.01297	.00859	.00584	.02484	.00864	.03824	.00919	.00804	.00622	.01423	.00546	.01138	1.01046	.01797	.00723	.01613	.00733	.04572
BLDG & CONSTR.	26	.01604	.04058	.04282	.00932	.00322	.00399	.00368	.00982	.01430	.01724	.00406	.00363	.00469	.00355	.00247	.00308	.00331	.00473	.01557	.00449	.00225	.00251	.00265	.00339	.00486	1.00379	.00354	.00953	.06098	.00439
TRANSP. & COMM.	27	.08444	.10116	.06781	.08190	.16849	.14122	.32529	.07504	.06237	.08217	.02589	.05663	.11556	.02520	.05832	.19168	.03662	.08947	.06380	.03396	.03705	.08211	.03488	.03399	.09415	.05637	1.02212	.02143	.07305	.27300
COMMERCE	28	.10844	.23922	.09818	.30116	.11178	.06127	.03703	.31121	.22842	.31469	.32897	.27111	.17430	.14386	.13420	.07860	.27789	.14802	.13171	.34479	.15724	.04265	.21545	.17787	.03645	.09927	.04925	1.02745	.03517	.14335
OTHER SERVICES	29	.04692	.06799	.03665	.07115	.04013	.06485	.06039	.07874	.06170	.07797	.05662	.05359	.07271	.05689	.03900	.04943	.04929	.07517	.04958	.06072	.03444	.04108	.04074	.05362	.08031	.06068	.05811	.14293	1.01600	.06682
UNALLOCATED	30	.01417	.02680	.00761	.01429	.18244	.11186	.01318	.01971	.02445	.02110	.01509	.01603	.04037	.00717	.00500	.01713	.01835	.03462	.01254	.02245	.02320	.00837	.00928	.02391	.00999	.04766	.01161	.02440	.05346	1.01850

NOTE: This table is the inverse of an identity matrix less the matrix of direct input coefficients in Table B1.

Each column shows the total supplies directly and indirectly required from each of the 30 industries listed at the left, per \$ of sales to final demand by the industry listed above each column.

TABLE 'A'  
WESTERN AUSTRALIA  
INPUT-OUTPUT TABLE, 1958-59: PURCHASERS' VALUES. \$ '000

For the disposition of output of an industry, read the row for that industry. For the origin of input into an industry, read the column for that industry.	No.	WHEAT/SHEEP	SOUTHERN AGRICULTURE	DAIRYING	PASTORAL & TRAPPING	KIMBERLEY	ORCHARDS & VINEYARDS	MARKET GARDENS	POULTRY	FISHING	FORESTRY	GOLD MINING	COAL MINING	OTHER MINING & QUARRYING	GRAIN MILLING	BAKERIES	MILK PROCESSING	MEAT PROCESSING	WINE & AERATED WATERS	BEER & TOBACCO	OTHER PROCESSED FOODS	ANIMAL OILS	SAW MILLS	FURNITURE	PAPER & PRINTING	MINERAL OIL	CHEMICAL FERTILIZER	OTHER CHEMICALS	CEMENT GOODS	LIME AND PLASTER	BRICKS, GLASS & POTTERY	LEATHER GOODS							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31							
WHEAT/SHEEP	1	..	182	106	247	22	..	..	351	..	..	..	..	..	10,249	..	..	10,797	..	530	11	..	..	..	..	..	..	..	..	..	..	..	..						
SOUTH. AGRIC.	2	230	..	77	..	..	65	..	29	..	..	..	..	..	811	..	456	3,079	..	206	..	..	..	73	..	..	..	11	..	128	..	..	..						
DAIRYING	3	..	..	..	..	..	..	..	..	..	..	..	..	..	95	38	4,842	9,610	..	285	..	..	..	..	..	..	..	..	..	..	..	..	..	..					
PASTORAL	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	488	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..				
KIMBERLEY	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2,891	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
ORCHARDS ETC.	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	160	..	..	188	..	..	236	..	..	1	..	..	66	..	..	..	..	..	..	..				
MARKET GARD.	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	312	..	..	..	..	..	8	..	..	..	..	..	..	..	..				
POULTRY	8	..	..	..	..	..	38	77	..	..	..	..	..	..	..	160	..	1,150	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..				
FISHING	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	170	..	..	..	618	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
FORESTRY	10	..	..	..	..	..	..	31	..	..	..	590	153	212	..	..	..	..	..	..	..	..	7,992	..	..	..	..	273	..	..	..	..	..	..	..				
GOLD MINING	11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,038	..	..	..	..	..	..	..	..	..				
COAL MINING	12	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	20	..	..	40	73	3	..	..	..	..	7	3	..	9	357	..	..	..	..				
OTHER MINING	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	36	..	..	..	1	..	527	2	1,515	521	374	..	..	..	..				
GRAIN MILLING	14	44	14	2,048	..	..	..	..	2,007	..	..	..	..	..	..	3,453	8	..	..	..	78	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..			
BAKERIES	15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
MILK PROC.	16	..	..	..	..	..	..	..	..	4	..	..	..	..	44	55	..	..	..	..	41	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
MEAT PROC.	17	..	..	42	..	..	..	..	..	1,270	..	..	..	..	..	189	..	..	..	..	..	468	..	..	..	..	..	39	..	..	..	..	..	..	..	518	..		
WINERIES ETC.	18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
BEER, TOBACCO	19	..	..	24	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	..	381	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
O'R PROC. FOODS	20	..	..	3	..	..	769	..	..	..	..	..	..	..	15	1,523	308	571	468	206	..	..	..	..	..	..	..	12	..	..	..	..	..	..	..	..			
ANIMAL OILS	21	..	..	557	..	..	..	..	183	..	..	..	..	..	274	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
SAW MILLS	22	..	..	..	..	..	664	301	..	..	..	102	46	64	2	77	216	58	56	42	266	18	..	2,683	13	..	1	224	4	51	222	25	..	..	..	..			
FURNITURE	23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
PAPER, PRINT.	24	..	..	..	..	..	134	..	..	..	..	..	..	..	165	376	171	223	..	17	344	..	..	4	..	..	380	470	192	..	16	48	..	..	..	..			
MINERAL OIL	25	6,772	1,762	812	506	154	548	616	126	796	..	395	28	250	26	106	103	101	15	84	26	166	251	1	7	..	32	72	452	670	233	3	..	..	..	..			
FERTILIZERS	26	10,545	4,743	1,567	..	10	294	1,043	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	15	..	..	..	..	..	..	..	..			
O'R CHEMICALS	27	1,534	458	362	64	10	312	153	..	1	..	2,072	158	230	12	17	15	..	235	..	316	..	138	385	336	586	6	..	28	12	187	108	..	..	..	..			
CEMENT GOODS	28	..	..	..	..	..	124	101	..	..	..	228	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14	2	..	..	..	..			
LIME, PLASTER	29	..	..	270	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..	..	..	..	..			
BRICKS, GLASS ETC	30	..	..	..	..	..	49	7	..	..	..	..	..	..	..	170	..	190	654	248	..	29	15	..	..	..	41	4	..	..	..	..	..	..	..	..	..		
LEATHER GOODS	31	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
WOOLLEN MILLS	32	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
CLOTHING	33	..	..	..	..	..	..	..	..	..	..	35	..	..	..	..	..	..	..	..	..	..	..	..	136	18	..	..	..	..	..	..	..	..	..	..	..	..	..
O'R TEXTILES	34	692	292	128	123	7	..	184	..	215	..	..	..	..	746	..	..	29	..	..	92	49	..	162	..	..	1,138	..	13	65	..	..	..	..	..	..	..	..	
O'R MANUFACT.	35	1,810	394	188	..	..	102	74	..	..	..	13	..	..	..	..	..	..	..	..	..	..	5	218	1	..	..	..	..	..	..	..	..	..	..	..	..	..	
IRON & STEEL	36	..	..	..	..	..	..	..	..	..	..	87	..	12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	139	1	..	..	..	..	..	..	..		
FERROUS WIRE	37	..	..	..	..	..	..	..	..	..	..	284	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
FERROUS PIPES	38	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
VEHIC. ASSEMBLY	39	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
O'R ENGINEERING	40	6,684	1,468	1,062	762	54	578	383	..	633	..	2,556	441	1,263	112	152	447	1,104	111	423	923	325	854	44	210	746	625	196	211	87	319	57	..	..	..	..	..		
GAS	41	..	..	..	..	..	..	..	..	..	..	10	..	..	14	66	..	2	..	24	12	..	2	..	10	..	..	3	3	15	24	2	..	..	..	..			



TABLE "A2"  
WESTERN AUSTRALIA 1958 - 59  
DIRECT AND INDIRECT REQUIREMENTS PER \$ OF SALES TO FINAL DEMAND

OUTPUTS OF INPUTS INTO	No.	WOOLLEN MILLS	CLOTHING	OTHER TEXTILES	OTHER MANUFACTURES	IRON & STEEL	FERROUS WIRE	FERROUS PIPES	VEHICLE ASSEMBLY	OTHER ENGINEERING	GAS	ELECTRICITY	WATER	DWELLING RENT	BUILDING & CONSTRUCTION	RAIL TRANSPORT	ROAD TRANSPORT	AIRWAYS & SHIPPING	COMMUNICATION	COMMERCE	FINANCE	PERSONAL & GOVT. SERVICES	BUSINESS SERVICES	UNALLOCATED
		32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
WHEAT/SHEEP SOUTH. AGRIC.	1	.378740	.015650	.001999	.000186	.000087	.000146	.000081	.000163	.000194	.000109	.000086	.000955	.000092	.000260	.000211	.000145	.000199	.000085	.000687	.000154	.000246	.000458	.002885
DAIRYING PASTORAL	2	.161332	.006767	.048232	.001683	.000076	.000139	.000265	.000155	.000160	.000166	.000076	.000604	.000190	.001152	.000377	.000263	.000156	.000076	.000588	.000111	.000213	.000258	.001823
KIMBERLEY ORCHARDS ETC.	3	.014269	.001831	.000751	.000513	.000161	.000500	.000209	.000669	.000594	.000175	.000149	.000596	.000082	.000344	.000320	.000165	.000129	.000112	.003145	.000110	.000211	.000397	.001787
MARKET GARD. POULTRY	4	.116248	.004802	.000459	.000413	.000009	.000012	.000012	.000015	.000018	.000013	.000009	.000152	.000014	.000039	.000036	.000059	.000042	.000020	.000038	.000021	.000039	.000020	.000465
FISHING FORESTRY	5	.006244	.000321	.000074	.000027	.000013	.000023	.000012	.000028	.000031	.000013	.000009	.000141	.000013	.000035	.000023	.000010	.000011	.000007	.000122	.000020	.000033	.000018	.000430
GOLD MINING COAL MINING	6	.000041	.000040	.000035	.000025	.000091	.000032	.000036	.000028	.000041	.000025	.000021	.000069	.000015	.000080	.000021	.000013	.000065	.000009	.000099	.000015	.000049	.000078	.000195
OTHER MINING	7	.000017	.000037	.000023	.000017	.000017	.000018	.000010	.000022	.000021	.000007	.000006	.000020	.000004	.000018	.000009	.000005	.000073	.000004	.000097	.000004	.000010	.000011	.000059
GRAIN MILLING BAKERIES	8	.000073	.000031	.000021	.000011	.000005	.000009	.000005	.000011	.000012	.000005	.000004	.000054	.000005	.000014	.000008	.000004	.000004	.000002	.000049	.000008	.000013	.000007	.000164
MILK PROC. MEAT PROC.	9	.000111	.000094	.000138	.000066	.000057	.000053	.000038	.000057	.000078	.000046	.000034	.000472	.000045	.000128	.000157	.000025	.000029	.000018	.000230	.000066	.000113	.000055	.001435
WINERIES ETC. BEER, TOBACCO	10	.001727	.000626	.000639	.000592	.001642	.001421	.001013	.000960	.002263	.007617	.006807	.011804	.006297	.042434	.010082	.000415	.000428	.000667	.001103	.001027	.004671	.002256	.002983
O'R PROC. FOODS ANIMAL OILS	11	.003477	.000157	.000511	.001417	.000009	.000013	.000026	.000025	.000019	.000071	.000008	.000104	.000012	.000043	.000014	.000123	.000009	.000021	.000036	.000016	.000034	.000021	.000316
SAW MILLS FURNITURE	12	.004329	.002244	.003168	.002488	.004427	.006877	.002259	.001650	.003742	.304753	.237872	.006221	.001430	.007824	.059881	.001595	.002620	.003902	.004233	.001404	.003087	.003194	.013193
PAPER, PRINT. MINERAL OIL	13	.002554	.000280	.000601	.000338	.038725	.004050	.003376	.000186	.000642	.000246	.000213	.001133	.006206	.046035	.000287	.000192	.000187	.000161	.000427	.000938	.002408	.001616	.003351
FERTILIZERS O'R CHEMICALS	14	.001299	.000167	.000095	.000048	.000019	.000046	.000020	.000060	.000055	.000017	.000015	.000070	.000009	.000037	.000030	.000016	.000030	.000011	.000281	.000013	.000024	.000043	.000211
CEMENT GOODS LIME, PLASTER	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BRICKS, GLASS ETC. LEATHER GOODS	16	.001292	.003734	.001888	.001517	.000413	.001507	.000597	.002069	.001751	.000441	.000380	.000454	.000136	.000800	.000868	.000434	.000300	.000304	.009860	.000122	.000337	.000597	.001321
WOOLLEN MILLS CLOTHING	17	.003195	.001337	.000905	.000466	.000218	.000392	.000207	.000480	.000537	.000215	.000160	.002367	.000218	.000586	.000367	.000162	.000160	.000102	.002126	.000332	.000549	.000305	.007207
O'R TEXTILES O'R MANUFACT.	18	.000154	.000257	.000172	.000124	.000102	.000181	.000084	.000156	.000178	.000180	.000196	.000110	.000033	.000151	.000124	.000188	.000161	.000115	.000619	.000163	.000161	.002502	.000161
IRON & STEEL FERROUS WIRE	19	.001352	.001210	.001280	.000789	.001161	.001561	.000797	.000865	.001392	.002229	.002475	.001675	.000408	.001644	.001270	.002331	.002144	.001406	.002363	.002227	.002094	.034136	.002738
FERROUS PIPES VEHIC. ASSEMBLY	20	.001491	.003961	.002276	.001671	.000750	.001741	.000745	.002258	.001960	.000554	.000465	.001419	.000228	.001063	.000844	.000513	.007865	.000351	.010412	.000274	.000570	.001001	.004239
O'R ENGINEERING GAS	21	.000758	.000673	.001019	.000486	.000428	.000392	.000279	.000418	.000575	.000345	.000253	.003502	.000333	.000949	.001174	.000185	.000216	.000130	.001684	.000488	.000837	.000408	.010649
ELECTRICITY WATER	22	.005441	.001856	.001749	.001726	.002279	.004517	.003177	.003436	.008366	.006179	.008267	.002635	.021140	.157318	.036405	.001284	.001273	.002187	.002961	.003173	.008595	.006565	.007317
DWELLING RENT BUILDING ETC.	23	.000280	.000585	.000304	.000242	.000077	.000244	.000102	.000324	.000280	.000111	.000095	.000080	.000650	.004838	.000529	.000080	.000055	.000063	.001528	.000101	.000274	.000251	.000222
RAIL TRANSPORT ROAD TRANSPORT	24	.012607	.013578	.012320	.010462	.009597	.013059	.006851	.008877	.012474	.016270	.017778	.015943	.003604	.015211	.010015	.017031	.014869	.010235	.029613	.016380	.029938	.236732	.032121
AIR & SHIPPING COMMUNICATION	25	.052323	.029462	.020154	.014698	.018336	.017514	.011902	.018300	.017248	.109063	.131434	.011849	.007860	.053132	.038130	.114636	.054771	.020730	.067471	.004167	.015786	.014410	.031596
COMMERCE FINANCE	26	.060184	.002610	.008710	.000410	.000077	.000106	.000101	.000111	.000164	.001128	.000065	.001269	.000131	.000421	.000150	.000100	.000102	.000044	.000426	.000180	.000286	.000190	.003864
PERSONAL & GOVT. BUSINESS SERVICES	27	.016789	.004102	.009226	.006289	.051041	.009951	.017581	.005485	.014173	.010273	.008146	.034415	.007660	.042050	.007648	.003286	.004023	.002575	.008643	.005829	.025109	.010096	.098639
UNALLOCATED	28	.001111	.000241	.000194	.000119	.000094	.000872	.008954	.000127	.000223	.000174	.000185	.000158	.009525	.071362	.000136	.000177	.000155	.000114	.000473	.001233	.003341	.002309	.000319

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