Testing for Market Power in the Australian Grains and Oilseeds Industries: Further Results

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Contributed Paper presented to the 47th Annual Conference

Of the Australian Agricultural and Resource Economics Society

At

Fremantle,

February 12-14, 2003

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Abstract

Recent empirical studies have found significant evidence of departures from competition in the input side of the bread, breakfast cereal and margarine end-product markets. In this study we specify a general duality model of profit maximisation that allows for imperfect competition in the input and output markets of the grains and oilseeds industries. The model allows for variable-proportions technologies and can be regarded as a generalisation of several models appearing in the agricultural economics and industrial organisation literatures. Aggregate Australian data are used to implement the model for thirteen grains and oilseeds products handled by seven groups of agents. The model is estimated in a Bayesian framework. Results are reported in terms of (characteristics of) estimated probability distributions for demand and supply elasticities and indexes of market power.

Keywords: market power, conjectural elasticities, grains and oilseeds

1. Introduction

The research project reported in this paper explores the degree of competition (or more precisely the degree of farm-retail price transmission) in the Australian grains and oilseeds sector. The study of competition in food processing and marketing has had a long history in the North American and European economics and agricultural economics literatures (see for example Collins and Preston 1966, Marion *et al*. 1979, McDonald *et al*. 1989, Holloway 1991). However, it has only recently become evident as an important area of research in Australia. Deregulation of agricultural product marketing structures and the growing level of concentration in food processing and retailing are two related reasons why a focus on the nature of competition in the Australian food chain has emerged (Australian Parliament 1999). Since then, Digal and Ahmadi-Esfahani (2002) reviewed the methodological literature and suggested ways of better measuring the existence of market power, while Griffith (2000) and Piggott *et al*. (2000) reviewed the conceptual and empirical literature and suggested some further research that may assist consent authorities like the Australian Competition and Consumer Commission when deciding on merger and acquisition applications.

In the empirical work reported in these latter studies, although admittedly preliminary in nature and based on highly aggregated data, the grains and oilseeds sector was the only sector of the Australian food chain where evidence of non-competitive behaviour was found. This was in the purchasing of the relevant farm commodities by processing firms. As noted previously (Griffith 2000, p.358), this result accords with the views of the Prices Surveillence Authority (PSA 1994), that regarded the markets for products contained in the Breakfast Cereals and Cooking Oils and Fats indexes as

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The authors are grateful for the financial assistance provided by the Rural Industries Research and Development Corporation.

"not effectively competitive" (p.14), and consequently maintained price surveillence on the major firms in this product group (at the time Arnotts, Kelloggs, Uncle Tobys and Sanitarium), and with the large number of judgements against firms in this sector for price fixing or other types of non-competitive behaviour. It would seem that a closer examination of the degree of farm-retail price transmission in this sector would be worthwhile. A start on this was made in Griffith and O'Donnell (2002) – in this paper we extend the coverage of the sector and the realism of the model used.

There are arguably two key factors that determine the extent to which a change in the price of an agricultural product will be transmitted to the retail sector: the food processing technology, and the degree of competition in the sector. The processing technology matters because input substitutability has an impact on changes in processing costs; the degree of competition matters because it determines the magnitude of price-cost markups. Although economists have long been capable of estimating important characteristics of production technologies (see for example Chambers 1988), they have little experience in estimating the degree of competition in multi-product markets where the production technology is at all complex. This paper reports the development and implementation of a methodology for estimating the degree of competition in complex, multiple-input, multiple-output markets such as those in the grains and oilseeds sector.

There are many models of the farm-retail price transmission process reported in the agricultural economics literature (see Digal and Ahmadi-Estfahani 2002 for a review), and all are underpinned by specific assumptions concerning the technology and/or the nature of competition. Two of the most important assumptions are:

i) that the technological relationship between agricultural inputs and final food outputs is one of fixed proportions. This is despite the fact that, certainly in the case of multi-market models, the assumption of fixed proportions is highly questionable (see Alston and Scobie 1983, Mullen *et al*. 1988, Lemieux and Wohlgenant 1989, Wohlgenant 1989).

ii) that food markets are perfectly competitive. This is despite the fact that food markets appear to be characterised by varying degrees of oligopoly, and that price transmission depends crucially on the nature of firm behaviour at *every* stage in the food marketing chain (see McCorriston and Sheldon 1996).

In this paper, a model that allows for both variable proportions technologies and imperfect competition at different stages of the marketing chain is specified and estimated. The theoretical model can be regarded as a generalisation of several models appearing in the agricultural economics literature. We use an empirical version of the model that has the convenient property that it is linear in the parameters, so it can be estimated using simple techniques such as ordinary least squares. Moreover, estimates from the empirical model can be combined with demand and supply elasticity estimates to obtain unambiguous estimates of indexes of market power (ie. conjectural elasticities).

2. The Theoretical Model

We begin by considering a potentially non-competitive industry in which N firms produce M homogenous outputs using K inputs that are employed in variable proportions. The vector of outputs of firm n is denoted $\mathbf{y}_n = (y_{n1}, ..., y_{nM})'$; the vector of inputs is denoted $\mathbf{x}_n = (x_{n1}, ..., x_{nK})'$; aggregate outputs and inputs are $\mathbf{Y} \equiv \Sigma\mathbf{y}_n \equiv (Y_1, ..., Y_M)'$ and $\mathbf{X} \equiv \Sigma\mathbf{x}_n \equiv (X_1, ..., X_K)'$; the output price vector is $\mathbf{p} = (p_1, ..., p_M)'$; and the input price vector is $\mathbf{w} = (w_1, ..., w_K)'$. We assume each firm

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may exercise some market power in the sale of outputs and/or the purchase of inputs. The demand functions for outputs and the supply functions for inputs are respectively

(1) $Y_m = D_m(\mathbf{p}, \mathbf{v})$ $\quad m = 1, ..., M,$

and

(2) $X_j = S_j(w_j, \mathbf{z})$ $\quad j = 1, ..., K,$

where **v** and **z** are vectors of exogenous variables.

The profit maximisation problem for firm n can be written in two alternative but equivalent ways (see Chambers 1988, p.268):

$$\max_{\mathbf{y}_n} \sum_{i=1}^{M} p_i y_{ni} - c_n(\mathbf{w}, \mathbf{y}_n) - \kappa_n \tag{3}$$

and

$$\max_{\mathbf{x}_n} r_n(\mathbf{p}, \mathbf{x}_n) - \sum_{i=1}^{K} w_i x_{ni} - \kappa_n \tag{4}$$

where κ_n represents fixed costs, $c_n(\mathbf{w}, \mathbf{y}_n)$ is the minimum cost of producing output vector $\mathbf{y}_n$ given input prices **w**, and $r_n(\mathbf{p}, \mathbf{x}_n)$ is the maximum revenue that can be obtained from input vector $\mathbf{x}_n$ given output prices **p**. Assuming an interior solution for all quantities, the first-order conditions associated with (3) and (4) can be written

$$p_i + \sum_{j=1}^{M} \sum_{k=1}^{M} \frac{\partial p_j}{\partial Y_k} \frac{\partial Y_k}{\partial y_{ni}} y_{nj} - \frac{\partial c_n(\mathbf{w}, \mathbf{y}_n)}{\partial y_{ni}} = 0 \tag{5}$$

and

$$w_i + \sum_{j=1}^{K} \frac{\partial w_j}{\partial X_j} \frac{\partial X_j}{\partial x_{ni}} x_{nj} - \frac{\partial r_n(\mathbf{p}, \mathbf{x}_n)}{\partial x_{ni}} = 0. \tag{6}$$

To motivate our empirical work, it is convenient to rewrite both equations in terms of conjectural and price elasticities:

$$p_i + (1/y_{ni}) \sum_{j=1}^{M} \sum_{k=1}^{M} (p_j y_{nj} \theta_{nki}/\varepsilon_{kj}) = \frac{\partial c_n(\mathbf{w}, \mathbf{y}_n)}{\partial y_{ni}} \tag{7}$$

and

$$w_i + (1/x_{ni}) \sum_{j=1}^{K} (w_j x_{nj} \phi_{nji}/\eta_j) = \frac{\partial r_n(\mathbf{p}, \mathbf{x}_n)}{\partial x_{ni}} \tag{8}$$

where $\theta_{nki} \equiv (\partial Y_k/\partial y_{ni})(y_{ni}/Y_k) \geq 0$ is the conjectural elasticity indicating firm n's beliefs about how aggregate output of product k responds to its own output of product i, $\phi_{nji} \equiv (\partial X_j/\partial x_{ni})(x_{ni}/X_j) \geq 0$ is the conjectural elasticity indicating firm n's beliefs about how aggregate demand for input j responds to its own demand for input i, $\varepsilon_{kj} \equiv (\partial Y_k/\partial p_j)(p_j/Y_k) \leq 0$ is the j-th price elasticity of demand for product k, and $\eta_j \equiv (\partial X_j/\partial w_j)(w_j/X_j) \geq 0$ is the own-price elasticity of supply of input j.

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Closer examination of equations (7) and (8) reveals that the conjectural elasticities can be used to identify the two polar cases of market power: if $\theta_{nki} = \phi_{nji} = 0 \ \forall$ k, j and i, then (7) and (8) collapse to the well-known set of perfectly competitive first-order conditions (FOCs); and if $\theta_{nii} = \phi_{nii} = 1 \ \forall$ i and $\theta_{nki} = \phi_{nki} = 0 \ \forall \ k \neq i$, then they collapse to the set of monopoly-monopsony FOCs. Further examination of equations (7) and (8) reveals that the intermediate values $\theta_{nki} = y_{nk}/Y_k$ cause (7) and (8) to collapse to the Cournot FOCs (k , i = 1, ..., M; n = 1, ..., N). Moreover, (7) and/or (8) collapse to the perfectly competitive first-order conditions if $|\varepsilon_{kj}| \to \infty$ and/or $|\eta_j| \to \infty \ \forall$ k and j. This last result suggests that, in these cases of perfectly elastic output demands and/or input supplies, the conjectural elasticities cannot be, and probably do not need to be, empirically identified. More will be said about this below.

3. Aggregation Issues

Equations (7) and (8) characterise the behaviour of potentially non-competitive individual firms. However, in our empirical work we only have access to industry-level data. For cost and revenue functions to be well-defined at the industry level, the individual firm functions must be of the Gorman polar form :

$$(9) \qquad c_n(\mathbf{w}, \mathbf{y}_n) = g_n(\mathbf{w}) + \sum_{i=1}^{M} h_i(\mathbf{w}) y_{ni}$$

and

$$(10) \qquad r_n(\mathbf{p}, \mathbf{x}_n) = b_n(\mathbf{p}) + \sum_{i=1}^{K} f_i(\mathbf{p}) x_{ni}$$

This implies marginal costs and revenues are constant across firms:

$$(11) \qquad \frac{\partial c_n(\mathbf{w}, \mathbf{y}_n)}{\partial y_{ni}} = h_i(\mathbf{w})$$

and

$$(12) \qquad \frac{\partial r_n(\mathbf{p}, \mathbf{x}_n)}{\partial x_{ni}} = f_i(\mathbf{p}).$$

We follow Appelbaum (1979, 1982) and Wann and Sexton (1992) and assume that equilibrium conjectural elasticities are the same for all firms, ie., $\theta_{nki} = \theta_{mki}$ and $\phi_{nji} = \phi_{mji} \ \forall$ m and n. (See Wann and Sexton 1992, and Gohin and Guyomard 2000 for a rationale). Then multiplying both sides of (7) by y_{ni}, summing over all firms, dividing by Y_i, and rearranging yields the industry-level function:

$$(14) \qquad p_i = h_i(\mathbf{w}) - \sum_{j=1}^{M} \sum_{k=1}^{M} (p_j \theta_{ki} / \varepsilon_{kj})(Y_j / Y_i).$$

A similar treatment of equation (8) yields:

$$(15) \qquad w_i = f_i(\mathbf{p}) - \sum_{j=1}^{K} (w_j \phi_{ji} / \eta_j)(X_j / X_i).$$

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Equations (14) and (15) are the backbone of the empirical model used in this project, and again, we are wishing to test whether the equilibrium conjectural elasticities, θ_{nki} and $\phi_{nji,}$ are zero or not.

4. Related Models

- If M = 1 (ie. only one output) the model collapses to the model of Holloway (1991). This paper also gives some useful insights into our own theoretical model.
- Raper *et al*. (2000) develop an empirical model by obtaining explicit expressions for the derivatives $\partial Y_k/\partial p_j$ in (5) and $\partial X_j/\partial w_j$ in (6). These expressions are obtained by assuming that upstream and downstream firms are perfectly competitive.

5. The Empirical Model

The empirical model comprises 64 equations relating to the behaviour of seven groups of agents in the Australian grains and oilseeds sector. Thus, it is a major extension of the model proposed in Griffith and O'Donnell (2002). This section describes the inputs and outputs of these groups. It is useful at this point to note that all firms are assumed to be price-takers when sourcing inputs from outside the sector (eg. labour, capital, materials), implying $\phi_{nji} = 0$ for these inputs.

We assume **grains and oilseeeds producers** use K = 3 variable inputs (labour, capital and materials) and one fixed input (land) to produce M = 6 outputs (wheat, barley, canola, oats, grain sorghum and triticale). These producers are assumed to be price-takers in all input markets (ie., $\phi_{nji} = 0\ \forall$ j and i), implying no need to estimate equations of the form given by (2) and (15). Thus, the behaviour of grains and oilseeeds producers is modelled using the 12 equations given by equations (1) and (14) for i = 1, ..., 6.

We assume **flour and cereal food product manufacturers** use K = 7 variable inputs (wheat, barley, canola, oats, triticale, labour and a category of "other inputs") and fixed inputs including plant and machinery to produce M = 2 outputs (wheat and other cereal flours, and cereal foods including breakfast foods). The behaviour of these firms is modelled using the 13 equations given by equations (1) and (14) for i = 1 and 2, equations (2) and (15) for j = 1, 2, 4 and 6, and equation (15) for j = 3. Equation (2) is not estimated for j = 3 because canola was not produced in most states in most time periods – there are insufficient observations to obtain reliable estimates of the parameters. Equations (2) and (15) are not estimated for j = 6 and 7 because the conjectural elasticities associated with labour and other inputs are already assumed to be zero.

We assume **beer and malt manufacturers** use K = 4 variable inputs (wheat, barley, labour and other inputs) and fixed inputs including plant and machinery to produce M = 1 output (beer). The behaviour of these firms is modelled using the 6 equations given by equations (1) and (14) for i = 1, and equations (2) and (15) for j = 1 and 2.

We assume **oil and fat manufacturers** use K = 3 variable inputs (canola, labour and other inputs) and fixed inputs including plant and machinery to produce M = 1 output (margarine). The behaviour of these firms is modelled using the 3

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equations given by equations (1) and (14) for $i = 1$, and equation (15) for $j = 1$. Equation (2) was not estimated for $j = 1$ because of the large number of zero output observations.

We assume **bakery product manufacturers** use $K = 3$ variable inputs (flour, labour and other inputs) and fixed inputs including plant and machinery to produce $M = 2$ outputs (bread, and cakes and biscuits). The empirical model is made up of the 5 equations given by equations (1) and (14) for $i = 1$ and 2 and equation (15) for $j = 1$.

We assume **other food product manufacturers** use $K = 8$ variable inputs (wheat, barley, canola, oats, grain sorghum, triticale, labour and other inputs) and fixed inputs including plant and machinery to produce $M = 1$ output (other foods). The empirical model is made up of the 12 equations given by equations (1) and (14) for $i = 1$, equations (2) and (15) for $j = 1, 2, 4$, and 6, and equation (15) for $j = 3$ and 5. Again, equation (2) was not estimated for $j = 3$ and 5 (canola and grain sorghum) because of the large number of zero output observations.

Finally we assume the category of final **consumers** (including both domestic consumers and exporters) consumes $K = 13$ products (wheat, barley, canola, oats, grain sorghum, triticale, cereal foods including breakfast foods, wheat and other cereal flours, beer, margarine, bread, cakes and biscuits, and other foods). The empirical model is made up of the 13 equations given by (15) for $j = 1,...,13$.

6. Estimation

For estimation purposes we assume $h_i(\mathbf{w})$, $f_i(\mathbf{p})$ and the demand and supply functions (1) and (2) are linear[1] for all i. Under these assumptions, the functions (14) and (15) can be written as a linear function of the parameters. Specifically, if the demand and supply functions (1) and (2) are linear:

$$(16) \qquad Y_k = \gamma_{k0} + \sum_{j=1}^{M} \gamma_{kj} p_j + \mu_k v \qquad k = 1, ..., M,$$

and

$$(17) \qquad X_j = \alpha_{j0} + \alpha_j w_j \qquad j = 1, ..., K,$$

then $\varepsilon_{kj} \equiv (\partial Y_k/\partial p_j)(p_j/Y_k) = \gamma_{kj} p_j/Y_k$, $\eta_j \equiv (\partial X_j/\partial w_j)(w_j/X_j) = \alpha_j w_j/X_j$ and (14) and (15) can be written:

$$(18) \qquad p_i = h_i(\mathbf{w}) + \sum_{j=1}^{M} \sum_{k=1}^{M} \beta_{kji} Y_{kji}$$

and

$$(19) \qquad w_i = f_i(\mathbf{p}) + \sum_{j=1}^{K} \psi_{ji} X_{ji}$$

[1] This functional form assumption is arbitrary, although it is not possible to assume the demand and supply functions are log-linear if the model is to remain identified.

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where $Y_{kji} \equiv -Y_k Y_j/Y_i \equiv Y_{jki}$, $X_{ji} \equiv -X_j X_j/X_i$, $\beta_{kji} = \theta_{ki}/\gamma_{kj}$ and $\psi_{ji} = \phi_{ji}/\alpha_j$. Estimates of β_{kji}, γ_{kj}, ψ_{ji} and α_j can be obtained by estimating equations (16) to (19) individually or as part of a seemingly unrelated regression (SUR) system. Then estimates of the conjectural elasticities, θ_{ki} and ψ_{ji}, are obtained residually as $\theta_{ki} = \beta_{kji}\gamma_{kj}$ and $\phi_{ji} = \psi_{ji}\alpha_j$.

All prices and quantities were treated as endogenous and, following Gohin and Guyomard (2000), lagged values were used as instruments (lagged values for undefined observations were set to the variable means). Own-price elasticities of output demand and own-price elasticities of input supply were constrained to be nonpositive and nonnegative respectively, in line with economic theory. Conjectural elasticities were constrained to lie in the unit interval. No other theoretical restrictions were imposed.

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Sampling theory methods for imposing inequality constraints are unsatisfactory, so the model was estimated in a Bayesian framework. Empirical implementation of the Bayesian approach is straightforward. Details can be found in, for example, Griffiths, O'Donnell and Tan Cruz (2000).

7. Data Requirements

Estimation of the model requires data on prices and quantities of variable inputs and outputs. Prices and quantities of fixed inputs are not measured because the cost of fixed inputs, κ_n, does not appear in the first-order conditions for profit maximisation given by (5) and (6).

The data set covers the six states of New South Wales, Victoria, Queensland, South Australia, Western Australia and Tasmania over the ten financial years 1989-1990 to 1999-2000. Thus, in the pooled data set 66 observations were available for estimation, although six of these observations were lost through lagging.

Data were collected from various ABS and ABARE sources. Various interpolation methods were used to impute values for some data that were missing in some states in some time periods. For example, data on production and the gross value of production was used to calculate the prices of all grains and oilseeds. Missing values were obtained using predictions from a regression of each grain/oilseed price on wheat, barley and oats prices, and the CPI. Data on employment and wages and salaries in manufacturing industries was used to calculate a labour price. Missing values were obtained using predictions from a regression of the labour price on all other price indexes, GDP and consumption expenditure.

A full description of the data and the linkages between groups of agents was given in Griffith and O'Donnell (2002)

8. Results

Markov Chain Monte Carlo (MCMC) samples were drawn from the posterior probability density functions (pdfs) of the parameters using GAUSS. The means and standard deviations of these samples are reported in Tables 1 to 7. Our primary interest is in the β_{iii} and ψ_{jj} parameters – if these parameters are equal to zero then industry behaviour is consistent with perfect competition. Importantly, $\beta_{iii} \to 0$ as $\theta_{ii} \to 0$ and/or $|\varepsilon_{ii}| \to \infty$ (ie. as the i-th output conjectural

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elasticity approaches zero and/or demand for the i-th output becomes perfectly own-price elastic). Likewise, $\psi_{jj} \to 0$ as $\phi_{jj} \to 0$ and/or $|\eta_j| \to \infty$ (ie. as the j-th input conjectural elasticity approaches zero and/or supply of the j-th input becomes perfectly own-price elastic). Thus, we are also interested in these "component" parameters. These parameters are reported in the last three rows of each table, along with the (negative) Lerner index, a common measure of market power. This index is defined as $\theta_{ii}/\overline{\varepsilon}_{ii}$ for output markets and as $\phi_{jj}/\overline{\eta}_j$ for input markets.

In Table 1 for example, none of the mean values for the θ_{ii} parameter are large either in absolute value or in relation to their standard deviations. The temptation is to conclude that grains and oilseeds producers sell to processors in competitive markets. However, when the value of the estimated aggregate supply elasticity is considered, the calculated Lerner index may suggest some market power in the sale of barley to processors. We need to remember though that marketing boards for barley were in operation in several states over the period of the study, and that the estimated Lerner index here will reflect the result of monopoly selling of barley by these boards.

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In other tables, there is no evidence of seller market power in any of the output markets or in consumer purchases of any of the 13 products studied. There does seem to be evidence of market power in the purchase of wheat, barley, oats and triticale by flour and cereal food product manufacturers, of wheat and barley by beer and malt manufacturers, and of wheat, barley, oats and triticale by other food product manufacturers.

The estimated posterior pdfs are more informative than the means and standard deviations of (samples of observations on) these parameters of interest. There are 41 estimated pdfs, however only a small selection are presented here, in Figures 1 to 6. Like the tabulated results, the first panel in each figure presents the output/input conjectural elasticities, the second the elasticities of demand/supply and the last the (negative) Lerner index.

Across all of the figures, there are some common patterns:

- the pdfs of most conjectural elasticities have modes at zero, implying the absence of market power. This is true for the output markets, such as the sale of cereal foods from flour and cereal food product manufacturers as shown in Figure 1.
- some estimated own-price elasticities of demand/supply are large in absolute value, and this sometimes makes it difficult to statistically identify the associated conjectural elasticities. This identification problem manifests itself in pdfs which span the [0, 1] interval. The example shown in Figure 2 is for the purchase of wheat by flour and cereal food product manufacturers.
- large estimated own-price elasticities of demand/supply do not always make it difficult to identify associated conjectural elasticities. See, for example, Figure 3 for the sale of beer by beer and malt manufacturers.
- even when estimated own-price elasticities of demand/supply are relatively small, there may be considerable uncertainty concerning the values of conjectural elasticities. In these cases we conclude there is positive probability that the industry exercises market power. The example shown in Figure 4 is for the purchase of oats by flour and cereal food product manufacturers.
- in some cases we have no knowledge of elasticities of demand and supply. We can obtain estimates of associated conjectural elasticities by simply assuming values for price elasticities at mean prices and quantities. Two examples

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are given in Figures 5 and 6. Figure 5 reports the estimates for the purchase of canola by oil and fat manufacturers, while Figure 6 reports the estimates for the purchase of flour by bakery product manufacturers. Note that these estimated pdfs can be "scaled" up (down) proportionately by increasing (decreasing) the assumed value of the elasticity of demand/supply.

Based on these general patterns in the estimated pdfs, we suggest that there is positive probability that the following firms/industries exert market power:

- flour and cereal food product manufacturers (when purchasing wheat, barley, oats and triticale),
- beer and malt manufacturers (when purchasing wheat and barley), and
- other food product manufacturers (when purchasing wheat, barley, oats and triticale).

9. Conclusions

In this study we set out to explore the degree of farm-retail price transmission in the Australian grains and oilseeds sector. We specified a general duality model of profit maximisation that allows for imperfect competition in both input and output markets, and for variable-proportions technologies. Aggregate Australian data were used to implement the model for thirteen grains and oilseeds products handled by seven groups of agents. The model is estimated in a Bayesian framework. Results are reported in terms of (characteristics of) estimated probability distributions for demand and supply elasticities and indexes of market power. Our results suggest that there is positive probability that flour and cereal food product manufacturers exert market power when purchasing wheat, barley, oats and triticale; that beer and malt manufacturers exert market power when purchasing wheat and barley; and that other food product manufacturers exert market power when purchasing wheat, barley, oats and triticale.

These results confirm the preliminary conclusions reached by Griffith (2000) and Piggott *et al*. (2000). What is interesting is that each of the transaction nodes where market power is indicated is one where a farm commodity is sold to a processing sector – that is, the evidence suggests oligopsonistic behaviour by grains buyers. The wheat and barley industries seem to be especially disadvantaged by this type of market conduct. While these results are the subject of a good deal of uncertainty, there are implications to be considered relating to marketing board deregulation and ways of grains producers achieving countervailing power in these markets.

A related and equally interesting result is that there was no consistent evidence of market power in the downstream nodes of the data set relating to the sales of flour and other cereal foods, or the sale of bread and other bakery products. These sectors are those highlighted by the Prices Surveillance Authority (1994) as being "not effectively competitive" or those subject to numerous actions by the ACCC. Perhaps the growing power of the retail chains has limited potential abuse of market power in these sectors, but unfortunately the data were not available to enable this hypothesis to be tested.

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Much of the uncertainty surrounding our estimates probably stems from the lack of good quality data. Future research efforts should be directed at:

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- improving the collection and integrity of relevant data (including for the retail and distributive nodes of the various markets),
- estimating the models in larger SUR frameworks, not least so that we can obtain consistent estimates of input elasticities across sectors, and
- incorporating more equality and inequality information into the estimation process (eg. symmetry and homogeneity constraints; inequality constraints on income elasticities).

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Table 1. Parameter Estimates: Grains and Oilseeds Producers

	Wheat (i = 1)	Barley (i = 2)	Canola (i = 3)	Oats (i = 4)	Grain Sorghum (i = 5)	Triticale (i = 6)
γ_{i0}	10718.388 (1706.214)	1426.044 (308.325)	214.064 (144.260)	490.391 (107.765)	-118.944 (144.762)	-89.088 (43.911)
γ_{i1}	-43.408 (6.243)	7.709 (1.330)	1.196 (0.472)	0.735 (0.568)	1.069 (0.844)	-0.050 (0.158)
γ_{i2}	10.806 (7.308)	-0.659 (0.658)	-2.121 (1.174)	0.054 (0.834)	-7.312 (1.091)	1.021 (0.242)
γ_{i3}	1.319 (2.514)	-2.667 (0.709)	-0.071 (0.113)	-0.061 (0.250)	0.750 (0.323)	0.092 (0.080)
γ_{i4}	-12.623 (6.138)	-5.040 (1.618)	0.248 (0.451)	-4.169 (0.600)	5.698 (1.041)	-0.742 (0.229)
γ_{i5}	-2.840 (5.477)	0.773 (1.393)	-0.896 (0.552)	-0.806 (0.426)	-0.313 (0.285)	0.410 (0.126)
γ_{i6}	-0.132 (6.381)	-3.475 (2.020)	0.295 (0.587)	1.145 (0.649)	0.590 (0.984)	-0.516 (0.382)
μ_i	8.592 (4.040)	1.682 (0.849)	1.372 (0.283)	2.091 (0.272)	3.404 (0.412)	0.898 (0.087)
δ_{i0}	185.115 (70.627)	-106.551 (57.751)	66.320 (128.308)	-20.218 (62.046)	-233.282 (65.997)	-125.111 (53.708)
δ_{i1}	-1.155 (0.786)	-1.628 (0.678)	-2.951 (0.586)	-1.244 (0.404)	-2.019 (0.514)	-0.985 (0.560)
δ_{i2}	1.151 (1.289)	-2.850 (1.462)	5.800 (2.007)	-3.788 (1.443)	-2.327 (1.246)	-6.938 (1.510)
δ_{i3}	0.573 (1.451)	6.725 (1.460)	0.038 (2.707)	6.670 (1.427)	7.671 (1.668)	10.477 (1.396)
β_{11i}	-0.003 (0.003)	-0.003 (0.002)	0.000 (0.000)	-0.002 (0.001)	0.001 (0.001)	0.000 (0.000)
β_{12i}	0.047 (0.026)	0.024 (0.009)	0.001 (0.001)	0.008 (0.002)	-0.006 (0.003)	0.000 (0.001)
β_{13i}	0.180 (0.116)	0.056 (0.028)	-0.021 (0.010)	0.026 (0.012)	-0.019 (0.019)	-0.002 (0.005)
β_{14i}	0.208 (0.069)	0.002 (0.027)	-0.001 (0.005)	0.022 (0.009)	-0.001 (0.005)	-0.004 (0.004)
β_{15i}	0.068 (0.023)	0.010 (0.005)	0.002 (0.003)	0.005 (0.002)	0.016 (0.011)	0.002 (0.001)
β_{16i}	-0.354 (0.196)	-0.210 (0.066)	0.006 (0.015)	-0.058 (0.020)	-0.002 (0.030)	-0.002 (0.008)
β_{22i}	-0.035 (0.031)	-0.044 (0.018)	0.000 (0.001)	-0.007 (0.002)	0.003 (0.003)	0.000 (0.001)
β_{23i}	0.055 (0.301)	0.179 (0.095)	0.035 (0.037)	-0.063 (0.025)	0.076 (0.046)	0.006 (0.008)

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Table 1 cont.

	Wheat (i = 1)	Barley (i = 2)	Canola (i = 3)	Oats (i = 4)	Grain Sorghum (i = 5)	Triticale (i = 6)
β_{24i}	0.007 (0.121)	0.050 (0.064)	-0.005 (0.006)	0.015 (0.020)	-0.002 (0.012)	-0.003 (0.004)
β_{25i}	-0.036 (0.081)	0.055 (0.039)	-0.003 (0.004)	-0.009 (0.006)	0.012 (0.034)	0.001 (0.003)
β_{26i}	-0.415 (0.619)	-0.516 (0.300)	-0.016 (0.049)	0.010 (0.051)	0.098 (0.049)	0.004 (0.017)
β_{33i}	-0.156 (0.785)	0.013 (0.177)	-0.044 (0.038)	-0.009 (0.061)	0.024 (0.095)	0.001 (0.019)
β_{34i}	-2.572 (0.917)	-1.702 (0.346)	0.131 (0.079)	-0.319 (0.104)	0.143 (0.080)	-0.001 (0.040)
β_{35i}	-0.398 (0.441)	-0.327 (0.112)	-0.017 (0.095)	-0.157 (0.050)	0.072 (0.171)	0.015 (0.011)
β_{36i}	1.815 (3.301)	1.969 (0.770)	0.453 (0.389)	0.721 (0.254)	-1.137 (0.543)	0.007 (0.072)
β_{44i}	-0.796 (0.373)	-0.048 (0.162)	0.021 (0.021)	-0.027 (0.023)	0.057 (0.022)	0.020 (0.019)
β_{45i}	-0.326 (0.303)	0.038 (0.121)	0.040 (0.027)	-0.087 (0.045)	-0.342 (0.085)	-0.020 (0.009)
β_{46i}	2.649 (2.430)	1.748 (0.811)	0.019 (0.112)	0.317 (0.246)	-0.166 (0.165)	0.024 (0.061)
β_{55i}	-0.021 (0.026)	-0.012 (0.010)	-0.001 (0.005)	0.000 (0.002)	-0.015 (0.016)	0.000 (0.001)
β_{56i}	0.384 (0.765)	0.134 (0.256)	-0.146 (0.068)	0.065 (0.147)	0.980 (0.363)	-0.049 (0.039)
β_{66i}	2.347 (5.323)	1.340 (1.713)	-0.210 (0.426)	0.128 (0.494)	-0.381 (0.516)	-0.068 (0.062)
θ_{ii}	0.136 (0.137)	0.028 (0.032)	0.003 (0.004)	0.111 (0.099)	0.004 (0.006)	0.028 (0.031)
$\bar{\varepsilon}_{ii}$	-2.966 (0.427)	-0.124 (0.124)	-0.220 (0.351)	-2.166 (0.312)	-0.228 (0.207)	-1.127 (0.835)
$\theta_{ii}/\bar{\varepsilon}_{ii}$	0.046 (0.045)	0.233 (0.094)	0.014 (0.012)	0.051 (0.045)	0.021 (0.022)	0.031 (0.029)

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Table 2. Parameter Estimates: Flour and Cereal Food Product Manufacturers

	Outputs			Inputs				
	Wheat & Other Flours (i = 1)	Cereal Foods (i = 2)		Wheat (j = 1)	Barley (j = 2)	Canola (j = 3)	Oats (j = 4)	Triticale (j = 5)
γ_{i0}	1.395	1.007	α_{j0}	42.643	577.687	-	188.351	26.596
	(0.495)	(0.628)		(2958.514)	(335.931)		(108.150)	(40.209)
γ_{i1}	-0.003	-0.002	α_j	15.982	1.934	-	0.639	0.290
	(0.003)	(0.002)		(14.219)	(2.095)		(0.697)	(0.267)
γ_{i2}	-0.002	-0.003						
	(0.002)	(0.002)						
μ_i	0.011	0.019						
	(0.002)	(0.001)						
δ_{i0}	76.080	2.092	κ_{j0}	-57.376	17.841	100.033	21.607	-59.874
	(50.995)	(57.588)		(69.176)	(58.205)	(122.842)	(63.782)	(63.671)
δ_{i1}	-0.069	0.226	κ_{j1}	0.004	0.203	-0.071	0.291	0.294
	(0.081)	(0.096)		(0.161)	(0.147)	(0.286)	(0.166)	(0.152)
δ_{i2}	0.141	-0.006	κ_{j2}	0.772	0.337	1.046	0.138	0.457
	(0.114)	(0.138)		(0.187)	(0.178)	(0.336)	(0.177)	(0.192)
δ_{i3}	0.114	0.176	ψ_{1j}	0.021	0.000	0.001	-0.002	0.000
	(0.034)	(0.037)		(0.027)	(0.005)	(0.001)	(0.002)	(0.000)
δ_{i4}	-0.168	-0.293	ψ_{2j}	-0.203	0.085	-0.001	-0.002	0.000
	(0.097)	(0.090)		(0.116)	(0.082)	(0.001)	(0.005)	(0.002)
δ_{i5}	0.215	0.123	ψ_{3j}	-2.915	0.372	1.267	0.328	-0.009
	(0.087)	(0.087)		(3.816)	(0.522)	(0.519)	(0.199)	(0.016)
δ_{i6}	3.148	0.201	ψ_{4j}	-0.738	-0.074	0.018	0.377	-0.034
	(0.395)	(0.399)		(1.956)	(0.451)	(0.046)	(0.353)	(0.021)
δ_{i7}	-0.076	2.030	ψ_{5j}	1.031	-1.222	0.612	0.341	1.271
	(0.569)	(0.666)		(13.988)	(3.461)	(1.210)	(1.264)	(1.280)
β_{11i}	-4.797	-0.013						
	(4.592)	(0.006)						
β_{12i}	-17.263	0.140						
	(9.334)	(0.055)						
β_{22i}	2.420	-0.417						
	(4.385)	(0.155)						
θ_{ii}	0.010	0.001	ϕ_{jj}	0.180	0.121	0.020	0.147	0.199
	(0.015)	(0.001)		(0.186)	(0.147)	(0.008)	(0.165)	(0.192)
$\bar{\varepsilon}_{ii}$	-0.891	-0.917	$\bar{\eta}_j$	1.092	0.365	0.050	0.332	0.633
	(0.936)	(0.617)		(0.972)	(0.396)	(a)	(0.362)	(0.583)
$\theta_{ii}/\bar{\varepsilon}_{ii}$	0.015	0.001	$\phi_{jj}/\bar{\eta}_j$	0.314	0.448	0.409	0.726	0.581
	(0.015)	(0.001)		(0.393)	(0.433)	(0.168)	(0.680)	(0.585)

(a) Assumed value.

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Table 3. Parameter Estimates: Beer and Malt Manufacturers

Beer Output			Inputs: Wheat ($j = 1$)	Inputs: Barley ($j = 2$)
γ_{10}	5.497 (0.964)	α_{j0}	-206.394 (2332.631)	465.264 (450.800)
γ_{11}	-0.024 (0.006)	α_j	15.824 (11.735)	2.698 (2.419)
μ_1	0.011 (0.002)			
δ_{10}	-110.215 (56.730)	κ_{j0}	93.772 (35.026)	123.740 (33.631)
δ_{11}	-0.008 (0.071)	κ_{j1}	0.615 (0.199)	0.296 (0.186)
δ_{12}	-0.067 (0.086)	ψ_{1j}	0.033 (0.042)	0.001 (0.005)
δ_{13}	0.636 (0.289)	ψ_{2j}	0.027 (0.230)	0.147 (0.150)
δ_{14}	2.538 (0.647)			
β_{111}	-0.311 (0.313)			
θ_{ii}	0.007 (0.007)	ϕ_{jj}	0.274 (0.243)	0.247 (0.241)
$\bar{\varepsilon}_{ii}$	-1.951 (0.455)	$\bar{\eta}_j$	1.081 (0.802)	0.509 (0.457)
$\theta_{ii}/\bar{\varepsilon}_{ii}$	0.004 (0.004)	$\phi_{jj}/\bar{\eta}_j$	0.478 (0.612)	0.778 (0.794)

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Table 4. Parameter Estimates: Oil and Fat Manufacturers

	Margarine Output		Canola Input
γ_{10}	2.170 (0.576)	α_{10}	-
γ_{11}	-0.015 (0.004)	α_j	-
μ_1	0.014 (0.001)		
δ_{10}	-25.774 (27.263)	κ_{10}	421.724 (111.103)
δ_{11}	-0.020 (0.014)	κ_{11}	-0.297 (0.707)
δ_{12}	0.124 (0.084)	ψ_{11}	1.054 (0.743)
δ_{13}	1.727 (0.264)		
β_{111}	-0.557 (0.548)		
θ_{ii}	0.008 (0.008)	ϕ_{11}	0.017 (0.012)
$\bar{\varepsilon}_{ii}$	-2.804 (0.684)	$\bar{\eta}_1$	0.050 (a)
$\theta_{ii}/\bar{\varepsilon}_{ii}$	0.003 (0.003)	$\phi_{11}/\bar{\eta}_1$	0.341 (0.240)

(a) Assumed value.

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Table 5. Parameter Estimates: Bakery Product Manufacturers

	Outputs: Bread (i = 1)	Outputs: Cakes and Biscuits (i = 2)		Flour Input
γ_{i0}	3.618 (0.332)	3.322 (0.697)	α_{10}	-
γ_{i1}	-0.004 (0.003)	0.005 (0.004)	α_1	-
γ_{i2}	-0.017 (0.004)	-0.026 (0.008)		
μ_i	0.011 (0.001)	0.021 (0.002)		
δ_{i0}	-42.661 (35.656)	29.296 (15.023)	κ_{10}	184.185 (38.978)
δ_{i1}	0.345 (0.054)	0.180 (0.022)	κ_{11}	1.319 (0.187)
δ_{i2}	2.583 (0.276)	0.762 (0.126)	κ_{12}	-0.960 (0.372)
δ_{i3}	0.533 (0.368)	0.646 (0.158)	ψ_{11}	19.378 (18.690)
β_{11i}	-6.106 (4.756)	-3.924 (0.999)		
β_{12i}	14.953 (5.035)	17.215 (1.112)		
β_{22i}	-3.903 (1.434)	-0.391 (0.364)		
θ_{ii}	0.027 (0.028)	0.010 (0.010)	ϕ_{11}	0.003 (0.003)
$\bar{\varepsilon}_{ii}$	-0.576 (0.333)	-1.896 (0.573)	$\bar{\eta}_1$	0.050 (a)
$\theta_{ii}/\bar{\varepsilon}_{ii}$	0.047 (0.037)	0.005 (0.005)	$\phi_{11}/\bar{\eta}_1$	0.062 (0.060)

(a) Assumed value.

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Table 6. Parameter Estimates: Other Food Product Manufacturers

	Other Food Output		Wheat (j = 1)	Barley (j = 2)	Canola (j = 3)	Oats (j = 4)	Grain Sorghum (j = 5)	Triticale (j = 6)
			Inputs					
γ_{10}	55.918 (16.676)	α_{10}	1585.622 (1356.258)	449.144 (425.103)	-	184.494 (93.806)	-	-7.169 (74.934)
γ_{11}	-0.476 (0.149)	α_1	6.550 (6.508)	2.732 (2.394)	-	0.529 (0.661)	-	0.518 (0.461)
μ_1	0.156 (0.011)							
δ_{10}	20.186 (13.993)	κ_{j0}	-159.802 (105.087)	-96.607 (93.179)	116.315 (190.393)	135.485 (95.331)	-147.696 (108.737)	-7.423 (102.123)
δ_{11}	-0.014 (0.013)	κ_{j1}	3.185 (0.912)	2.337 (0.808)	2.688 (1.660)	0.075 (0.835)	2.790 (0.957)	1.494 (0.870)
δ_{12}	0.072 (0.016)	ψ_{1j}	0.040 (0.039)	-0.001 (0.005)	0.000 (0.001)	-0.001 (0.002)	0.001 (0.000)	0.000 (0.000)
δ_{13}	-0.015 (0.005)	ψ_{2j}	0.013 (0.147)	0.101 (0.105)	0.002 (0.001)	0.006 (0.006)	0.000 (0.001)	0.006 (0.003)
δ_{14}	-0.054 (0.015)	ψ_{3j}	2.221 (4.488)	0.623 (0.596)	2.181 (0.597)	0.199 (0.222)	0.035 (0.034)	0.009 (0.010)
δ_{15}	-0.019 (0.010)	ψ_{4j}	-2.522 (2.427)	-0.626 (0.594)	0.082 (0.059)	0.418 (0.367)	-0.057 (0.034)	-0.019 (0.018)
δ_{16}	-0.014 (0.016)	ψ_{5j}	-0.071 (0.142)	0.014 (0.017)	0.012 (0.003)	-0.007 (0.006)	0.295 (0.183)	0.002 (0.002)
δ_{17}	0.252 (0.072)	ψ_{6j}	21.875 (17.328)	-0.580 (3.653)	2.135 (1.257)	-1.300 (1.336)	0.336 (0.880)	0.964 (1.320)
δ_{18}	0.895 (0.135)							
β_{111}	-0.008 (0.008)							
θ_{11}	0.004 (0.004)	ϕ_{jj}	0.164 (0.177)	0.195 (0.205)	0.035 (0.010)	0.142 (0.163)	0.020 (0.013)	0.219 (0.209)
$\bar{\varepsilon}_{11}$	-4.038 (1.266)	$\bar{\eta}_j$	0.448 (0.445)	0.516 (0.452)	0.050 (a)	0.275 (0.343)	0.050 (a)	1.133 (1.007)
$\theta_{11}/\bar{\varepsilon}_{11}$	0.001 (0.001)	$\phi_{jj}/\bar{\eta}_j$	0.588 (0.571)	0.533 (0.554)	0.705 (0.193)	0.804 (0.707)	0.405 (0.252)	0.441 (0.604)

(a) Assumed value.

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Table 7. Parameter Estimates: Consumers

	Wheat (j = 1)	Barley (j = 2)	Canola (j = 3)	Oats (j = 4)	Grain Sorghum (j = 5)	Triticale (j = 6)	Cereal Foods (j = 7)
κ_{j0}	202.574	176.090	412.725	154.595	163.615	173.506	232.780
	(13.041)	(10.222)	(12.987)	(9.928)	(8.125)	(10.201)	(9.078)
ψ_{1j}	0.007	0.000	0.000	0.000	0.000	0.000	0.000
	(0.005)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ψ_{2j}	-0.014	0.016	0.000	-0.001	0.000	0.001	0.000
	(0.026)	(0.011)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
ψ_{3j}	-0.416	0.076	0.224	0.007	0.017	-0.003	0.000
	(0.705)	(0.106)	(0.078)	(0.040)	(0.011)	(0.004)	(0.000)
ψ_{4j}	-0.418	0.062	0.028	0.142	0.016	-0.010	0.000
	(0.578)	(0.116)	(0.022)	(0.060)	(0.028)	(0.006)	(0.000)
ψ_{5j}	0.013	0.021	0.007	0.012	0.026	-0.004	0.000
	(0.066)	(0.013)	(0.002)	(0.005)	(0.019)	(0.002)	(0.000)
ψ_{6j}	-1.433	-0.212	0.286	0.149	0.239	0.272	-0.001
	(3.102)	(0.724)	(0.178)	(0.286)	(0.176)	(0.130)	(0.001)
ψ_{7j}	-17466.485	591.551	1227.792	3658.776	-1960.231	325.119	10.291
	(39158.216)	(4969.109)	(1253.596)	(4516.374)	(3488.414)	(888.037)	(8.760)
ψ_{8j}	8292.706	-3288.719	-343.369	-3722.739	-4257.080	-955.265	-12.624
	(24426.159)	(4987.487)	(1089.926)	(2565.389)	(1967.394)	(645.444)	(6.691)
ψ_{9j}	3066.385	-70.099	0.020	145.019	-271.324	-44.930	-0.518
	(2384.999)	(275.403)	(70.047)	(103.476)	(100.569)	(56.906)	(0.576)
$\psi_{10,j}$	35716.459	1967.568	-493.583	-1882.323	7661.659	110.023	-27.057
	(45685.865)	(6500.959)	(2296.494)	(5381.444)	(4303.024)	(1456.217)	(10.990)
$\psi_{11,j}$	-1839.449	1245.668	171.149	-515.618	4408.011	226.629	-0.748
	(5405.111)	(999.119)	(242.323)	(357.303)	(1158.255)	(115.620)	(1.982)
$\psi_{12,j}$	362.670	-115.373	279.562	1161.909	-1778.593	52.393	1.733
	(4007.665)	(862.816)	(244.766)	(612.517)	(609.687)	(112.130)	(1.132)
$\psi_{13,j}$	-141.711	-45.123	-31.511	-69.586	6.695	3.088	-0.136
	(189.788)	(36.644)	(14.050)	(26.563)	(26.143)	(5.189)	(0.076)
ϕ_{jj}	0.054	0.051	0.004	0.071	0.002	0.062	0.002
	(0.036)	(0.036)	(0.001)	(0.030)	(0.001)	(0.030)	(0.001)
$\bar{\eta}_j$	0.500	0.600	0.050	0.260	0.050	0.500	0.050
	(a)	(a)	(a)	(a)	(a)	(a)	(a)
$\phi_{jj}/\bar{\eta}_j$	0.108	0.085	0.072	0.273	0.036	0.124	0.033
	(0.072)	(0.060)	(0.025)	(0.116)	(0.026)	(0.059)	(0.028)

(a) Assumed value.

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Table 7cont.

	Wheat & Other Flours (j = 8)	Beer (j = 9)	Margarine (j = 10)	Bread (j = 11)	Cakes & Biscuits (j = 12)	Other Foods (j = 13)
κ_{j0}	330.583	172.686	167.213	169.701	161.140	119.560
	(6.914)	(6.323)	(3.559)	(10.989)	(5.222)	(1.583)
ψ_{1j}	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ψ_{2j}	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ψ_{3j}	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ψ_{4j}	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ψ_{5j}	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ψ_{6j}	-0.001	0.001	0.000	-0.001	-0.002	-0.001
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
ψ_{7j}	-7.845	19.353	5.188	7.731	-10.442	30.771
	(9.641)	(19.830)	(4.872)	(17.790)	(8.902)	(19.485)
ψ_{8j}	15.124	-0.926	-8.702	-17.660	-4.209	-19.370
	(7.425)	(9.341)	(3.108)	(12.264)	(9.310)	(11.794)
ψ_{9j}	0.042	5.633	0.279	2.410	-0.033	4.924
	(0.201)	(2.986)	(0.439)	(1.368)	(0.483)	(1.743)
$\psi_{10,j}$	-6.056	-16.938	7.042	3.178	20.000	7.421
	(8.799)	(16.994)	(5.110)	(20.382)	(10.563)	(23.005)
$\psi_{11,j}$	5.238	15.819	2.720	20.124	19.958	26.402
	(1.504)	(5.990)	(1.252)	(5.571)	(4.184)	(6.381)
$\psi_{12,j}$	3.232	-1.077	-0.012	-2.166	2.407	-8.276
	(0.966)	(2.173)	(0.832)	(2.395)	(1.620)	(2.898)
$\psi_{13,j}$	-0.213	-0.441	0.010	-0.357	-0.250	0.168
	(0.045)	(0.110)	(0.050)	(0.168)	(0.126)	(0.142)
ϕ_{jj}	0.025	0.034	0.019	0.078	0.016	0.010
	(0.012)	(0.018)	(0.014)	(0.022)	(0.011)	(0.008)
$\bar{\eta}_j$	0.500	0.500	0.500	0.500	0.500	0.500
	(a)	(a)	(a)	(a)	(a)	(a)
$\phi_{jj}/\bar{\eta}_j$	0.050	0.068	0.039	0.156	0.033	0.020
	(0.025)	(0.036)	(0.028)	(0.043)	(0.022)	(0.017)

(a) Assumed value.

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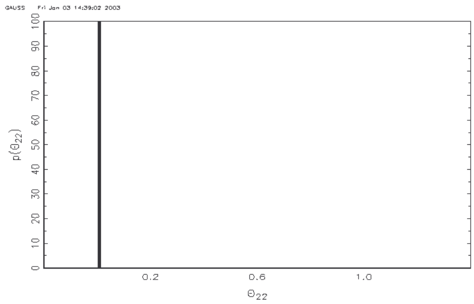

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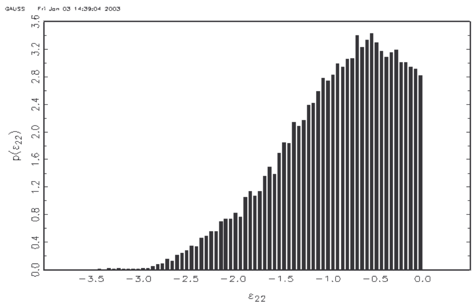

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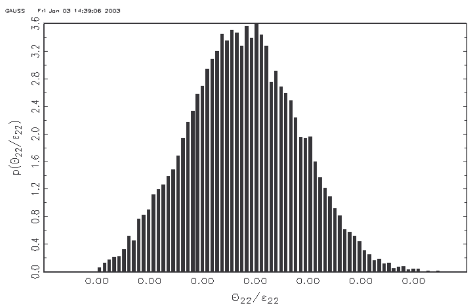

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Fig. 1: Flour and Cereal Food Product Manufacturers – Output of Cereal Foods

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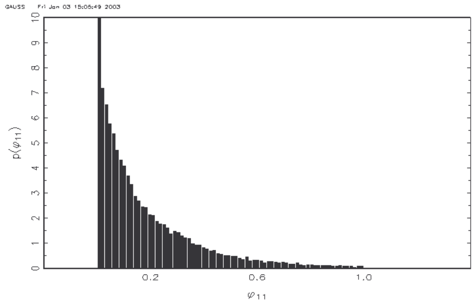

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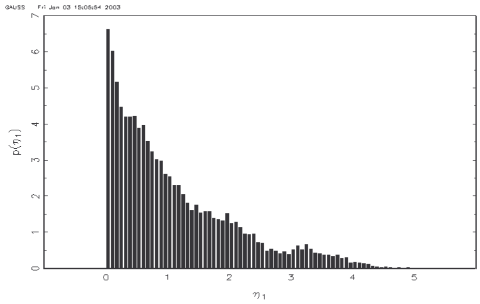

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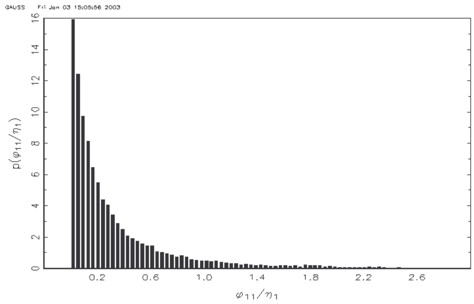

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Fig. 2: Flour and Cereal Food Product Manufacturers – Wheat Input

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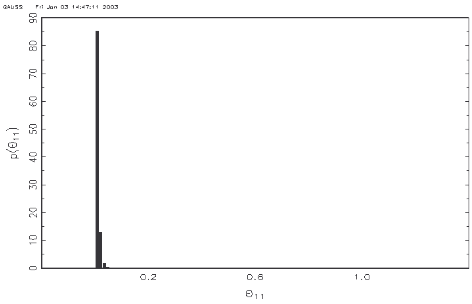

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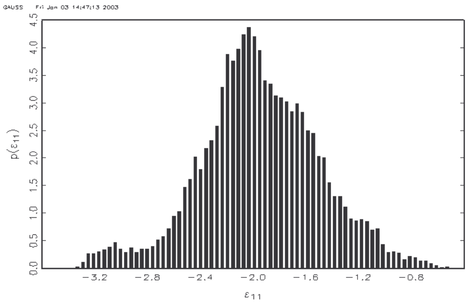

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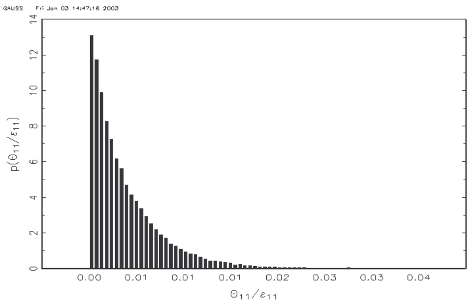

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Fig. 3: Beer and Malt Manufacturers – Beer Output

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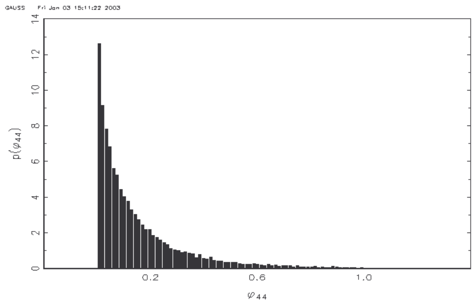

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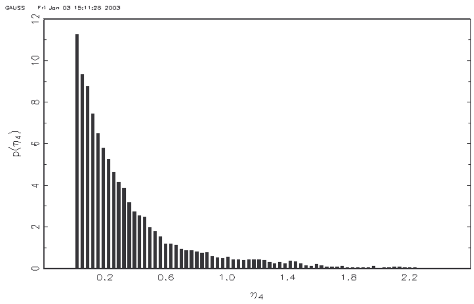

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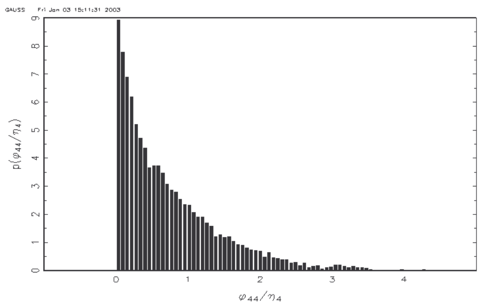

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Fig. 4: Flour and Cereal Food Product Manufacturers – Oats Input

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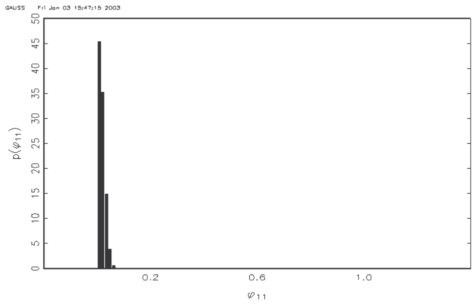

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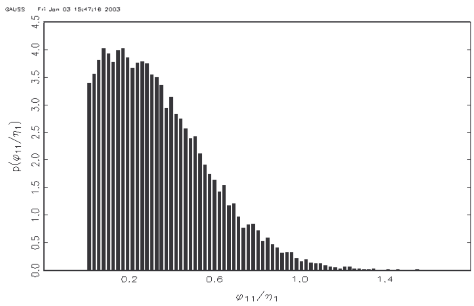

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Fig. 5: Oil and Fat Manufacturers – Canola Input

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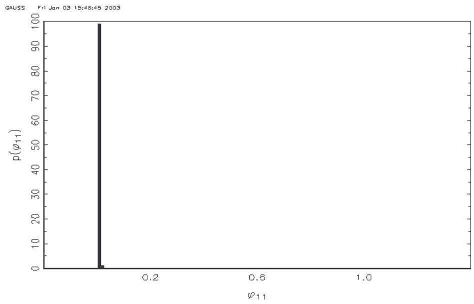

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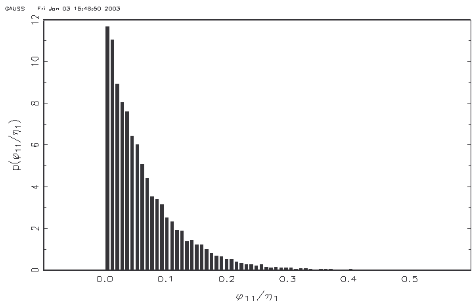

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Fig. 6: Bakery Product Manufacturers – Flour Input

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