Measuring Market Power for Marketing Firms: The Case of Japanese Soyabean Markets

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Abstract: This paper extends Bresnahan’s market power measure, which can be estimated econometrically, to marketing firms that have potential for price discrimination. An investigation of Japanese soyabean markets during 1973–78 using the model reveals an episode in which Japanese importers exercised some market power for several years after the US soyabean embargo of June 1973. An analysis of welfare loss and exchange rate transmission is also presented.

Market Power Coefficients

The firm’s profit-maximizing rule is to set perceived marginal revenue equal to marginal cost. In a competitive market, any attempt by a firm to raise prices by supplying fewer commodities would result in increased supply by other firms. A single firm thus has no market power to influence market prices. Hence, perceived marginal revenue equals price and also equals marginal cost. When market power exists, both perceived marginal revenue and marginal cost are less than price.

Bresnahan (1982) argues that market power in an industry can be measured as a coefficient, \( \lambda \), in the following relation between price \( P \) and quantity \( Q \):

\[
P = MC - \lambda Q \frac{\partial P}{\partial Q}
\]

This function postulates equality between perceived marginal revenue and marginal cost. When \( \lambda = 0 \), the market is perfectly competitive. When \( \lambda = 1 \), the market is monopolistic. In an oligopolistic market structure, \( \lambda \) lies between zero and unity. In a case where inverse demand and marginal cost are represented by \( P = G(Q, Y, \alpha) \) and \( MC = C(Q, W, \beta) \), where \( \alpha \) and \( \beta \) are parameters, and while \( Y \) and \( W \) are exogenous consumer income and wages, respectively, then the price relationship becomes:

\[
P = C(Q, W, \beta) - \lambda Q \frac{\partial G(Q, Y, \alpha)}{\partial Q}
\]

Treating \( P \) and \( Q \) as endogenous variables, the demand function and price relationship are simultaneously estimated to reveal the market power coefficient, \( \lambda \).

However, Bresnahan explains that the degree of market power, \( \lambda \), cannot be identified unless an additional interaction between price and income is included in a system of linear demand and marginal costs. If a change in the exogenous variable on the demand side, \( Y \), only shifts the demand function in parallel, the hypotheses of competition and monopoly are not differentiated.

However, when characteristics of marketing firms and their sales environment are recognized, Bresnahan’s additional variable can become unnecessary. As an illustration, consider a general formulation of the marketing problem. Suppose firms buy from producers and sell the product to human consumers and large-scale processors. Further, marginal revenues in product markets differ due to differences in demand elasticities and market power. Marketing firms’ costs rise due to material and processing costs. Costs are also higher for the human consumption market, owing to local distribution costs.

The demand functions are:

\[
D_1 = \alpha_0 N + \alpha_1 \frac{P_1 N}{CPI_1} + \alpha_2 \frac{YN}{CPI_1}
\]
(4) \[ D_2 = \beta_0 + \beta_1 \frac{Y_s^o P_s^o + Y_s^m P_s^m}{CPI_2} - \beta_1 \frac{P_2}{CPI_2} + \beta_2 \frac{M_R}{CPI_2} + \beta_3 C \]

where \( D_i \) and \( P_i \) are quantity demanded and price in market \( i \). Equation (3) shows that the demand for direct human consumption depends on real price and real income. Equation (4) tells us that the demand for processing is determined by real margins to process soyabeans and rapeseed and the capacity of factories. Perceived marginal revenues, in turn, depend on market power and the parameters of the demand functions:

(5) \[ MR_1 = P_1 + \lambda_1 \left( \frac{D_1 CPI_1}{\alpha_1} \right), \text{ and } MR_2 = P_2 - \lambda_2 \left( \frac{D_2 CPI_2}{\beta_1} \right) \]

A general formulation of the cost function specifies material and processing components and adjusts processing costs to wages (\( W \)):

(6) \[ C(Q_1, Q_2) = P^*(Q_1 + Q_2) + W \left[ \alpha_1 (Q_1 + Q_2) + \frac{\beta_1}{2} (Q_1 + Q_2)^2 \right] + \alpha_2 Q_1 + \frac{\beta_2}{2} Q_2^2 \]

where the \( Q_i \) are marketing firms' outputs for market \( i \). Notice that costs are higher in the local market when \( \alpha_1 \neq 0 \). Also, marginal costs are different and increasing when \( \beta_s \) and \( \beta s_1 \) are positive.

Pricing relationships for both product markets can be developed from solutions to the maximum profit problem for marketing firms. The profit function is:

(7) \[ \pi = P_1 D_1 + P_2 D_2 - C(Q_1, Q_2) \]

This function can be expressed in terms of the \( D_i \)s by noting that \( Q_1 = D_1 \) and \( Q_2 = D_2 + S \), where \( S \) is the change in ending stocks. Then the first order conditions are:

(8) \[ \frac{\partial \pi}{\partial Q_1} = MR_1 - (P^* + W [\alpha_1 + \beta_1 (D_1 + D_2 + S)]) + W [\alpha_2 + \beta_2 D_1] = 0 \]

(9) \[ \frac{\partial \pi}{\partial Q_2} = MR_2 - (P^* + W [\alpha_1 + \beta_1 (D_1 + D_2 + S)]) = 0 \]

The implied pricing functions are:

(10) \[ P_1 = \frac{\lambda_1 (CPI_1 D_1)}{\alpha_1} + (\alpha_2 + \alpha_2) W + (\beta_1 + \beta_1) (WD_1) + \beta_s (WD_2) + \beta_s (WS) + P^* \]

(11) \[ P_2 = \frac{\lambda_2 (CPI_2 D_2)}{\beta_1} + \alpha_2 W + \beta_s (WD_1) + \beta_s (WD_2) + \beta_s (WS) + P^* \]

An econometrically useful form of the marketing system is given by Equations (3), (4), (10), and (11). There are 10 endogenous variables and 8 exogenous variables:

Endogenous: \( P_1, P_2, D_1, D_2, \frac{P_1 N}{CPI_1}, \frac{P_2}{CPI_2}, \frac{CPI_1 D_1}{N}, CPI_2 D_2, WD_1, \) and \( WD_2 \)

Exogenous: \( N, \frac{YN}{CPI_1}, \frac{Y_s^o P_s^o + Y_s^m P_s^m}{CPI_2}, \frac{M_R}{CPI_2}, C, W, WS, \) and \( P^* \)

The criterion for identifying an equation is that the number of included endogenous variables less one must be equal or less than the number of excluded exogenous variables. For instance, two endogenous variables are included in Equation (3) \( (D_1 \) and \( P_1/CPI_1) \). Six exogenous variables are excluded. Thus, Equation (3) is identified because \( 1 < 6 \). Following the same rule, Equations (4), (10), and (11) are also identified. Furthermore, \( \lambda_1 \) and \( \lambda_2 \) can both be
determined from the first coefficient of the respective price equations and demand price response parameters ($\alpha_1$ and $\beta_1$). Thus, the oligopoly solution is identified for marketing sectors with two product markets.

For subsequent empirical investigations, the capacity adjustments by marketing firms should also be included. Now the profit function is:

$$\pi = P_1D_1 + P_2D_2 - \left[ P^* (Q_1 + Q_2) + W \alpha_s (Q_T - \bar{Q}_T) + \frac{\beta^2_s}{2} (Q_T - \bar{Q}_T)^2 + \alpha_{s1} (Q_1 - \bar{Q}_1) + \frac{\beta_{s1}}{2} (Q_1 - \bar{Q}_1)^2 \right]$$

where $\bar{Q}_T$ and $\bar{Q}_1$ are capacities and $Q_T = Q_1 + Q_2$. Now the pricing functions are:

$$P_1 = - \frac{\lambda_1}{\alpha_1} \frac{CPI_1D_1}{N} + (\alpha_s + \alpha_{s1}) W + (\beta_s + \beta_{s1}) WD_1 + \beta_s WD_2 + \beta_s WS$$

$$- \beta_s WQ_T - \beta_{s1} W\bar{Q}_1 + P^*$$

(13)

$$P_2 = \frac{\lambda_2}{\beta_1} CPI_2 D_2 + \alpha_s W + \beta_s WD_1 + \beta_s WD_2 + \beta_s WS - \beta_s WQ_T + P^*$$

(14)

where (14) is identical to (11) except one term, $-\beta_s WQ_T$, and there are more additional terms in (13) compared to (10). The four equations, (3), (4), (13), and (14), are still identified, as are $\lambda_1$ and $\lambda_2$.

The cost structure of marketing firms is an empirical issue. Short-run marginal cost functions could be constant ($\beta_1 = 0$) in both markets when capital stock (handling and storage equipment) is fixed and variable costs are proportional to labour and energy used for handling. Further, Thompson and Dahl (1979) hypothesize economies of scale in transport, information network, risk bearing, and storage space for US grain exporters. As scale of operations increases and firms accumulate capital, the marginal cost of marketing firms could decrease over longer run periods. The inverse relationship between marginal cost and capacity in the above cost function potentially accounts for these long-run cost adjustments.

Japanese Soyabean Markets

The two-market assumption is an alternative method to Bresnahan’s demand notation for identifying the market power coefficients. Soyabean markets in Japan seem well-suited for testing this model. There are two primary soyabean usages in Japan. One is for direct human consumption as food (tofu, natto, etc.) except oil, and the other is for livestock feeds and oil. The former market accounts for 30 percent of all soyabean consumption in the Nation. More than 88 percent of soyabeans are imported, with the primary sources being the USA, China, and Brazil. Crushing mills are located on the coast to minimize transport costs. Other imported soyabeans are unloaded there and sent to urban areas where human consumption points are concentrated.

Point-of-import prices and urban wholesale prices have behaved differently. The unit value import price closely follows the US export price adjusted by the exchange rate and transport costs. That close relationship suggests that a constant margin model may be suitable. Similarly, Tokyo wholesale prices from the early 1970s and post-1979 period closely reflect import prices. However, there appears to have been an episode of extremely high wholesale prices during 1973–78. Supplies worldwide were short in 1973, and all import and wholesale prices increased. However, domestic wholesale prices increased more than proportionately and remained high even after world prices declined. This period of high domestic prices may have been triggered by the US soyabean embargo, which was in effect for 5 days from 21 June 1973. Afterwards, export licences were set at 50 percent of unfilled export contracts until 1 September 1973 (Kost et al., 1986).

There was an inventory buildup in anticipation of the embargo. However, consumption behaviour was not unusual; i.e., there was a consumption decrease in the presence of high domestic prices during the high-price era of the early 1970s.
MEASURING MARKET POWER FOR MARKETING FIRMS

Estimation and Data for the Soyabean Market

Specification of demand relationships in Japan's soyabean markets and preliminary hypothesis testing produced a more precise system of demand and pricing functions. These functions are shown below as Equations (15)-(18).

The demand function for the human consumption market (3) is a per-capita function. Population then becomes a scaling factor for independent variables in the market demand function, as shown in Equation (15) below. Also, separability for food consumption is assumed, so \(Y/CPI_1\) and \(P_1/CPI_1\) in Equation (3) are the ratios of nominal household expenditure on food and nominal soyabean wholesale price to a consumer food price index (Phlips, 1983, p. 73). Finally, seasonal trends in soyabean consumption are taken into account with dummy variables, one for the second and third quarters and the other for the fourth quarter.

In market 2, rapeseed margins are included as an exogenous variable in Equation (16), since it is expected that soyabeans would be replaced by this important substitute if rapeseed profitability increased. A capacity measure is also included as an explanation for the secular increase in demand.

Several preliminary specifications of pricing equations were also examined. In particular, the data supported the notion of constant marginal costs for both markets. That is, the coefficients \(\beta_5\) and \(\beta_{S1}\) were not statistically significant. With regard to market power, the coefficient \(\lambda_2\) was not statistically significant. Similarly, the market power coefficient \(\lambda_1\) was not statistically significant in some preliminary specifications. However, \(\lambda_1\) was found to be statistically significant when an "episode" of monopoly pricing between 1973 and the first half of 1978 was specified. Hence, Equation (13) is slightly changed as follows:

\[
P_1 = -\left(\frac{CP_1D_1}{N+\alpha_0}\right)\left[\lambda_1D_1+\lambda_2(1-D_1)\right] + (\alpha_3+\alpha_{s1})W + (\beta_0+\beta_{s1})W_1D_1 + \beta_5WD_2
\]

\[
+ \beta_5WS - \beta_5WQ_1 - \beta_3WQ - P^*
\]

where \(D_1 = 1\) during 1973–78; otherwise \(D_1 = 0\).

Then the equations are simultaneously estimated and the hypotheses \(\lambda_1 = 0, \lambda_2 = 0, \beta_5 = 0,\) and \(\beta_{s1} = 0\) are tested. The \(\chi^2\) is 7.72, which is less than \(\chi^2 (4, 0.05)\). The hypothesis cannot be rejected at the 0.05 level.

A typical system of estimation equations for Japan's soyabean market is shown below:

\[
D_1 = \alpha_0N + \frac{\alpha_1P_1}{CPI_1}N + \alpha_2\frac{YN}{CPI_1} + \alpha_3D_2N + \alpha_4D_4N
\]

\[
D_2 = \beta_0 + \beta_1\frac{MS}{CPI_2} + \beta_2\frac{MR}{CPI_2} + \beta_3C
\]

\[
P_1 = -\frac{\lambda_1D_1}{\alpha_1} + (\alpha_3+\alpha_{s1})W + P^*
\]

\[
P_2 = \alpha_5W + P^*
\]

The variable definitions are given in Table 1. Quarterly data for 1971–88 are used for each variable. Most data come from Japanese domestic sources.

Results

Table 2 summarizes the empirical results. Two sets of estimates are shown. One is a full system while the other is separated. The latter system is added because of concerns about the import unit value as an accurate measure of transaction prices in the processing \(P_2\) market. Both sets of equations in the tables are similar. Quantities of soyabees consumed in market 1 demonstrate a statistically significant negative relationship with relative prices of soyabees
and a positive relationship with household expenditure on food. Statistically significant seasonal trends show that direct human consumption of soyabeans is affected by seasonal factors, high in the fourth quarter and low in the second and third quarters. Food made from soyabeans, such as tofu and aburaage, are largely consumed during the New Year celebrations, the most important Japanese holiday, and high expenditure on food during the fourth quarter may be supported by the large additional income provided by December bonuses.

Table 1—Definition of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D_1$</td>
<td>Soyabean use for direct consumption (approximated as domestic production plus imports plus difference in stocks between the previous period and the current period minus quantity processed)</td>
<td>1000 t</td>
</tr>
<tr>
<td>$D_2$</td>
<td>Soyabean use for processing into meal and oil</td>
<td>1000 t</td>
</tr>
<tr>
<td>$S$</td>
<td>Change in ending stocks</td>
<td></td>
</tr>
<tr>
<td>$P_1$</td>
<td>Weighted average of wholesale prices of Japanese, US, and Chinese soyabeans by market shares ($P_1 = P_i^{MS} + P_j^{MS}$, where $MS$ represents market share and superscripts $US$, $J$, and $C$ respectively represent USA, Japan, and China)</td>
<td>¥/kg</td>
</tr>
<tr>
<td>$P_2$</td>
<td>Unit value of imported soyabeans</td>
<td>¥/kg</td>
</tr>
<tr>
<td>$P_R$</td>
<td>Rapeseed price to large processors</td>
<td>¥/kg</td>
</tr>
<tr>
<td>$M_S$</td>
<td>Soyabean margin ($= Y_o^o P_s^o + Y_o^m P_s^m - P_2$)</td>
<td></td>
</tr>
<tr>
<td>$M_R$</td>
<td>Rapeseed margin ($= Y_r^o P_r^o + Y_r^m P_r^m - P_R$)</td>
<td></td>
</tr>
<tr>
<td>$Y_I$</td>
<td>$J$ yield from one ton of $I$ (meal and oil yields for soyabean and rapeseed are calculated by dividing soyabean oil or meal production by soyabean use by processors for every quarter between the first quarter of 1971 and the fourth quarter of 1988 and regressed on the time from 1 to 72)</td>
<td></td>
</tr>
<tr>
<td>$P_I$</td>
<td>Wholesale price of $IJ$ ($I =$ soyabeans or rapeseed; $J =$ oil or meal)</td>
<td>¥/kg</td>
</tr>
<tr>
<td>$P^*$</td>
<td>Export price of American soyabeans, adjusted for freight and exchange rate</td>
<td>¥/kg</td>
</tr>
<tr>
<td>$CPI_1$</td>
<td>Consumer price index for food</td>
<td>%</td>
</tr>
<tr>
<td>$CPI_2$</td>
<td>Consumer price index</td>
<td>%</td>
</tr>
<tr>
<td>$N$</td>
<td>Population</td>
<td>million</td>
</tr>
<tr>
<td>$Y$</td>
<td>Nominal per-household consumption of food, beverages, and cigarettes</td>
<td>¥1,000 million</td>
</tr>
<tr>
<td>$C$</td>
<td>Capacity to process soyabeans for oil or meal calculated from $Q$</td>
<td>1000 t</td>
</tr>
<tr>
<td>$W$</td>
<td>Nominal wages in food industry</td>
<td>¥1,000</td>
</tr>
</tbody>
</table>

The estimation of Equation (16) shows that quantities of soyabeans processed in market 2 are positively related to soyabean margins and capacity. There is a negative relationship between quantities and rapeseed margins, but it is not significant.

In Equation (18), the hypothesis that an intercept term equals zero was not rejected from Equation (17), $\alpha_S \neq 0$ with $t = 7.2$. These results specify the cost functions for the Japanese soyabean marketing firms. Since:
(19) \( TC = P^*(Q_1 + Q_2) + \alpha_S W(Q_1 + Q_2 - Q_T) + \alpha_{S1} W(Q_1 - Q_1) \)

the marginal cost for each market is constant with marginal cost in market 1 and significantly higher than that in market 2. This result indicates that significant handling and transport costs are incurred in marketing for human consumption after unloading at the ports.

Table 2—Estimation Results for Equations (15)–(18)

| Coefficient/Variable | Combined System | | | Separated System | | |
|----------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                      | Estimate | \( t \)-ratio | Estimate | \( t \)-ratio | Estimate | \( t \)-ratio |
| \( \alpha_0 \)       | 0.02385 | 1.49 | 0.02172 | 1.35 |
| \( \alpha_1 \)       | -0.0046541 | -2.58 | -0.0043112 | -2.38 |
| \( \alpha_2 \)       | 0.41388 | 0.17 | 0.68773 | 0.29 |
| \( \alpha_S \)       | -0.0048923 | -1.97 | -0.0050297 | -2.03 |
| \( \alpha_4 \)       | 0.01133 | 2.29 | 0.01093 | 2.20 |
| \( \beta_0 \)        | -153.33 | -1.61 | -146.58 | -1.53 |
| \( \beta_1 \)        | 358.72 | 1.81 | 283.51 | 1.42 |
| \( \beta_S \)        | 81.01448 | 0.36 | 96.05749 | 0.42 |
| \( \beta_3 \)        | 0.98441 | 12.91 | 0.98462 | 12.84 |
| \( \alpha_S \)       | 0.00018821 | 0.18 | 0.000184 | 0.18 |
| \( \alpha_{S1} \)    | 0.02122 | 7.19 | 0.02127 | 7.60 |
| \( \alpha_S + \alpha_{S1} \) | | | 0.02127 | 7.60 |
| \( \lambda_{11} \)   | 0.08137 | 2.53 | 0.07632 | 2.35 |
|                      | R^2 | 0.62 | 1.4 |
|                      | DW | 0.87 | 1.0 |
|                      | Q1 | 0.58 | 2.4 |
|                      | Q2 | 0.77 | 2.4 |

*Values for the combined and separated system are the same up to three significant digits. The statistically significant \( \lambda_1 \) (\( t=2.53 \)) suggests that market power existed in the wholesale market between 1973 and the first half of 1978 and that the market was not competitive. The Japanese soyabean markets were segmented, and marketing firms might have exercised market power and pursued policies of price discrimination in the two soyabean markets during 1973–78.

Welfare Analysis and Exchange Rate Transmission

The market power coefficient \( \lambda_1 \) is small relative to its pure monopoly value, but it is statistically significant. Profit margins and consumer welfare losses, which are based on estimates of demand functions and market power coefficients, are presented in this section. Judgments on the importance of this market power episode are enhanced with these conventional performance measures.
Pricing behaviour and loss of consumer surplus are shown in Figure 1. The MR schedule depicts the firms’ perceptions of how revenues will change when price changes; it depends on $\lambda_1$. The condition that $MR = MC$ defines the equilibrium price and quantity, $P^0$ and $D^0$. The competitive solution is also given; as $\lambda_1$ approaches zero, $MR$ rotates to $D$. Then the price reduces to marginal cost ($\delta$) and consumption expands to $D'$. The area of $P^0\delta BA$ is the consumer welfare loss. This area is calculated from the values of $P^0$, $MC$, $D^0$, and $D^c$ for each period from 1973 up to the first half of 1978.

![Figure 1](https://via.placeholder.com/150)

The estimated demand, marginal revenue, and marginal cost functions enable us to specify profit margins and to calculate algebraically the loss of consumer surplus. The inverse demand, marginal revenue, and marginal cost functions given from Equations (15) and (17) are:

\[
P_{1t} = \frac{CPI_{1t}}{\alpha_1 N_t} D_{1t} + \alpha_{dt}, \quad MR_t = P_{1t} + \lambda_1 \frac{CPI_{1t}}{\alpha_1 N_t} D_{1t}, \quad MC = (\alpha_S + \alpha_{S1}) W_t + P^*_t = \delta_t
\]

where: $\alpha_{dt} = -\frac{CPI_{1t}}{\alpha_1} \left[ \alpha_0 + \frac{\alpha_2 Y_t}{CPI_{1t}} + \alpha_3 D_{23} + \alpha_4 D_4 \right]$ and $t$ shows that each variable depends on time. Each parameter follows the result in Table 2.

The values that define the welfare area can be calculated from the above marginal revenue, marginal cost, and price functions. The appropriate prices and quantities are given below:

\[
P^o_t = \frac{\alpha_{dt} \lambda_1 + \delta_t}{1 + \lambda_1}, \quad D^o_t = \frac{(\delta_t - \alpha_{dt}) \alpha_1 N_t}{(1 + \lambda_1) CPI_{1t}}, \quad \text{and} \quad D^c_t = \frac{\delta_t - \alpha_{dt} \alpha_1 N_t}{(1 + \lambda_1) CPI_{1t}}
\]

Profit margins are measured as $(P^o_t - \delta_t) / P^o_t$ for each period. The average was 22 percent.

The loss of consumer surplus during the period was $376$ million, of which $361$ million were transferred to marketing firms and the rest was wasted as dead-weight loss.

### Exchange Rate Transmission

Another aspect of competitiveness in the market is the degree to which the exchange rate is transmitted to the wholesale price. A perfectly competitive market has an elasticity of wholesale price with respect to an exchange rate of unity, assuming that the pricing strategy of soyabean exporters is not affected by exchange rate changes (no pricing to the market) and
that transaction costs from import points to wholesale markets are fixed. That is, the percentage change in the exchange rate is perfectly absorbed by the percentage change in the wholesale price. If the yen appreciates against the US dollar by 10 percent, then wholesale prices of US soyabeanse decline by 10 percent under perfect competition. However, when the market is not competitive, a change in the exchange rate may be adjusted by the firm’s profit margins as well as wholesale prices. So if the yen appreciates against the dollar by 10 percent, and wholesale prices of US soyabeanse decline by 8 percent, then 2 percent is left in importers’ pockets as their additional profit.

Suppose the marketing cost (O) includes the product of the export country price and the exchange rate, \( P^* = P e \), where \( P^* \) and \( P \) are import prices in yen and in dollars, and \( e \) is the exchange rate (yen per dollar). Then, any changes in the exchange rate are perceived through changes in import prices in yen terms. When the exchange rate changes, the import price in yen terms will be affected as well, which will influence importers’ marginal costs. Figure 1 suggests that the level of \( P^0 \) is determined by a combination of demand, marginal revenue, and marginal cost functions. The argument in Equation (21) clarifies that \( P^0 \) depends on demand conditions, marginal cost, and market power. An exchange rate transmission elasticity is obtained:

\[
\frac{e}{p} \left( \frac{\partial P}{\partial e} \right) = \frac{e}{P} \left( \frac{\partial P}{\partial e} \right) \leq \frac{1}{\alpha_0 + \alpha_1 \lambda_1 + (\alpha_0 + \alpha_2) W_t} e_t P_t^e
\]

where \( 0 < \lambda < 1 \) and \( pe \) is the export price of US soyabeanse, assuming that US exporters are not price discriminating due to a change in the exchange rate (i.e., \( a p e / a e = 0 \)).

The elasticities from 1973 up to the first half of 1978 were calculated for each period. The average is 60.4 percent. Elasticities for the same period with an assumed competitive structure (\( \lambda = 0 \)) are 86.7 percent. The exchange rate transmission was incomplete in 1973–78 while the yen was in a long appreciating trend against the dollar and relatively stable. The small magnitude of the market power coefficient seems to have a relatively large influence on the exchange rate transmission elasticity.

Conclusion

Bresnahan’s method for measuring a market power coefficient was applied to marketing firms where an interactive exogenous variable with prices was not necessary. This two-market model was tested in the Japanese soyabi market. The data are consistent with an episode in which there was market power in the Japanese soyabi wholesale market after the US embargo. The estimates suggest that Japanese consumers lost $376 million during this episode, most of which was transferred to the importers. Also, the average exchange rate transmission was 68.9 percent, which indicates price stickiness in the wholesale market.

The market power episode ceased in late 1978, and the market has been competitive since then. This could be explained by increased domestic supplies and imports of soyabeanse from China in the late 1970s. Further investigations might focus on the potential role of energy costs or marketing risks as factors contributing to the period of unusually high margins.

Notes

1 Iowa State University.
2 Additional variable definitions are given in Table 1.
3 The increase in price in the first quarter of 1973 might be due to unusual circumstances. The model was tested excluding this observation, but \( \lambda_1 \) was still statistically significant.
References


Discussion Opening—Joyce A.S. Cacho (Virginia Polytechnic Institute and State University)

During 1970–88, Japan imported soyabeans from the USA, Brazil, and China. Soyabean imports from the USA and Brazil are processed for vegetable oil and protein meal. The direct human consumption market is primarily supplied by Japanese-produced soyabean and imports from China. China’s soyabean is closest in variety to Japanese soyabean. The variety differences between soyabeans for feed and food use mean that soyabeans are not a homogeneous product in the Japanese market. The US embargo, which was in effect 21–26 June 1973, would be expected to affect the processing market and have a neutral effect in the human consumption market.

Between 1973 and the first half of 1978, an episode of high wholesale prices for soyabeans occurred in Japan. This sustained price level may represent the market power of the firms (approximately 10) involved in the for-feed market. In the estimation of the system of equations for Japan’s soyabean market and testing for market power, the authors include a variable to represent this in the equation for soyabeans for food use. Since the demand patterns for feed-use and food-use markets are separate and different, the market power variable may be included more appropriately in the feed-use equation where market power is likely to have occurred after the US embargo.

The technique developed in this paper to measure market power is methodologically sound. In addition to providing an alternative technique to using time-series analysis of market power, price in Japan is comprised of US price and the US dollar/yen exchange rate. Thus the linkage between the competitiveness of the market and the exchange rate transmission may be analysed. However, the application of the technique to the Japanese soyabean market and the corresponding results need to be re-examined. The assumption that the feed-use and food-use markets are separate but linked is brought into question by the fact that a varietal difference exists between the soyabeans supplied to each market.

[Other discussion of the paper and the authors’ reply appear on page 93.]