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EFFECTS OF PRICING DECISIONS OF A STATUTORY MARKETING BOARD

A Case Study

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Applying econometric analysis to a model recently used by Parish, this article examines the short-run implications for consumers and producers of the pricing decisions of the Western Australian Egg Board over the period 1953-54 to 1962-63.

Statutory agricultural marketing boards operate in all Australian States to facilitate the orderly marketing of farm products. The boards are variously composed of producer and government or consumer representatives who are charged with developing policies which reconcile the interests of these groups. Some of the boards act as legalized monopolies, with power to control production, acquire the product, and set wholesale and retail prices. Others perform only regulatory or co-ordinating functions. Most boards have a range of powers between these extremes.

Many State marketing boards set prices on the domestic market, usually at higher levels than would be obtained on a free market. Any particular pricing policy will have implications for consumers, producers, and general economic efficiency. The implication for consumers is potential consumption foregone, for producers it is potential monopoly gains not appropriated, and for society as a whole it is the possible misallocation of resources into and within the industry. The extent to which any group is favoured by pricing decisions depends upon the board's enabling legislation, the degree of protection on the local market, the demand characteristics of the commodity, and the voting power of the various groups represented on the board.

The purpose of this paper is to examine the short-run (annual) implications for consumers, producers, and economic efficiency of the pricing decisions of a particular marketing board. The criteria are those of economic-surplus theory. The method is the econometric analysis of annual time series. The conclusions are thus circumscribed by the limitations of both types of analysis.

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The Western Australian Egg Marketing Board

The Marketing of Eggs Act, 1945-1960, of Western Australia requires that all eggs sold in the South West Land Division be marketed either through the Western Australian Egg Marketing Board or under a permit system which is administered by the Board. The Board controls both local and export sales, and sets local wholesale and producers' prices of eggs. Egg production is not limited by the Board, and the number of eggs produced in any year has always been greater than the annual requirements for local consumption. The Board has set the local wholesale price above the export level in order to improve producers' returns. Farmers receive an equalized price based on the pooled returns from both markets.

The Board is composed of six members: three appointed by producers, two consumer representatives and a voting chairman appointed by the Government. Hence, unlike egg marketing boards in some other States, producer members do not command a firm majority. The Board does act in the interests of producers, however, to the extent that it carries out price discrimination, it promotes eggs on the local market, and it actively seeks sales on overseas markets. Consumer interests are served through the Board's grading standards, wholesale price stabilization, and the reduction of seasonal shortages by encouraging production during periods of short supply. This is done through a system of differential seasonal producer prices maintained by a producer levy. The domestic Western Australian market is separated from other Australian markets only by transportation costs and the general discouragement of interstate sales by the various State egg boards. An embargo on overseas eggs keeps supplies from these sources off the market.

The Costs of Price Discrimination

A model of the implications of price discrimination on the domestic market, based on classical economic-surplus theory, has been given by Parish.[1] The effects of the pricing policies of the Board will be evaluated within the general framework of this model. The model's important features are illustrated in Figure 1. SS and D_dD_d represent the supply and domestic demand schedules respectively. The Board sets a domestic price of OP_1 which leads to consumption of OQ_1 on the domestic market. All eggs produced in excess of OQ_1 are exported at price OP_2. Demand on the export market is perfectly elastic, so the export demand schedule can be represented by the horizontal line P_2D_e. Total production from the industry is OQ_3, which is the amount supplied at the equalized price OP_3. The equalized price, which is a weighted average of the domestic and export prices, itself depends upon OQ_3.

Producers receive the equalized price for all eggs. The market value of marginal production, however, is the lower export price, OP_2. If producers received only OP_2 for their marginal production a smaller number of eggs, OQ_2, would be produced. The area JHG thus represents the waste through failing to restrict production to OQ_2. This area is the difference between the additional costs of producing the surplus eggs, Q_2JHQ_3, and the additional revenue from sales, Q_2JGQ_3.[2]

[1] Parish, R. M., The Costs of Protecting the Dairying Industry, *Economic Record*, Vol. 38, No. 82, (June, 1962), pp. 167-182.

[2] This assumes that there are no external economies or diseconomies of production and that resources from the egg industry could be efficiently employed elsewhere. See Parish, *ibid.*, p. 169.

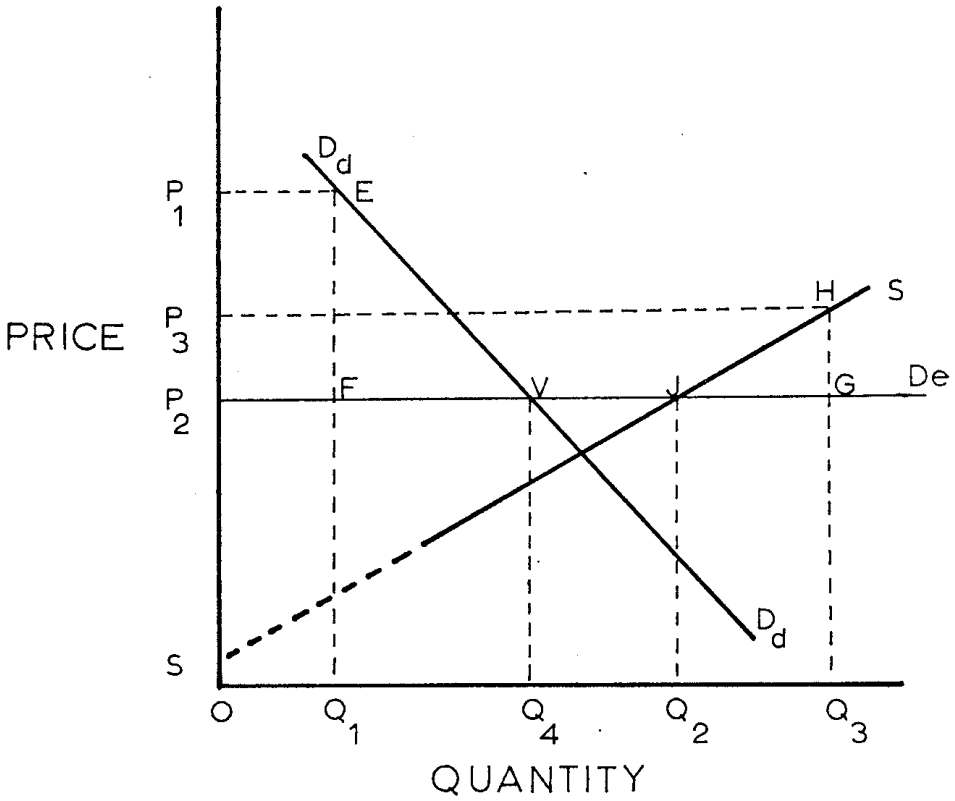

FIG. 1—Price discrimination model.

If there were no domestic price maintenance, all eggs would sell at the export price, resulting in local consumption of OQ_4. The cost to local consumers of maintaining the domestic price at a higher level than the export price is therefore the value which local consumers would place on additional consumption of eggs if there were no discrimination, i.e., Q_1EVQ_4. However, the cost of making these eggs available would be the loss of export income, which is Q_1FVQ_4, so the net value of foregone consumption is FEV.

Gross producer income is the sum of revenue generated from domestic and export sales, i.e., OP_1EQ_1 plus Q_1FGQ_3. The total cost of supplying both these markets is the industry fixed costs plus the area under the supply schedule, i.e. fixed costs plus $OSHQ_3$. Net producer income will hence be greatest if OP_1 is selected to maximize $(SP_1EFJ - JHG)$, assuming that this price does not increase sales outside the Board. The loss to producers of any policy adopted by the Board then depends on the extent to which the actual domestic price is greater or less than the optimizing domestic price. This loss would clearly be reduced by an efficient policy which limited production to OQ_2.

Market Structure Estimates

Estimates of the supply and domestic demand relationships have been made using annual time series data from 1953-54 to 1962-63 for supply and from 1951-52 to 1962-63 for demand.

Annual supply relationships of Western Australian egg production

have been examined in detail by Banks.[3] The industry consists of two fairly distinct producer groups, full-time and part-time. Since it is possible that the Board's pricing policy might affect these groups in different ways, separate supply estimates have been made for each. Production of at least 20,000 dozen eggs per year has been chosen as the criterion for a full-time producer. It is common for producers with a smaller annual output to supplement their income from off-farm employment. The capital commitment of producers in this group is also small. They typically use an open range system, and it is easy for them to enter or leave the industry.[4] Since 1953-54 there has been an overall decline in total production, made up of a marked decline from the part-time group, where the number of producers has declined from approximately 3,000 to 1,000 over the period, and a less than compensating increase from the full-time group. Full-time producers use a greater capital input. The group is characterized by a higher and more rapidly increasing productivity per man through the use of capital intensive production systems.

Full-time, part-time and total production of eggs sold through or under permit from the Board from July to June were regressed on a number of variables which were thought to be likely supply determinants on *a priori* grounds.[5] Prices of poultry feed lagged one year and egg prices lagged two years did not have significant coefficients. The price of eggs from August to May of the previous year and a structural shift variable (represented by time) did give satisfactory estimates, however. Decisions on chicken buying, and hence the hen numbers in the coming financial year, are made in May, and they are likely to be based on the previous season's price. This price has not been deflated. Deflating series, such as factory wage rates or the consumer price index, are more appropriately included as separate variables. These series are both highly correlated with time ($r = 0{\cdot}99$) and their influences are therefore assumed to be accounted for by the structural time shift. Both linear and logarithmic functions were estimated, the former being slightly more adequate. Residuals were not significantly serially correlated, nor did regressor variables show appreciable correlation. The linear estimates are summarized in the following equations, where figures in parentheses are standard errors of the coefficients.

[3] Banks, E. L., The Effect of Price on the Supply of Eggs in Western Australia, unpublished M.Sc.Agr. thesis, University of Western Australia, 1964; and Egg Supply and Pricing Policy, *Farm Policy,* Vol. 4, No. 1, (June, 1964), pp. 1-6.

[4] For a description of the characteristics of the industry in the mid-1950's see *Report of the Royal Commission into Matters Relating to the Marketing and Distribution of Eggs,* Western Australian Government Printer, Perth, 1955, *passim.* The somewhat arbitrary criterion for distinguishing between full-time and part-time producers is based upon findings of this Commission (*ibid.,* pp. 11 and 19). Production of 20,000 dozen eggs is also used by the Egg Board to distinguish between larger and smaller producers.

[5] Production figures do not include eggs which come from "back yarders" (those who have hens to supply their own needs), nor from producers who make sales outside the Board at higher prices by avoiding the payment of Board levies. Production from these sources was estimated in 1955 as being 10 per cent of the total State production. See *Report of the Royal Commission, op. cit.,* p. 14. This component would also be likely to vary with price, but it has been neglected in the following analysis since adequate data are not available. This omission is likely to be less of a handicap than it would be in other States which also have to cope with interstate sales.

Full-time

$$X_3 = 1{,}564{\cdot}732 - \underset{(39{\cdot}178)}{21{\cdot}946X_1} + \underset{(30{\cdot}566)}{224{\cdot}738X_2} \qquad R^2 = 0{\cdot}89$$

Part-time

$$X_4 = 2{,}055{\cdot}611 + \underset{(31{\cdot}258)}{149{\cdot}798X_1} - \underset{(24{\cdot}387)}{400{\cdot}518X_2} \qquad R^2 = 0{\cdot}98$$

Total

$$X_5 = 3{,}620{\cdot}402 + \underset{(54{\cdot}836)}{127{\cdot}851X_1} - \underset{(42{\cdot}782)}{175{\cdot}780X_2} \qquad R^2 = 0{\cdot}76$$

where

X_1 is average price of eggs received by producers from August to May, year $t - 1$, in pence per dozen;
X_2 is time (years); 1953-54 = 1 to 1962-63 = 10;
X_3 is egg production of full-time producers from July to June, year t, in thousands of dozen;
X_4 is egg production of part-time producers from July to June, year t, in thousands of dozen;
X_5 is egg production of all producers from July to June, year t, in thousands of dozen.

Secular trends in full-time and part-time production are reflected in the coefficients of X_2. The effects of long-term price movements are possibly included in these trends. The effects of year to year price variation are reflected in the coefficients of X_1. Part-time producers appear to be very responsive to annual price changes. The elasticity of supply of this group with respect to annual price variation is approximately unity. This seems reasonable, since these producers can easily enter or leave the industry. Many of them live in the Perth Metropolitan Area and can get jobs off the farm or are already in non-farm employment. Changes in production from full-time producers appear to be completely dominated by long-term considerations.

The domestic demand for fresh eggs has been less exhaustively studied than supply. A greater proportion of variation in domestic consumption has been accounted for by price and income variables than was so of variation in production, however. Per capita consumption of eggs sold under the authority of the Board was regressed on the current retail price of the principal grade of eggs deflated by the consumer price index of other foods and per capita personal disposable income deflated by the total consumer price index.[6] Ideally the price of eggs and the price of other foods should be considered as separate variables. But the latter variable was highly correlated with deflated per capita disposable income, making it impracticable to use the index as a separate series. The linear estimate is

$$X_8 = -0{\cdot}7274 - \underset{(0{\cdot}0298)}{0{\cdot}04038X_6} + \underset{(0{\cdot}0053)}{0{\cdot}030332X_7} \qquad R^2 = 0{\cdot}79$$

where

X_6 is average retail price of grade 1a eggs from July to June, year t, in pence per dozen, deflated by the consumer price index for food, net of eggs (consumer price index, all items, 1952-53 = 100);

[6] Consumption figures also exclude eggs which come from back-yard producers and from black-market sales outside the Board.

X_7 is per capita disposable personal income from July to June, year t, in Western Australia (£) deflated by the consumer price index for all items (1952-53 = 100);

X_8 is per capita consumption of fresh eggs in the South West Land Division of Western Australia, in dozens.

The variable X_6 is taken to represent year to year variations in the retail price of fresh eggs. The actual deflated average retail price of eggs will in fact be lower, due to sales of other lower priced grades of eggs. The only estimate of average retail price is rather indirect, and the series was not considered to be adequate for the estimation of the demand relationship, though it has been used in the estimation of the value of consumption of eggs on the domestic market.

Again, the linear estimate was more satisfactory than the estimate based on a logarithmic transformation. The correlation between regressor variables was very small, and residuals were not significantly serially correlated. The estimated average price and income elasticities of demand over the period are — 0·32 and 1·42, respectively. The latter figure is possibly too high to be realistic. During the period there was a marked increase in expenditure by both the Board and the industry on the domestic promotion of eggs. Combined expenditure rose from less than £1,000 in 1953-54 to nearly £10,000 in 1962-63. Deflated promotion expenditure was very highly correlated with deflated per capita disposable income, however, and it was not possible to estimate an independent effect for promotional expenditure, though this effect may be included within the coefficient of X_7.

Analysis of Pricing Decisions

By adjusting variables X_1 through X_8 with appropriate series, simple supply and demand functions corresponding to those of Figure 1 can be derived having the following form:

supply

$$OQ = a + bOP$$

demand

$$OQ = c - dOP,$$

where OQ is the quantity produced or consumed, and OP is either the lagged average price received by producers net of retailing and Egg Board deductions (which include marketing costs, promotion levy, plant and building reserve, etc., but not the equalization levy which is redistributed to producers), or the average price paid by consumers.

Series are available from the Board for average domestic wholesale prices of fresh eggs, average prices paid to producers for all eggs, and average prices received by the Board for locally pulped and export eggs. The average retailing margin for grade 1a eggs can be easily estimated from the published domestic retail and wholesale price series for this grade. An estimate of the average domestic retail margin for all eggs can be made by deflating the retail margin for grade 1a eggs by the ratio of the average domestic wholesale price for all eggs to the average domestic wholesale price for grade 1a eggs. Egg Board deductions for all eggs can also be estimated from the series of prices received by the Board and the average prices paid to producers. These various estimates are summarized in an Appendix. The export price includes the price of the small number of eggs pulped within Western Australia for local sale.

Simple supply and demand schedules were evaluated for each year from 1953-54 to 1962-63. They are illustrated in Figure 2, where S_fS_f and S_pS_p are the full-time and part-time supply schedules, respectively. To avoid confusion, no distinction has been made in Figure 2 between the price series used to estimate D_dD_d and the estimate of average domestic retail price, which is the average domestic wholesale price plus the retail margin. In the subsequent calculations this difference has been borne in mind by using the following notation:

OP_1 = average retail price of grade 1a eggs;
$OP_1{}^*$ = estimated average retail price of all fresh eggs.

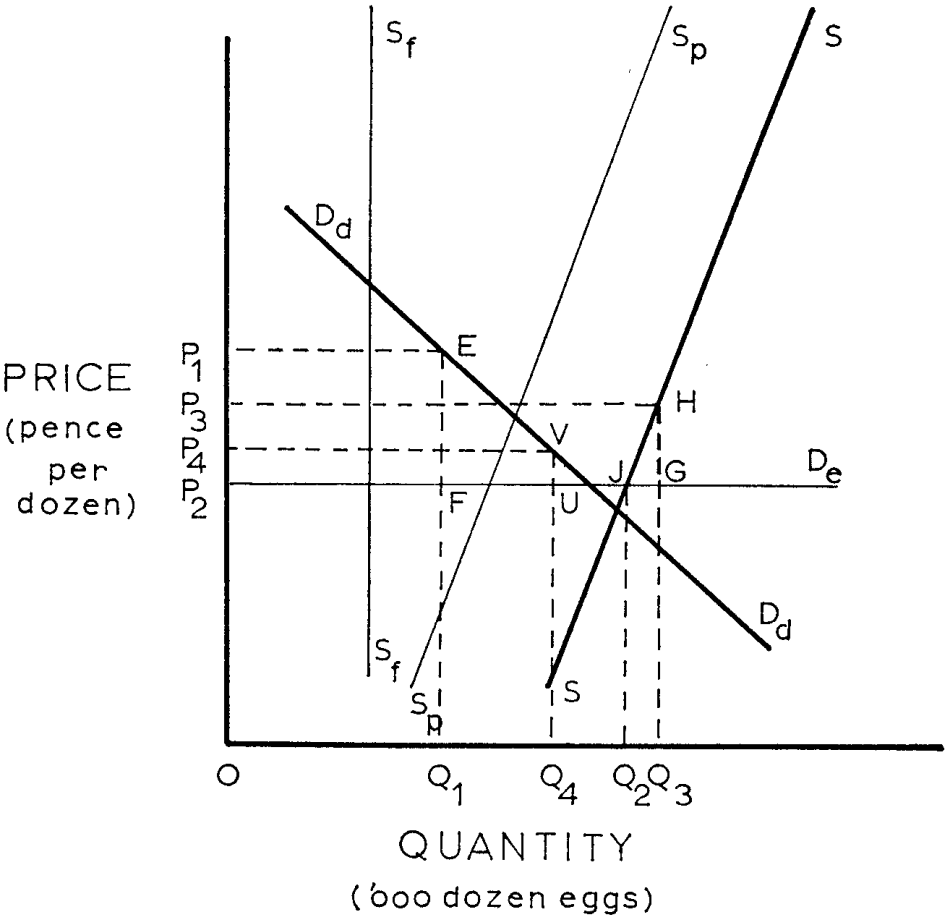

FIG. 2—Supply and demand schedules in the price discrimination model.

In the absence of price discrimination, the price charged to local consumers would be OP_4, which is the export price (OP_2) plus average domestic retail charges. The value to domestic consumers of egg consumption foregone by setting the domestic price at $OP_1{}^*$ rather than OP_4 is Q_1EVQ_4 in Figure 2. In terms of the parameters of the demand function this is:

$$\begin{aligned} Q_1EVQ_4 &= \tfrac{1}{2}(OP_1{}^* - OP_4)\{(c - dOP_4) - (c - dOP_1)\} \\ &\quad + OP_4\{(c - dOP_4) - (c - dOP_1)\} \\ &= \tfrac{1}{2}d(OP_1 - OP_4)\,(OP_1{}^* + OP_4). \end{aligned}$$

The cost of making these additional supplies available is the export income which would have to be foregone, Q_1FUQ_4. This is $Q_1FUQ_4 = OP_2\{(c - dOP_4) - (c - dOP_1)\} = dOP_2(OP_1 - OP_4)$. The net value of consumption foregone, which is FEVU, is therefore given by

$$FEVU = \tfrac{1}{2}d(OP_1 - OP_4)\ (OP_1{}^* + OP_4) - dOP_2(OP_1 - OP_4)$$
$$= d(OP_1 - OP_4)\{\tfrac{1}{2}(OP_1{}^* + OP_4) - OP_2\}.$$

Annual estimates of these values, together with the value of domestic egg consumption, are given in Table 1. These estimates indicate that the Board's pricing policy has led to a very small net loss of total consumption, averaging less than one per cent of the total expenditure on eggs within the State, though the value of domestic consumption foregone has reached as high as 7·5 per cent of the total expenditure figure.

TABLE 1

Value of Egg Consumption and Gross and Net Values of Egg Consumption Foregone through Price Discrimination

(£'000)

Year	Value of domestic consumption (OP_1EQ_1)	Value of foregone domestic consumption (Q_1EVQ_4)	Export value of foregone domestic consumption (Q_1FUQ_4)	Net value of foregone consumption ($FEVU$)*
1953-54	1,005	24·5	21·3	3·2
54-55	1,049	35·1	33·3	6·2
55-56	1,197	20·3	17·6	2·7
56-57	1,068	54·6	46·9	7·6
57-58	1,058	53·4	44·9	8·5
58-59	1,176	57·7	49·4	8·3
59-60	1,328	71·5	60·1	11·4
60-61	1,406	104·5	79·8	24·7
61-62	1,496	112·5	85·7	26·8
62-63	1,629	82·3	67·8	14·5

* *FEVU* is net only of revenue lost from export sales. It includes marketing costs *FKVU*, where *K* has co-ordinates (Q_1, P_4).

Costs to producers and the waste which arises from misallocated resources can only be evaluated in terms of the equalized price. This is a weighted average of the net price received from domestic and export sales, and is determined by both current and past prices.[7] Current prices affect the equalized price directly through their effects on current domestic and export sales. Past prices affect the equalized price indirectly through their effects on current production. The effect of current prices on the equalized price, which is OP_3 in Figure 2, is

[7] In terms of period analysis the effect of a current price change on current equalized price and producer income is a *transient* or *short-run* effect, while the fully adjusted effect over all periods is a *steady state* or *long-run* effect. In the following discussion OP_3 and π are transient (short-run) solutions while $OP_3{}^*$ and π^* are steady state (long-run) solutions. These terms are avoided in the text, however, since they could lead to confusion about the nature of the supply and demand function estimates.

$$\begin{aligned} OP_3 &= (OP_1' \cdot OQ_1 + OP_2' \cdot Q_1Q_3)/OQ_3 \\ &= OP_2' + (OP_1' - OP_2')\, OQ_1 /OQ_3 \\ &= OP_2' + (OP_1' - OP_2')\, (c - dOP_1) \,/(a + bOP_3') \end{aligned}$$

where

OP_1' = OP_1^* — Board deductions — retail margin;
OP_2' = OP_2 — Board deductions;
OP_3' = OP_3 in the previous year.

Net producer income, π, is equal to returns from domestic and export sales less the industry's fixed and operating costs. In terms of the parameters of supply and demand this is:

$$\begin{aligned} \pi &= OP_1' \,(c - dOP_1) + OP_2' \,\{(a + bOP_3') - (c - dOP_1)\} \\ &\qquad - \tfrac{1}{2}OP_3'\{(a + bOP_3') - a\} - \text{fixed costs} \\ &= (OP_1' - OP_2')(c - dOP_1) + OP_2'(a + bOP_3') - \tfrac{1}{2}b(OP_3')^2 \\ &\qquad - \text{fixed costs.} \end{aligned}$$

Current pricing decisions also affect future equalized prices through their effects on production. If the domestic and export demand characteristics were not to change, the fully adjusted equalized price, OP_3^*, would be determined from a quadratic equation in OP_3^* having the following real solution:

$$OP_3^* = \tfrac{1}{2}\{OP_2' + 1/b(\,[\,(a + bOP_2')^2 + 4b(c - dOP_1)\,(OP_1' - OP_2')\,]^{\frac{1}{2}} - a)\}.$$

Fully adjusted net producer income would then be:

$$\pi^* = (OP_1' - OP_2')\,(c - dOP_1) + OP_2'(a + bOP_3^*) - \tfrac{1}{2}b(OP_3^*)^2 - \text{fixed costs.}$$

If the Board were to maximize either π or π^*, the value of OP_1 to select would be where marginal revenues are equal in both the domestic and the export markets. Under this condition the domestic price will be

$$OP_1 = c/2d + OP_2/2.$$

The fully adjusted effects are almost entirely achieved by the end of the year following the price change. Therefore, if no changes were anticipated in prices or the supply and demand characteristics, π^* could be taken to represent the expectation of net producer income in the following year.

If either π or π^* is to be maximized, however, a restraint must be placed on the revenue function. OP_1 cannot be set at a higher level than the price which will induce eggs onto the local market from the Eastern States. Eggs have never come into Western Australia, apart from a limited number of importations by the Board in periods of short seasonal supply. It has therefore not been possible to evaluate the upper limit of OP_1 from the past records of the market.

Solutions of both the current and fully adjusted net revenue functions indicate that the unconstrained optimum values of OP_1 throughout the period would have been about two-and-a-half times the actual values. At these price levels estimated net returns would have doubled. Import constraints would, of course, have operated well before these levels were reached. Without knowing what the effective upper limits of OP_1 were throughout the period, it is not possible to estimate the potential monopoly returns foregone by producers.[8] However, an idea of the potential

[8] Estimating an effective upper limit OP_1 is more complex than finding a break-even point at which eggs *may* have come into W.A. Estimates of transport costs suggest that in some years during the period Eastern States' eggs *could* have been sold profitably in W.A.

gains to producers of a domestic price increase can be gauged from the changes in net income resulting from a marginal increase in OP_1. Estimates of the marginal changes in π and π^* from an increase in OP_1 of one penny are given in Table 2, while the elasticities which these changes represent are given in Table 3. Elasticities are tabulated to indicate the relative importance of the marginal changes. They should be interpreted with caution, however, since fixed costs and variable costs of that sector of the industry which is not responsive to year to year price changes have not been deducted from income.

TABLE 2

Marginal Net Incomes from a Penny Rise in the Domestic Retail Price of Eggs (OP_1)

(£'000)

Year	Marginal current income (π)			Marginal fully adjusted income (π^*)		
	full-time	part-time	total	full-time	part-time	total
1953-54	1·3	14·5	15·8	1·3	14·2	15·5
54-55	2·3	15·0	17·3	2·2	14·4	16·6
55-56	2·9	16·7	19·6	2·8	16·3	19·1
56-57	3·1	14·7	17·8	2·9	14·4	17·3
57-58	4·2	13·5	17·7	3·7	12·1	15·8
58-59	5·1	14·3	19·4	4·8	12·7	17·5
59-60	5·6	15·3	20·9	5·1	14·3	19·4
60-61	6·3	14·2	20·5	5·5	12·4	17·9
61-62	7·2	14·4	21·6	6·3	12·7	19·0
62-63	8·9	15·3	24·2	7·9	13·7	21·6

TABLE 3

Net Income Elasticities with respect to Domestic Retail Price of Eggs (OP_1)

Year	Current income (π) elasticity			Fully adjusted income (π^*) elasticity		
	full-time	part-time	total	full-time	part-time	total
1953-54	0·34	0·95	0·83	0·34	0·93	0·81
54-55	0·52	1·22	1·03	0·49	1·17	0·99
55-56	0·56	1·38	1·13	0·54	1·34	1·10
56-57	0·53	1·32	1·05	0·50	1·30	1·02
57-58	0·68	1·65	1·23	0·60	1·48	1·10
58-59	0·76	1·96	1·39	0·72	1·74	1·25
59-60	0·77	2·01	1·41	0·70	1·88	1·31
60-61	0·82	2·50	1·53	0·72	2·18	1·34
61-62	0·85	2·88	1·62	0·75	2·54	1·42
62-63	1·00	3·96	1·89	0·88	3·55	1·69

Gains to producers in the first year would have been greater than fully adjusted gains, since the revenue generated from future production response would not be as great as additional costs. But the differences are small. The tables suggest that producer incomes could have been signifi-

cantly increased by a policy which raised the domestic price of eggs. Most of this gain would have gone to part-time producers.

The waste from excess resources used in egg production is *JHG* in Figure 2. In terms of the parameters of the supply function this is:

$$JHG = \tfrac{1}{2}(OP_3' - OP_2')\{(a + bOP_3') - (a + bOP_2')\}$$
$$= \tfrac{1}{2}b(OP_3' - OP_2')^2.$$

Estimates of this waste are given in Table 4. Current domestic pricing policies do not affect current waste, but by setting domestic prices above export prices the Board has in most years induced some waste in the following year through excess resources in the industry. However, in 1953-54 and 1955-56 net export prices were larger than the equalized prices of the preceding year, so induced waste in these years was the outcome of too few resources in the industry. Waste has never exceeded six per cent of the area under the supply curve to the left of OQ_3, which is an estimate of the variable costs of the sector of the industry which is responsive to year to year price changes. This variable cost has remained fairly constant at around £500,000 per year.

TABLE 4

Waste through Failure to Control Production

(£)

Year	Total value of excess resources in the industry
1953-54	962*
54-55	15,794
55-56	770*
56-57	863
57-58	27,173
58-59	3,263
59-60	266
60-61	28,812
61-62	19,701
62-63	12,682

* Net export prices in 1953-54 and 1955-56 were larger than the equalized prices received by farmers in the preceding year.

Although potential producer gains are equal to the value of excess (or deficit) resources in the industry, the distribution of waste between full-time and part-time producers is not the same as the distribution of potential gain. Full-time producers, with no significant response to annual price changes, make no contribution to resource waste. Yet full-time producers would gain considerably from a restriction of production, as it would increase the average return per dozen eggs. This would become particularly important to full-time producers if higher domestic prices were charged.

Conclusions

Obviously the results of this type of analysis should be hedged with a battery of qualifications. The time span over which the supply and demand estimates are made is quite short, and many changes have been at work during this period. The linearity assumptions are liable to give poor

estimates outside the range of past experience. The estimates take only short-run (annual) factors into consideration, though a changed policy would have long-run implications. Confidence intervals have not been placed on the estimates, though at the conservative probability levels usually adopted they would be quite large. Yet the general conclusions *are* based on observations of consumer and producer behaviour, and they *are* consistent with the structure of the Board.

In setting a domestic price for eggs the Board must consider the ways in which the interests of various groups are affected. Over the period studied the Egg Board seems to have regulated egg prices without incurring large costs for consumers. Price discrimination on the local market has restricted the value of consumption by only two to 7·5 per cent of the total value of domestic sales. Yet large producer gains could have been appropriated if the Board had set higher domestic prices, provided that Eastern States' eggs could have been kept off the local market. The operation of this particular Board therefore does not support the contention which is frequently expressed that consumer interests are least cared for in marketing board decisions.[9]

Producers have obviously appreciated this fact, judging from their pleas for a producer majority on the Board.[10] Yet it is doubtful that this policy has caused general hardship among producers. Throughout most of the period Western Australia has had one of the highest producer prices in Australia.

Only small gains would have been made from efficient restriction of production, unless higher domestic prices had been charged. Most of these gains would have been appropriated by full-time producers. Production restraint would make most sense if it were associated with higher domestic prices. In this situation full-time producers would stand to make large short-term gains.

The analysis is limited by its consideration of only short-term effects. Likely future changes do give some support for a system of production control, however. It is likely that production from full-time producers will increase. At present less than half of the State's egg production comes from this group, but at the present rate of growth Western Australia could arrive at the same position as N.S.W. where more than 80 per cent of production comes from comercial flocks of over 1,000 birds and total production is rising.[11] Increased production would lower the equalized producer price. There is also the likelihood of lower export prices as larger quantities of surplus eggs have to be sold and world supply increases at a faster rate than demand. This could be partially offset by a higher domestic price. The maintenance of returns could only be efficiently achieved, however, if producers were forced to make their production responses to changes in the export price rather than changes in the equalized price. This could be efficiently achieved by a negotiable quota scheme where allotments were made for the higher priced domestic market while excess production received the lower export price.

[9] See J. A. Morey, *Role of the Statutory Marketing Board in the Organized Marketing of Australia's Primary Products,* Reserve Bank of Australia, Sydney, 1959, pp. 84-86.

[10] See *Egg and Fowl* (official organ of the Poultry Farmers' Association of W.A. and several other producer organizations), Vol. 16, No. 5, (November, 1963).

[11] Egg Marketing Board for the State of New South Wales, *Farm Registration Statistics,* January, 1964, mimeo.

APPENDIX

Price Series Used in Consumption and Income Calculations

(Pence per dozen)

Year	OP_1	OP_1*	Estimated average retail margin	Estimated total Egg Board deductions	OP_2	OP_3
1953-54	64·0	62·3	6·8	8·1	53·0	45·9
54-55	59·8	58.5	7·1	7·9	46·1	40·9
55-56	62·0	60·5	6·7	9·2	51·8	43·7
56-57	63·0	57·4	5·3	5·4	47·3	44·4
57-58	59·8	58·6	4·2	11·3	45·6	39·2
58-59	62·1	59·4	4·1	11·9	47·6	40·4
59-60	65·3	60·6	5·0	8·1	47·5	44·5
60-61	68·6	63·2	6·1	8·7	42·8	43·9
61-62	69·9	63·4	6·5	7·7	43·0	45·3
62-63	69·9	64·9	6·4	11·5	49·9	45·2

NOTE:

OP_1 is the annual average of the monthly retail price of grade 1a eggs at the 15th of each month in the Perth Metropolitan Area.

OP_2 is the average price of export eggs and eggs pulped for local sales. It is estimated from quantities and values given in the *Annual Report and Accounts* of the Western Australian Egg Marketing Board for various years.

OP_3 is the average price paid to producers net of all deductions. It is taken from the *Annual Report and Accounts* of the Western Australian Egg Marketing Board for various years.

OP_1* is the estimated average domestic retail price of eggs of all grades. It is calculated from OP_1, and the average wholesale prices for grade 1a eggs of all grades.

The average retail margin and total Egg Board charges are estimated from OP_1*, the average wholesale price of eggs of all grades, OP_2, and OP_3.