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PRICING EFFICIENCY IN THE RETAIL MEAT MARKET*

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The degree of pricing efficiency achieved in the retail meat market is reconsidered in this paper. The approach adopted is to develop an economic model of the pricing behaviour of retail butchers, to postulate a behavioural model consistent with the economic model, and to test this model using the data supplied by three retail butchers. The results indicate that the deleterious effects of price levelling and averaging practices on pricing efficiency may have been understated in earlier studies. It is concluded that further research is required to re-assess the extent of the problem of pricing efficiency in the retail meat market.

Introduction

The alleged practices of price levelling and averaging[1] have led to studies of pricing efficiency in retail meat markets in Australia by Griffith (1974), Marceau (1967), Tambi (1975) and Woodward (1968). These authors have investigated hypotheses about price levelling and averaging behaviour using an an aggregative approach. A major deficiency of these studies is the lack of an explicit link between the formation of a marketing margin and the profit maximising behaviour of retail butchers.

Duesenberry (1966) has discussed the dangers inherent in using aggregate economic variables to test hypotheses about micro-level behaviour. An estimated aggregate relationship may be a derived aggregate relationship rather than a fundamental aggregate relationship. A fundamental aggregate relationship is the aggregate expression of a behavioural relationship which holds at the individual firm level. A derived aggregate relationship is a spurious relationship which holds because of the existence of other fundamental aggregate relationships. The possibility of a derived aggregate relationship means that conclusive evidence relating to hypotheses about micro-level behaviour cannot be obtained from an observed aggregate relationship. A number of micro relationships may be consistent with an observed macro relationship so that an observed macro relationship may merely reflect the symptoms of pricing behaviour rather than an underlying causal micro relationship.

Derived aggregate relationships do not ordinarily hold for individual firms, and Duesenberry (1966) has suggested two principles to be observed when testing hypotheses about aggregate behaviour—every hypothesis ought to be stated in terms of the behaviour of the individual

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1 Price levelling refers to the practice of retailers holding selling prices stable while wholesale prices fluctuate. Price averaging refers to the practice of setting higher margins on some types of meat to off-set lower margins on other types of meat.

firms and, in so far as is possible, hypotheses ought to be tested against data which indicate the behaviour of individual firms. Australian empirical studies of pricing efficiency in retail meat markets have generally not followed these principles, so that it is doubtful that the testing procedures used constitute a valid test of the relevant hypotheses.

More generally, the conventional approach to empirical studies of marketing margins can also be criticised for the lack of an explicit link between the formation of a marketing margin and the profit maximising behaviour of individual firms. Typically, a linear relationship between the marketing margin and retail price is postulated, as in George and King (1971). Two theoretical justifications have been advanced for such a relationship. The first is based on the theory of derived demand in a perfectly competitive market and states that the relationship between the marketing margin and retail price is a reflection of the nature of the supply curve for aggregate marketing services. The second justification is based on the view that the relationship between the marketing margin and retail price is the aggregate expression of the average cost pricing methods widely used by individual firms—the standard patterns of marketing margin behaviour being constant absolute amount, constant percentage amount, and the perverse margin.

Neither of these justifications stands up well under close examination. Gardner (1975) demonstrated that the usual discussion based on the theory of derived demand implicitly considers only the case of a shift in farm supply and its implications for the marketing margin in a perfectly competitive market. If the analysis is broadened to consider a shift in the retail demand for a product, or a shift in the supply curve for marketing services, then a simple relationship between the marketing margin and retail price is inconsistent with equilibrium in the markets for the farm product, the retail product, and marketing services in a perfectly competitive economy.

The widespread use of average cost pricing methods is not necessarily consistent with a linear relationship between the marketing margin and retail price, even disregarding the problems of aggregation bias. Oxenfeldt (1966) has discussed nine pricing methods, a number of which can be used simultaneously. For example, the retail meat industry appears to make use of average cost pricing, flexible mark-ups, price maintenance, price followership, and price-line pricing. Actual pricing practice in its totality is likely to be quite complex and the postulate of a simple linear relationship between the marketing margin and retail price is based on a oversimplified view of pricing behaviour.

In view of these considerations, the approach adopted in this paper is to develop an economic model of the pricing behaviour of retail butchers, to postulate a behavioural model consistent with the economic model, and to test this model using the data supplied by retail butchers. The choice of a micro-level approach involved a trade-off because the resources available allowed an investigation of the trading accounts of only three retail butchers, and consequently the results obtained lack generality and must be regarded as merely suggestive. In addition, the nature of the available data placed restrictions on the kinds of hypotheses which could be tested.

Price Stability

Price levelling and averaging practices can be regarded as forms of the more general phenomenon of a tendency to stability in retail meat prices. Stigler (1971) has discussed three traditional neo-classical explanations for the stability of retail prices—long-run considerations, the cost of price changes, and administrative weaknesses in collusion. An additional explanation has been proposed by Parish (1967) in the specific context of the retail meat industry, namely that the demand curves facing a retail butcher are considerably more elastic when prices are high than when they are low, and are kinked at a normal price. This view is adopted in this paper and the rationale of Parish is presented in a slightly abbreviated form below.

A retail butcher may face kinked demand curves because the distribution of price information among buyers is not symmetric with respect to the direction of price change.[2] A retail butcher's customers may be divided into two categories—regular shoppers who visit the particular shop for reasons of convenience or habit, and comparison shoppers who visit competing shops before making their purchases. If a retail butcher changes his price, this fact is known by all comparison shoppers in the market, and by all his regular customers, but not by the regular customers of his competitors. This distribution of knowledge will introduce an asymmetry into the demand response to price rises as compared to price falls. If the retail butcher lowers his price (and his competitors do not), he can expect to attract many comparison shoppers and to retain his regular customers, and he can also expect to sell larger quantities to both old and new customers. If the retailer raises his price, he can expect to lose many comparison shoppers, and to sell smaller quantities to all his customers. In addition, he can anticipate losing some of his regular customers, who, knowing that he has raised his price, will be prompted to enter the ranks of comparison shoppers, at least temporarily.

The distinction between comparison shoppers and regular shoppers is not essential for the analysis. An asymmetric demand response will be generated if there exists a class of relatively ill-informed customers who regularly patronise particular butchers, and if some of these are stimulated by a rise in their retail butcher's price to shop or make price comparisons elsewhere. Not all ill-informed consumers will be regular customers of particular retailers. Similarly, not all regular cutomers will be ill-informed about prices, and to say that they value the convenience of shopping at a particular shop is only another way of saying that for them the disutility of 'shopping around' is high. This does not mean that they disregard price information—it means that in general they do not very actively seek it out. If their retail butcher raises his price they receive a piece of price information. Even if only a few act on this information, by seeking more information by means of comparison shopping, an asymmetric demand response will be generated.

[2] Two other arguments advanced by Parish (1967) as to why consumers might be more price conscious when prices are high than when they are low are omitted for the sake of brevity. Both relate to the cost of price search as the level of price changes.

The relative importance of the asymmetric demand response as an explanation of stability in retail meat prices compared to other explanations must remain a matter of opinion, which will be based on judgment and experience of the industry rather than on the theoretical criteria. The asymmetric demand response is assumed to be a significant factor influencing the stability of retail meat prices.

The Economic Model

The conventional theory of the firm has been extended by Holton (1957) and Holdren (1960) in the supermarket context to account adequately for the multi-product nature of the retail firm, and the interrelationships in the demand for its products. A similar model can be developed in the retail butcher context incorporating the assumption of kinked demand curves.

Consider a two-product retail butcher handling the meats A and B where the price of A is fixed. The demand for A and the demand for B are interrelated and the products are both potential substitutes and potential complements. If the price of B is reduced the volume of A sales will tend to fall because of substitution of B for A, but the volume of A sales will also tend to rise because of the purchases by new customers, i.e. the complementary effect. The net effect of a price reduction on B on the volume of A sales will depend on the relative strengths of the complementary and substitution effects (ignoring a slight income effect).

Coase (1946) suggested a solution for the determination of the equilibrium conditions for a firm with complementary demand for its products—namely that the marginal cost function of product B be lowered by the marginal profits received from product A as a result of increased sales of B, the price of A remaining fixed. Holton (1957) presented this solution diagrammatically with reference to the supermarket where substitution effects are relatively unimportant and can be ignored for analytical purposes. The pricing behaviour of the retail butcher can be examined using a modification of Holton's diagram which incorporates substitution effects and the assumption of kinked demand curves.

The demand for B is represented in Figure 1 by the curve D_B which is drawn so that demand is considerably more elastic when prices are high than when they are low and that demand is kinked at the price P_2. The marginal revenue of B is represented by the curve MR_B which has a discontinuity at the output level OM as a consequence of the kink in D_B. The marginal cost of B is represented by the curve MC_B which is drawn as constant because wholesale price is the dominant element in marginal cost. The curve CMC_B represents the corrected marginal cost of B and is constructed as marginal cost as usually defined less marginal profits on A sales resulting from a change in B sales, the price of A remaining fixed. CMC_B is drawn to illustrate the case where the complementary effect is assumed to outweigh the substitution effect for output levels up to ON. The substitution effect erodes the complementary effect as the price of B falls in this output range because of a widening price differential between B and A. Thus the curve CMC_B will slope upwards, and the ratio of A sales to B sales

in physical units will decline as the price of B falls. The kink in D_B results in a change in the complementary effect at the output level OM. The complementary effect is less at prices of B below P_2 than for prices of B above P_2. However, the substitution effect, which is determined by price relativities, is unaffected by the kink in D_B. Hence the slope of CMC_B changes at the output level OM.

The price P_1 will generate the output level OL at which marginal revenue is equated to marginal cost. However, P_1 is not a profit maximising price because the dominant complementary effect in the demand for A and the demand for B has been ignored. The price P_2 will generate the output level OM, and profits are maximised at P_2 because corrected marginal cost lies within the zone of discontinuity in marginal revenue. As long as the corrected marginal cost of B at the output level OM lies within the zone of discontinuity, then P_2 will remain the profit maximising price. Thus P_2 becomes the 'normal' price because wholesale meat prices may fluctuate over a range without affecting the profit maximising retail price.[3]

There will be short-run shifts in the demand curves facing a retail butcher arising from factors such as short-run weather influences,

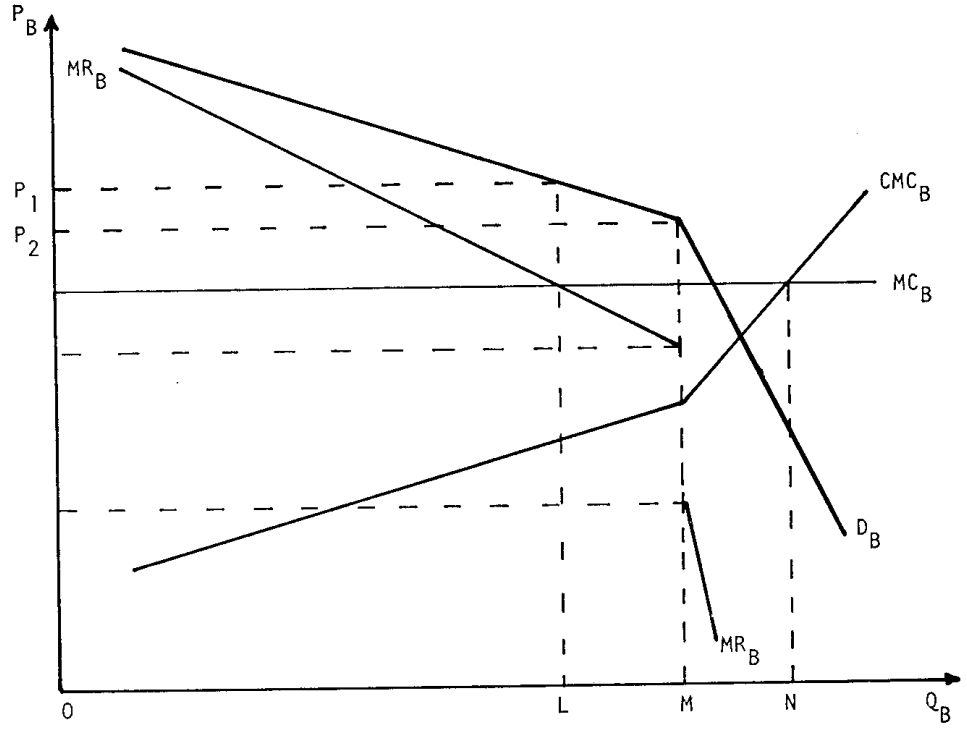

FIGURE 1—The economic model.

[3] The location of the kink is determined to some extent by the combination of price and non-price components of a retail butcher's offer. Since the price at the kink becomes the 'normal' price for a particular retailer, it is conceivable that a large number of 'normal' prices might exist. A limited number of 'normal' prices are likely to exist in practice, but it should be clear that the 'normal' price applies to a particular retailer, or a particular class of retailers, and is not meant to imply a single market price.

seasonal differences in tastes and preferences, variation in competitors' prices, or from unknown causes. Since the demand curves will continue to be kinked at the normal price, short-run fluctuations in demand can be represented as leftward or rightward shifts of the curves D_B, MR_B, CMC_B. The normal price will continue to be the profit maximising retail price if corrected marginal cost lies within the zone of discontinuity in marginal revenue.

Although profit is maximised at the normal price under the conditions outlined above, the level of profit is not determinate. Short-run profit from B will vary with short-run fluctuations in the wholesale price of B, and with short-run demand shifts. Fluctuations in profit from B sales will be treated as windfall gains and losses so long as the corrected marginal cost of B lies within the zone of discontinuity in marginal revenue.

If a change in wholesale price means that corrected marginal cost falls outside the zone of discontinuity at the normal output level, then a process of price adjustment will follow which can be considered in two stages. In the first stage a retailer will adjust prices in order to equate marginal return with corrected marginal cost, accepting a change in output as a result. If other retailers choose to alter their prices in a similar fashion, then the original retailer will experience a demand shift as customers are attracted to or drawn away from his shop. In the second stage of price adjustment a new normal price may be discovered where corrected marginal cost again falls within the zone of discontinuity in marginal revenue.

The two-product model can be readily extended to an n-product model (see Naughtin 1977). The economic model incorporates the view advanced by Parish (1967) that price levelling and averaging are not distinct phenomena but rather that both are the outcome of the stickiness or stability of retail prices. The margins on individual meats and the overall shop profit may be allowed to vary in the short run to maintain stability in retail prices.

A Postulated Behavioural Model

The theory of the firm provides a formal method of analysis of the consequences of profit maximisation rather than a description of how businessmen actually make pricing decisions. In practice businessmen use a number of pricing methods of which average cost pricing is perhaps the most common. Holdren (1960) demonstrated that a general pricing strategy for supermarkets of average cost pricing using customary mark-ups, coupled with flexible mark-ups on those products with strong potential to transfer patronage from one store to another, may be consistent with profit maximisation. Similarly, retail butchers could make use of pricing methods such as average cost pricing, flexible mark-ups, price maintenance, price followership, and price-line pricing in maximising profit.

Pricing methods were discussed with three retail butchers in the Melbourne area who were prepared to provide access to their trading accounts. Each butcher operated a traditional type of shop located away from a major shopping centre. The butchers saw little need for a full recording of price and quantity data, and tended to think in terms of

revenue and expenditure. Reliable records of revenue and expenditure were maintained as a guide to pricing decisions. The butchers emphasised a need to maintain stable prices in the short run, and suggested that their decisions as to when to vary prices were based on shop performance in relation to an aggregate profit goal. The paucity of reliable data on variables other than revenue and expenditure on which to base a pricing decision supports this view. An aggregate profit goal or margin policy relating to the surplus of total revenue on all meats over total expenditure on all meats appeared to be the only formal basis on which the butchers made pricing decisions.

An aggregate margin policy could be consistent with profit maximisation given the short-run stability of retail prices postulated in the economic model. Throughput will be relatively stable in the short run and will vary only with short-run demand shifts, which would normally be of a minor nature. Wholesale prices can fluctuate considerably in the short run so that movements in the aggregate margin may reflect predominately movements in the marketing margins on individual meats. If the implications of a departure from normal prices in the short run are appreciated, and if the non-price aspects of the butcher's offer are optimal, then movements in the aggregate margin could be a useful guide in making the price adjustments predicted by the economic model. It is postulated that a butcher adopts a long-run margin policy in relation to aggregate shop profit as a practical approximation to the pricing process described in the economic model. The pursuit of profit maximisation will thus constrain the level at which the aggregate margin goal is set.

The form of the aggregate margin which results may be a constant absolute margin on long-run wholesale meat expenditure[4], or alternatively a constant percentage margin. The butchers interviewed computed both figures weekly, but the percentage figure appeared to be used mainly for between-shop comparisons. The actual aggregate margin in the short run will vary around the long-run goal and, given the nature of the economic model, it is possible to investigate the existence and duration of price levelling and averaging practices through an empirical study of the short-run fluctuations in the aggregate margin.

The Mathematical and Statistical Models

The postulated long-run aggregate margin policy can be expressed as:

$$M = B_0 + B_1 \cdot W, \tag{1}$$

where M = desired aggregate margin in the long run,
W = aggregate wholesale meat expenditure in the long run,
B_0, B_1 = parameters.

[4] Dalrymple and Thompson (1969) reported that most merchants prefer to calculate margins based on retail prices rather than wholesale cost. However, the trade literature indicates that the practice in the retail meat industry is to calculate margins on wholesale cost rather than retail price, possibly because of the difficulty in calculating an average retail price. For this reason it was postulated that aggregate margins were based on aggregate wholesale meat expenditure rather than retail revenue.

Short-run behaviour is of prime concern in a study of pricing efficiency. The short run in this context refers to the retail butcher's planning horizon for pricing decisions. This is the length of time for which a butcher plans his pricing behaviour and for which he must look ahead when pricing his throughput. The planning horizon will be the period of time used in an assessment of current shop performance and of the need for a change in margins.

In the short run, fluctuations in wholesale prices and demand shifts result in deviations of actual revenue and expenditure from their expected values. These deviations are treated as windfall gains and losses because short-run profits are usually maximised at normal prices. The long-run aggregate margin policy can be expressed in short-run terms if expected values rather than actual values are used.

$$E(m) = b_0 + b_1 E(w), \tag{2}$$

where $E(m)$ = expected value of the desired aggregate margin expressed in short-run terms,
$E(w)$ = expected value of the aggregate wholesale meat expenditure expressed in short-run terms.
b_0, b_1 = parameters.

The actual aggregate margin will be equal to the expected aggregate margin corrected for deviations of actual revenue and wholesale meat expenditure from their expected values. An alternative form of (2) is:

$$m + [w - E(w)] - [r - E(r)] = b_0 + b_1 E(w), \tag{3}$$

where m = actual value of the short-run aggregate margin,
w = actual value of short-run wholesale meat expenditure,
r = actual value of short-run revenue,
$E(r)$ = expected value of short-run revenue.

Equation (3) suggests a functional relationship between m and the explanatory variables $E(w)$, $[w - E(w)]$, and $[r - E(r)]$:

$$m = b_0 + b_1 E(w) + b_2 [w - E(w)] + b_3 [r - E(r)]. \tag{4}$$

The predicted values of b_2 and b_3 are -1 and $+1$ respectively because short-run fluctuations in wholesale meat expenditure and revenue are treated as windfall gains and losses. If the desired aggregate margin is an absolute margin, then $b_0 > 0$ and $b_1 = 0$. If the desired aggregate margin is a percentage margin, then $b_0 = 0$ and $b_1 > 0$.

The development of a statistical model from equation (4) involves the specification of the length of the planning horizon for pricing decisions, and the method of forming expected values. Some a priori restrictions are possible. A quarterly planning horizon was considered to be the largest feasible planning horizon for pricing decisions. Planning horizons between one week and one quarter could be investigated with the available data. A polynomial lag method of forming expected values was considered but it is unlikely that butchers form their expectations in such a sophisticated way. It was decided to experiment, initially at least, with a variant of the naïve expectations model where the expected value in the current planning horizon is a simple arithmetic average of a number of actual values in the preceding planning horizons.

A statistical model based on equation (4) can be written as:

$$(5) \quad m_t = b_0 + b_1 EP_t + b_2 (w - EP)_t + b_3 (r - RE)_t + e_t,$$

where EP = the expected expenditure defined as the average value of wholesale meat expenditure in a number of preceding planning horizons,

RE = the expected revenue defined as the average value of revenue in a number of preceding planning horizons,

e_t = a disturbance term,

$t = 1, \ldots, n$, where n is the number of observations.

An inflationary economic environment persisted over the period covered by the data (1969-75). The rate of increase among the various components of total retailing costs was probably not uniform nor constant over time. Any method of adjusting the statistical model to account for the effects of inflationary rises in retailing costs will involve approximation. A linear trend variable was used to adjust the margin model for the effect of increases in retailing costs.[5] The expanded statistical model is:

$$(6) \quad m_t = b_0 + b_1 EP_t + b_2 (w - EP)_t + b_3 (r - RE)_t + b_4 T + e_t,$$

or equivalently:

$$(7) \quad m_t = b_0 + b_1 EP_t + b_2 EC_t + b_3 RC_t + b_4 T + e_t,$$

where T = trend variable,

$EC_t = (w - EP)_t$ as previously defined,

$RC_t = (r - RE)_t$ as previously defined.

The statistical model (7) is interpreted as follows. The actual aggregate margin in the current planning horizon is the expected aggregate margin corrected for deviations of actual wholesale meat expenditure and actual revenue from their expected values. The expected margin may be formed as a constant absolute amount or a constant percentage amount on expected aggregate wholesale meat expenditure. The expected aggregate margin is adjusted upwards over time reflecting movements in retailing costs in an inflationary economic environment. The deviation of actual wholesale meat expenditure from its expected value will reflect predominantly movements in wholesale meat prices and, to a lesser extent, short-run demand shifts. The deviation of actual revenue from its expected value will reflect short-term demand shifts.

If the planning horizon and method of forming expected values have been correctly specified, then the existence and duration of price levelling and averaging practices can be investigated using the regression coefficients b_0, b_1, and b_2. If butchers attempt to stabilise retail prices through price levelling and averaging only within the current planning horizon, then the coefficient b_2 will have a predicted value of -1 implying no adjustment of retail prices to fluctuations in wholesale prices in the current planning horizon, while the coefficients b_0 and b_1 would reflect a long-run aggregate margin strategy as discussed earlier.

[5] The approximately linear rate of increase in the award rate of pay for a general retail butcher supported the use of a linear trend variable. A trend variable was preferred to the alternative of deflation because a behavioural relationship expressed in nominal values of the variables was considered more realistic than one expressed in real values.

However, if butchers were to stabilise prices beyond the current planning horizon, then b_2 will again have a predicted value of -1, but b_1 will have a negative value reflecting a negative relationship between the aggregate margin and wholesale meat expenditure which extends beyond the current planning horizon.

The Results

The data used are the weekly total revenue and weekly wholesale meat expenditure figures of three retail butchers in the Melbourne area. The data are not corrected for fluctuations in the weekly level of stocks since it was assumed that the volume and value of weekly stocks remained constant and low throughout the period, because of the perishable nature of the product.

The aggregate margin and aggregate wholesale meat expenditure series were examined for seasonality using analysis of variance models. The null hypothesis of the absence of seasonality was accepted using the F test, so that the statistical model was not modified to account for seasonality.

The procedure adopted was to 'fit' the statistical model using a number of alternative specifications of the length of the planning horizon and the method of forming expected values. The objectives of the approach were the selection for each butcher of an appropriate specification of the planning horizon and the establishment of the basis on which their expectations are formed. The criteria on which a particular specification of the statistical model is to be preferred are: (a) the extent to which the estimated coefficients coincided with the predicted sign and size of the coefficients; (b) goodness of fit as indicated by the adjusted coefficient of determination; and (c) the absence of autocorrelation in the regression residuals as indicated by the Durbin-Watson statistic, or a relatively low level of autocorrelation for the particular retailer concerned.[6]

The data were aggregated into periods of different lengths to represent planning horizons. The chosen periods were 1 week, 4 weeks, 8 weeks, and 13 weeks. To facilitate the comparison of regression equations, the average weekly values of the variables over a particular period were used in the regression equations, rather than the aggregate values of the variables over the period.

The method of forming expected values adopted was to define the expected value as the weekly average of the values in the preceding planning horizon, or the preceding two planning horizons, or the preceding four planning horizons. The last definition of expected values gave the best results in terms of the three criteria above, and this method is used in the results reported in Table 1.

[6] The Durbin-Watson statistic provides an indication of mis-specification of the planning horizon. For example, if a weekly planning horizon is assumed when the butcher actually uses a quarterly planning horizon, then the regression residuals will be autocorrelated because the butcher does not react to a trend in weekly margins until it has persisted for some time. There may be other sources of autocorrelation in the regression residuals, but the Durbin-Watson statistic generated by the various 'fitted' models should give some indication about this source of mis-specification.

TABLE 1

Regression Results[a]

Equation number	Dependent variable	Variable					Regression statistics		
		Constant	*EP*	*EC*	*RC*	*T*	$\bar{R}^2$	*F*	DW
8	*Butcher* 1 *MAR* 8	311·00** (4·44)	—0·38** (0·02)	—1·00** (0·03)	0·87** (0·04)	7·34** (0·30)	0·99	$F_{4, 26} = 625$	1·23
9	*MAR* 13	299·23** (4·72)	—0·40** (0·03)	—1·03** (0·04)	0·99** (0·05)	12·29** (0·82)	0·99	$F_{4, 13} = 627$	1·10
10	*Butcher* 2 *MAR* 13	521·70** (53·01)	—0·20* (0·08)	—0·82** (0·10)	0·82** (0·14)	8·88** (1·64)	0·89	$F_{4, 15} = 40$	0·46
11	*Butcher* 3 *MAR* 4	1469·51** (278·96)	—0·25* (0·10)	—1·13** (0·09)	0·91** (0·07)	4·28 (5·45)	0·92	$F_{4, 14} = 55$	2·17

[a] The code of symbols is:

MAR 4 = the average aggregate gross margin over a 4 week period,
MAR 8 = the average aggregate gross margin over an 8 week period,
MAR 13 = the average aggregate gross margin over a 13 week period,
EP = expected expenditure defined as an average of aggregate wholesale meat expenditure in the preceding four periods (of 4, 8, or 13 weeks each),
EC = the deviation of aggregate wholesale meat expenditure in the current period from *EP*,
RC = the deviation of aggregate revenue in the current period from expected revenue defined as an average of aggregate revenue in the four preceding periods,
T = trend variable,
* = significant at 5 per cent level using *t*-test,
** = significant at 1 per cent level using *t*-test.

The regression results are presented as equations (8) to (11) in Table 1. The standard errors are given in parentheses and the significance levels using the t test are indicated by asterisks. Equations (8) and (9) using planning horizons of eight and thirteen weeks respectively gave regression models for Butcher 1 which were considered equally acceptable in terms of the three criteria above. Equation (11) for Butcher 3 is the regression model using a planning horizon of four weeks. There were insufficient data to investigate planning horizons longer than four weeks for Butcher 3. The model provided a good fit to the data and the coefficient estimates conformed with a priori predictions. The coefficients of the deviation variables *EC* and *RC* are approximately equal to the predicted values of -1 and $+1$ respectively. These values indicate no adjustment of retail prices in the current planning horizon to fluctuations in aggregate wholesale meat expenditure and aggregate revenue from their expected values. The value of -1 for the coefficient of *EC* implies no adjustment of retail prices to fluctuations in wholesale prices in the current planning horizon. The trend variable, which is a surrogate for retailing costs, was positive in each equation although not significant for Butcher 3 (the observations for Butcher 3 spanned a period of 21 months as compared to approximately 5 years for Butchers 1 and 2). The positive value for the constant term and the negative coefficient for expected expenditure indicated that, although a general strategy for the aggregate margin of a constant absolute amount was pursued, the butchers also attempted to stabilise prices beyond the current planning horizon through price levelling and averaging practices. The planning horizons of the butchers are in the vicinity of two to three months, so that the results indicate that price levelling and averaging practices may extend beyond the current quarter.

Discussion and Conclusions

The empirical evidence relating to pricing efficiency (i.e. the rapid, accurate, and effective transmission of prices between market levels) in retail markets in Australia is conflicting. Griffith (1974) and Marceau (1967) found evidence of price levelling and averaging within the current quarter, while Woodward (1968) and Tambi (1975) generally found no evidence of price levelling and averaging practices. The conflicting evidence may arise from the differing approaches adopted to testing hypotheses about price levelling and averaging. Griffith and Marceau each estimated a complex simultaneous equation model of the relationships between the marketing margins on the various meats. Tambi and Woodward used a simpler approach of examining the relationship between two aggregate price variables at different market levels. The conventional wisdom appears to be that butchers do level and average prices but only within the current quarter. However, the empirical foundations of this view are not strong, and furthermore there is a methodological weakness in the empirical studies as discussed earlier.

An economic model of the pricing behaviour of retail butchers has been advanced in this paper which incorporates the kinked demand curve hypothesis of Parish (1967). A behavioural model has been postulated which could be consistent with the economic model and which

was specified in terms of the aggregate variables that butchers were found to record as a guide to pricing decisions. A statistical model was developed which gave a good fit to the data drawn from the trading accounts of three retail butchers, and the coefficient estimates conformed with a priori predictions. The results indicate that price levelling and averaging practices were not confined to the current planning horizon (approximately one quarter). While the sample of retailers is inadequate to draw general conclusions about pricing efficiency, the results are of interest because an hypothesis about micro-level pricing behaviour has been tested using micro-level data.

Only limited conclusions can be drawn from the empirical results. The results are consistent with the economic and behavioural models postulated, but they do not provide conclusive evidence in support of these hypotheses, even disregarding sampling problems. An alternative interpretation of the results could be that the demand curves are not kinked and that butchers are satisficing with respect to short-run profits and maximising when the costs of finely-tuned profit maximising behaviour are taken into account, because of the complexity of pricing to maximise profit in a multi-product environment. The validity of the assumption of a kinked demand curve as an explanation for the stability of retail meat prices rests on the credibility of the rationale advanced earlier. Further research may reconsider the usefulness of this explanation of the tendency for stability in retail meat prices compared with other explanations of stability.

The main conclusion of this study is that there is a possibility that the deleterious effects of price levelling and averaging practices on pricing efficiency may have been understated in earlier empirical studies. Further research is required to re-assess the extent of the pricing efficiency problem in retail meat markets. This further research should be based on an explicit link between the pricing behaviour of the individual firm and the formation of a marketing margin. It would be useful to consider at greater depth the role of non-price aspects of a retail butcher's offer in segregating the retail meat market. Cross-sectional studies of the retail meat market are needed for this purpose.

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