A STUDY OF RETAIL PRICES OF GROCERIES IN RELATION TO STANDARD PRICE THEORY

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Data from a survey of self-service grocery stores in New South Wales and Victoria is used to show that the surface of prices is not well explained by simple price theory. Also examined and tenatively explained are price differences between chain and non-chain stores and between metropolitan and rural stores; the roles of different products in store pricing; and the nature of price competition in local markets.

1 INTRODUCTION

Standard marketing theory suggests a product market of many buyers and sellers with free entry will, at any point in time, tend toward a uniform basic price; this basic price will vary only with costs of supplying different locations or different qualities [18, pp. 19–28]. In studying prices of foods at wholesale, this simple theory is valuable not only for prescription but also for prediction. At retail, by contrast, it is much less useful for three main reasons.

(i) The retail food store sells many products.

(ii) Consumers do not have complete knowledge of prices.

(iii) Location affects price through its influence on demand rather than on supply.

Retail grocers sell many products; thus the typical Australian self service store carries around 4,000 lines. Consumers find it convenient to buy most of their groceries (and other household products regularly consumed) from one or a few stores. On the supply side, moreover, the costs of retailing are reduced by using plant and labour, neither of which are perfectly divisible, to sell many more than one product.

Because they buy many products on each store visit, consumers' decisions on the store at which they will buy each product are interrelated. (Also, consumers' selections of products bought may themselves vary with the configuration of prices in a store.) Hence, in setting the price of a product the retailer will consider the effect of price on sales not only of that product but also of other products in the store. Variations in degree of interdependence between sales curves (i.e. demand

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curves facing each firm) mean that, even under optimal pricing, the relation between marginal revenue and marginal cost of individual products will vary within and between stores[1].

The diversity of prices due to the multi-product nature of the retail firm, is reinforced because consumers are incompletely informed on prices. To always know the prices of several hundred items in a number of retail outlets, when the price of each may change weekly or more often, would be difficult and costly for any consumer. A situation in which *all* consumers found it both feasible and worthwhile to remain completely informed on retail prices of convenience goods, such as foods, seems empirically impossible. Knowledge possessed by buyers in retail markets is therefore inevitably less than perfect.

A more general reason for expecting variation in retail prices which are not related to costs is that retail units are necessarily differentiated by location[2]. This is especially true of units selling goods such as foods, which are bought often.

While location relative to supply source will affect the into-store *cost* of goods to a retail unit, location within the sub-market will affect retail margins mainly *via* the influence of its convenience on the shape of the the unit's sales curves.

This is not to imply, however, that the theory of monopolistic competition is a wholly appropriate tool for analysis of retail prices of foods. As noted above, the multi-product nature of the retail firm and the imperfect knowledge of consumers must be considered. Furthermore, since consumers consider, as possible places to buy their food needs, only the small number of stores within convenient shopping distance, sales curves facing different retailers within a sub-market are interlinked.

Despite the apparent defects mentioned, the simple theory of the likely surface of retail prices of foods is implicit in much of the related teaching and research done by economists. Food retailing generally, and retail pricing of foods in particular, has not been much studied in Australia (or indeed elsewhere)[3]. The volume of resources employed and its strategic importance as the final link between producer and consumer make desirable a greater knowledge of food retailing [20, pp. 66–69, 71–72, and 86–88].

For these reasons, some results of a survey of retail prices of groceries in 82 self-service stores in New South Wales and Victoria, done in 1966,

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[1] Several theories of such product discrimination in retail pricing have been developed [8], [9], and [16].

[2] As Holdren has well said, "Even if all consumers had identical preference functions and identical incomes, but were distributed uniformly over the landscape, the demand function for a given retail unit would be less than perfectly elastic". [8, p. 17.]

[3] In the U.S. however, in addition to the largely theoretical works noted in footnote 1, a number of empirical studies of retail pricing of foods have in recent years been carried out [1], [7], [14], and [15]. In Australia the only major exception to the general dearth is an extensive study of grocery retailing in Western Australia [2].

and originally intended for class use only, are now reported. The main features (and limitations) of the design of the survey are outlined in Appendix A.

Several aspects of the surface of retail prices of groceries, at a point in time, are considered, namely:

(i) price differences between stores

(ii) prices in chain and non-chain stores

(iii) prices in metropolitan and rural areas

(iv) price distributions of different products

(v) prices in particular sub-markets.

2 PRICE DIFFERENCES BETWEEN STORES

The basic hypothesis here tested is that retail prices of groceries differ from store to store only with distance from supply source and level of store services provided. However, in the model hypothesised, variables to represent some widely accepted aspects of monopoly and incomplete adjustment are also included.

Distance from supply source is approximated in the model by distance from the nearest capital city (Sydney, Melbourne or Brisbane). Ordinal indices of some more readily observable of the non-price aspects of stores' offers together represent levels of service provided. Ancillary services considered are credit, delivery, and packing. Shopping convenience is measured by number of check-outs (floor space constant) and product line width (in terms of broad product groups). Important aspects of quality of service not considered in the analysis include parking facilities, lighting, temperature control, cleanliness, tidiness, and "atmosphere".

Other influences examined in the analysis are store size, population, and ownership type. The corresponding hypotheses are that, *cet. par.*, prices are lower (i) in large than small stores, (ii) in large towns than small towns, and (iii) in chain than non-chain stores.

Specifically, linear regression equations fitted by ordinary least squares for each of the products were of the form

$$P = a + b_1L + b_2C + b_2D + b_4K + b_5W + b_6N + b_7F + b_8P + b_9T$$

where

P = price divided by mean sample price, times 100,

L = distance by rail, of towns in which store is located, from nearest capital city, in miles,

C = credit provision (10 = no credit given, 20 = credit given),

D = delivery service (10 = no delivery, 20 = delivery at a charge, 30 = free delivery),

K = packing service (10 = packing by consumer, 20 = packing by check-out operator, 30 = packing by employee other than checker),

W = index of product line width (ranging from 10 for a store selling dry groceries only to 80 for a store offering also full lines of fresh meats, greengroceries and liquor[4]),

N = number of check-outs, multiplied by 10,

F = floor space, in hundreds of square feet,

P = population of town (or suburb) in thousands,

T = ownership type (chain = 10, non-chain = 20),

and $a, b_1 \ldots b_9$ are regression constants.

The equations thus fitted, a selection of which are presented in Appendix B, Table 2, are weak both as predictors and estimators. Coefficients of multiple determination are, with one exception, below ·5; indeed, over half are below ·25. In only eight of the regressions are more than two of the nine regressor variables significently different from zero at the five per cent level; at the other extreme, 20 of the more than 50 equations fitted contain no significant variables. Taking the equations collectively, moreover, the relative importance and direction of effect of the independent variables show little consistency.

Thus, the results of this regression analysis seem generally to contradict the "conventional wisdom" on retail price surfaces of foods. The defects of the analysis, however, can not be overlooked. Quality of service is very partially and crudely measured; not all the products originate mainly in the capital cities; population is not very meaningful in respect of the eleven metropolitan stores in our sample; and, more fundamentally, the sample was not randomly drawn. On the other hand, multicollinearity, contrary perhaps to expectations, does not appear to be serious[5].

While the need for further research is recognised, the provisional conclusion must be that differences in retail prices of individual groceries, charged by self service stores at a point in time, are not well explained by differences in transport costs, quality of service, size of unit and firm, population of town, and ownership type. This leaves open the possibility that these factors may reasonably explain differences in *overall* store price levels. This would imply that "unexplained"

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[4] Scores for each product group in the index of product line width are inversely related to the average shopper's expectation of finding that group offered in a grocery store; thus liquor has the highest score, followed by meat, and then greengroceries.

[5] Restricting our attention to pairs of variables with a coefficient of determination (r^2) of above ·20 we find direct correlation between credit provision and delivery service (r^2 = ·31) floor space and number of checkouts (·29), floor space and width of product line (·26), and ownership type and credit provision (·26) and inverse correlations between population and location (·39) and floor space and delivery service (·22).

variations in prices of individual products, brought about by demand complementarities and consumer ignorance, are mutually offsetting.

To compare store price levels, prices of individual products must be somehow combined. Whatever the purpose, no one system of weights will be valid for all stores. The mix of sales will vary from store to store with product width, consumer reactions to different price structures, and display plan. To make comparisons, however, a uniform weighting system is needed. One possible system is to weight by unit weight, by simply summing prices [2, pp. 86–95]; another is to weight each product equally, by taking a simple average of price relatives [15, pp. 20–24]. The author prefers, however, following Holdren [8, pp. 68–70], to take account of the relative importance of different products in the consumer's budget and the retailer's sales. Thus product price relatives (sample mean = 100) are weighted, firstly, according to their relative importance in the Consumer Price Index [4, pp. 31–32]. An alternative index uses weights based on a trade estimate of sales through retail outlets [6]. The systems are not greatly different[6]. The resulting differences in the regression equations for the two indices, however, highlight the sensitivity of indices of retail prices of foods to minor changes in weighting [15, p. 15]. The equations estimated for the "census" and "trade" weighted basket indices *Bc* and *Bt* (sample mean = 100) are as follows. (Standard errors are bracketed below each coefficient; asterisked coefficients are significantly different from zero at the five per cent level; independent variables are specified on page 5 above.)

$$\begin{aligned} Bc = 101{\cdot}496 &+ \underset{(\cdot 004)}{{\cdot}006L} + \underset{(\cdot 134)}{{\cdot}059C} - \underset{(\cdot 092)}{{\cdot}005D} - \underset{(\cdot 994)}{{\cdot}079K} - {\cdot}026W \\ &- \underset{(\cdot 031)}{{\cdot}066N^*} - \underset{(\cdot 029)}{{\cdot}016F} - \underset{(\cdot 024)}{{\cdot}049P^*} + \underset{(\cdot 116)}{{\cdot}024T} \end{aligned}$$

$$[R^2 = {\cdot}38]$$

$$\begin{aligned} Bt = 101{\cdot}744 &+ \underset{(\cdot 004)}{{\cdot}003L} - \underset{(\cdot 127)}{{\cdot}072C} + \underset{(\cdot 087)}{{\cdot}067D} - \underset{(\cdot 094)}{{\cdot}113K} + \underset{(\cdot 020)}{{\cdot}040W^*} \\ &- \underset{(\cdot 030)}{{\cdot}074N^*} - \underset{(\cdot 028)}{{\cdot}030F} - \underset{(\cdot 023)}{{\cdot}057P^*} + \underset{(\cdot 109)}{{\cdot}129T} \end{aligned}$$

$$[R^2 = {\cdot}45]$$

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[6] A preferable "trade" system would have been one based on sales through self service groceries alone. No basis for such was found, however. A few products which appear in only one source, have a common weight, *relative to butter*, in both indices. Product weights differ by more than ·01 (out of a total weight of 1·00) in the two indices are: (a) "trade" weight greater, cornflakes, biscuits (two types), dried fruit, canned soup, marmalade, camp pie, frozen peas, toilet paper, and detergent powder, (b) "census" weight greater; cordial, bacon, chicken, ice cream and cigarettes.

It is likely that results would also be changed by using different selection of products or different bases for price relatives, e.g. modal prices [15, p. 16] or prices in a particular store [8, p. 69].

Despite differences in both regression coefficients and coefficients of multiple determination, both equations support the following broad propositions.

(i) Location, in the broad sense (as opposed to location within the sub-market) *per se* is not an important direct determinant of store price levels.

(ii) There is no clear relationship between price levels and services offered in respect of credit, delivery, and packing. However, the possibility that consumers pay for the convenience of one-stop shopping remains open (the coefficient of price level on product line width being significantly positive in one equation).

(iii) Other things, especially floor space, unchanged, price level declines as number of checkouts increases—but only slightly. An increase of one check out, *cet. par.*, is associated with a decline in basket index of ·007 of an index point (generally less than one hundredth of one per cent). *Cet. par.* prices overall do not vary with the selling area of the store.

(iv) The larger the town, *cet. par.*, the lower is the level of prices in the town's self service grocery stores. The relation, however, is weak; an increase of one thousand in population is associated with a decline in ·05 of a percentage point in price level.

(v) Non-chain stores, *cet. par.*, do not charge higher prices than equivalent chain stores.

(vi) Differences in price levels of self service grocery stores are not well explained by differences in proximity to capital city, quality of service, size of unit and firm, population of town, and ownership type. These factors, nevertheless, explain differences in overall price level better than differences in the price of most individual commodities.

We might expect the "conventional wisdom" to explain differences in price levels between stores better than differences in prices of individual products. The multiproduct nature of the retail firm is less pertinent in discussion of price levels. (*A priori*, however, we would expect product line width, measured in terms of individual items, to affect the price level of a sample basket. The wider the product line, the greater the potential for product discrimination in pricing). Also, consumer knowledge is likely to be more nearly complete in respect of price levels than of component prices, especially where differences are persistent; the value of information on the former is greater and the costs of getting it less (but by no means low [8, p. 69]).

Therefore, the main reason why the simple conventional model fails to explain the surface of store price levels must be that the all-important influence of location within the sub-market is neglected. It is likely that retail prices of foods are much more strongly affected by where the store lies in relation to its customers (and potential customers) and in relation to its competitors, than by the particular sub-market in which the store lies.

The non-significance of the relations found between levels of prices and of certain services does not confirm the conventional view that the costs of such retailing services are passed on to consumers in higher prices; nor yet does it confirm Holdren's hypothesis that levels of price and of non-price offer are likely to be inversely related [8, pp. 105–114, 146–149, and 191]. The mathematical logic of Holdren's case can not be meaningfully condensed. The main threads of the argument, however, can be stated within the context of theory of monopolistic competition, especially as developed by Scitovsky [17, pp. 247–264].

Consider firstly the effect on profit maximising price of an improvement in the non-price offer of a monopolistic competitor. The improvement will result in a rise in price if the sales curve is made less price elastic or if the marginal cost curve is shifted upward. Also, the more steeply cost rises with production the more likely is a given outward shift in demand to lead to a rise in price. Most changes in non-price aspects of the self-service retailer's offer, however, affect discretionary fixed costs rather than variable costs and therefore leave marginal costs unchanged. Also, because the labour requirement of a supermarket of given size is rather stable within its normal operating ranges, the marginal cost of retail production of a commodity is nearly constant, at a level slightly above invoice cost. Thus, the cost structure of the supermarket would not lead us to expect that improvements in services offered will be associated with marked increases in prices nor that stores offering the highest level of services will necessarily charge the highest prices. Moreover, on the demand side, price elasticity is more likely to be increased than decreased by improvements in non-price offer. The dominant effect of such improvement is to attract newcomers rather than to attach existing customers more firmly to the store. Given that new customers will have better knowledge of other stores and will have more conveniently located alternative stores at which to shop, elasticities of demand will tend to be increased.

A further, though less precise, argument for expecting low prices and a high level of service to go together is that market conditions which yield a high response of sales to price are also likely to yield a strong response of sales to variation in non-price offer—and conversely. A key presumption of this theory is that the market for food distribution services is not segmented (say firstly into price and service conscious components). Casual empiricism suggests such segmentation does exist in some sub-markets. Conceivably, then, our inconclusive regression result may mean direct relations between price and service levels in some sub-markets are offset by inverse relations in others. More intensive study of particular sub-markets is apparently required. The regression analysis suggests the price level of a store is not affected by the location of the surrounding town, but is affected by its population.

In the next section we explore again the influence of ownership type on price levels, which the regression equations showed to be *per se* insignificant.

3 A COMPARISON OF PRICES IN CHAIN AND NON-CHAIN STORES

In this section, we simply compare levels and structures of prices in a number of chain and non-chain stores, without attempting to abstract from the influences of variables other than location and store size. To this end, we use a sub-sample of twelve branch stores of a large grocery chain matched by twelve non-chain stores in the same sub-markets. The latter were chosen according to their closeness in location and size to the corresponding chain branch. From information given unsolicited, it is believed most of the non-chain stores were affiliated to wholesalers in voluntary or cooperative groups[7].

Two main hypotheses are considered:

(i) Prices of groceries are lower in chain stores than in other self-service stores, comparable in size and location.

(ii) Prices of groceries vary less between branches of a chain than between comparable non-chain self-service stores.

Our first hypothesis is based partly on other empirical studies in the U.S. [8, p. 71; 13, pp. 113–114; 14, pp. 308–310; 15, pp. 15–34]. It is also based on *a priori* considerations. Differences in prices between chain and non-chain stores may result from differences in one or a combination of (i) cost curves, (ii) sales curves, and (iii) efficiency of pricing.

Costs may be usefully divided into the into-store costs of products handled and the costs of providing retail services. The first category of costs are here of overwhelming importance, because about 90 per cent of other costs are either fixed costs or discretionary fixed costs [8, pp. 27–40], and therefore do not affect marginal cost curves.

Economies of scale in wholesaling in respect of handling, transport and selling, in principle, can be as well realised by voluntary or co-operative groups as by corporate chains. (Wholesaling costs of some groups, however, may be greater because they supply some stores which are smaller than the average chain branch [14, p. 157].)

Groups may also, like chains, use the volume of their purchases to bargain with suppliers for discriminatory prices. (These usually take the form of volume rebates, advertising allowances, special credit terms, or similar concealed discounts [2, pp. 84–85].) Chains, however, probably have a peculiar bargaining advantage, in that they can better ensure stores remain loyal and carry out contract terms. Likewise, chains seem better able to obtain market power by the use or threatened use of private brands.

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[7] Both voluntary and cooperative groups carry out jointly wholesaling, advertising, and other merchandising activities. Cooperative groups are run on a non-profit basis by their retailer-owner-patrons. Voluntary groups by contrast, are directed and owned by wholesalers [13, p. 17].

A priori consideration of variable cost curves would therefore lead us to expect lower prices in chain stores. No similar generalized comparison can be made of sales curves. Indeed, few group stores try to significantly differentiate themselves from chain stores [2, p. 160].

Even where demand and cost conditions are similar, chain stores could charge lower prices because they maximise store profits less closely than non-chain stores. One might argue larger firms are less concerned to maximise profits. More plausibly, the managerial structure of chains may prevent the setting of profit maximising prices in all stores. Chains' systems of management accounting depend on comparability of sales figures from various stores. Hence they are reluctant to incur the administrative costs of departing from established margins for individual stores. Price uniformity may also be considered good for public relations. Hence, chains which set prices the same in many branches may still be aiming at maximum *firm* profit. To appear competitive in all markets, they may nevertheless have to maintain a lower price level than their more flexible non-chain rivals [8, pp. 100–101].

We would not, however, expect chain prices to be completely uniform between branches. Stores may be placed in different divisions of a chain, according to location or type. Secondly, chains normally have some procedures—albeit cumbersome ones, for the altering of prices to meet local competition. Finally, the lag between central initiation of price changes and local adoption may vary between stores [3, pp. 141–142]. (One aspect of the relative pricing flexibility of chain and non-chain stores is considered under our second hypothesis, where we compare price variation in the sample of chain branches with that in the matched sample of non-chain stores.)

The mean "census" weighted basket price for the twelve non-chain stores was 1·2 per cent higher than that for the chain branches. A "t" test at the five per cent level, however, shows this difference to be statistically insignificant. When the "trade" weights were used, the basket price was 1·8 per cent higher in the non-chain stores than the chain stores, but the difference remains statistically insignificant. In nine of the twelve pairs of stores compared, the chain price level was lower. However, use of the non-parametric (one tailed) sign test [19, pp. 68–74] suggests there is a seven per cent probability of obtaining such a sample result from a population of store pairs of which the median difference in price level was zero.

In a comparison of samples of chains and non-chain stores in Perth in 1964, Briggs and Smyth found the non-chain price level to be nearly four per cent higher than the chain price level [2, p. 87]. This result, however, is obviously not incompatible with that of this study. The Perth chain sample consisted of branches of six different chains; also in constructing the basket price, product prices were not weighted.

The most reasonable conclusion seems to be that levels of grocery prices are probably slightly lower in Australian chain than non-chain self service stores but that sufficient doubt remains to justify more rigorous testing of the hypothesis.

Of the 53 individual products priced, the mean price in the non-chain stores was higher in 35 cases. However, in only six comparisons was the difference statistically significant (on the basis of a "t" test at the five per cent level); the chain price advantage ranged from nine per cent on cake mix through 13 per cent on dried fruits and toothpaste to 20 per cent on devon. The lower (−11 per cent) chain price of tea, which reflects the use of a private brand, may be a permanent difference. Other significant differences were no doubt temporary and of interest only in their magnitude. The most important finding may be the simple one that 35 out of 53 products were on average cheaper in the chain stores. In terms of a one tailed sign test this result is highly significant.

Thus, we may more confidently conclude that the price of any given product is likely to be lower in a chain than a non-chain store than that the overall chain price level will be lower than the non-chain price level. This would imply that non-chain stores match or even undercut chain stores on certain key products which are important in consumer food budgets. Thus, in our sample, non-chain prices of such staples as sugar, coffee, margarine, eggs, bacon, and biscuits were lower, if not significantly lower, than chain prices. Moreover, prices of cigarettes, butter, cheese, and chicken were less than one per cent higher in the non-chain stores. The mean non-chain price, however, was *significantly* lower on only three products, potatoes, onions, and cordial. Higher chain prices for fresh fruit and vegetables were also found in one recent U.S. study and were attributed to higher packaging costs [14, pp. 309–310].

The hypothesis of greater price variability between non-chain stores was more strongly supported than our first hypothesis. The variance of the overall price level was significantly greater in the non-chain sample than the chain sample (based on an F test at the five per cent level of significance). The median coefficient of variation of the fifty-three individual product prices was ·121 in the non-chain stores compared to only ·097 in the chain stores. The variance of the non-chain prices was greater for thirty-two out of the fifty-three products, and in 11 cases significantly greater[8].

These findings do not, however, exclude the possibility that retailer groups may have some of the pricing inflexibility of chains ("Specials" for example are usually group-wide to reduce advertising costs). Moreover, chains other than the one sampled may be more (or less) flexible in their pricing. Hence it would be desirable to compare samples of several groups and several chains.

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[8] The eleven products on which the variance of non-chain store price was higher were bacon, frankfurters, canned salmon, canned peas, powdered milk, evaporated milk, arrowroot biscuits, potatoes, soap powder, detergent powder, and washing up liquid. Brands of bacon, salmon and frankfurters probably varied more in non-chain stores but this factor would not have applied in other cases.

4 PRICES IN METROPOLITAN AND OTHER STORES

One conclusion from the regression analysis was that location, in the broad sense of proximity to capital city, is not an important *direct* determinant of store price levels. Nevertheless it may be that, because location and population density are interrelated, grocery prices may differ systematically between cities and country towns. Such raw comparisons of prices are of interest because they bear on such questions as the economics of decentralisation and the level of real farm incomes relative to non-farm incomes.

To compare price levels, stores were first divided into zones according to their distance from the nearest capital city. These zones are the same as used by a trade newspaper [5] in presenting recommended prices. Zone price indices (sample average basket = 100) were then obtained by averaging "census" weighted basket indices of stores within each zone[9]. The results are tabulated below.

TABLE 1

Zonal Indices of Grocery Prices in New South Wales and Victoria, 74 Self Service Stores, May, 1966

	Capital City	Distance from nearest Capital City			
		Up to 100 miles	101–200 miles	201–300 miles	Over 300 miles
Index (Sample Average) =100	95.8	96.0	98.8	101.5	101.6
Number of Stores in Zone	11	6	8	26	23

Analysis of variance reveals some significant differences between these zonal indices. However, using Tukey's test for multiple contrasts [21], we find the only significant difference between pairs of *adjacent* zones is that between the 101–200 mile zone and the 201–300 mile zone. Given the small sizes of the zone samples, we do not wish to emphasize the similarity of price levels in the metropolitan and inner zones. The firmer conclusions are:

(i) In towns more than 200 miles from the nearest metropolis, the overall price of groceries is significantly higher (in our sample six per cent higher) than within the metropolis.

(ii) In the outer zones, price level does not increase with distance from capital city.

[9] When "trade" weighted indices were used results were not materially different and are hence not presented. Only stores carrying all or virtually all specified products were included in the aggregate analysis, eight of the stores in the total sample being excluded.

The second finding may indicate that price levels are higher in country towns than cities, not so much because into-store product costs are higher but because sales curves in areas of small and dispersed population are more inelastic[10].

Comparison of prices of individual products between zones, likewise, do not seem to be wholly attributable to the influence of freight costs. The 20 products which (on the basis of Tukey's test at the five per cent level) were significantly higher priced in the outer zones than the metropolitan zones are not consistently either the bulkiest or most centralised in production. For example, the prices of sugar and plain flour did not vary significantly between zones whereas the prices of rice and self raising flour did so; camp pie showed significant zonal variation in price but not canned salmon or tuna; again, cigarettes and tissue do but other non-food products do not; the prices of butter and eggs, predictably, did not vary zonally, but nor did the prices of cheese or margarines; canned and bottled goods were divided between those with prices significantly higher in the rural zones and those not.

In sum, then, the common belief that grocery prices are on the whole higher in country towns than cities is supported. However, this by no means applies to all individual products. Finally, differences in intensity of competition rather than transport costs seem to be the main explanation of such price differences.

5 PRICE DISTRIBUTIONS OF INDIVIDUAL PRODUCTS

It has been shown in earlier sections that the pricing role of the food retailer is far removed from one of making, item by item, standard adjustments for quality of service and general location to a well established market level. In the next two sections, a more detailed exploration is made of how the pattern of prices observed differs from what would have been found if retail pricing were that simple. Differences in distributions of prices between products are presented and provisionally explained. Then, in Section 6, we examine the effect of complex pricing strategies on the shopping opportunities facing consumers within sub-markets.

The survey results can yield only limited information about strategies of product pricing because they (i) relate to only one point in time, (ii) are drawn from a number of sub-markets, and (iii) reveal little about margins[11].

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[10] One complicating factor, however, is that stores do not always obtain all their supplies from the nearest capital city, especially when that city is in another state [12].

[11] In fact, however, from a confidential source, we were able to make rough estimates of many margins. Thus we could identify as high (greater than 25 per cent) margin products, canned peas, marmalade, tissues, toothpaste, honey, dried fruit, and chocolate and as low (less than 15 per cent) margin products, butter, margarines, milk powder, detergent and soap powders, baby food, and cigarettes.

Nevertheless, we can make some observations on the basis of the variability, skewness and deviation from recommended levels of prices of different products. Recommended prices are zonally weighted means of those published in a trade paper, for the survey period, as a guide for corner stores [5].

The existence of recommended prices, which self service stores would rarely exceed, may explain the unusually large number of negatively skewed price distributions (19 out of 53). Positively skewed distributions of prices, which might generally be considered more likely, characterised only ten products. The remaining twenty-four products had roughly symmetrical distributions of prices. The coefficient of variation of price ranged from as little as ·04 on sugar and butter to ·20 on toothpaste and ·24 on frozen peas, around a median of ·12. The deficit of average on recommended price ranged from about zero on toilet rolls and matches to 28 per cent on tomato soup.

By classification of products on the above characteristics, we may firstly identify the products most used as "specials". Supermarkets typically, each week, select a number of products for sale at well advertised specially low prices. This is done because shoppers are able to compare prices of only a limited number of lines and are more impressed by deep cuts on a few items than marginal cuts on many items; selective price cutting is also operationally less costly[12]. [10, pp. 165–166.] Product characteristics favouring special low margin treatment are: a high price per unit; consistent quality; purchase by a high proportion of consuming units; frequent purchase by most units; high budgetary importance; and a low elasticity of *market* demand [8, p. 140].

In our survey results, widespread use of a product as a leader would be reflected by prices which were highly dispersed, left skewed and on average well below the recommended price. Products in the first quintile in respect of both price dispersion and deficit of mean or recommended price are toothpaste, baked beans, plain flour, tomato sauce, and ice-cream. Commodities in the first quintile in one of the above respects and in the second quintile in the other are rice, dried fruit, evaporated milk, tuna, toilet soap, honey, and self raising flour. All these products, except ice cream and evaporated milk, had negatively skewed price distributions.

While most of the above products fit Holdren's criteria of good "special" products, we could well think of others such as butter and cigarettes, which fit them much better. These products, however, together with sugar and margarine are in the lowest quintile on price

[12] Traffic building is probably the most the most common and certainly the most commonly discussed motive for "specialling". The primary objective may, nevertheless, sometimes be to increase sales of the product specialled. Thus products in seasonally high demand or supply may be featured; the special may be initiated by a manufacturer; or the supermarket may wish to boost sales of a new addition to the product line [7, p. 129].

variation. The likely explanation is that these commodities are *so* effective as specials that few stores will allow themselves to be undercut on them. Hence, prices of these products may be quite stable and uniform over long periods—though at a level which yields low margins[13]. (These products were in the second to fourth quartiles in deficit on recommended prices, which are in themselves not generous to retailers.)

Some key items were uniformly sold at close to the recommended price (though with a tendency to negative skewness), namely eggs, chocolate, fish fingers, and biscuits. These are probably cases of effective price maintenance by marketing boards and concentrated manufacturing industries.

All these observations, however, are very tentative. To make firm statements on the dynamics of retail pricing, we would need to observe prices regularly over many weeks.

6 PRICE DISTRIBUTIONS WITHIN LOCAL MARKETS

In seven country towns (five in New South Wales and two in Victoria) four or more self service grocery stores were surveyed. The resulting data is used in this section to investigate the dispersion of prices, price levels and price structures within local markets.

Because retail grocery stores are multi-product and differentiated by location and because shoppers are imperfectly informed, we would expect prices of products within markets to be diverse (above pp. 1–3). The degree of heterogeneity of prices found in our subsample is nevertheless remarkable. In the following table, for each sub-market, we classify products by the number of identical store prices. Thus in town D, in which four stores were surveyed, there were three products for which all four stores asked the same price, none on which three stores asked the same price, three on which two pairs of stores asked identical prices, twenty on which two stores asked the same price, and eighteen on which each store charged a different price.

In the four towns, in which four stores were surveyed, only five per cent of products on average were identically priced. In the two markets, in which six stores were surveyed, only one product, chocolate, was at the same price in all stores. Other products with uniform prices in some markets are butter, eggs, rice, arrowroot biscuits, and sugar. These products are subject to price maintenance by suppliers and/or are sensitive staples, which retailers do not "special" for fear of direct retaliation by competitors. Such implicit collusion (or less probably head-on price warfare) is clearly not general. On average, in the four towns in which four stores were surveyed, each store charged a different price on no less than 38 per cent of products; even in the towns in which six stores were surveyed, the corresponding proportion was 13 per cent.

[13] We estimate average margins in the survey period to have been roughly; butter 5 per cent, margarines 10 per cent, cigarettes 11 per cent, and sugar 13 per cent.

TABLE 2

Numbers of Products with Specified Numbers of Identical Store Prices in Seven Retail Markets, May, 1966

Town	Number of Stores	6 prices identical	6 prices identical	4 prices identical	3 prices identical	2 pairs identical prices	2 prices identical	All different prices	Total Number of Products
A ..	6	1	2	3	16	8	15	8	53
B ..	6	1	2	13	13	6	22	6	53
C ..	5		1	6	12	4	15	15	53
D	4			3	9	3	20	18	53
E ..	4			0	7	5	15	26	53
F ..	4			2	4	1	28	18	53
G	4			2	10	0	22	19	53

Prices not only differ greatly among stores; they also differ in no consistent pattern, rankings of stores on price varying from product to product. Since complementarities in store demand between many products are reversible, a retail store may counteract a price cut by a competitor on a particular product by cutting price on other products. Often, indeed the sales effect of such indirect retaliation is greater than that of direct retaliation [8, p. 136]. Hence, the great diversity of prices found in the markets studied is certainly compatible with intense competition. We may also infer that (i) managerial decisions on retail pricing are by no means simple and (ii) consumers are poorly informed on the prices of many products (or else are disinclined to make use of the knowledge they have).

These findings are strengthened, when we consider the ranges of price differences observed. Averaging first by market and then by product, we find a grand mean relative range (range as percentage of lowest price) of 24 per cent. This mean, however, is inflated by a few exceptionally high mean relative ranges of 50 per cent and more for four products (potatoes, frozen peas, toothpaste, and detergent liquid). The modal group of mean ranges containing twenty products is from 10·0 to 19·9 per cent. Even so seventeen products had mean relative ranges of 20·0 to 29·9 per cent and eight of between 30·0 and 39·9 per cent; and only in the cases of sugar, cigarettes, butter, and eggs was the mean percentage range less than 10. The grand mean absolute range was 6·6 cents; the modal group of nineteen products had a mean price range of 3·0 to 5·9 cents, though on thirteen staple and/or low priced items it was less than 3·0 cents; the remaining twenty-one commodities were equally divided into the groups 6·0 to 8·9 cents, 8·0 to 11·9 cents and 12·0 cents and over.

Prices ranges are wide because the price cutting store generally aims to build traffic by its cuts and because consumers are ill informed on prices. A low return on a cut price product can be compensated by consequent increased sales of other products. Secondly, to impress shoppers enough to divert their patronage, large cuts in prices are required[14].

Because there is such selective and indirect price competition, the diversity and range of store price levels is much less than that of individual product prices. In the table below, we show "trade" weighted price indices for each store in our sub-sample, taking the cheapest store in each market as 100.

It will be seen the excess of the dearest over the cheapest store within each group ranges from 3 to 11 per cent around a median of 8 per

[14] McLelland has suggested British consumers are not impressed by price cuts of less than 10 per cent [11]. Gray and Anderson [7, p. 128] in a study of San Francisco supermarkets found special prices average about 20 per cent below non-special prices.

TABLE 3

Index Numbers, Price Level and Service Quality—33 Stores in Seven Markets, A through G, May, 1966. (Market lowest = 100)

Store	Index of Price Level	Index of Service Quality	Store	Index of Price Level	Index of Service Quality
A–1 ..	105.0	143	D–1 ..	106.8	127
A–2 ..	104.8	145	D–2 ..	105.1	107
A–3 ..	104.4	133	D–3 ..	100.4	100
A–4 ..	101.6	100	D–4 ..	100.0	100
A–5 ..	101.2	133			
A–6 ..	100.0	116	E–1 ..	110.9	100
			E–2 ..	107.7	108
B–1 ..	102.9	113	E–3 ..	104.0	125
B–2 ..	101.7	165	E–4 ..	100.0	150
B–3 ..	101.6	135			
B–4 ..	101.5	100	F–1 ..	107.7	107
B–5 ..	101.2	148	F–2 ..	105.9	100
B–6 ..	100.0	174	F–3 ..	101.0	100
			F–4 ..	100.0	110
C–1 ..	110.3	148			
C–2 ..	108.6	100	G–1 ..	109.0	170
C–3 ..	105.0	100	G–2 ..	107.4	161
C–4 ..	104.4	137	G–3 ..	105.6	117
C–5 ..	100.0	144	G–4 ..	100.0	100

cent[15]. The disparity of store price structures, which translates wide differences in product lines to much narrower differences in overall price levels, makes finding the overall cheapest store, each week, a heroic task for the individual consumer. Hence, we believe the substantial range of price levels between stores, found in our sample markets, is quite typical.

The diversity of price structures is indicated by the fact that on average in the seven markets, the cheapest store overall was cheapest (or equally cheapest) on only twenty-five of the fifty-three products priced. To further illustrate this diversity, for each market, an index for a mythical composite store which had the lowest price on each item was constructed. These indices range from 3 to 9 per cent below those of the cheapest stores.

The index price of a basket of products, each bought at the cheapest price was 7 to 11 per cent below the *average* store price level. Thus the average consumer would have saved, according to town, $0.70 to $1.10 on a 10 dollar grocery bill by shopping at four to six stores rather than one. Most of the lowest prices were no doubt advertised as "specials" and thus the cost of searching out the cheapest prices would

[15] A similar study for "Center City" U.S. in 1954 found a range of about 6 per cent between cheapest and dearest stores [8, p. 69]. A 1964 Perth study suggests a comparable range of about 10 per cent [2, p. 87].

not have been very great. The result therefore indicates most consumers place a high value on the convenience of buying all their groceries at one store. Therefore the most useful service a local consumers' group could provide would be to identify the overall cheapest store each week. Consumers with consumption patterns markedly different from the average or who are prepared to carry large "speculative" inventories might still prefer to be guided by the advertisements of "specials".

To investigate further the relation of price level and quality of service a crude index of service quality was constructed. For each store, dummy values used in the regression analysis to measure level of service in respect of delivery, credit, wrapping, and width of product line were expressed as a fraction of their maximum value, summed, and then divided by one hundredth of the lowest sum in the market. Comparison of rankings of the indices of price and quality, shown in the above table, again however, yields no clear conclusion. In markets B and E the cheapest stores appear to have offered the highest level of service; the converse applied in markets A, D, and G; while in markets C and F there appears to be no relation. Tests broader in space, time, and services measured are clearly needed.

7 SUMMARY AND CONCLUSIONS

Briefly and broadly, the main findings of the study are:

(i) Commonly accepted models of the likely or attainable surface of food prices at retail ignore the multi-product nature of retail stores, the importance of market location as a differentiating factor and the imperfect knowledge of consumers. Hence neither differences in the prices of fifty-three individual grocery products nor differences in overall price levels, between the eighty-two stores sampled, are well explained by differences in proximity to capital city, quality of service, size of unit and firm, and population of towns. Price levels do appear to vary inversely with number of check outs and with size of town—but only slightly.

(ii) There are sound theoretical reasons to expect levels of retail prices and quality of service to vary inversely—provided markets are not segmented. Neither the regression analysis nor a study of seven local markets support this hypothesis. Nor do they support the more common view that levels of price and service are directly related.

(iii) Analysis of matched sub-samples of chain and non-chain stores suggests a chain store is likely to have a lower price level and (more certainly) to be lower priced on more commodities than a non-chain store of similar size and similarly located. Chain store prices may well be lower mainly because their pricing is less efficient due to organisational inflexibility.

(iv) A weighted index of a basket of fifty-three grocery products was found to average about 6 per cent higher in rural towns than capital cities. Comparison of different rural zones and of individual products suggests the difference may be the result of differences in demand rather than in invoice costs due to freights.

(v) Key products in stores' pricing strategies, as indicated by the variability of price and the deficit of price on recommended price, roughly fit Holdren's theoretical requirements of good leader items. Other products which fit these criteria more closely, however, seem to have been rarely featured at prices below competitors because of fear of direct retaliation, or price maintenance by suppliers.

(vi) An analysis of seven local markets shows the great diversity of prices, price levels, and price structures that result from consumers' imperfect knowledge of prices and strong preferences for "one stop" shopping. It also illustrates the selective and indirect nature of price competition between retail grocery stores.

REFERENCES

[1] BAUMOL, W. J., QUANDT, R. E., and SHAPIRO, H. T., "Oligopoly Theory and Retail Food Pricing", *Journal of Business*, Vol. 37, No. 4, (October, 1964), pp. 346–363.

[2] BRIGGS, D. H. and SMYTH, R. L., *Distribution of Groceries*, (Perth: University of Western Australia Press, 1967).

[3] CASSADY, Jr., R., *Competition and Price Making in Food Retailing: The Anatomy of Supermarket Operations*, (New York: Ronald Press, 1962).

[4] COMMONWEALTH BUREAU OF CENSUS AND STATISTICS, *Labour Report No.* 51, (Canberra: Government Printer, 1965).

[5] CONTACT MONTHLY, Volume 18, No. 5 (May, 1966).

[6] FOODWORLD FACTS MANUAL, 1966, (Sydney, 1966).

[7] GRAY, R. W. and ANDERSON, R., "Advertised Specials and Local Competition Among Supermarkets", *Food Research Institute Studies*, Vol. 3, No. 2, (May, 1962), pp. 125–139.

[8] HOLDREN, B. R., *The Structure of a Retail Market and the Market Behaviour of Retail Units*, (Ames: Iowa State University Press, 1968).

[9] HOLTON, R., "Price Discrimination at Retail: The Supermarket Case", *Journ. of Industrial Economics*, Vol. 6, No. 1, (January, 1958), pp. 13–32.

[10] MCLELLAND, W. G., "The Economics of the Supermarket", *Economic Journal*, Vol. 72, No. 285, (March, 1962), pp. 154–170.

[11] MCCLELLAND, W. G., *Studies in Retailing*, (Oxford: Blackwell, 1963).

[12] MCPHAIL, I. R. and WOOLMINGTON, E. R., *Origins of Retail Commodities in Northern New South Wales*, (Armidale: Department of Geography, University of New England, 1966).

[13] MUELLER, W. F. and GAROIAN, L., *Changes in the Market Structure of Grocery Retailing*, (Madison: University of Wisconsin Press, 1961).

[14] NATIONAL COMMISSION ON FOOD MARKETING, *Organisation and Competition in Food Retailing*, (Washington: Government Printing Office, 1966).

[15] NELSON, P. E. and PRESTON, L. E., *Price Merchandising in Food Retailing: A Case Study*, (Berkeley: Institute of Business and Economic Research, University of California, 1966).

[16] PRESTON, L. E., "Markups, Leaders and Discrimination in Retail Pricing", *Journal of Farm Economics*, Vol. 44, No. 3, (May, 1962), pp. 291–306.

[17] SCITOVSKY, T., *Welfare and Competition: The Economics of a fully employed Economy*, (London: Allen and Unwin, 1964).

[18] SHEPHERD, G., *Marketing Farm Products*, 4th Edn., (Ames: Iowa State University Press, 1962).

[19] SIEGEL, S., *Nonparametric Statistics for the Behavioural Sciences*, (New York: McGraw Hill, 1956).

[20] STURGESS, I. M., "Changes in Marketing and Agricultural Adjustment", in J. P. Makeham and Bird, J. G. (eds). *Problems of Change in Australian Agriculture*, (Armidale: Department of University Extension, University of New England, 1969), pp. 63–91.

[21] TUKEY, J. W., "Comparing Individual Means in the Analysis of Variance", *Biometrics*, Volume 5, No. 1, (January, 1949), pp. 99–114.

APPENDIX A

DESCRIPTION OF SURVEY

(i) The 82 stores sampled were self-service groceries in New South Wales and Victoria.
(ii) The survey was confined to one week-end shopping period (Friday-Saturday) in May, 1966.
(iii) Recording and interviewing were done by unpaid students of the Faculty of Agricultural Economics of the University of New England.
(iv) The sample of stores was not random but determined by the home towns of the participating students and the latter's choice of stores within their towns. Hence, the sample was biased toward stores in N.S.W. and stores in rural towns.
(v) The 53 products priced in each store (Appendix B, Table 1) were mainly branded dry groceries. Commodities represented, however, account for almost half the spending on food of the standard consumer, as defined by the Commonwealth Bureau of Census and Statistics [4, pp. 31–32].
(vi) Of some products, the same brand was priced in each store; of others, the cheapest of several specified brands, arbitrarily deemed similar in quality, was priced; finally, of products where differentiation was believed weak, the lowest price irrespective of brand was taken.
(vii) Store managers were asked about the size and width of product line of the store and about services provided.

APPENDIX B

TABLE 1

Items Priced in Survey of 82 *Self Service Stores, May*, 1966

Product group	Product	Specification	Brand	Mean sample price (cents)
Starch Foods ..	Arrowroot Biscuits.	8 oz packet ..	Arnotts ..	17·2
	Cake Mix ..	Chocolate ..	White Wings, Puffin, Betty Sydney.	23·7
	Cornflakes ..	16 oz packet ..	Any	32·1
	Plain Flour ..	2 lb	Any	15·8
	Rice	Short Grain 1 lb packet.	Sunwhite ..	13·8
	Rolled Oats	2 lb packet ..	Uncle Toby's ..	36·3
	Sao Biscuits	8 oz packet ..	Arnotts ..	17·1
	Self-Raising Flour.	2 lb	Any	17·8
	Sugar.. ..	White, 4 lb ..	Any	39·3
Beverages, Spreads, Confectionery.	Chocolate ..	Plain, milk bar, "20 cent" size.	Cadbury's, Nestle's.	19·7
	Coffee ..	Instant 6 oz jar ..	Nescafe, Maxwell House.	122·6
	Cordial ..	Orange, 26 oz bottle.	Cottee's, Mynor, Kia-Ora.	31·9
	Honey ..	Clear, 2 lb jar ..	Any	48·0
	Marmalade ..	24 oz can ..	Any	29·0
	Mixed Dried Fruit.	12 oz packet ..	Any	26·7
	Tea	First Grade ½ lb packet.	Any regular ..	30·8
Dairy and Related Products.	Butter ..	1 lb packet ..	Any	50·6
	Cheese ..	½ lb packet ..	Kraft Coon ..	31·4
	Cooking Margarine.	½ lb packet ..	Marvel, Fairy, Tulip.	14·2
	Eggs ..	Large (24 oz) 1 doz in carton.	Any	66·8
	Evaporated Milk.	Unsweetened, 14½ oz can.	Carnation, Bear	17·3
	Ice Cream ..	Vanilla, ½ gal. can	Peters, Streets, Devondale.	64·0
	Powdered Milk.	Full cream, 3 lb can.	Any	127·2
	Processed Cheese.	Cheddar, ½ lb pack	Kraft	25·5
	Table Margarine.	½ lb pack	Eta, Stork, Daffodil.	19·9

TABLE 1 (continued)

Items Priced in Survey of 82 *Self Service Stores, May,* 1966

Product group	Product	Specification	Brand	Mean sample price (cents)
Canned and Bottled Produce.	Baked Beans	16 oz can ..	Any	16·7
	Corn	Sweet, whole kernel, 10 oz can.	Any	18·1
	Fruit	Peaches, Pears or Apricots, 29 oz can.	Any	30·7
	Green Peas ..	16 oz can ..	Any	21·2
	Soup	Tomato	7 brands specified.	16·9
	Tomato Sauce	10 oz bottle ..	Any	20·1
Frozen Foods ..	Chicken ..	2½ lb–3 lb.. ..	Any	56·8 (per lb)
	Fish Fingers..	10 oz packet ..	Birds Eye ..	46·7
	Peas	10 oz packet ..	Any	25·0
Canned Meat and Fish.	Baby Food ..	4 oz tin or 4½ oz jar.	Nestle's or Heinz	8·5
	Camp Pie ..	12 oz can ..	Imperial, Swift, Tom Piper.	20·1
	Salmon ..	Imported Fancy pink 8 oz can.	Any	37·6
	Tuna ..	15 oz can ..	Safcol, Greenseas.	42·9
Smallgoods ..	Bacon ..	Middle rasher, ½ lb cello. pack.	Any	46·7
	Devon ..	½ lb nob	Any	21·6
	Frankfurts ..	1 lb cello pack ..	Any	48·9
	Sausages ..	Pork, 1 lb cello pack.	Any	34·8
Fresh Produce ..	Onions ..	White, 2 lb bag ..	Any	24·3
	Potatoes ..	5 lb bag	Any	24·9
Non Foods ..	Cigarettes ..	Carton of 200 ..	Rothmans King Size Filter.	371·5
	Detergent Powder.	Economy Size ..	Fab, Omo, Surf, Ajax.	50·4
	Matches ..	1 doz boxes ..	Any	17·6
	Soap	Bath size, 1 bar ..	Lux, Palmolive	16·1
	Soap Powder	Economy Size ..	Persil, Rinso ..	44·2
	Tissues ..	Pack of 200 ..	Kleenex, Scotties	25·2
	Toilet Paper	1 Roll	Sorbent, Dawn	15·6
	Toothpaste ..	Economy size ..	Colgate ..	40·2
	Washing-up Liquid.	Standard Size ..	Lux	39·9

TABLE 2

Selection of Regression Equations for Prices of Individual Products in 82 Self Service Stores, May, 1966

Product	Inter-cept	Location	Credit	Delivery	Packing	Product line width	Number of checkouts	Floor space	Population of town	Owner-ship type	R^2
Sugar	101·023	+·009* (·004)	+·443** (·129)	−·231** (·088)	+·082 (·095)	+·025 (·020)	+·031 (·030)	−·061* (·028)	−·036 (·023)	−·337 (·111)	·39
Rolled Oats ..	99·403	−·011 (·010)	−·353 (·321)	+·231 (·220)	−·492* (·239)	+·132* (·050)	−·032 (·075)	−·110 (·070)	−·129* (·058)	+·654* (·278)	·42
Tea	86·418	+·009 (·009)	−·283 (·291)	+·436* (·199)	+·109 (·216)	+·001 (·046)	−·137* (·068)	−·024 (·064)	+·032 (·052)	+·359 (·251)	·28
Butter	99·119	−·001 (·004)	−·304* (·126)	+·161 (·086)	−·101 (·093)	+·209 (·020)	−·015 (·029)	−·040 (·027)	−·013 (·022)	+·159 (·109)	·15
Tomato Sauce ..	100·865	+·033* (·013)	−·915* (·403)	+·760* (·276)	−·842** (·299)	+·141* (·063)	−·451 (·094)	+·001 (·088)	−·058 (·072)	+·985** (·348)	·60
Frozen Peas ..	102·595	+·012 (·020)	−1·706* (·626)	+·953* (·429)	−·825 (·464)	+·295* (·098)	−·349* (·147)	−·061 (·137)	−·192 (·112)	+1·134 (·541)	·37
Baby Food ..	105·406	−·007 (·017)	+·040 (·551)	−·200 (·378)	−·170 (·409)	−·023 (·864)	−·203 (·129)	+·055 (·121)	−·135 (·099)	+·718 (·477)	·15
Bacon	95·416	+·018 (·015)	+·467 (·476)	+·176 (·326)	−·445 (·353)	−·073 (·075)	−·025 (·112)	+·097 (·104)	+·069 (·085)	−·061 (·412)	·09
Potatoes	181·762	−·075* (·031)	+·556 (·992)	−·980 (·679)	+·139 (·736)	−·057 (·155)	−·265 (·232)	+·017 (·217)	−·487** (·177)	−1·992* (·857)	·20
Detergent Powder	113·686	−·005 (·012)	−·777* (·373)	+·299 (·255)	−·553* (·277)	+·091 (·058)	−·135 (·087)	−·096 (·081)	−·046 (·067)	+·605 (·322)	·21
Cigarettes ..	95·177	+·006 (·004)	+·049 (·117)	+·143 (·080)	+·012 (·087)	+·013 (·019)	−·042 (·027)	+·012 (·025)	−·038 (·021)	−·023 (·101)	·37

Standard errors bracketed below each coefficient: single and double asterisk indicate significantly different from zero at the five and one one per cent levels respectively; for full specification of variables, see p. 169 of text.