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FROM CONSUMER CHOICE PROCESS TO AGGREGATE ANALYSIS: MARKETING INSIGHTS FOR MODELS OF MEAT DEMAND

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The presence or absence of structural change in meat demand is critical to marketing decision making. If change is present, marketing bodies need to know what underlies the change so that the most appropriate response can be identified. Marketing theory is considered as a possible source of more explicit models of demand which may lead to a better understanding of consumption patterns and structural change.

Introduction

Testing for structural change in the demand for meats has been an area of interest for the agricultural economics profession over the last decade. Considerable effort has been expended on studies which have examined the demand for meats in the United States, Canada and Australia. Analysts have chosen different data, model specifications, restrictions to be imposed and statistical tests. Although consumption patterns are similar across countries, in that consumers are eating more white meat such as chicken and less red meat such as beef, there is little consensus as to what has caused these changes and whether structural change has occurred, with opinions and empirical results being mixed.

One theory is that there has been little or no structural change with changes being explained by changes in relative prices. Major technological advances in the chicken industry, largely flowing from the development of intensive production systems, have meant that the real price of chicken has fallen. In comparison, technological advances in the red meat industry have not been as great, causing chicken to become a relatively less expensive alternative. This theory implies that

The authors acknowledge the assistance of Kevin Parton, Bill Schroder, Phil Simmons, an anonymous referee, and the Editors.

preferences have remained stable. Alternatively, other theories are based upon the notion that consumers' preferences have changed. The reason for these changes is usually cited as consumers having increased dietary consciousness, with white meats being perceived to be more healthy than red meats. Another is that changing lifestyles are causing consumers to demand more convenience or 'value-added' to be associated with food products and poultry is seen to have more value-added potential. In most instances these reasons are cited arbitrarily rather than being tested formally as the underlying causes.

The presence or absence of structural change in demand is critical to marketing decision making. If change is present, marketing bodies need to know what underlies the change so that the most appropriate response can be identified. That is, if the reason behind the changes in consumption is that tastes have changed or red meat is perceived as being unhealthy, industry needs to respond to this with resources allocated appropriately to product development and/or advertising. If structural change is not present and changes in consumption can be explained by changes in relative prices, it is important not to waste resources by reacting to shadows but for the red meat industry to devote more resources to research and development so that in the future red meat may be able to compete with the white meats on price. Getting it right and determining whether structural change has occurred and, if it has, identifying what has caused it, is pertinent for industry policies in the future. Getting it wrong could be costly.

There are some economists, and many non-economists, who have no doubt that there has been structural change, provoked by changing lifestyles and dietary concerns, although proving it has been difficult. Alternatively, there are other economists who have tested for structural change using nonparametric techniques and shown that changes in consumption can be explained by changes in prices and expenditures, concluding that preferences have remained stable (e.g. Chalfant and Alston 1988). Other formal approaches by economists using parametric techniques have resulted in mixed results, with results varying and being sensitive to choice of functional form, making it difficult for any definitive conclusions to be made about the presence or absence of structural change.

In the following sections, the current approaches to testing for structural changes and some of the inherent problems researchers encounter are discussed and then ways marketing theory may be used to improve future research are considered.

Current Approaches to Testing for Structural Change

Structural change in demand refers to changes in preferences not related to changes in product prices or incomes. Researchers who endeavour to test for the absence or presence of structural change usually rely upon parametric or nonparametric techniques. First the

former is considered. The parametric approach is the most common approach. This requires a particular functional form to be chosen for demand equations which are then estimated with tests for the stability of parameters and the statistical significance of trends used to detect the presence or absence of change. These parametric tests are conditional on the functional form which is chosen being correct, and this is problematic because the true underlying functional form is unknown.

In an attempt to minimise the confounding effect of this auxiliary hypothesis on the appropriateness of the functional form which is chosen, parametric techniques are tending to greater sophistication, from linear models and Chow tests to the adoption of flexible functional forms and the use of Andrews and Fair (1988) likelihood ratio tests (see Moschini and Meilke 1989). Flexible functional forms, it seems, are the preferred models as they are considered to do a good job of approximating the true data-generating mechanism. However, in some instances they seem to lure researchers into a false sense of security when making inferences. Alston and Chalfant (1991) point out that the existing literature on structural change in meat demand contains a variety of results with many contradictions. They found that the literature abounds with whimsical specification choices and fragile results and, in most cases, scant attention [being] paid to these issues (p. 36). Alston and Chalfant (1991) sum up the typical study as follows.

First it is noted that the specification of the functional form can influence results and, in consideration of this, a flexible functional form is used - but usually only one functional form is tried. After estimating the parameters of the system, diagnostic tests are performed. Rejection of the model is interpreted as a rejection of the stable preferences (with an appeal to demographic shifts or health concerns). It is rare for such studies to examine whether an alternative demand system would have resulted in different conclusions. (p. 36)

Strictly speaking, unless the appropriate functional form is known with certainty, residual imputation problems are inevitable. That is, the residual imputation problem is a concern when methods are used which deny the ability to distinguish the effects of mis-specification from those of structural change. The problem is simply a circularity, and resolution of the problem seems unlikely unless the circularity is breached.

Alternatively, there has been some attention given to the use of non-parametric tests that avoid choices about functional form. The nonparametric approach uses revealed preference theory to test whether consumers' behaviour is consistent with the axioms coincident with a stable set of preferences. Failure to find any violations of the axioms enables the researcher to conclude that changes in quantities consumed can be explained by changes in relative prices and expenditures. Despite the obvious advantages of this approach com-

pared to the parametric approach where a particular functional form must be specified, there are concerns with respect to the power of these nonparametric tests and whether they are capable of detecting structural change. An important observation made by Chalfant and Alston (1988) was that:

it may be the case that household production functions have shifted over time and that meat is being perceived and used differently by consumers. Yet when conventional demand theory is applied to market demands, we find that we are unable to reject the stability of a set of preferences defined over market quantities of meat items (p. 407).

Such possibilities make it difficult to make definitive conclusions when no violations of the axioms are found. A better understanding of the power of the test is required if the likelihood of structural change occurring, with none of the relevant axioms being violated, is to be validly assessed. Even then, the subsequent question as to what has caused any change so detected has still to be addressed.

From the discussions above it is obvious that both the non-parametric and parametric techniques have some inherent problems. With respect to the former, there are doubts about the power of the test and its ability to detect structural change. With respect to the latter, problems arise because economic theory does not provide necessarily sufficient insights as to what variables are required to properly specify the functions to be estimated nor any insight as to what the functional form should be.

It seems that researchers are poised, in the case of the parametric techniques, to develop more flexible functional forms or even less restrictive models that minimise the importance of the auxiliary hypothesis of functional form. Such endeavours are important and critical to developing better models. In addition, however, perhaps the traditional method of estimating equations for meat demand using neoclassical demand theory needs further consideration. Its theoretical elegance notwithstanding, the coarseness of economic theory as a model of consumer behaviour may mean that it may be necessary, or at the least fruitful, to consider models in other disciplines that may enable researchers to model consumer behaviour better. One such discipline is what tends to be called in agricultural economics 'business marketing'.

It is pertinent to note that making use of models in other disciplines is likely to modify the way in which questions of interest are framed. For example, 'structural change' is a construct which may be specific to economic theory. It is necessary to be sensitive to the models within which variables sit and which may need to accompany explanatory variables acquired from other disciplines. Otherwise there is a risk that functions to be estimated will lack a coherent theoretical base and that constructs will be invalid.

Realistically, when the question of whether or not there has been structural change in meat demand is considered, it might be suggested that if lifestyle and other changes of the magnitude witnessed over the past two or three decades have not altered the demand for meat, it will probably never change. Almost all aspects of the different types of meats, including quality and the forms in which they are sold and consumed, have changed to such an extent in the past few decades that it is difficult to believe that these changes have not affected, or are unrelated to, changes in consumer preferences. The most extreme instance is probably chicken. In major consumer-relevant ways the product forms in which chicken is now sold have been elaborated considerably over the past decade or so. Also, such developments in domestic cooking technology as microwave ovens are likely to have influenced consumers' evaluations of different meats. As well, changes such as the increasing tendency of consumers to eat out, and the increased utility to them of time-saving product features (Sheth 1991; Nichols and Fox 1983), have favoured some meats more than others for reasons unrelated to prices and incomes. If the firm likelihood that preferences have changed is accepted, then the appropriateness of existing techniques and data used by researchers to test for structural change, and which have only been able to yield results that are mixed, must be queried. That is, are the techniques, models and data currently used insufficiently comprehensive and informed to identify the underlying factors and detect structural change? In the following sections, some issues are developed concerning specification in relation to demand models for meat, in an attempt to resolve the incompatible perceptions of the stability of meat demand.

Marketing Perspectives on Product Choice and Meat Demand

In marketing, a starting point for the analysis of demand, is the proposition that consumer perceptions define key demand constructs. The products, be they goods or services, that consumers purchase are chosen on the basis of characteristics consumers perceive them to have and the match between these characteristics and the characteristics consumers seek. Substitutes in consumption are defined by these perceptions.

In marketing, the most extensive operation of consumer choice processes is usually characterised as involving recognition of a need, consideration of all available information as to possible resolutions of the need, selection among the options, and action (or inaction). The process seems to be modelled most accurately as a hierarchical one where a choice set, or set of substitutes, is identified and alternatives successively eliminated from it (Johnson 1989). All feasible means of satisfying active needs are identified in the initial choice set, and selection criteria applied, successively, to arrive at final choice. In the case of many manufactured products, the final selection is between

brands of a particular product. In the case of fresh foods, the final selection is more often between different products within a product category; for example, pork versus beef within the meat category, or apples versus oranges within the fruit category. This reflects the typical absence of brands, and the product homogeneity, amongst fresh foods, and the variety in satisfaction of needs sought over the period of consumption being provided for by typical (e.g. weekly) shopping expeditions. The extent to which this choice process operates depends on a variety of factors: product importance; perceived risk of inappropriate choice; familiarity with the product; and so on. The extent of operation of the choice process is minimal when awareness of a need leads immediately to action; a situation of habitual purchase behaviour.

Substitutes, or the choice set, are identified on the basis of whether or not products are perceived to possess desired characteristics, given the needs to be satisfied (Corfman 1991; Ratneshar and Shocker 1991; Cohen and Basu 1987). This group of desired characteristics may be large initially. Selection amongst substitutes is then made on the basis of the extent to which alternatives are perceived to possess key characteristics (see Hauser (1986) for a review of relevant models). These key characteristics are defined by both the ranking of characteristics in importance by the consumer and the similarity between products in terms of characteristics. Typically, the key characteristics are few in number.

At the level of the initial identification of substitutes, considerable similarity can be expected amongst consumers in the perception of substitutes. Moving down the hierarchy of sets of substitutes, greater and greater heterogeneity emerges. This reflects the diversity of key characteristics different consumers use and the diversity in the treatment of information, among individuals and across products, in the process of selection (Bagozzi 1986). Thus foods, for example, may be evaluated with different consumers placing different emphasis on health concerns, ease of preparation, acceptability to children, their contribution to desired levels of variety over one week's consumption, and so on (see, for example, Jackson, McDaniel and Rao 1985).

In marketing, the features of products with which consumers work to make choices are not normally described as 'characteristics'. Characteristics are viewed, as by Lancaster (1966), as being physical or chemical properties. Consumers are interested in 'attributes': the utility-satisfying features of products derived from characteristics (see Bagozzi 1986). 'Key characteristics' are expressed as 'determinant attributes': attributes which are determinants of choice. Clearly, attributes are inferred by consumers and advertising is a marketing activity which is often focused on the inference process.

A potentially important implication of this model of choice behaviour is that characteristics which are the focus in economics, such as price, may not be determinants of choice among products. Marketers occasionally suggest, to the alarm and scorn of economists, that price

is not important to consumers (see Hoyer 1984). As an unqualified statement this is ludicrous, of course. However, in the context of the marketing model of consumer choice, the proposition can be presented more carefully. The role of price may be primarily to help eliminate substitutes prior to formation of the final choice set. In such circumstances substitutes are characterised as being 'within the acceptable range' of price (see Park and Smith 1989). For example, the set of substitute meats for meals at home commonly excludes lobster and may do so nowadays for this reason. Among the final choice set, price may then not be a determinant attribute because all products exceeding acceptable price have been defined out of the set. The variability of agricultural product prices at retail injects more dynamism into the situation than is true for toothpaste or beer, but it has to be appreciated that to some extent consumers anticipate this variability. Acceptable price ranges are likely to be broad relative to those for products with less variable prices (Winer 1986). (Note, though, that consumers often err in their perceptions of prices prior to shopping expeditions; see Urbany and Dickson 1991.)

Thus, price influences demand in this case by determining whether or not products enter and remain in the set of products evoked as substitutes, given recognition of the need for a given type of product. Price does not necessarily then act as a determinant attribute for choice within the final choice set. An explanation for such treatment of price by consumers lies in the basically different roles of product attributes, such as price and distribution features, which facilitate exchange and acquisition and those, such as physical and functional attributes of the product, which determine utility in consumption. The consumer's budget constraint is likely to be used to reduce the set of potential sources of consumption utility prior to detailed evaluation of those alternatives. Arguably, this is more true for what is termed in marketing 'mundane everyday consumption' (see Kleine, Schultz-Kleine and Kernan 1992) than for less routine choice and purchase activity. Products regularly acquired for mundane everyday consumption are unlikely to attract the mental effort required to jointly optimise acquisition and consumption utility.

The potentially weak role of price in determining consumer choice among substitutes raises some doubts as to the appropriateness of either a neoclassical or Lancasterian approach to the modelling of demand. Both of these approaches assume that price is persistently important in determining choice. Price is persistently relevant, but its precise role in the choice process may be such as to raise doubts about the way it is modelled in economics.

When price is not a determinant attribute, the implication for demand analysis is that estimated price and income elasticities are not informative in the way economists usually imagine. Demand responses to price changes would occur, at the level of the individual consumer, discontinuously; a stepped demand function, in effect, would apply.

To the extent that consumers face similar levels of price variability for a given product, it could be optimistic to expect aggregation to smooth this stepped function.

The situation is complicated by heterogeneity amongst buyers, most notably, in the case of demand for food, the highly probable use by institutional buyers (for prisons, hospitals, the armed forces, residential colleges, etc) of price as a determinant attribute. Nevertheless, in the context of sets of substitutes composed of different products (such as types of meat) rather than different brands, large proportions of the total number of buyers for domestic consumption can be expected to exhibit stepped demand functions where the steps relate to bounds to the range of acceptable prices. Where alternative brands of a given type of product comprise the final choice set, however, there is evidence that deviations between expected and observed price can have an impact on choice at the point of purchase (Kalwani *et al.* 1990). Choice among brands is not the focus of interest here, although the capacity for differences between expected and observed prices to draw the consumer's attention to transaction and acquisition utility (Bearden *et al.* 1992, p.629) provokes interesting questions as to the potential for similar effects related to product, rather than brand, choice in the case of fresh agricultural products. The implications for the role of price in demand analysis, though, would still appear not to favour conventional economic approaches.

Much of marketing is to do with choices among brands. It has been said that 'the whole of *marketing management* is the struggle to escape a purely competitive market situation' (Houston and Gassenheimer 1987, p. 15). This focus of marketing has two main implications here. One is to emphasise the heterogeneity of consumers and their preferences. The variety in consumer demographics, attitudes and behaviour is the basis for the identification and targeting of consumer segments by producers of differentiated products. Gaining an understanding of determinant attributes and trends in preferences is less difficult when the consumers of interest comprise a segment, a group of consumers with product-relevant similarities, than when the focus is more on aggregate consumers. The second implication is related. It is that the brand orientation in marketing has caused much consumer-oriented marketing research to be only weakly relevant, if at all, to marketing issues as they relate to the marketing of commodities. There may be fewer insights relating to the analysis of commodity demand than might be indicated by superficial scanning of marketing literature.

It is clear, however, that structural changes in demand, as defined, may derive from anything, apart from price and income, that influences the consumer-perceived match between product attributes and consumer preferences. Given the above discussion of the possible role of price in consumer decision making, the definition of structural change is problematical and, given that it is consumers who define substitutes, the assumption of stable product form, implicit in economic analysis,

is also problematical. As well, the nature of the cause(s) of structural change is as important to know as the existence of the change. Marketing responses can range from the adroit use of promotion to modify perceptions of the product to the commencement of production of an entirely different type of product. Which response is most appropriate depends on the factors causing structural change.

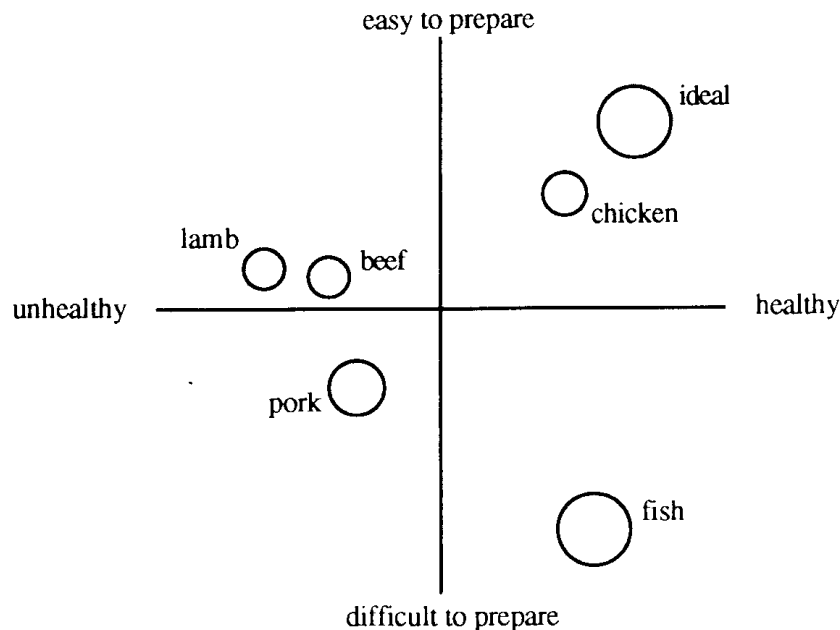
From a marketing perspective, structural change is an arcane concept. This is because structural change is a residual of price and income change effects in a context where marketing analysts work with much more detailed models of demand and models which do not, *a priori*, accord any special status to prices and income. While there appears to have been no formal reflection on the possibility that instances of structural change may be ephemeral, the rhetoric of published work in the area indicates that secular change is of most frequent interest. Leaving aside the question of the role of prices, the marketing interpretation of the question as to the existence of enduring structural change would be that it involves the analysis of the match, over time, of preferences and products. This may change as a result of changes to preferences (for attributes), changes in the attributes of a product, changes in the attributes of substitutes, or changes in consumer perceptions of products. Potentially, any of these may be of a short- or long-run nature. Changes in price and income effects, likewise, may be of a short- or long-run nature, particularly if they occur in the context of changes in other determinants of the match.

In this context, the magnitude of the task to identify the presence, and source, of enduring structural change can be appreciated. A technique useful for summarising the notion of matches between preferences and products is perceptual mapping. Perceptual mapping is a means of identifying: determinant attributes applied by a market segment to a set of substitutes; the mix of determinant attributes possessed by the ideal product; and the location in determinant attribute space of substitutes within the product class. Perceptual maps are constructed, using non-parametric techniques, on the basis of consumer survey data. For simplicity, perceptual mapping is discussed in terms of two dimensions. These dimensions are determinant attributes. In the space defined by these axes the mix of determinant attributes perceived to be possessed by substitutes and by the ideal product allows the placement of these products. The perceived mixes will differ somewhat amongst consumers defined to comprise a segment and this leads to products being represented as circles rather than points. The size of each circle indicates the diversity of perception within the segment.

In Figure 1 a hypothetical perceptual map is presented. The focus is on perceptions of meat and determinant attributes of 'healthiness' and 'ease of preparation in the home' have been assumed. On this perceptual map fish, chicken, pork, beef, lamb, and an ideal product have been arbitrarily located for purposes of illustration. (It should not be presumed, though, that consumers necessarily use any notion of

'ideal product' explicitly in decision making). The marketing notion of 'position' is best described with reference to perceptual maps. 'Position' refers to the location of a product, or brand, in determinant attribute space, as perceived by consumers.

FIGURE 1
A Hypothetical Perceptual Map for Meats



Perceptual maps provide a useful framework within which to consider marketing activity such as advertising and product development. Advertising can be characterised as an attempt to change the position of a product with respect to substitutes or the ideal product by the promulgation of information. This may involve information about the product, the substitutes, the ideal product (that is, consumers' perceptions of their needs) or some mix of these. Similarly, product development, or 'value-adding', is an attempt to change the position of a product. Marketing activity may, of course, have a more fundamental objective: inducing consumers to include a product in the final choice set where currently they tend not to. That is, marketing activity may be undertaken in an attempt to have some consumers add a product to their perceptual map.

Consumers differ in their needs and this can lead to different consumers having different 'ideal products' within a given determinant attribute space, or to working with different sets of determinant attributes altogether, for a given set of substitutes. This is the basis of the notion of 'market segments'. In what follows preferences are

discussed initially as though all consumers of meat comprise one segment which is homogeneous in terms of perceptions and preferences.

Verma (1980), as discussed in Berndt (1991), argues that households can be viewed as combining the inputs of time, information, and market goods, subject to constraints provided by a household production function, to produce unobserved, latent commodities that ultimately create value or utility (p. 372). 'Value-adding' involves the incorporation of characteristics in market goods which improve the contribution of utility by those goods to the 'latent commodities' or which move the production frontier further from the origin. Preferences for meats, as market goods, can be expected to change as the utility function or production function changes.

As inputs to meals, foodstuffs encounter demand derived from a perceptual map for meals which has determinant attributes linked to Verma's 'latent commodities'. Sets of substitute foods will be defined by their role, given meal preparation technology, in different types of meals. If meals to be eaten away from home are sought, lamb is not in the set of substitutes. If concern for healthy lifestyle is an attribute driving meal preference, all meats may be dominated by non-meat substitutes.

Anderson and Shugan (1991) report that in the U.S.A., sales of both beef and poultry are increasing at the medium and high levels of convenience and that both categories are experiencing decreasing sales in their low-convenience form (p. 227). Furthermore, they were able to show that poultry is changing in the mix of products sold faster than beef, and offering an increasingly greater proportion of convenient product forms (p. 288). In relation to quality judgements and costs of re-positioning they concluded that it was less costly to re-position the poultry product because poultry adapts better to high-convenience forms and retains its flavour when micro-waved or frozen, whereas beef has quality problems (p. 230). These findings indicate that convenience in domestic meal preparation is a determinant attribute for meats for major market segments in the U.S.A. and that 'position' with respect to perceived convenience is causing the substitution of chicken for beef in the U.S. diet.

These findings by Anderson and Shugan (1991) have some important implications for further formal testing for structural change in meat demand. The findings indicate that there has been a definite structural change in meat demand in the U.S.A. This structural change was found to be caused by consumers' increased demand for the attribute of 'convenience' rather than the more commonly cited alternative of chicken appealing to 'increasing health consciousness'. Importantly, this finding raises the question as to why an explanatory variable that reflects convenience is not included in demand equations if convenience or the amount of value added is such an important attribute being demanded by consumers. As well, the findings indicate the confounding effect that aggregation of cuts of meat could have for

research in this area. For example, Anderson and Shugan (1991) found that the prices of high-convenience forms of beef and poultry are not significantly different statistically, and that sales of low-convenience forms of poultry are falling.

When considering changes in demand for food products, it is also salient to bear in mind the high frequency of food consumption, and purchase, by individual consumers. Variety in food is sought by most consumers and for most this operates as a constraint on the magnitude of changes they make to their food demand. Many consumers seem to believe that, even if consumption of red meat is not quite life-threatening, it would be prudent to consume a little less of it than older generations did. This is a convenient perception because it is consistent with wishes for variety in meats, whereas total abandonment of red meat is likely to reduce variety. A wish to consume less red meat will lead to a reduction in the frequency with which it is identified as a substitute meat. Or, to put this another way, the need for meat for home consumption, say, becomes qualified by a need for variety on the one hand, and a need to feel that one is consuming responsibly from a health perspective. Variety-seeking behaviour has received attention, mainly at the brand level, in marketing (see, e.g., McAlister and Pessemier 1982, Givon 1985 and Feinberg, Kahn and McAlister 1992). An interesting analysis, in a Lancastrian framework, of the role of variety-seeking in vegetable demand is that of Wierenga (1984).

Overall, models and findings in marketing seem to indicate that, in seeking to assess the impact of changing preferences on demand, it is necessary first to identify the attributes that consumers are using as criteria for making choices. This may well require sample survey research. Provided suitable aggregate data can be found, aggregate analysis can then be conducted to evaluate magnitudes of impacts. Even then, attention has to be given to the ways in which consumers deal with preferences, such as that for variety in their purchase decision making. For research where the sole interest is income and price elasticities, marketing perspectives imply that it may be necessary to account for changes in product forms in the estimation or interpretation of price and income elasticities. The match between a product's attributes and consumer preferences can change as a result of a change in attributes, preferences or both.

Can Marketing Perspectives Aid Present Methodology?

From a marketing perspective structural change, in the sense of changing matches between products and preferences, is endemic. Marketers are more concerned with how substantial the change has been, how persistent it is likely to be, what underlies it, and what (mix of) responses are most appropriate to counter its effects. In the context of the choice of the allocation of primary producer funds, collected for industry-level activity, being initially between promotion and research

and development, the question related to appropriate response(s) becomes one of whether the industry needs to adjust to changing consumer preferences, implying research and development, or only needs to communicate its offer better. Neither of these responses can substitute effectively for the other. However, both responses are likely to be appropriate at any time; only the emphasis accorded each is likely to vary in appropriateness.

The most confronting implication of marketing perspectives, it would appear, is the potential need to modify the way responses to price changes are modelled. If it is the case that meats face stepped demand curves, it is unhelpful for the isolation of the effects on demand of other factors for those curves to be modelled as smooth functions. It has to be emphasised that the way in which consumers 'use' price in their meat purchasing decision making is not known. A stepped demand function is just one, plausible model. The point is that with price, as with other variables or, more precisely, attributes, *a priori* assumptions about what influences demand, and in what way, comprise a risky starting point for analysis. There is a need to specify demand functions to be estimated with reference to prior research into consumer decision making processes.

The purpose here is not to attempt to list 'new' variables required to be included in demand equations. One set of *a priori* assumptions is no less risky than another, *a priori*. It is apparent that the marketing discipline seems to afford clear indications as to ways in which demand might be modelled more fruitfully than has been the case to date. Specifically it suggests that there may be variables other than price and incomes that may help better explain consumers' behaviour. For example, some of the marketing research referred to in this article indicates that it may be productive to include variables that measure variety-seeking and convenience in demand analyses. Other possible variables worth including may be variables that reflect the promotional effort aimed at influencing consumers' consumption patterns. Obviously, better-founded specification of models will require prior research. Not surprisingly, perhaps, this suggested approach involves a more detailed specification of sources of demand change such that the questions as to whether there has been change and, if so, the reasons for the change, are addressed simultaneously.

With this plea for more detailed specifications comes the inevitable nightmare for most researchers: data quality and availability. A major possible source of unreliability in analyses of structural change in meat demand is the fact that the data to which models are applied are of doubtful adequacy. Also, proper doubt must be held about the extent to which aggregate data smother or distort significant changes in demand which occur amongst only some groups of consumers. And, how often variables are omitted as 'irrelevant' because, in fact, the data just do not exist? The thrust of the issues considered above relate to specification of models for estimation of demand, but if it is the case

that necessary data are poor or do not exist, then progress in demand estimation will be seriously undermined. Contemplation of the possible contributions to aggregate analysis to be gleaned from marketing make more apparent something that has probably been true for a while: the constraints on research productivity imposed by theoretical and methodological shortcomings are trivial compared to those imposed by data availability and quality. The benefits to better data collection can be seen to attach principally to the producers whose industry taxes are being allocated to research and development or product promotion on the basis of the analysis of the data.

Conclusions

Concerns have been discussed about whether existing techniques, models and data currently used are sufficiently rich to identify the underlying factors causing the changing meat consumption patterns and answering the question of whether there has in fact been structural change. Marketing theory was considered as a source of useful insights. The major implication of marketing perspectives on demand is that *a priori* assessment of choice criteria, and the way they are applied to choice problems, is unjustified in the context of the complexity and heterogeneity of consumer decision making. Aggregation is extremely unlikely to allow this implication to be dispensed with. It is apparent that non-price variables potentially are significant influences on meat demand and that the role of price as an influence may be mis-stated and overstated by casual assumption about the role it plays.

Agricultural economists may want to begin to use the insights extant in the marketing literature to further improve models currently used in analyses of meat demand. Generally, this will involve the incorporation in demand equations of variables which measure those product attributes and consumer characteristics which jointly influence the demand for products (e.g., variety, convenience, promotion) and which are not generally considered in the Marshallian demand function.

Identifying these other possible additional variables which are required to properly specify the demand equations, combined with further work in developing less restrictive and possibly even more flexible models that minimise reliance on the auxiliary hypothesis of functional form, seems to offer the greatest promise. This is not to say that all further work should immediately, in an *ad hoc* way, incorporate additional explanatory variables. Developing more explicit models is bound to be a difficult endeavour relying crucially on new and better data. In particular, collecting time series data that measure non-economic variables (that is, variables other than prices and incomes) is not a simple task and is likely to be expensive in terms of resources and time. However, such endeavours may further develop present thinking and lead to a better understanding of changing consumption patterns and the underlying forces, thereby enabling appropriate industry responses to be undertaken.

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