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Quality Effects in Consumer Behaviour

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A theory of consumer behaviour is proposed which differs from the conventional approach. Flexible prices are introduced for goods as a measure of quality. Empirical results are presented which provide insight into the effect of income, household size, and price level on the demand for quality. Some proposals are offered on the use of quality effects in policy formulation.

I. INTRODUCTION

The problem of quality effects on consumer behaviour is considered in a model for demand which is somewhat different from traditional approaches. Some empirical results on food consumption patterns indicate that as income rises in most instances people spend a portion of the increase on larger quantities but much of the increase goes on higher-priced varieties. The implications of these phenomena are discussed for programmes aimed at improvement in nutritional status.

II. CONSUMER BEHAVIOUR

The conventional theory of consumer behaviour is often based on assuming (or deriving from a set of assumptions) that individual consumers have a utility function $U(x)$, $U_i > 0$ with appropriate second-order conditions so that one may solve the problem

$$\begin{aligned} &\text{Max } U(x) \\ &x \geqslant 0 \qquad \ldots \qquad \ldots \quad (1) \\ &\text{s.t. } p'x \leqslant Y \end{aligned}$$

where x is the bundle of goods at prices p and Y is income. One of the difficulties with this type of formulation is that it is extremely difficult to incorporate many

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empirically observed phenomena. Among these are the theory of conspicuous consumption as expounded by Thorstein Veblen, or by John Rae at an even earlier date.[1]

Veblenite prophecies of the triumph of technocracy may not yet be fulfilled but there is considerable evidence that tastes and consumer demand are to some degree conditioned by such things as advertising and a 'keeping up with the Joneses' syndrome. In many underdeveloped countries the demonstration effect referred to by Ragnar Nurkse is self-evident. One often observes the consumption of imported varieties of many goods because of some loosely defined snob appeal. In some developing regions of the world certain beverages are available when even a local water supply is lacking.

The present work is motivated by a study of food-consumption patterns in Pakistan. The empirical work is largely based on the household surveys conducted by the Government of that country for the period 1968-1972. In particular, these surveys give the quantity and expenditure for various foods by different income groups. Information is also available on total expenditure, household size, and urban-rural status. For a particular food, say wheat, the ratio of expenditure to the quantity purchased by an average household in any one income group gives an imputed price. However, this price varies by as much as a factor of two or three across groups for many food items. The reason for this variation may be considered a generalized quality effect. A naive analysis of the data would show price as an *increasing* function of the quantity demanded, quite contrary to what traditional economic theory would suggest.

III. PRICE VARIATIONS

There are many factors which account for price variations. It is convenient to consider two points of view. The first is to account for these different prices of the "same" intrinsic food, and, secondly, to develop an hypothesis for some households' willingness to pay these higher prices. There are, typically, aggregation problems. Thus Food Group 1 includes wheat and wheat flour. One would expect the consumption of higher income groups to be biased towards a higher proportion of flour and consequently a higher price. Secondly, there is a multi-dimensional generalized quality of the commodity. For example many varieties of rice or meat cuts are consumed, and, again, one would expect the consumption of higher-priced varieties to rise with income. The third is the ratio of home purchases to cash purchases. This, in turn, reflects the additional costs of packaging and service ranging from the individual attention of small shops to the less convenient but cheaper service at outlets which specialize in bulk sales. The fourth is the question of

[1] See Veblen [20], Rae [18] or Liebenstein's [12] discussion of a number of these phenomena.

regional and seasonal variations. In urban areas one tends to have more ration shops per capita but also a greater variety: the former would offer lower price opportunities for necessities while the latter would admit a wider range of prices. Seasonal variations are most pronounced where storage and transport facilities are least developed. Finally, there are the problems of price discrimination sometimes arising from discriminating monopolistic behaviour but often being rooted in social status.

The imputed price, p, for any food group, i, may be viewed as a function of an intrinsic price, p_i^*, and generalized-quality traits of that food group q_{il}, where $i = 1, \ldots n$,

$$p_i = \pi (p_i^*; q_{i1}, q_{i2}, \ldots, q_{in}) \qquad (2)$$

A variation in the imputed price, p_i, reflects the net effects of changes in the intrinsic price and in the quality measures. As economies develop, it is observed that the non-primary component of consumption expenditures, particularly for food, tends to increase. This means that the part largely received by agriculture tends to decrease Kuznets [11] has recorded the phenomenon with some detail for Sweden.[2]

In this study, a somewhat simplified view is taken, namely that relative price is a measure of the quality of a food.

$$p_i = p_i^* \, q_i \qquad (3)$$

where p_i is the imputed price, p_i^* is price paid by the lowest income group and q_i is the associated quality.

To model some of these phenomena, one would like to include quality effects in the utility function. Houthakker [8] drew attention to the possible bias caused by using only one representative price for each commodity. By extending the classical problem to include quality effects he proposed the maximum problem

$$\text{if} \quad \begin{array}{l} u (x_1, \ldots, x_n, \nu_1, \ldots, \nu_n) \max \\ \sum_{i=1}^{n} x_i (a_i + b_i \nu_i) = M \end{array} \qquad (4)$$

where he called constants a_i and b_i the quantity price and quality price respectively. Within this framework, he deduced many rather interesting properties which result when both quality and quantity effects are considered. The non-convexity of the

[2] Kuznets [11] analyzed the PTD component (processing, transportation and distribution) for food expenditures in Sweden and the United States. For Sweden, PTD as a fraction of food expenditure went from .36 (1891-1900) to .47 (1921-1930) while for the United States it went from .32 (1909) to .56 (1949-1957).

constraint does impose some difficulties which does not appear to have been considered in his analysis. There have been some attempts at estimating quality effects: see, for instance, Griliches [7], for in general it has proved rather difficult.

Interpersonal effects would suggest including purchases of others in each person's utility function. Thus the price (or relative price) one pays might of itself have some utility.[3] The inclusion of a price in the utility function leads to some technical problems.[4] Kalman introduced a price in his utility function formulation and established some theories to extend the traditional theory. In a more recent paper, Chichilnisky and Kalman [2] study the "local" properties of equilibria – without the convexity assumptions – for "less neoclassical" agents.

IV. THE MODEL

The approach proposed here seeks to resolve some of these difficulties by considering consumer behaviour to be essentially a two-step process. For each good there is a base price, p_i^*.[5] The consumer can actually pay a price, p_i, which in general will be different from p_i^*. This difference reflects the various quality, PTD (Processing, Transportation and Distribution), or snob values mentioned earlier. For convenience, here it is termed the non-primary content ratio or quality $q = \frac{p_i}{p_i^*}$.

Thus for *each good* i (i = 1, . . . n), consumer's expenditure is allocated to yield maximum satisfaction or utility by an appropriate quantity-quality mix.

[3] One might also consider the Pigou effect or, indeed, any one of the consumption functions where real wealth enters as an argument, it being indicative of price parameters in the utility function. See Ando and Modigliani [1] and Pigou [16]. Gabor and Granger [6] also analyze price as an indicator of quality.

[4] Consider the problem:

$$\text{Max } U(x, p, Y)$$
$$p'x \leqslant Y$$
$$x \geqslant O_*$$
$$p \geqslant p^*$$

One loses convexity so that without imposing further unrealistic assumptions one cannot obtain a solution.

[5] The base price actually chosen in this model is p_i^* where p_i^* is the price paid by the lowest income group. Without loss of Generality, one could also choose some other basis for p_i^*. The consumer is, however, aware of the general price level for each good.

In the second stage (not necessarily time-phased), a consumer allocates expenditure between goods so as to maximize his overall utility:

$$\text{Max } U\left(f^1\left(x_1, \frac{p_1}{p_1^*}\right), f^2\left(x_2, \frac{p_2}{p_2^*}\right), \ldots, f^n\left(x_n, \frac{p_n}{p_n^*}\right)\right)$$
$$x_i > 0 \qquad (5)$$
$$p_i \geqslant p_i^*$$
$$\Sigma\, x_i p_i = Y$$

The constraint is not convex but one can obtain a solution if the f^i are sufficiently convex. One may formalize this concept of sufficient convexity by defining a Lagrangian L where

$$L = U + \lambda\,(Y - \Sigma\, x_i\, p_i')$$

where

$$p_i = \frac{p_i}{p_i^*}$$

Let $z = (x, p)$
and $g(z) = Y - \Sigma\, x_i\, p_i'$

Sufficient conditions of optimality are given by

$$< \bar{z},\ (L_{zz}(\lambda, \hat{z}) - p g_z'(\hat{z}) > < g_z(\hat{z}))\,\bar{z} > < 0 \quad \forall \bar{z} \neq 0$$

where

$$\left\{ \begin{matrix} L_{xx} & L_{px} \\ L_{xp} & L_{pp} \end{matrix} \right\} = L_{zz}$$

$$p > 0$$

and $> <$ denotes outer product.

This is essentially a technique for augmenting the Lagrangian to ensure a local optimum. For some choice of functional forms, one can also have a global solution. Further details are given by Wierzbicki [22].

One indicative solution may be obtained by considering the class

$$f^i\left(x_i, \frac{p_i}{p_i^*}\right) = \mu_i (\log x_i)^{\alpha i} \log\left(\frac{p_i}{p_i x}\right)^{\beta i}, i = 1, \ldots, n \quad \ldots (6)$$

where $\alpha_i + \beta_i \geqslant 0$.

One may then view the sub-problems as concave programming problems in $\log x_i - \log \frac{p_i}{p_i^*}$ space.

So, for each good one obtains[6]

$$x_i = r(k_i, p_i^*) \qquad i = 1, \ldots, n \quad \ldots \quad \ldots \quad \ldots (7)$$

$$p_i = s(k_i, p_i^*)$$

where $k_i = p_i x_i$ and it is assumed that U is concave in $f^i(\,)$.

If one defines a Lagrangian,

$$L = U + \lambda (Y - \Sigma k_i) \quad \ldots \quad \ldots \quad \ldots (8)$$

The first-order condition for a constrained maximum is

$$\frac{\delta L}{\delta k_i} = 0 \qquad i = 1, \ldots, n$$

$$\ldots \quad \ldots \quad \ldots (9)$$

The second-order condition is that d^2L be negative definite subject to the constraint

$$\Sigma dk_i = 0 \quad \ldots \quad \ldots \quad \ldots (10)$$

The system (9) can be solved for k_i if the conditions of the implicit function theorem are satisfied. From 9 one obtains n + 1 equations

$$g^i(z_1, \ldots, z_{n+2}) = 0 \quad i = 1, \ldots, n+1 \quad \ldots \quad \ldots (11)$$

where the n+2 arguments are (k; Y, λ).

[6]For instance, sufficient second-order conditions are $0 \leqslant \alpha_i \leqslant 1, 0 \leqslant \beta_i \leqslant 1, \mu_i \geqslant 0$.

Equation 11 can be solved for k_i in terms of Y if g^i and $\frac{\delta g^i}{\delta z_j}$ are continuous and the Jacobian, J, is non-zero, in the neighbourhood of $\bar{k}, \bar{Y}, \bar{\lambda}$.

$$J = \begin{Bmatrix} g_1^1 & g_2^1 & \cdots & g_{n+1}^1 \\ & & & \\ g_1^{n+1} & & \cdots & g_{n+1}^{n+1} \end{Bmatrix} = 0 \ldots \quad \ldots (12)$$

where g^i_j is $\frac{\delta g^i}{\delta z_j}$.

Hence, one obtains a solution of the form

$$k_i = h^i(Y) \qquad i = 1, \ldots, n \quad \ldots \quad \ldots (13)$$

Combining equations 7 and 13, one obtains

$$x_i = d^i(Y, p_i^*) \quad \ldots \quad \ldots (14)$$

$$i = 1, \ldots, n$$

$$q_i = w^i(Y, p_i^*)$$

where $q_i = \frac{p_i}{p_i^*}$. These equations may be interpreted as follows. A typical consumer consumes a quantity, x_i, of good i with corresponding quality, q_i, when he has income Y and is faced by a general price level, p_i^*, for that good. The development of this model is of course premised on a number of assumptions. The assumption of a non-zero Jacobian implies linear independence among the columns. Economically, this is likely to be satisfied if the choice of goods, x_i, and the corresponding f^i correspond to distinct categories. Thus the methodology would be least applicable to goods which are close substitutes. In particular, the assumption of an "average" utility function is open to question. A practical solution requires some balance between a theory, based on highly stylized assumptions, and reality. The choice of an appropriate functional form for d, ( ) has been discussed at length in the literature Houthakker [9], Prais and Houthakker [17], and Phlips [15] and is typically limited to the linear, semi-logarithmic and double-logarithmic functions.

The actual equations estimated for x_i and q_i are adapted to try and reflect some of the individual differences between consumers.[7] The model is given by

$$\log x_i = \alpha_{0i} + \alpha_{1i} \log E + \alpha_{2i} \log H + \alpha_{3i} D + \alpha_{4i} J + \alpha_{5i} \log p_i^* + \in_i$$

$$i = 1, \ldots, n \quad \ldots \quad \ldots (15)$$

$$\log q_i = \beta_{0i} + \beta_{1i} \log E + \beta_{2i} \log H + \beta_{3i} D + \beta_{4i} J + \beta_{5i} \log p_i^* + \in_i$$

where x_i is quantity of good i consumed, E is per capita expenditure, H is household size, p_i^* is price paid for good i by the lowest income group, D is a dummy variable for urban (1) or rural (0) status, J gives job status, (1 for self-employed, otherwise 0) and q_i is the quality of good i.

V. DISCUSSION OF EMPIRICAL RESULTS

The model given in equation 15 was first estimated for all income groups aggregated. A slightly modified[8] version was used for low, medium and high income groups and finally for urban and rural populations separately. The separate income group regressions suffer from a lack of sufficient observations; so the standard errors in many instances are perhaps on the high side. In interpreting the results one must also be mindful of the fact that Pakistan is a developing country so that the markets and degree of participation, particularly in rural areas, are far from perfect.[9]

The food groupings, F_i, $i = 1, \ldots, 11$ are chosen because these are the foods which dominate the Pakistan diet for protein-calorie intake. One must make the usual compromise between too much detail and overpowering volumes of data on the one hand and highly aggregated but less informative grouping on the other. The grouping chosen follows fairly closely that used by the Government of Pakistan in carrying out its household survey.

One can obtain an overall view of the situation from Tables 1 and 2. Here one notices that the expenditure elasticities for most foods are positive, which is not really too surprising. However, on examining Table 2 one finds a less obvious outcome; that as expenditure rises, in many instances consumers are willing to pay more for the same quantity. What this says is that as income and, hence, expenditure rise, households tend to buy higher-priced varieties. The implication of this phenomenon is that if one is interested in improving nutritional intake as measured by food

[7] See Taylor and Weiserbs [19] for a discussion of theoretically plausible dynamic demand functions.

[8] The modification for separate income groups was to omit the J variable to try and increase the statistical stability of the estimates where the dearth of data created some difficulty while for the urban and rural regressions the dummy variable D was, of course, omitted.

[9] For a discussion of these and other imperfections see Eckaus [4].

Table 1

Determinants of Consumption of Various Food Groups by All Income Groups: Quantity

Constant Variables	Food Groups											
	wheat F1	rice F2	pulses F3	milk F4	butter F5	ghee F6	v. ghee F7	mutton F8	beef F9	vegetable F10	sugar F11
C											
Constant	3.2	− .57	− .17	1.5	1.3	2.0	− 2.5	.89	− .86	1.10	1.96
	(.35)	(.55)	(.28)	(.59)	(2.3)	(.66)	(2.7)	(1.3)	(.57)	(.23)	(.31)
EL											
(Expend-iture)	.08	.29	.28	.92	1.6	1.3	− .38	2.6	.41	.38	.74
	(.08)	(.24)	(.10)	(.17)	(1.0)	(.21)	(.9)	(.47)	(.22)	(.09)	(.12)
HL											
(House-hold size)	− .12	.60	.006	.52	.05	.03	.67	.66	.26	− .05	− .26
	(.05)	(.12)	(.06)	(.11)	(.5)	(.13)	(.5)	(.26)	(.13)	(.05)	(.07)
D											
(Urban-rural status)	− .19	− .15	.009	− .17	− 2.9	− 1.2	1.2	.48	.42	− .005	− .28
	(.04)	(.05)	(.03)	(.06)	(.2)	(.08)	(.3)	(.12)	(.05)	(.027)	(.03)

Continued –

Table 1 – *Continued*

Constant Variables	Food Groups										
	wheat F1	rice F2	pulses F3	milk F4	butter F5	ghee F6	v. ghee F7	mutton F8	beef F9	vegetable F10	sugar F11
J (Job status)	.01 (.07)	.14 (.20)	.17 (.08)	.25 (.13)	– 1.1 (.9)	– .4 (.16)	.08 (.66)	.29 (.37)	.31 (.18)	.04 (.07)	– .10 (.09)
p_i^* (Base price)	.29 (.23)	– .24 (.10)	– .22 (.11)	– .67 (.27)	– .3 (.1)	– .85 (.37)	– 1.6 (2.0)	– .07 (.58)	– .44 (.21)	.3 (.15)	– .13 (.02)

Source: [14]
Note: Standard errors are given in parentheses.

Table 2

Determinants of Consumption of Various Food Groups by All Income Groups Quality

Constant Variables	Food Groups										
	wheat F1	rice F2	pulses F3	milk F4	butter F5	ghee F6	v. ghee F7	mutton F8	beef F9	vegetable F10	sugar F11
C (Constant)	– .64 (.24)	.12 (.46)	.007 (.48)	– .1 (.43)	3.0 (1.5)	2.3 (.25)	3.0 (2.6)	.84 (.42)	.05 (.37)	– .71 (.40)	.05 (.31)
EL (Expend-iture)	.10 (.06)	.25 (.16)	– .04 (.15)	.22 (.13)	.99 (.69)	.25 (.11)	.89 (.8)	.11 (.14)	.04 (.14)	.19 (.13)	.32 (.11)
HL (House-hold size)	.004 (.04)	.12 (.10)	– .02 (1.0)	.01 (.08)	– .05 (.31)	– .057 (.06)	– .99 (.5)	.11 (.08)	.16 (.09)	.14 (.08)	.28 (.07)
D (Urban-rural status)	.02 (.02)	.15 (.05)	.02 (.06)	.33 (.04)	.31 (.11)	.04 (.02)	– .13 (.3)	.11 (.05)	.06 (.04)	.29 (.06)	.21 (.04)

Continued –

Table 2 – *Continued*

Constant Variables	Food Groups										
	wheat F1	rice F2	pulses F3	milk F4	butter F5	ghee F6	v. ghee F7	mutton F8	beef F9	vegetable F10	sugar F11
J (Job status)	– .02	.03	– .2	.05	.86	.11	.05	– .02	– .09	– .004	.07
	(.05)	(.12)	(.11)	(.11)	(.60)	(.09)	(.06)	(.10)	(.11)	(.1)	(.08)
p_i^* (Base price)	– .82	– .57	– .82	– .68	– .81	– 1.1	.9	– .6	– .5	– 2.0	– .97
	(.16)	(.13)	(.29)	(.18)	(.07)	(.09)	(1.9)	(.24)	(.17)	(.37)	(.02)

Source: [14].
Note: Standard errors are given in parentheses.

quantities, then one should be aware of significant "leakage" between the increase in income and the increase in nutrient intake.

The results are now discussed in more detail, first for quantity and then for quality of food.

Quantity Regressions

1. *Expenditure Effect* (EL)

As might be expected, expenditure (and hence income) is a significant determinant of the quantity of food entering the consumer's bundle. For ten of the food groups the expenditure elasticity, η_e, is positive. The exception, that for vegetable ghee (F7), is negative but not statistically significant at the 95-percent level. This may be attributed in part to severe shortages of that food. In recent years, it has been subject to strict rationing.

To appreciate some of the variation across income groups, the expenditure elasticities for two foods, wheat, F1 (a staple), and ghee, F6 (a luxury), are given in Table 3.

Table 3

Expenditure Elasticity of Demand by Income Group

Food	Income Group			
	Low	Middle	High	All Groups
Wheat	2.79	.37	– .65	.08
Ghee	3.7	3.2	3.4	1.3

2. *Household Size* (HL)

The effect of household size on the quantity consumed again follows a fairly distinct pattern (Table 1). The general tendency is for larger households to have a consumption pattern that is higher in luxury-goods content.

3. *Urban-Rural Status* (D)

The most significant differences between urban and rural household consumptions occur for butter, F5, ghee, F6, and vegetable ghee, F7; while the first two foods are consumed more by rural population than by urban population, the reverse is true for vegetable ghee. The differences may in part be attributed to marketing problems and transportation costs, as butter and ghee, obtained from livestock raised on farms, are more readily available in rural areas while vegetable ghee, a manufactured product, is more readily available in urban areas.

4. Job Status (J)

The results for job status are not particularly illuminating. The self-employed are largely farmers, particularly among low income groups. The results do not contribute much more than what might be expected for farmers. The self-employed consume more pulses, milk and beef than other products.

5. Price (p_i^*)

Nine price elasticities, η_p, were negative (Table 1) and statistically significant for luxuries, F5 and F6, and also for milk, F4, and beef, F9. In general, it is noted that the *quantity* of these goods purchased by the higher income groups is not affected negatively by price.

Quality Regressions

1. Expenditure Effect (EL)

Once more the aggregate picture is conveyed by Table 2. The expenditure elasticity of demand for quality, μ_e, is either negligible or positive. The value of μ_e is positive for the luxuries F5 and F6 and also for the sugar group, F11. This implies that as consumer's income rises there is a strong tendency not only to buy more but also to buy higher-priced varieties.

2. Household Effect (HL)

The effect of household size is rather mixed. For most food groups the household-size coefficient is positive, the exceptions being F3, F5 and F6 and vegetable ghee, F7. The last is probably due to the strong role played by the government in maintaining a uniform price. Thus one is led to believe that as household size increases members tend to alter their consumption *toward higher-priced varieties* of some foods.

3. Urban-Rural Status (D)

The results indicate what one might expect intuitively: positive coefficients for ten of the eleven food groups. One might attribute this to the more numerous varieties available in urban areas. Also, one expects a broader spectrum of P.T.D. or non-primary components in urban areas. However, advertising media such as television, which is particularly popular in Pakistan among the urban populace wealthy enough to afford it, and radio, exert their greatest efforts in urban areas.

4. Job Status (J)

Again the results are not too clear for this variable. The self-employed, again reflecting their bucolic content show preference for the dairy products F5 and F6.

5. Price (p_i^*)

The price elasticities of the demand for quality, μ_p, display an intuitively reassuring pattern. This is helped to some extent by the manner in which quality is defined. In ten instances, these are negative and statistically significant. The exception, once more is vegetable ghee due to the limited-variety availability. The price elasticities for quality do not show a uniform pattern for all foods across income groups but for a number of them one may observe that as income rises the μ_p becomes first more negative and then less so. This would indicate that as the general price for these food groups rises the *middle class tends to change more than other income groups* towards varieties at lower prices than it customarily consumes (Table 4).

Table 4

Price Elasticity for Demand for Quality *In Various Foods Across Income Groups*

Food	Income Group			
	Low	Middle	High	All Groups
Rice (F2)	− .56 (.42)	− 1.05 (.14)	− .72 (.46)	− .57 (.13)
Beef (F9)	− .68 (.18)	− 1.3 (.1)	− .9 (.8)	− .68 (.18)

CONCLUSIONS AND POSSIBLE STRATEGIES

The primary conclusion of this analysis of the demand for food is that quality matters. Failure to consider the policy effects will tend to give lower values for price elasticities as quality changes tend to absorb part of the response to prices. Not only should one analyze the quantity of various foods which enter a consumer's bundle but also the quality combination chosen. The general pattern that emerges is as follows:

(i) As income increases, people consume more but much of the increase goes to buying higher-priced varieties.

(ii) As household size increases consumption of higher-priced varieties increases.

(iii) Urban dwellers are more prone to purchase higher-priced varieties.

(iv) As price levels rise, the quantity consumed falls, but an even stronger effect is the degree to which people switch to lower-priced varieties.

The issue then arises of what policy implications are suggested. At one extreme (very extreme), a nutritionally aware benevolent dictator looking at these results could conclude that a significant improvement in nutritional status may be achieved by using the country's resources for providing only the lower-priced varieties. In many centrally-planned economies,[10] the government limits the available range of qualities of various foods to ensure that the broad mass of the population is first adequately nourished before catering to those tastes which may involve a mis-allocation of resources.

Where funds are not readily available to supplement incomes or to improve food intake (to avoid leakage effect as indicated by positive quality-expenditure elasticities), a government should consider programmes to modify tastes. In most of the mixed economies this could best be done by tax incentives related to nutrient content. This could be done by an *ad valorem* progressive tax which is zero for the low-cost varieties. The rate would vary according to the quality elasticity.

An alternative is to apply some form of price controls to the lower qualities. This has the advantage that much of the cost of such a programme may be defrayed by permitting price increase for higher qualities, provided the spread is not too great. Some estimates of the costs of such programmes for foodstuffs in Pakistan are given by McCarthy [13].

Modifying of tastes does seem to offer some opportunity to policy makers for improving nutritional status in countries with limited resources. The problem is, of course, an extremely difficult one. Some strong centrally-controlled governments have had some success but in a mixed economy a realistic programme should probably rely more heavily on a suitably-designed tax incentives in trying to change deeply-imbedded traditions. The approach advocated here might be fruitful in that one is not trying to introduce radical taste changes from one food to another but rather changes "within foods" from one variety to another.

[10] For an interesting report of how some of these issues were addressed by one centrally-planned economy, see Wray [21].

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