# The New Household Economics, General X-Efficiency Theory, and Developing Countries

*by Jeffrey James**

*Economics has traditionally been concerned with efficiency in production rather than consumption. There is a vast literature on the former, almost none on the latter. Yet common observation suggests consumer choice can be a significant source of welfare loss. This paper, accordingly, attempts to provide a framework in which problems of consumption efficiency can be analysed. This is accomplished by regarding the household as a unit which produces characteristics from purchased inputs and labour-time and in which X-inefficiencies similar to those which arise in the firm are frequently encountered. Some, but not all forms of X-inefficiency are shown to be more pronounced in developing as compared to developed countries.*

The notion that consumers are inefficient is hardly new. As long ago as 1912, Wesley C. Mitchell deplored the backward state of the art of spending money, pointing to 'ignorance of qualities, uncertainty of taste, lack of accounting, carelessness about prices' [*Mitchell, 1912: 269*]. Writing in 1947 Margaret Reid was no less critical. 'That consumers in their market selection are inefficient cannot be denied', she wrote. 'Many are very poorly informed, are uncertain in their market selection, credulous and easily influenced, very susceptible to flattery' [*Reid, 1947: 87*].

However obvious consumption efficiency may have seemed to these and other observers, it has nevertheless been almost totally ignored by microeconomic theory. There is a vast literature on production efficiency, almost none on consumption efficiency. A significant reason for this neglect lies in the nature of the traditional theory of consumer demand. Utility in this theory is a function of goods consumed, while the consumer operates within constraints set by his income and prices. In the revealed preference variant of the model, the consumer is said to express his preference between different goods through his choice behaviour in the market place. According to Scitovsky it is assumed that:

> whatever he [the consumer] does must be the best thing for him to do, given his tastes, market opportunities and circumstances, since otherwise he would not have done it. The great advantage of such an approach is that it enables economists to look upon the consumer's

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> actual behaviour as a faithful reflection of his preferences and, conversely, to regard his preferences as revealed by his behaviour [*Scitovsky, 1976: xi*].

Sub-optimal choices are, therefore, ruled out by definition. The only way in which a consumer can make the 'wrong' decision according to traditional theory is as a result of misinformation about relative prices. But the theory is incapable of dealing with misinformation about any other aspects of goods which, collectively, define their 'quality'.

The 'new' theory of demand, normally associated mainly with Lancaster and Becker – which treats products as bundles of characteristics – lends itself far more readily to dealing with this question and thereby provides the basis for a much more adequate analysis of consumption efficiency. In fact, by viewing the consumer as 'producing' characteristics from purchased inputs and labour time, a direct link with the theory of production is established.

Becker's concern is with the role of time in the household production process. In his model, 'households produce commodities by combining inputs of goods and time according to the cost-minimisation rules of the traditional theory of the firm' [*Becker, 1965: 516*]. The model is applied to the analysis of a variety of actual situations. For example, an increase in the value of a mother's time may lead her to enter the labour force and spend less time cooking by using pre-cooked foods, while it is the relatively high value of time in the United States that is said to account for the time-saving methods of household production that are normally found there. Becker's approach does not, however, take up the question of efficiency in household production; this question, in contrast, is central to Lancaster's exposition.

But because the Lancaster model of the household as producer contains a highly oversimplified and unrealistic view of the consumption process, it throws only a limited amount of light on the nature and scope of consumption efficiency. In particular, the household as producer (as in Becker's model) is assumed to behave according to the simplest neo-classical theory of the firm. And just as the traditional theory of the firm fails to explain what Leibenstein has called X-inefficiency in production, [*Leibenstein, 1980*] so too does the Lancaster model fail to capture the most important aspects of what may be termed X-inefficiency in consumption.

This paper, accordingly, seeks to show how the theory of X-efficiency that has been developed almost exclusively in relation to the firm may also be applied to the household. By effecting a marriage between the characteristics approach to demand theory and general X-efficiency theory, the paper will be concerned with a 'micro-micro' approach to the household, that is, one in which the individual rather than the household is the basic unit of study.

In the first section the Lancaster model and its weaknesses are discussed. Then, following a brief account of general X-efficiency theory, the sources of inefficiency in production of characteristics within the household are described. Particular attention is paid to the question of whether and how inefficiency may be expected to differ between rich and poor countries (where, given very low incomes, any inefficiency losses tend naturally to be

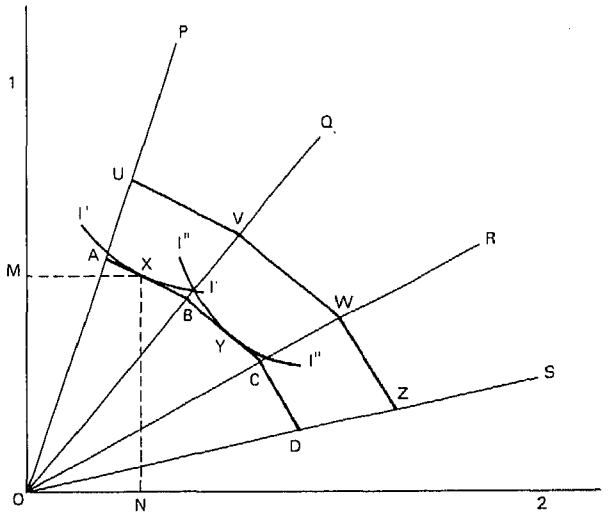
more serious). The final section of the paper discusses some policy implications of the analysis, especially as they relate to developing countries.

## I. THE LANCASTER MODEL

Lancaster's approach, as it is propounded in two papers in 1966 and a book published in 1971 [*Lancaster, 1966a, 1966b, 1971*], and as it differs from Becker's model, is based on the assumption that the characteristics that are relevant for consumer behaviour are objective, measurable and identical for all consumers [*Ironmonger, 1975*]. The aim of this assumption is to separate the demand for goods into two quite distinct components, namely, 'the relationship between things and their characteristics (objective and technical) and the relationship between characteristics and people (personal involving individual preferences)' [*Lancaster, 1971: 7*].

The decomposition of demand proposed by Lancaster can be illustrated as in Figure 1 (which is based on the assumption of four perfectly divisible goods).

FIGURE 1
CONSUMPTION EFFICIENCY



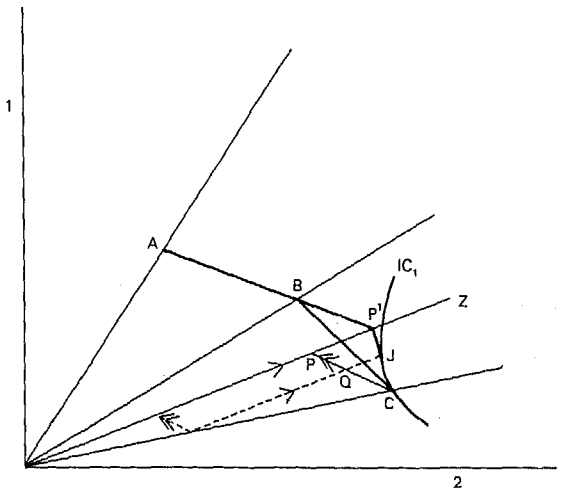

These four goods are represented by the rays, P, Q, R and S. Each good contains the two characteristics 1 and 2 in different proportions and the price of each good determines the distance along each ray for a given budget. If the entire budget were to be spent on good P, for example, OA is the furthest distance which can be attained along this ray. Points B, C, and D are determined analogously. ABCD thus comprises the 'efficiency frontier' in the sense that any point within it represents inefficient expenditure, that is, more of both characteristics could be attained for the same outlay. It

depends entirely on the relationship between goods and characteristics which Lancaster terms the 'consumption technology'. (The shape of the efficiency frontier is invariant to changes in income – UVWZ, for example, is a scalar enlargement of ABCD).

What the Lancaster model thus envisages is a separation of the demand for goods into two quite distinct parts. The first, summarised as the 'consumption technology' is 'objective and technical'. Individual preferences or utility functions (the second part), are required only to establish which of the efficient positions will be chosen. In Figure 1, for example, the individual with the preference function represented by I'I' will choose point X and the individual represented by the indifference curve I"I" will find his optimal combination of goods at point Y. At point X, OM units of characteristic 1 and ON units of characteristic 2 are consumed.

One obvious source of inefficient consumption, noted by Lancaster, is imperfect information about the extent to which characteristics are embodied in competing goods. It may be the case, for example, that advertising leads to the consumption of goods which do not form part of the efficiency frontier. Figure 2 illustrates one such case [*James, 1983*]. The figure shows a situation of four goods and two characteristics. ABC is the initial efficiency frontier. Commodity Z is inefficient and does not form part of the efficiency frontier. (If the entire budget were spent on it, point P, which is inside the frontier, would be attained.)

FIGURE 2
THE EFFECT OF ADVERTISING ON CONSUMPTION EFFICIENCY




It is now assumed that as a result of advertising the consumer overestimates the extent to which good Z possesses both characteristics. Specifically, he imagines that instead of reaching only point P, he could actually reach $P^1$ by spending his entire budget on good Z. The 'notional' efficiency frontier

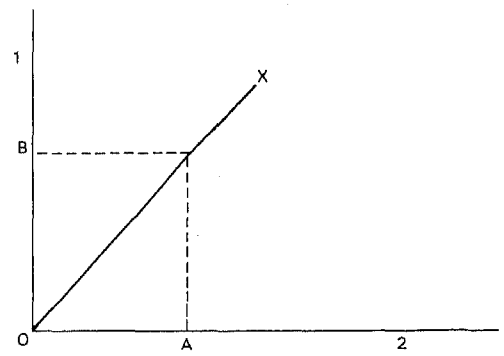
thus becomes $ABP^1C$. Next, assume that point J is chosen along this frontier. In fact, this means that the consumer is at point Q on the (now) relevant part of the efficiency frontier PC. This means that advertising has resulted in consumption inefficiency – for the same outlay the consumer could attain more of both characteristics, that is, he could move on to the original efficiency frontier ABC.

For this and other reasons that lead to imperfect information, the consumer spends more than is necessary on desired characteristics, that is, those that yield positive utility (though few studies have demonstrated this empirically). But it may also sometimes be the case that inefficient consumption takes the form of spending on *undesired* characteristics. Figure 3 illustrates a case in which only characteristic 2 is assumed to be positively valued by the consumer. In order to acquire (say) OA of this characteristic through the purchase of good X, he has therefore to purchase OB of the undesired characteristic 1.

This type of inefficiency characterises 'inappropriate' products imported

FIGURE 3

*EXPENDITURE ON REDUNDANT CHARACTERISTICS IN DEVELOPING COUNTRIES*




from rich countries, embodying characteristics that are redundant or excessive from the point of view of low-income consumers in the Third World. For instance, in urban markets of developing countries the poor consumer is often faced with the choice between high-priced processed foods with many extras built in (some of which afford him no extra utility) or nothing. To acquire processed food – which preserves both nutritional value and taste – he has also to purchase the unwanted 'frills'.

It is apparent even from this brief discussion, that the Lancaster approach provides a convenient point of departure for the analysis of consumption efficiency. However, the usefulness of the model is limited to the extent that it makes no allowance for non-maximising behaviour; it assumes implicitly (and unrealistically) that all of the characteristics potentially available from a product are actually obtained in the process of consumption; it fails to analyse the consumer in the context of intra-household behaviour, and it is entirely static, ignoring any consideration of the post-purchase behaviour of

the consumer. Because it allows for these and other important factors, it will be argued in the following section that general X-efficiency theory, when applied to the notion of the household as producer, is a much more suitable framework within which the determinants of consumption efficiency may be analysed. It is worth stressing that the proposed framework does not imply a rejection of *all* the elements of Lancaster's approach. Rather, what is suggested is an integration of X-efficiency theory and the basic Lancasterian idea of the 'consumption technology'.

## II. GENERAL X-EFFICIENCY THEORY AND THE HOUSEHOLD AS PRODUCER

General X-efficiency theory differs from conventional microeconomics, on which the Lancaster approach is based, in the following major respects [*Leibenstein, 1980*]:

(a) its psychological assumptions;
(b) it is based primarily on individual behaviour rather than on the behaviour of firms and households;
(c) it applies to the behaviour of agents as well as principals;
(d) it lays considerable stress on the theory of inert areas.

We shall first examine these elements, briefly analysing their interrelationships, and then attempt to apply the basic model to the behaviour of the household as producer.

The point of departure for X-efficiency theory is the view that existing micro-theory relies on an assumption about individual behaviour that is psychologically untenable. Perhaps because it seems self-evident, maximisation is often merely *assumed* in traditional theory. But, according to Leibenstein, once the behavioural assumptions underlying the maximisation postulate are scrutinised, they turn out to make excessive psychological demands on the 'typical' individual. In particular, he regards as entirely unrealistic the view of decision-making in traditional micro-theory as effortless and costless.

There are a number of dimensions along which individuals operate in pursuance of maximising behaviour. One of them is 'calculatedness', which can be viewed along a continuum ranging from 'loose' or 'sloppy' calculation at the one end, to 'tight' calculation at the other. At the former end 'the degree of calculation is so sloppy as to be almost the same as a random choice' [*Leibenstein, 1980: 73*]. At the latter end, 'it is very careful – continually checked and rechecked, so that only a completely accurate answer, if possible, is tenaciously sought' [*Leibenstein, 1980*]. Some individuals (such as 'perfectionists') will always value the tight over the sloppy calculation and there will also be some circumstances in which most individuals prefer the tight calculation, but it seems plausible to argue that 'for some people at least some of the time, the comfortable degree of calculatedness is not very tight' [*Leibenstein, 1980*].

On other dimensions too, individuals will find the 'tight' procedures required for maximisation to be psychologically uncomfortable. It is rarely true, for example, that people have the high degree of sensitivity to changes

in magnitude implied by maximisation. Rather: 'Magnitude sensitivity involves taste to some degree. Psychologically we may be either insensitive to magnitudes within certain bounds or we may find it unpleasant to be so' [*Leibenstein, 1980: 85*].

In general, according to X-efficiency theory, individuals in choosing a comfortable rather than a highly tight position along the various dimensions of decision behaviour, behave according to a selective rationality rather than according to the 'full rationality' underlying the behaviour of 'economic man'.

Effort is a variable that depends on the degree to which rationality is selective rather than complete. In particular, 'The process of selective rationality allows for the choice of decision procedures at lower effort levels than the levels implied by maximization or optimization' [*Leibenstein, 1980: 134*]. But the degree of selective rationality that the individual is likely to exhibit in his behaviour will depend also upon whether he is an agent acting on behalf of a principal or whether he is acting entirely in his own interests. X-efficiency theory postulates that in general the individual will be more selectively rational – with a greater deviation from the effort associated with maximisation – if he is pursuing someone else's rather than his own interests.

The theory of inert areas plays a crucial dynamic role in X-efficiency theory because it is concerned with the extent to which opportunities for change from a *given* chosen position are actually pursued. Because of inertial cost, namely, the psychological cost of moving *away* from the given position as well as of 'settling into' the new position, not all opportunities for change will be exploited. In particular, those opportunities which do not result in a gain of utility (or avoidance of a loss) in excess of the cost of the move will not take place. The importance of inert area theory derives from the fact that it 'allows for a degree of stability in individual behaviour in the face of a great many changing external conditions'[*Leibenstein, 1980: 114*]. Not only, therefore, may the individual choose a position that corresponds to selective rather than complete rationality but he may also fail to deviate from the non-maximising position in spite of seemingly profitable opportunities for change.

Taken together, the key elements of X-efficiency theory described above, lead to conclusions that differ fundamentally from those derived on the basis of the conventional theory of the firm. On the one hand, X-efficiency theory predicts that only in special circumstances will unit costs of the firm be minimised and profits maximised. On the other hand, as a result of inert areas within the firm, discernible opportunities for gain may not be pursued or avoidable situations involving lossess may not be avoided.

In applying these central ideas of X-efficiency theory to the household as producer, we shall find it useful to consider the production process as comprising two distinct stages. In the first, the household purchases the inputs required (such as food) and in the second it converts these, using time and other inputs, into (measurable and non-measurable) characteristics. Inefficiencies may occur at each of these stages and total efficiency in consumption will, of course, be equal to the product of the degree of efficiency at each stage.

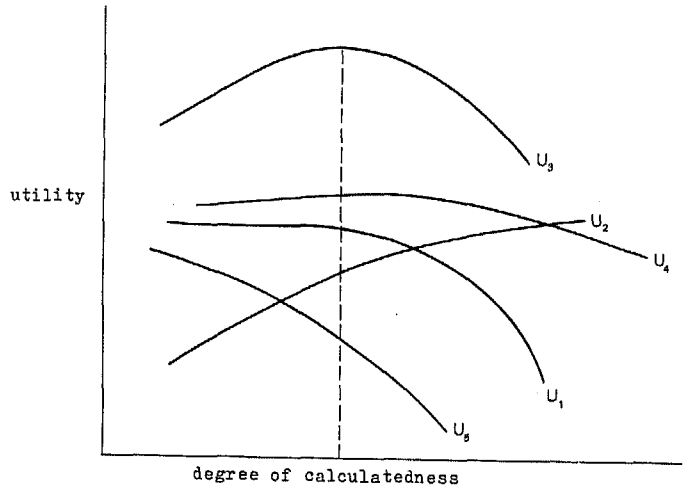
*(a) Inefficiency in the Purchase of Inputs*

Researchers in marketing and psychology have distinguished a number of rules by which consumers combine characteristics in order to choose among competing goods [*Wilkie and Pessemier, 1973*]. They have also shown, as one may expect, that in general the rules that produce efficient choices also tend to be cognitively relatively complex (not only in terms of the amount of information that has to be processed but also in the way in which information has to be combined in order to make a choice). There is, that is to say, a conflict between 'simplifying and optimizing' [*Wright, 1975*].

In the language of X-efficiency theory, this conflict corresponds to the distinction between full rationality (underlying the model of 'economic-man') and selective rationality. For only the choice rules that come close to complete calculation may be said to approximate maximisation; in the case of the remaining rules the partial and incomplete choice procedures accord with a more selective rationality.

In general, the degree of selective rationality chosen depends upon the extent of disutility associated with various levels of 'calculatedness' in relation to the perceived incremental benefits of making a choice based on 'tight' calculations. Diagramatically the matter may be viewed as follows.[1] (Similar figures can also be drawn for the other dimensions of rationality.) The

FIGURE 4
THE EQUILIBRIUM DEGREE OF CALCULATEDNESS




degree of calculatedness is assumed to be meaningful (and measurable) in an ordinal sense only, and the curve $U_1$ measures the utility associated with varying degrees of calculatedness. The non-linearity of this downward sloping curve reflects the fact that beyond a certain point the disutility associated with higher degrees of calculatedness increases quite sharply. Curve $U_2$

measures the utility obtained from the additional characteristics that are obtainable from choices that are closer to full rationality, that is, from greater calculatedness. Following the usual assumption of declining marginal utility as consumption increases, the curve increases at a decreasing rate. The addition of curves $U_1$ and $U_2$ yields curve $U_3$, with the maximum of which, the equilibrium degree of calculatedness is associated.

A similar argument applies to the question of combination costs. Where goods are combinable and divisible, efficient consumption requires, as shown in Figure 1, that goods be combined in the optimal proportions. But here too, individuals may prefer a degree of selective rationality which, though it yields less than the optimum amount of characteristics, economises on the costs, both mental and physical, of combining goods in the precise way that full rationality dictates.[2]

In Figure 4 the shape of the curve $U_1$, and hence the equilibrium degree of calculatedness, depends, firstly, on the personality of the buyer. Some individuals have personalities which predispose them to a high degree of calculatedness even for relatively unimportant purchases. On the one hand there are 'keen shoppers' who enjoy tight calculations for their own sake and whose utility of calculatedness curve may look something like $U_4$ in the figure. At the other extreme is the 'apathetic shopper'. For this type of consumer every attempt is made to minimise the degree of effort involved in purchasing goods and the curve describing the utility associated with varying degrees of calculatedness may look therefore more like $U_5$.

Secondly, societies differ in the extent to which 'economising' is regarded as a valued trait ('thriftiness') as opposed to one that is thought of as despicable ('stinginess'). In contrast to the 'carelessness' of Americans, for example, 'Europeans seem never to give a thought to the time, attention, nervous energy, and shoe leather spent in bargaining, arguing, comparing, seeking the best brand, the lowest price, and selecting the best specimen'[*Scitovsky, 1976: 176*]. It may be at least partly for this reason that price differentials for identical brands (of gasoline, durable goods and air travel) appear to be much greater in America than in Europe[*Scitovsky, 1976*].

Societies also differ with respect to average income levels. With other things being equal, it seems reasonable to expect the equilibrium level of calculatedness to be inversely related to the level of income. For those with relatively low incomes will tend to place a higher utility on the incremental characteristics obtainable from high degrees of calculatedness than individuals with incomes that are considerably greater. Of Nigerian consumers, for instance, it has been said that:

> Each foray into the market is done with deliberation and conscious intent. Shopping is not taken lightly or done on the 'spur of the moment'. The goods to be purchased have been given serious thought. ... Where the American consumer substitutes 'money to save time', the Nigerian consumer substitutes 'time to save money'[*Munn, 1969:317*].

As in the case of the firm, relationships between members of the household may also be important in determining the equilibrium degree of cal-

culatedness and hence the extent of X-inefficiency. In many, if not most cases, the housewife is acting as an agent in that she is purchasing goods whose enjoyment will be experienced by others as well as herself. Although we may perhaps expect a greater coincidence of interests between agents and principals within the household than within the somewhat more impersonal context of the firm, there is no reason why there should always be a complete identity of interests. Indeed, a considerable sociological literature attests to the often conflictual nature of intra-household relationships.[3]

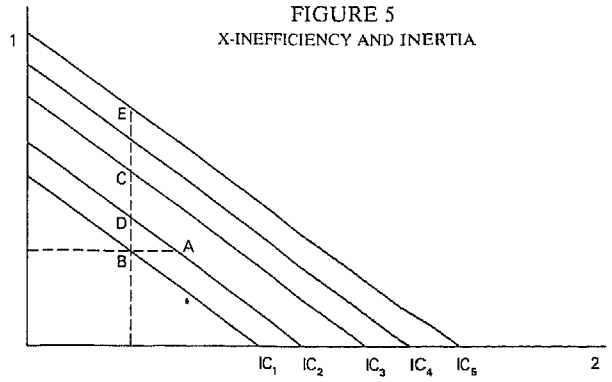
We have thus far applied general X-efficiency theory to the consideration of factors determining the extent of X-efficiency in the purchase of goods. Now we need to examine the dynamic/inertial aspects of the consumption process and to ask whether any given inefficiency is likely to be merely temporary or whether it is likely to endure over time.

In general, learning theory predicts that the consumer will correct his pre-choice errors (at a speed which varies according to the precise model chosen and the assumptions made). On the other hand, another theory – the theory of cognitive dissonance – suggests that there are inertial forces which may offset, partially or even fully, the results of the learning process. Proposed by Festinger in 1957, the theory of cognitive dissonance is based on the individual's supposed need for 'consistency within himself' – consistency, that is, between the attitudes that he holds and between these and his behaviour [*Festinger, 1957*]. When inconsistencies arise (that is, cognitive dissonance is experienced) the individual is viewed as suffering from psychological discomfort. As a result, he attempts by a process of rationalisation to remove or reduce the inconsistencies (the cognitive dissonance).

Applied to consumer choice, the theory predicts that after making a choice between products the consumer will experience anxiety as to whether the choice was the correct one. To reduce dissonance the consumer has a variety of options available. He can try to evaluate the chosen brand more favourably by exaggerating its positive features, minimising its negative characteristics, or by finding that it has additional desirable properties. Reading advertisements for the brand that has just been chosen is one important way of assisting these modes of reducing dissonance. Conversely, he may attempt to denigrate the unchosen alternatives. Or he may try to gain social support for his selection by persuading others of its superiority. To the extent that characteristics were overvalued relative to their actual levels prior to choice, it is clear that attempts to reduce dissonance by exaggerating some or all the features of his chosen brand (or diminish those embodied in rejected alternatives) offset partially, or fully, the consumer's process of learning through use of the good.

Consider the case illustrated in Figure 5. The figure shows a consumer whose indifference map is represented by the lines $IC_1$, $IC_2$, $IC_3$, etc. and who is initially faced with the choice between buying either good A or good B. Possessed of perfect information he would choose A which lies on the higher indifference curve $IC_2$. Because of advertising, however, which exaggerates the amount of characteristic 1 embodied in B by BC, A is not chosen. After experience with B the consumer will switch to A as long as his learning exceeds DC (for then A will lie on a higher indifference curve than

FIGURE 5
X-INEFFICIENCY AND INERTIA




B). But because B is chosen rather than A, the consumer experiences dissonance and attempts to reduce it either by favourably re-evaluating characteristic 1 or characteristic 2 of good B, or both.

Let us assume that only characteristic 1 is re-evaluated, by the amount CE, so that this distance is added to the over-valuation of good B that is caused by advertising. It is then apparent that dissonance will prevent the switch to A if, as here, it exceeds the amount BD. For then even complete invalidation of the misinformation due to advertising (that is, learning equal to BC) will not be sufficient to put B on a lower indifference curve than A. It is clearly possible, therefore, that 'the individual rather than learning from his mistakes, increases the likelihood of making them again and again through justification and rationalization' [*Cohen & Goldberg, 1970:316*].

The evidence that is available tends to confirm many of the predictions of cognitive dissonance theory in the context of consumer behaviour and thus provides powerful support for the theory of inert areas in general, and in relation to X-efficiency theory in particular.

*(b) The Conversion of Inputs into Characteristics*

Thus far we have been concerned solely with the factors determining the efficiency with which goods (inputs) are purchased by the household. Given a unique relationship between inputs and outputs, as is posited in traditional micro-theory, the extent of X-inefficiency is determined after the inputs are purchased. We shall argue in this section, however, that no such fixity exists in the relationship between inputs and outputs and that in fact many of the most interesting and important aspects of X-inefficiency arise precisely in relation to the poor *conversion* of goods into characteristics.

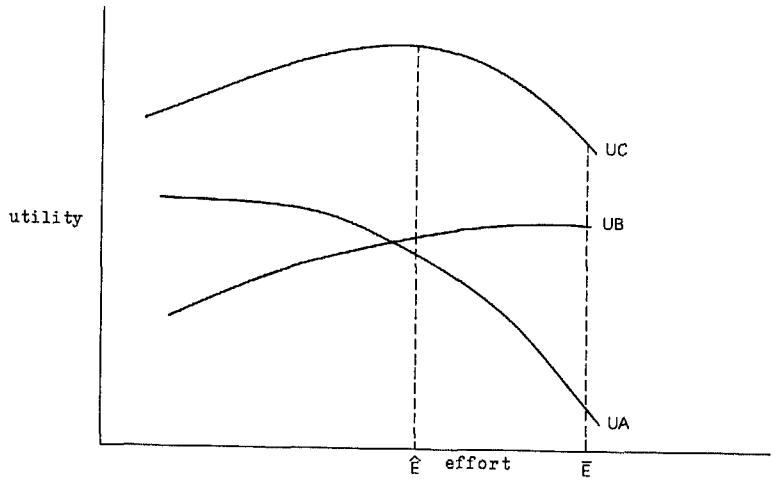
Just as in the case of production by the firm it is possible, when dealing with the household as producer, to think in terms of a maximum amount of output that is technically available from a given input. For instance, there is some maximum amount of characteristics (whiteness, soil removal, etc.) that can be obtained from the optimum usage of detergents. Similarly, the nutrients obtained from food depend on how it is prepared [*Schlage, 1969*]. If the housewife is to realise the maximum available characteristics, she

needs to be aware of the 'best-practice technique', and to produce exactly in accordance with it. In practice, however, these two conditions for efficient conversion are seldom likely to be met.

Some examples of X-inefficiency that are due to poor conversion of inputs, result from the simple fact that the housewife lacks the complementary skills and resources that are required. Failure on the part of many mothers in the Third World to mix infant formula correctly is due partly to illiteracy and the consequent inability to read the instructions. Similarly, households without refrigerated storage cannot prevent the sizeable losses of vitamins C and A that occur through storage of fruits and vegetables.[4] (More on this issue of complementarity below.)

Many other examples, however, seem to be due to selective rather than full rationality and an associated degree of effort that is inadequate to realise the maximum possible amount of characteristics. For efficient conversion often requires not only a high degree of attention to detail (in closely reading and comprehending the instructions) but also a degree of physical (and sometimes mental) effort in the process of actually executing the conversion. Figure 6 conceptualises the issue in a manner that is similar to Figure 4.

FIGURE 6
THE EQUILIBRIUM DEGREE OF EFFORT




The horizontal axis measures (ordinally) the amount of effort (both mental and physical) in converting inputs to characteristics. The relationship between utility and effort shown in curve UA is entirely analogous to curve $U_1$ in Figure 4. In addition, curve UB – which shows the utility derived from the extra characteristics obtained as a result of increased effort – is similar to curve $U_2$. Here too, of course, personality and societal factors influence the equilibrium position. Malnourished (and often diseased) individuals in developing countries, for instance, are likely to find effort, beyond some point, considerably more onerous than the majority of those living in more affluent

societies who are in good mental and physical health. The former, *ceteris paribus*, will therefore tend to display a lower degree of effort in equilibrium than the latter.

Whether X-inefficiency occurs and the extent to which it occurs, depends upon the slopes of the curves UA and UB (and hence the equilibrium level of effort) in relation to the *required effort level*. Some goods require much more effort than others to realise all their available characteristics. Goods differ, for instance, in the attention to detail and the co-ordination of tasks that they require for efficient conversion into characteristics. Where the required effort level (say $\bar{E}$) is high in relation to the equilibrium level ($\hat{E}$), a substantial degree of X-inefficiency may be expected.

Even in cases where one might expect a near coincidence of required and equilibrium effort levels, however, quite marked X-inefficiency often seems to occur. For instance, in the case of both over-the-counter and prescription drugs, there is a good deal of evidence that the maximum benefits are seldom realised because even the simplest instructions are not followed [*Silverman and Lee, 1974:227*]. (Studies by psychologists suggest that as many as half and sometimes as many as 80 per cent of patients do not follow or complete a prescribed course of treatment [*Leventhal, 1982*].) A study of infant formula usage in Indonesia revealed that 'only one in four women had mixed the milk reasonably close to its recommended strength, despite their above average economic and educational status and the clear directions on the cans' [*New York Times, 1981:102*]. Among users of washing-up liquids – another case in which the required degree of effort would appear to be low – quite substantial amounts of wastage have been reported for the UK (that is, less than the maximum amount of clean dishes per unit expenditure is obtained) [*'Which?', 1973*].

What these sort of findings suggest is either that individuals place a very low value on incremental characteristics beyond some reasonable level (so that beyond this point the UB curve becomes very flat), or that they experience disutility from even relatively low levels of effort (so that the curve UA falls sharply), or both of these. Casual observation suggests, for example, that relatively few individuals can be bothered to measure precisely the recommended amount of laundry detergent or the prescribed dosage of certain medicines (even where an instrument enabling them to do so is actually provided!).

Even if disutility does not attach to effort *per se*, more effort on a particular activity may imply less time available for other activities. (Notice that this trade-off does not *inevitably* exist – in a *given* amount of time the conversion of goods into characteristics can take place with varying degrees of 'sloppiness'.) Conflicts may then arise between the interests of different family members (as well as between effort and leisure). For instance, in a study of family influences on eating habits of children in the United Kingdom, Graham has observed that despite the strenuous efforts made to persuade mothers to delay the use of solids and adopt alternative solutions to their feeding problems which were less detrimental to their babies' health, these solutions were not adopted. What she concluded was that the alternative solutions:

> placed too high a premium on the baby's health and in consequence, too high a cost on the mother and other members of the family. Like breastfeeding, giving water was a baby-oriented method of feeding, which, in the context of the mother's conflicting family commitments, was unworkable [*Graham, 1980:176*].

That is, infant feeding has to be seen in the wider context of intra-household pressures and conflicts, and inefficiency therein cannot adequately be understood by focusing on the mother herself (a further example of the need for a micro-micro theory which analyses individual consumption behaviour in the context of the household).

For all of these reasons full efficiency in the conversion of inputs would seem to be likely only as a special case. Overall X-inefficiency in the economy – the product of inefficiency in production and that in consumption – then becomes much greater than when only the production side is taken into account. For instance, suppose that production efficiency is 80 per cent of maximum X-efficiency whereas the loss of inefficiency within households is 30 per cent (more on this below).[5] Then overall X-efficiency in the economy is only 56 per cent of the maximum.

Finally, we shall consider the often crucial manner in which inertial forces impinge on the efficiency with which inputs are converted to characteristics over time. Essentially, the problem arises from the fact that while the rapid introduction of new products frequently imposes new requirements on the housewife in terms of 'techniques of production', the force of habit (inertia) perpetuates the old use patterns and mitigates against the rapid adoption of the new. As a result, X-inefficiency associated with the new good may – at least temporarily – exceed that associated with the old product. 'Changing a habit requires a prolonged unlearning effort to first destroy the automaticity and efficiency of the old, followed by a fresh start on a new learning curve to construct the new response pattern' [*Wasson, 1975:281*]. The extent to which established habits of usage can be resistant to change and the consequences thereof are well illustrated in the case of the electric typewriter – which,

> required a change in a well-established habit pattern for any typist accustomed to using a manual machine. On the manual machine she had been trained to rest her fingers on the middle row of the alphabetical keys. She had now to avoid touching *any* key at all until she wanted to register it on her copy [*Wasson, 1975:107*].

Of course, not all new goods impose such radically different patterns of usage on the consumer. Some of them are in fact able to fit easily into the established routine of the consumer and in consequence little or no X-inefficiency results. Moreover, not all societies are exposed to the rapid introduction of new products that characterises advanced capitalist economic systems. Some tribal communities, for instance, are more or less totally isolated from modernising influences. It is perhaps not surprising, therefore, that in many such communities use practices seem to be relatively efficient. Thus, Quin's study of the Pedi tribe in Southern Africa concludes that 'recognition and encouragement of their traditional foods and feeding habits

could be the means of alleviating and perhaps even solving, the great problem of malnutrition and disease among these people' [*Quin, 1959:275*]. The same appears to be true of the Australian Aborigine prior to White settlement: 'A diet of seeds, stems, roots and native fruits, supplemented by fresh meat, fish and shellfish, produced a race that was free of disease. The overall picture was that of a nutritionally healthy culture, coexisting with their food sources, both plant and animal' [*Short, 1981:2*].

Conversely, when traditional use practices in the Third World fail to adjust to the quite different practices associated with modern products imported from the rich countries, X-inefficiency will tend to be greatest. Improper preparation of culturally unfamiliar forms of foods, for instance, has been shown to result in a loss of essential nutrients [*Austin et al., 1976*]. A study by James of the detergent market in Barbados showed that the efficient conversion of modern detergent products into cleaning characteristics required a greater degree of precision/attention to detail than many consumers had become accustomed [*James, 1980;1983*].

Over time, a kind of 'learning by consuming' takes place and X-inefficiency in conversion will tend to fall. The speed of this process will depend, among other things, on the degree of resistance to change that is given by the inertial forces described above. The strength of these forces, in turn, is a direct function of how deeply entrenched traditional habits have become. In general, therefore, X-inefficiency will tend to be most pronounced, as well as most enduring, where a fundamentally *different* technique of production is imposed on consumers and where existing techniques have, over a long period of time, become deeply entrenched and resistant to change. Because new products come 'on stream' continuously in the rich countries, there will be a perpetual tendency to X-inefficiency in these countries. But because new products are only rarely developed in and for those living in poor countries, the factors described above imply that the problem of lags is likely to be encountered to a more serious extent in the Third World.

Even without this problem of differential learning lags between rich and poor countries, however, the adaptation to the techniques imposed by new products may often be difficult or impossible for many of those living in the Third World. The reason is essentially that new products are developed in rich societies to fit in with the particular systems – social and economic – prevailing in these societies and often give rise to considerable problems, including that of X-inefficiency, when introduced into a totally different environment. These problems are very similar to, and indeed parallel those which arise in relation to the import of techniques from the West by firms in the Third World. As Stewart has put it, 'individual techniques are designed for a particular economic/technical environment, and are efficient, indeed viable, often only in the context of that environment' [*Stewart, 1977:83*].

New products designed in the developed countries tend to be consistent firstly, with average levels of education and skills in these countries. The development of pocket calculators and other 'high-technology' products, for example, presupposes at a minimum, basic arithmetic and mathematical skills. Moreover, adequate technical support required for the maintenance

and repair of these complex products can in general be taken for granted in these countries.

New products are designed, secondly, to fit in with the prevailing goods and services in rich societies. Cars are designed for particular types of roads and frozen foods for those in possession of refrigerators. Thirdly, new goods are designed to accord in a general way with the habits and systems of belief (cultural and religious) that exist in advanced, capitalist economies. There is little doubt, for example, that the growth of convenience foods has mainly been due to the increased participation rates of women in these economies.

It is seldom the case, however, that these complementary resources are widely available in developing countries. As a result, it may be impossible for those lacking the resources to adopt the new goods; frozen foods require refrigerators and video-tapes need television. Consumers in the Third World may, because of these technical linkages, often be bypassed by new product developments occurring in the industrialised countries.

A second possible consequence of the absence of resources that are complementary to new products, is that an attempt is made in the developing country to *reproduce* these resources. Western health practices in many developing countries are in part the result of an attempt to create the environment (in the form of hospitals, clinics, etc.) required for the efficient operation of modern medical equipment and modern drugs. Similarly, the building of certain roads to developed country standards may be seen partly as an attempt to reproduce the conditions required for the efficient functioning of cars imported from these same countries. But the attempt to reproduce elements of the developed country's environment, because it is highly expensive, necessarily means that only a small proportion of the population is able to have access to its benefits. For these fortunate groups, the use of the new products is indeed facilitated; for the remainder of the population who, despite lack of access to the resources provided, nevertheless purchase the new goods, the result is often X-inefficiency in the conversion of these goods into characteristics.

In some cases, however, the absence of complementary inputs does not affect the characteristics that can be obtained from new goods because of the existence of alternative inputs that can be easily substituted for those widely possessed in the developed countries. Batteries can be substituted for electricity in the use of transistor radios [*Austin et al, 1976*]. The benefits from non-stick frying pans can be obtained from firewood as well as electricity, and rain-water is an effective substitute for public water facilities (in, say, the taking of soluble aspirin). In two of these cases – the collection of firewood and rain-water – households in poor societies are able to obtain the characteristics from new products by 'producing' them in a time and labour-intensive manner relative to households in rich societies (which is what Becker's model would predict given the differences in factor endowments between rich and poor countries).

In other cases, however, substitution of inputs is either very difficult or impossible. Infant formula is by far the most important example of limited substitution possibilities. On the one hand it is difficult for many poor mothers who use formula to obtain the fuel required to boil the water (to

prevent contamination). In addition, mothers who do not possess a refrigerator have to store the bottle containing unfinished formula at room temperature; the result is inevitably rapid bacterial growth. What, in rich countries, is a safe, effective product often therefore becomes a lethal danger in the quite different context of Third World countries.

It is worth noting, finally, that the inefficient conversion of new products that sometimes occurs in a setting different from that in which they were developed is not confined to developing countries. The poor performance of the Renault in the United States at one time, for example, has been attributed to the design of the car for French rather than American roads and to the much more regular maintenance typically provided by the French car-owner [*Keegan, 1969*].

## III. CONCLUSIONS

We have shown in this paper that by viewing the household as producer of characteristics, the application of general X-efficiency theory can be extended beyond the confines of production and the firm, to the behaviour of the individual consumer within the household. It was argued that general X-efficiency theory provides a much more realistic framework than the Lancaster model for the analysis of the sources of inefficiency, both in the purchase and conversion of inputs. Inadequate and anecdotal though much of it is, the evidence provided does suggest that, as in the case of production and the firm, X-inefficiency within the household may be the rule rather than the exception. Some, but not all forms of X-inefficiency were shown to be more pronounced in developing as compared to developed countries.

The policy implications of the existence of X-inefficiency in consumption depend, however, on the reason for its occurrence. On the one hand, where inefficiency is due, say, to misinformative advertising of product characteristics, a clear role for policy intervention is indicated. On the other hand, inefficiency may be due merely to the personality of the buyer who associates extreme disutility with the decision costs associated with the requirements for X-efficiency in consumption.

Because the existence of X-inefficiency does not in itself therefore necessarily indicate the need for policies, detailed research into its causes in specific situations is called for. Though a great deal of (unrecorded) productive activity occurs in the poor household (cooking, cleaning, health care, etc.) very little is known about the X-efficiency aspects of this activity. Even in the case of infant formula, which has been relatively intensively studied, a great deal has still to be learned.

Research into the determinants of X-inefficiency in consumption in the Third World fits in very well with the basic needs approach to development which emphasises the particular goods and services that a society provides and the impact of these upon the fulfilment of needs such as hunger, freedom from disease, shelter, etc. [*Streeten et al, 1981*]. But in many cases, if the link between goods provided and indicators of basic needs fulfilment is to be properly understood, it will need to be decomposed into two separate relationships; namely, the relationship between goods and characteristics

and that between characteristics and the basic needs indicators.[6] For instance, the impact of food on indices of health depends, firstly, on the nutrients obtained from the food and secondly, on the impact that these nutrients have on the health of each particular individual living in poverty. If additional food has a minimal effect on the health of an individual, this could be due either to improper preparation/storage, which reduces the amount of realised characteristics, or to the fact that the additional nutrients are merely absorbed by disease (or to some combination of these). Examination of the extent and sources of X-inefficiency in household production could, in this and other cases, therefore, throw considerable light on part of the relationship between the goods that a developing country provides and the fulfilment of the basic needs of its poorest members.

The empirical evidence that is available points to widespread X-inefficiency within firms – as noted earlier, it can amount to as much as 40 per cent of net national product even in an economy as advanced as that of the United States. There is little reason to suppose that the extent of X-inefficiency in converting inputs to output within the household will be any less. Indeed, within poor households in the Third World, it is likely, if anything, to be even greater.

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NOTES

1. This diagram is similar to Figure 16 in Leibenstein [*1980:114*].
2. For a critique of the Lancaster model on the basis of combination costs see Hendler [*1975*].
3. See for example Davis [*1976*].
4. For example, the percentage loss of vitamin C from the storage of green beans at 21°C for 24 hours is 20 per cent. See Austin [*1981:150*].
5. The evidence suggests that X-inefficiency in production at any point of time in the United States is as much as 20 to 40 per cent of net national product [*Leibenstein, 1981*].
6. What Fei, Ranis and Stewart [*1979*] call the 'meta production function' – the relationship between goods and basic needs indicators – ignores the need for this decomposition.

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