LIMITATIONS OF NON-BEHAVIOURAL APPROACHES TO THE ECONOMICS OF QUALITY

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ABSTRACT

It is not possible to test economic-man theories of quality by their predictions, as they do not make direct predictions of the real world, and there are many reasons why the fact that indirect predictions, by models making use of this theory, fail will be ignored. Criticisms of *simplifying assumptions* are usually ignored when applied to theories. Criticisms of *boundary assumptions* as ruling out most of the real world only influence some economists, as the limited effect of criticisms of existing theory show. The *ad hoc* nature of many assumptions and the impossibility of identifying situations where these *ad hoc* assumptions apply, mean that most of Lancaster's theory, for example, has no possible application. The *fundamental assumptions* in most economic-man theory must hold if the theory is to reach even the first step of analysis. In fact, they are wrong in nearly all cases, and it is not possible to identify the one in a million case where they may hold. There are also fatal fundamental *logical* errors. The research programme is unusable.

INTRODUCTION

This paper discusses the limitations of those approaches to the economists of quality that are based on assumptions about the preferences of economic man, like those based on Lancaster (1966, 1971, 1979), Becker (1965), Muth (1966), Rosen (1974), Houthakker (1952), Thiel (1952), Brems (1948, 1957), Leland (1977), Ladd and Suvannant (1976), Ladd and Zober (1978), Ratchford (1979).

A distinction must be made between the method of testing a theory and the method of testing a specific model. Testing a model specific to a real life situation is a matter of its assumptions being realistic, its logic being correct, and its predictions being accurate and, while testing these is not as straightforward as it looks at first sight, it is the sort of economics done by most economists in their everyday work. Testing theory is a different matter. Very little textbook theory is intended to apply directly to the real world. Much of it is presented as a string of logic which might be included in real world models, or as a "what if" scenario which might be borne in mind when building specific models. This implies a different approach to testing, which is carried out in this paper.

I shall start by discussing why this group of theories cannot be tested and refuted by their predictions alone. I shall then show that these are different types of assumption in a theory - simplifying assumptions, boundary assumptions and *ad hoc* assumptions, fundamental

assumptions and assumptions leading to realism, for example - and that a theory may be rejected on some of these. A theory may also be rejected on some, but not all, logical errors.

TESTING THE PREDICTIONS

Like most of economic theory, the economic-man theories of quality do not make direct predictions about the real world. The paradigms are built on imaginary markets so they cannot be tested directly, but provide chains of logic which can be borrowed as a small part of models of real markets. In principle, the most one can do is ask whether models using Lancaster, say, make predictions which prove accurate and particularly whether these predictions are not made by competing theories (See Popper 1965, Feyerabend 1970 p.204, Lakatos 1970). The vast majority of uses of economic-man based models have not aimed to test the theory: they were investigations of practical quality-related issues using the theory as one of several tools in a complex model.

It takes skill to define an experiment that is potentially a crucial one, and a great deal of luck to get data that produces significantly different predictions between theories that are designed to explain the same phenomena. Popper (1959) would argue that only crucial experiments are tests. "It usually seems to give a good fit" is not a test. I do not know of any such crucial experiments od economic-man theories of quality.

However, even if dozens of tests had shown that models using Lancaster's paradigm, say, or Rosen's were worse predictors than others, this would not result in the theory being rejected, and it might not significantly reduce our confidence in it. There are many valid reasons why its defenders might ignore this evidence. For instance, any poor results may be explained away as the results of data problems, experimental error, unforeseen market changes etc. While a model may make many predictions, there is typically only one outcome that can be observed. Inevitably, Rosen's paradigm is only a small part of the specific model and the predictions depend primarily on other parts, which may be flawed. For example, Ladd and Zober's (1977) finding that some results did not appear to confirm the hypothesis that Lancaster's paradigm applied in all circumstances was attacked by Ratchford (1979) on the grounds that one could not test assumptions about individual preferences from aggregate demand functions. Competing theories may cover somewhat different areas, and so be incommensurable (Popper 1965 p.10). Many of the models which the authors claimed to depend on Rosen or Lancaster are, in fact, pure Waugh (1928).

There are less defensible but widely used reasons for rejecting evidence, such as "The predictions were wrong, so the assumptions cannot have applied in this case".

For these reasons I do not believe that most economic theories of quality are capable of testing or refutation by their predictions.

ASSUMPTIONS

SIMPLIFYING ASSUMPTIONS

It is necessary to make simplifying assumptions to produce a workable economic model. If this is done well, it produces a powerful tool with little loss in realism. Done badly, realism is lost immediately. However, because everyone accepts the need for simplification, criticisms of bad simplification are likely to fall on deaf ears. Criticisms of over-simplification are more usefully aimed at specific models than at theory.

It should be mentioned though that the economic-man theories do not simplify from reality, as do most other theories of quality, but aim to produce a theory with the minimum number of assumptions - far fewer than the number used in other approaches - and do not have the safety feature of overspecification.

BOUNDARY ASSUMPTIONS

Boundary assumptions state the areas where the theory is intended to work, and the theory can only be tested within these boundaries. The economic-man theories all have the same fundamental assumptions on human behaviour, but each works only within its boundaries, so comparative testing may not be possible.

The example of Lancaster (1966, 1971, 1979) may be given, as his is the most cited theory of quality, and is presented more fully and more rigorously than most others. It dominates the economic approaches and has a strong influence in marketing. Lancaster sets out his boundary assumptions:

> a) The satisfaction from a unit of a characteristic is independent of the form in which it is supplied - the satisfaction is obtained from one gram of protein whether it comes in the form of steak, potatoes or shoe leather.

> b) Any two goods can be mixed, and it is the total quantity of the characteristic in consumption that determines satisfaction. (Lancaster 1971).

His theory only works where these boundary conditions apply: his optimizatation and aggregation procedures do not work otherwise.

The boundary assumptions can only be "wrong" if they conflict with each other or with other assumptions, or if they rule out all reality. As Lancaster said of his 1975 paper:
> "At that stage it was not realized by the author that there are no viable market structures in the paradigm case, and thus there are important errors in the paper" (Lancaster 1979 p.13).

An alternative criticism of these assumptions is that they are far too restrictive and almost never apply in practice (Hendler 1975, Ladd & Zober 1977, Lucas 1975). The theory could only work when a consumer got the same satisfaction from one very sweet orange and one that has no sweetness at all, as from two moderately sweet ones, when two size six shoes were equivalent to one size twelve and when a Mozart sextet was 20% better than a quintet. In fact, the only cases where these assumptions apply are cases similar to the production economist's least-cost pigfeed problem, from which Lancaster's paradigm is derived.

To many economists the fact that a theory has very little practical application is damning. I have argued that the first scarce resource an economist must allocate is his own time and that an economist who spends his time on trivia is *ipso facto* incompetent (Bowbrick, 1988). Some schools of economics do not agree: for instance only 1.5% of papers citing Lancaster in the last four years cited Hendler or Lucas, whose criticisms of the boundary assumptions were the only real criticisms of the paradigm.

AD HOC ASSUMPTIONS

Ad hoc assumptions are ones which are added to the basic theory, not in order to make it conform more closely to the real world, but because the theory will not work without a special restrictive assumption (see Popper 1972 pp.15-16, 30, 1976 pp.40,42). Each *ad hoc* assumption limits the number of real life situations that the theory can apply to. At the same time, each new explicit assumption introduces implicit assumptions which are likely to pass unnoticed, so there is a strong possibility that a system with contradictory assumptions will be set up. These assumptions are not to be confused with ones which have the effect of making a model a closer approximation to the real world.

Again, Lancaster may be taken as an example, because of his rigour and his attempts to make his assumptions explicit. He appears at first sight to be arguing a general theory from a handful of assumptions. On examination, however, it is seen that he incorporates some 63 explicit assumptions in Consumer Demand (1971) and, by the most generous allowance, 40 of these are *ad hoc*. There are sixteen new *ad hoc* assumptions in Chapter 8 alone. It is assumed, for instance that:

- When one is dealing with a group of closely related goods, all other goods may be treated as equally close substitutes for this group (Lancaster 1971 pp.128-9). [He uses "goods" in the sense of a single product line.]

- There is a uniform distribution of income so that average income is constant over preferences and there is a rectangular distribution of preferences, with constant density taken to be unity (Lancaster 1971 p.79).

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There are in addition many *ceteris paribus* assumptions, assuming for instance that everything is consumed the moment it is bought. *Ceteris paribus* assumptions are necessary at some stage to make a theory manageable, but they must eventually be dropped. If they are not - and Lancaster does not drop them - they are just another form of *ad hoc* assumption or, in some cases, boundary assumption.

The number of restrictive *ad hoc* assumptions in Lancaster (1971,1979) is so great that I do not believe that a single product or market fits them. This means that, however valid his basic theory may be, the theory ceases to have any possible application as more and more *ad hoc* assumptions are introduced. It is surprising therefore that in *Variety, Equity and Efficiency* (1979) he makes extraordinarily general statements on welfare including the welfare effects of international trade and political systems, all based on these restrictive assumptions.

In most cases there is no conceivable way in which one could determine whether the assumption applied in any real-life situation.

Removing all the *ad hoc* assumptions has the effect of stripping down Lancaster's theory to its basics. It is then applicable to more situations (not a lot more, because of the restrictive boundary assumptions) but it has little content: it may, for example, claim to describe a single individual's choice, but not much more.

It will be noted that *ad hoc* assumptions are not introduced to the same degree when a theory is created by simplifying from reality as when introducing complexity to economic-man theories.

FUNDAMENTAL ASSUMPTIONS

There are also fundamental assumptions on supply and consumer preference which are basic to the theory. All the economic-man approaches to quality share much the same fundamental assumptions (even though they have different boundary assumptions), and these carry over to a greater or a lesser degree to most other approaches. If these can be shown to be unrealistic, the theories built on them have no practical value.

CONSUMER PREFERENCES

One assumption fundamental to most theories is that people always prefer a characteristics mix with a higher level of one or more characteristics (with a characteristic that is not wanted being plotted on a negative scale). This is set out most rigorously by Lancaster: his assumptions "simply carry over traditional preference theory, applying it to collections of characteristics instead of to collections of goods (1971 p.20) in order "that the consumer's preferences can be expressed in the terms of an ordinal utility function of the neoclassical kind with all its first order partial derivatives positive" (1971 p.21). He assumes transitivity, completeness, continuity, strict convexity, non-satiation and all characteristics positively desired, in order to produce an indifference curve looking like those of the basic text books (Figure 1).

This assumption is absolutely fundamental to these theories. If it does not apply, we cannot proceed to step two of the analysis.

The fundamental error here is a failure to realize that in standard economics we are dealing with two or more goods which are to be consumed separately, bread and petrol for instance. When we talk of quality, the characteristics are necessarily consumed together so the satisfaction obtained from the bread is altered if it is mixed with petrol. If we consider the characteristics sugar and acid of a bottle of wine, we get a set of indifference curves like that in Figure 2. The consumer prefers a medium-sweet, medium-acid wine, so this is the highest point on the indifference surface. A wine that is slightly too sweet or too acid will fall on a lower curve. Unlike the Lancaster theory, this does not imply that the consumer gets most satisfaction from the sweetest, most acid wine. This "bull's eye" indifference curve will be a first approximation to a large number of situations.

I have argued in Bowbrick (1992) and in more detail, with some modifications, in Bowbrick (1995) that a wide range of shapes of indifference curve are likely to be common when real consumers consume real product.

Some of the shapes of curve identified are set out in Figures 1-6. Figure 3 shows a two peaked preference, apples for dessert and cooking. Figure 4 shows a pure product being preferred to a mix. Fig. 5 has indifference curves being points on the product possibility curve. Figures 5 and 6 are different ways of plotting preferences for a mixture of kerosene and milk. These figures have been simplified, as it is not possible to explain their full complexity in the space available.

It is almost certain that all individuals will have an indifference curve that resembles one of these curves on at least one dimension. All food products, for example, have salmonella content or kerosene content as one dimension and this would imply an indifference curve on this dimension something like Figure 6.

A rather different way of showing this is Table 1. Here there are two characteristics and they are valued independently. The marginal utility first increases with level of characteristic, then becomes constant, then falls. Where marginal utility is increasing, the consumer is better off with all Characteristic A or all Characteristic B than with a mix, so the indifference curve is concave to the origin. As levels of characteristic increase, a bull's eye like Figure 2 appears. In order to get something like the curves assumed in theory, it is necessary to assume positive but declining marginal utility at all levels.

It is barely conceivable that a case exists where *all* curves are in accordance with the theory for *all* dimensions and for *all* consumers. Even in such a case the theory is useless, because it is not possible to show that the assumptions hold. It is not possible to plot an n-dimensional indifference surface for even a single individual from any number of observations that could be meaningful.

SUPPLY ASSUMPTIONS

Another fundamental assumption that pervades the theories of quality is that a good or a characteristics mix with more of an objective characteristic always costs more than one with less. This assumption is frequently implicit. If the assumption is wrong, the optimizing criteria do not hold. One cannot use the simple indifference curve analysis, as the budget line is shaped quite differently.

Again, the error arises from applying an analysis designed for separate goods to quality. It is reasonable to assume that in most cases it costs more to buy more of any one good. It does not follow that it costs more to buy a good with more of any one characteristic.

Figure 7 shows an example of wine prices, where the price of the wine reflects consumer demand, with medium sweet wines getting higher prices. Bull's eye indifference curves are also shown. Optimizing criteria are obviously not as in the theory.

In Bowbrick (1992) other variants of this are discussed, and in Bowbrick (1995) it is shown that neither marketing nor production cost considerations would tend to support the fundamental assumption.

LOGICAL ERRORS

Logical errors can be fatal to a theory, but only errors early in the analysis. Later errors merely require modifications. There is no sharp divide between logic and theory, as the choice of assumptions on indifference curves is theory laden.

One fundamental logical error which pervades many of the theories is the assumption that there is a single "characteristics space" in which preferences can be plotted. In fact the indifference surface for sugar, for instance, is a different shape depending on whether one is talking of sugar in a cup of tea, sugar in a meal, sugar in one's diet, or sugar in total

consumption (see Bowbrick 1995 for an analysis). With sugar in a cup of tea the product possibility curve is determined by the fact that the quantities of sugar, tea and milk have to add up to one cupful.

OTHER ERRORS

I have mentioned only a few errors here, as examples of different ways of testing the theory. I have discussed others elsewhere. For example it should not be necessary to mention that the convenient assumption that all decisions and evaluations are made with perfect knowledge of objective characteristics is unrealistic. This is not a minor *ceteris paribus* assumption that can be dropped at some stage (and it is seldom dropped in fact), but an assumption that affects the whole analysis. Similarly, marketing economists and economists with experience of the real world would take issue with the idea that it is possible to aggregate from assumptions about economic man to market level behaviour.

CONCLUSION

The purpose of this paper was first to show that testing of an economic theory was not just a matter of testing predictions or piling up criticisms of assumptions or logic. Some types of criticism are logically more important than others. Some are logically important but unlikely to convince adherents of the theory.

The second purpose was to show that the dominant theory in the economics of quality had fatal errors in its fundamental assumptions, in its logic, and in its applicability (when all *ad hoc* assumptions are taken into account).

Many of the criticisms raised can be shown to apply to economic-man theories in a relatively straightforward way. The criticisms do apply to a greater or lesser degree to other approaches to quality, but the impact is not so obvious because the assumptions and logic are seldom set out so clearly.

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