

**50 Years Ago: Duncan Ironmonger's *New Commodities and Consumer Behaviour* and its Relationship with Lancaster's 'New Approach' to Consumer Behaviour'**

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Abstract

This paper explores the origins, contributions, limitations, and impact of Duncan Ironmonger's (1972) book *New Commodities and Consumer Behaviour* and its similarities with, and differences from, Kelvin Lancaster's 'new approach' to consumer behaviour. It does this with the aid of material from an interview given by Ironmonger to one of the authors in 2015, reviews of his book, its citation details, and a re-reading of the book in light of the interview. It argues that there are substantial differences between the analyses offered by Ironmonger and Lancaster and that, despite them both offering models of choice focused on product attributes, their methods were profoundly different. The paper concludes by considering lessons of their different publication strategies, and their different impacts, for early-career researchers.

Keywords: new commodities, consumer demand, product characteristics, diffusion effect, want satiation

JEL Classification Codes: B21, B25, B31, B41, D11

## 1. Introduction

Duncan Ironmonger's (1972) book *New Commodities and Consumer Behaviour* (henceforth *NC&CB*) deserves retrospective analysis, despite having had a rather modest impact in the half-century since its publication. It is a remarkably original contribution that can be viewed as a key source for behavioural and evolutionary economists, as well as for researchers in marketing. It remains relevant today, both theoretically and for applied economists, even though its empirical content focuses mainly on the rise of new products and the fall of outmoded ones in the period 1920 to 1938.

Ironmonger made extensive use of his mathematical skills when writing the book, so it also had potential to be taken seriously by mainstream economists who insist on 'rigorous' analysis. However, the book is also very clearly written and is accessible to non-mathematical economists. Indeed, many of the ideas that it contains could readily have been brought into intermediate microeconomics courses in undergraduate programmes in economics and would have been far more useful to students than the conventional textbook treatments of consumer behaviour that are descended from the work of Hicks and Allen (1934a, 1934b).

Any consideration of the place of Ironmonger's book in the history of economic thought must consider its relationship with the work of Kelvin Lancaster, who began to offer a 'new', characteristics-based view of consumer behaviour in 1966 via both a long, formal article (Lancaster, 1966a) and a shorter, more accessible version that he had delivered at the December 1965 conference of the American Economic Association (Lancaster 1966b). Lancaster (1971) then developed his analysis into a book that was published the year before *NC&CB* appeared. Although Ironmonger's analysis focuses on 'wants' and 'qualities', it can be read as if these terms refer to product

characteristics, too. Hence, it easy to regard *NC&CB* as having had a rather limited impact because it was essentially offering a similar view of consumer behaviour to that which Lancaster had already published. On that view, an academic tragedy has played out, for Ironmonger proposed a characteristics-based analysis of demand before Lancaster, in his 1961 University of Cambridge PhD, but he then failed to publish his analysis until after Lancaster had reinvented it and achieved a massive first-mover advantage in the market for economic ideas.

Spice can be added to such an interpretation by noting that both economists were born in Australia (Lancaster in Sydney, NSW in 1924, and Ironmonger in Yass, NSW in 1931) but had very different careers, with their respective career and publication choices having co-evolutionary implications. Ironmonger did not chase international academic status: apart from his doctoral studies in Cambridge and brief overseas visits, he spent his career working in Australia. By contrast, after completing his PhD at the London School of Economics and rising rapidly there to the position of reader, Lancaster moved in 1961 to Johns Hopkins University in the United States. Soon after publishing his 1966 papers, he was appointed to the John Bates Clark chair at Columbia University.

By the time that *NC&CB* was published, Ironmonger held the position of Reader in Applied Economic Research at the University of Melbourne, in what is today known as the ‘Melbourne Institute’. However, in the years that followed the book’s publication, he was not promoted to a chair. He eventually retired into an honorary associate professor role, despite having gone on to serve as the Institute’s acting director for five years following the retirement of the founding director, Ronald Henderson, in 1979.

The acting director role was a dispiriting one for him, dominated by the protracted efforts of colleagues outside the Institute to find someone else to be the new director despite him having been Henderson’s deputy since 1972. That episode ended

with the University of Melbourne appointing Peter Dixon, a general equilibrium modeller, who took the Institute in a direction that conflicted with Ironmonger's research philosophy. Ironmonger avoided being part of that change by spending the period 1986 to 1991 as Director of Applied Research on the Future, at the University of Melbourne's Faculty of Architecture and Planning. It thus appears that by the time Ironmonger reached his late fifties, he had been marginalized via faculty politics, on top of having had his work on the demand for new commodities eclipsed by Lancaster's contributions.

However, there is more to Ironmonger's career than this. He became the Director of the Household Research Unit of the University of Melbourne's Department of Economics after Dixon moved to Monash University in 1991. Moreover, Ironmonger is far from being a completely unsung hero in the field of household economics, having been honoured with a festschrift volume (Hoa, ed., 2005) and by being made a Member of the Order of Australia in 2013.

In this paper, we use *NC&CB* as the focus for a cautionary case study in how the functioning of the market for economic ideas can be affected not merely by the timing of the launch of original contributions but also by how their authors choose to position them and by the publication media that they use. Our account benefits from being able to draw on an interview that one of us (Markey-Towler) recorded with Duncan Ironmonger at the University of Melbourne's Faculty of Business and Economics on 3 January 2015 (hereafter referred to as DSI2015). Ironmonger was then 83 but still research-active (focusing on how household time-use patterns change through the business cycle) and still serving as Director of the Household Research Unit.

The rest of the paper is structured as follows. In Section 2, we use material from the interview as a basis for outlining the background to Ironmonger's PhD thesis and

the delay in publishing *NC&CB*. The interview also provided us with a fresh understanding of how *NC&CB* needs to be read to be properly appreciated. This informs Section 3, where we explore similarities and differences between the approaches of Ironmonger and Lancaster and how they reacted to each other's contributions. Section 4 then shows how *NC&CB* fared with reviewers. Section 5 examines the book's impact relative to the impact of Lancaster's work, using data from Google Scholar. Section 6 offers concluding reflections.

## **2. Background to the book's inception and publication**

In 1957, when Ironmonger commenced his PhD at the University of Cambridge, he did so via a Public Service Scholarship that gave him two years' leave on full pay from what was then called the Australian Bureau of Census and Statistics. He recalled (DSI2015) three things that gave Cambridge a greater appeal than the LSE and Oxford, the other obvious contenders as places for him to study for a UK doctorate. One consideration was that some of his friends from his time as a student at the University of Melbourne were already research students in Cambridge. Particularly notable among them was Geoff Harcourt, with whom he had been one of just three who took the mathematical economics course while undertaking their master's degrees. Secondly, he knew that, if he went to the LSE, there would have been pressure to spend some of the summer vacation working at nearby Australia House, which could preclude taking vacations touring on the European mainland. But most of all, he hoped to extend work he had done in his master's dissertation by applying methods that Richard Stone (1954) had been using in Cambridge with UK data from the interwar period.

In those days (and for at least the next two decades or so), doctoral students in economics at Cambridge were not required to take any advanced coursework. However,

it was common for them to attend lectures by famous faculty members such as, in Ironmonger's case, Nicholas Kaldor and Joan Robinson. In the absence of coursework, they taught themselves new techniques, often by working in groups, and this was how Ironmonger developed the skills he needed in matrix algebra. In those days, the extent of PhD supervision was very limited: as Ironmonger (DSI2015) put it, some students 'might be lucky to see their supervisors more than a couple of times a year'.

Although it was Richard Stone who eventually wrote the foreword to *NC&CB*, Ironmonger did not get to have Stone as his supervisor. (He believes (DSI2015) that this was possibly due to Stone's wife having died in 1956, leading Stone to limit his commitments while getting over losing her.) On an alternative potential supervisor surely would have been the Director of the Department of Applied Economics (DAE), W. B. (Brian) Reddaway, who was both a gifted mathematician and a down-to-earth applied economist. Moreover, Reddaway had worked at the University of Melbourne from 1936 to 1939 and thereafter had maintained his Australian connections. However, a possible barrier was Reddaway's opposition to the overuse of mathematics in economics. Instead, Alan Brown from the DAE was 'allocated' (DSI2015) to be his supervisor.

Brown was a pioneer in applying lognormal distributions in empirical economics (Aitchison and Brown, 1957). He proved to be a good fit and a great influence on Ironmonger. Brown also mentored three of Ironmonger's contemporaries who were likewise studying the dynamics of demand, namely Andrew Bain (who in 1967 became, at the age of 31, the first professor of economics at the University of Stirling), Graham Pyatt (later a professor of economics at the University of Warwick) and J. S. ('Mars') Cramer (whose 1961 PhD was actually submitted to the University of Amsterdam and who became one of the Netherlands' most distinguished econometricians).

Although Ironmonger seems to have had much more contact with Brown than many of his contemporaries had with their supervisors, this does not mean that Brown was pioneering something akin to the hands-on modern approach to PhD supervision that seeks to managing risks of belated submissions or withdrawal from candidacy. We can get a sense of Brown's supervisory style from the memoir written by one of his later graduate students, John Creedy (2008, p. 10):

His approach to graduate supervision did not follow the kind of instructions given in glossy brochures produced these days by the education departments of universities, describing what a model of supervision looks like. He did not correct work or set out clear lists of expectations or discuss written plans in scheduled meetings. Instead, he provided a most valuable and rare kind of leadership by example, with subtle hints and quiet encouragement. A brief meeting, reinforced by reading and re-reading his own papers, provided all the stimulus one could hope for.

This kind of supervision was enough to enable Ironmonger to write his thesis in just two years – at a time when most of his peers seemed to be taking four or five years – and still have time to do some European travel with his wife and their first child (who had been born shortly after they arrived in Cambridge). However, the original thesis was not well received by his examiners, whom he felt had failed to understand what he was trying to do (DSI2015).

David Champernowne was the internal examiner; the external examiner was Christopher Winston from the Oxford University Institute of Statistics. Champernowne was not a particularly surprising choice: he was a direct contemporary of Brian



Reddaway and, like Reddaway, had been a stellar mathematician as an undergraduate in Cambridge (where, according to one of this paper's referees, they both ranked ahead of Alan Turing, their famous King's College contemporary). Winston was an econometrician and transport economist, and he had recently co-authored a long paper on innovation and the uptake of automation (Eels *et al.*, 1959). That paper gives the impression that he would have been a good fit as an examiner, as does his econometric reputation as originator, with Sigbert Prais (formerly of the DAE) of the Prais–Winston estimator for addressing serial correlation in trend estimates (Prais and Winston, 1954). (For an obituary of Winston, see Boyce and Nagurney, 2006.) However, Prais and Winston had devised their famous estimator while working at the Cowles Commission in Chicago and, as we will see shortly, the Cowles Commission connection may have been underpinned the reception that Ironmonger's thesis initially received.

After learning that he would need to revise and resubmit the thesis, Ironmonger had to wait several months before receiving a couple of short pages of extracts from the examiners' reports. On reading this material, he immediately realized what he needed to do to win over his examiners.

In its original form, Ironmonger's thesis began with his empirical measurement of the dynamics of consumer demand in the UK in the interwar period, with the second part of the thesis devoted to developing a theoretical framework to make sense of the patterns he had uncovered. This seems to have resulted in him unwittingly being caught up in the aftermath of the 'measurement without theory' debate between Koopmans (1947, 1949, 1957) and Vining (1949) that Koopmans had triggered via his critical review of the approach that Burns and Mitchell (1946) had employed when studying business cycles. As Mirowski (1989) has argued, this debate was part of a bigger clash

between the institutionalists at the National Bureau of Economic Research and the ‘economic scientists’, Koopmans included, at the Cowles Commission.

With his statistician’s way of thinking, Ironmonger had written the original version of his thesis with a measurement-focused, institutionalist-style front end, having begun by finding out what people did when they were presented with a succession of new commodities while experiencing changing incomes and relative prices. Leaving his attempt to construct a theoretical model of their *actual* behaviour until the second part of the thesis was at odds with the style of a post-Koopmans economist who begins with a set of axioms, tailored for its convenience in relation to preferred tools for modelling constrained optimization, and thereby sets out to discover how people *ought* to behave in a particular type of situation.

One way of revising the thesis would have been to concentrate on highlighting its originality by setting out more explicitly and forcefully the methodological basis for its structure. However, Ironmonger decided that his examiners might better appreciate his work if he simply reversed the sequence of the two parts of his thesis while leaving the contents of each part essentially unchanged (DSI2015). The new structure had the desired effect, and he received his doctorate in 1961. When he eventually decided to turn the thesis into a book, he opted to keep the revised structure rather than reverting to his original structure and setting out his methodological position in more detail.

With his doctorate completed, Ironmonger resumed his work as a public service statistician in Canberra, with the added capabilities that he had acquired via his work in Cambridge, and with prospects for accelerated promotion. Unlike Brown’s other consumer behaviour protégés, Bain, Pyatt, and Cramer, he did not immediately seek to turn his thesis into a book, for he saw his doctorate in the context of his public service position rather than as a means of kick-starting an academic career (DSI2015).

However, in the ensuing five years he increasingly realized that what he wanted to do was not to focus on collecting better economic statistics but to conduct economic analysis of statistics on consumer behaviour. An opportunity to switch to doing the latter came in 1966 when Professor Ronald Henderson invited him to work as a senior research fellow at the Institute for Applied Economic and Social Research that had been established at the University of Melbourne in 1962 (when it was known as the Institute for Applied Economic Research).

Before becoming the Institute's founding director, Henderson had been a fellow of Corpus Christi College in Cambridge. Henderson had become Harcourt's supervisor by the time that Ironmonger arrived. Via this connection, Ironmonger got to know Henderson and came to tutor some of Henderson's least academically engaged undergraduates for their weekly supervisions. Henderson's approach to applied economics was non-technical. In Henderson's case, in contrast to that of Reddaway, this was a result of his lack of technical expertise, and it meant that he was not well-equipped to appraise the quality of the work that Ironmonger was doing for his doctorate. However, it is not surprising that, once Champernowne and Winston had given their approval to Ironmonger's thesis, Henderson would consider Ironmonger as an excellent addition to the Institute's staff (whose numbers reached around 40 by 1972, when Ironmonger was promoted to deputy director).

Ironmonger's move to the Melbourne Institute took place around the time that Lancaster (1966a, 1966b) published his first papers on his 'new' consumer theory. The process of settling into his new job – which in the first eighteen months included getting the *Australian Economic Review* up and running – contributed to some delay in Ironmonger paying much attention to the extent to which Lancaster's theory overlapped with what he had produced in Cambridge. However, there was a much more

fundamental barrier to him studying what was being published on consumer behaviour and turning his thesis into a book: although his job at the Melbourne Institute did not involve any diversion due to teaching, it kept him away from applied microeconomics and consumer behaviour because it was, in essence, a full-time role in macroeconomic forecasting.

When interviewed in 2015, Ironmonger did not explain his belated decision to get his PhD published as a book in terms of an attempt to challenge Lancaster's claims of originality or to suggest that Lancaster's 'new approach' had shortcomings that he did not. Rather, he referred to (a) the fact that, after becoming an academic researcher, he recognized that he was expected to publish his research, so getting a slightly updated version of his PhD published seemed desirable, and (b) that he had been told that some researchers were reading and citing what he had done in his thesis, despite it only being available via the copy in Cambridge University Library. Turning the thesis into a book would make it easier for researchers to get access to his work as word spread about it.

The latter claim led us to explore the usage and citation records for Ironmonger's (1961) thesis. One of us (Coutts) examined it in the Rare Books Room at Cambridge University Library, where each reader's name and their date of viewing are recorded in the front coversheet. We thereby discovered that no one had read it prior to August 1970, the date of the preface to *NC&CB*, though there were three readers – Stanley Wong, Patricia Apps and Terry Barker – between then and the publication of the book. Google Scholar lists no citations of Ironmonger's thesis in the 1960s and only three citations in the 1970s. These three citations are in papers drawn from the Cambridge PhD by Apps (1972), who had viewed Ironmonger's thesis in November 1971, only a few months before her own thesis was lodged.

Apps' thesis – which one of us (Coutts) viewed on the same occasion as Ironmonger's – was on residential choices and urban planning. She wrote it at The Centre for Land Use and Built Form Studies under the supervision of the Centre's founding director, architect Lionel March. We have not been able to ascertain the networking trail by which she came across Ironmonger's thesis. The probable route initially seemed to be via Paul Stoneman, the economist that she acknowledged as having helped her with her thesis. Stoneman had been taught by Pyatt as a Warwick undergraduate and by 1971 was working on the diffusion of innovations for his own Cambridge PhD; he also went on to cite *NC&CB* in his post-PhD work (Stoneman, 1978, 1983). However, it turned out that Apps did not discover Ironmonger's thesis via Stoneman (personal communication between Stoneman and Earl, 5 May 2022).

These discoveries imply that any communications that had made Ironmonger aware of ongoing interest in his thesis, and hence of the case for turning it into a book, could not have pertained to *past* use of the thesis. What seems more likely is that his memory had got slightly scrambled on this matter and that the case for publishing the thesis was put to him by someone (say, Richard Stone or Alan Brown) who knew of its contents, had seen its *potential* impact, and perhaps thought that the publication of Lancaster's articles would mean that a book based on a thesis that was clearly ahead of its time would now be viewed very favourably.

Ironmonger's decision to try to get his thesis published fitted in well with his success in obtaining a Fulbright scholarship to visit Philadelphia 'to sit at the feet of Larry Klein' (DSI2015) and enhance his macroeconomic modelling expertise. By adding some extra weeks of leave, he was able, on the way there, to spend time in Cambridge discussing the book's publication with Cambridge University Press, the DAE and Brian Reddaway (who had succeeded James Meade as Professor of Political

Economy in 1969). The production process was not rapid after Richard Stone added his forward in January 1971: the book was not released until 13 July 1972.

*NC&CB* is essentially the same as the thesis aside from the addition of an extra chapter and other improvements in the second part that employ additional data (from Stone and Rowe, 1966) that had become available after the thesis had been completed. Ironmonger wove a few relevant empirical studies from the 1960s into the book, but he signalled on page 3 that, while he was aware of Lancaster's (1966a) work, he would not be discussing it in the pages that followed. His candour in revealing how little he had done to update the thesis and his decision to do so little to update it despite showing he was aware of Lancaster's work, would have consequences when the book was sent to reviewers.

It is indeed surprising that Cambridge University Press published the book in this form. Doing so could result in the impression that it consisted of 'old ideas that nobody thought worth publishing in the journals' (Ehrenberg, 1974, p. 637). It does not leave one with the impression that the manuscript was assessed by referees who were experts on recent literature on consumer behaviour.

We might expect that such referees would have urged not merely that differences from Lancaster's approach should be explained, but also that the book should explore the relationship between Ironmonger's work and the following:

- (a) Complementary contributions by Becker (1965) and Muth (1966) that, like Reid (1934), took a production-theoretic view of household behaviour.
- (b) The characteristics-focused analysis of transportation choices set out in Quandt and Baumol (1966) and its extension by Baumol (1967) to the economics of retailing and marketing strategy.

- (c) The literature on ‘hedonic’ prices, which are estimated based on product characteristics.
- (d) Research that had begun to appear in marketing during the 1960s on multi-attribute models of consumer behaviour and on the uptake of new products.

(These connections were all explored slightly later, from a marketing standpoint, by Ratchford, 1975, in a paper that also refers to *NC&CB*.)

Such referees would also have expected that someone with the mathematical skills that Ironmonger displayed would show how his analysis related to slightly earlier formal work on utility trees and (additively) separable utility functions by Strotz (1957, 1959) and Gorman (1959) and Theil’s (1967, pp, 276–80) preference independence transformation (whereby independent marginal utilities of goods might be viewed as reflecting separate ‘wants’). Expert referees might have advised Ironmonger to try to obtain a copy of Gorman’s legendary mimeographed (1956a) paper, on measuring quality differences. This paper was well known long before it was formally published as Gorman (1980). It contains (*ibid.*, p. 844) a figure that represents linear consumption technologies with a piecewise efficiency frontier that anticipates the constraint side of Ironmonger’s and Lancaster’s models. To one segment of this frontier, there is a tangential indifference curve that makes the figure easy to mistake for one from Lancaster’s ‘new approach’.

### **3. Similarities and differences between Ironmonger's and Lancaster's contributions**

Ironmonger and Lancaster argue the case for taking a wants-/characteristics-based view of demand in much the same way, i.e., in relation to its ability readily to explain how consumers deal with new products and to explain patterns of substitution. Their arguments also apply in relation to quality improvements and new variants of existing generic classes of product. They both recognize that, when consumers choose between new and established commodities, they focus on what these commodities offer as means for producing utility. In their respective theories, a unit of a commodity is represented as a point in wants/characteristics space instead of being represented, as in traditional consumer theory, as a point on an axis in commodity space. Furthermore, like Gorman (1956a/1980), both Ironmonger and Lancaster model the technology of consumption as if it is linear, i.e., doubling the number of units of a commodity that one purchases is expected to double the amounts of each characteristic that one gets. This implies that efficiency frontiers for combinations of commodities will either be linear or consist of linear segments that are concave to the origin.

Because Ironmonger and Lancaster share the linear approach, they offer remarkably similar graphical depictions of efficient combinations that constrain the consumer's choice and of how changes in prices, income, and product quality change the consumer's feasible set. Otherwise, however, the analyses that Ironmonger and Lancaster proposed have major differences that result from their different methodological strategies.



*Ironmonger: measurement-inspired theory*

As we saw in Section 2, Ironmonger's way of thinking followed an NBER/institutionalist style – a style that is probably better termed as 'measurement before theorizing' rather than 'measurement without theory'. The role of his empirical work was not to test his theory but to provide clues about the kind of theory of consumer behaviour that one should construct to understand changing patterns of demand due to the introduction of new commodities. He did not test the analysis proposed in Part I because he constructed his theoretical perspective in the light of the findings reported in Part II. He thus knew that it was consistent with his empirical analysis.

Given the method that Ironmonger used, the theoretical contribution of *NC&CB* is best appreciated by reading Part II – the empirical chapters – first. When reading Part II, the key thing to appreciate is that he was conducting analysis of demand for generic commodities (e.g., canned food) rather than specific brand-level products (e.g., Heinz baked beans). Hence, when he explores the impact of changes in prices, his focus is on changes in relative index prices for broad categories of products, not on price changes of rival brands that might affect their relative within-market sales.

In essence, his empirical focus was similar to that of modern evolutionary economists who map changes through time in the popularity of a class of products that conform to a generic characterization rule. These trajectories usually trace S-shaped curves whereby adoption accelerate until an inflexion point is reached some time before popularity peaks, after which the number of users falls as consumers switch to more attractive new alternative means of meeting similar needs/wants. Ironmonger (1972, chapter 7) studied the duration of diffusion processes for 60 new commodities and found that it averaged about 60 years, far longer than we are used to for modern

consumer products. This was potentially a problem for him, as his data (from Stone *et al.*, 1954) for quantities, prices, and incomes only covered 19 years (1920–1938).

In chapter 8, he turned this problem into an opportunity by recognizing that he could use linear regression methods to model approximately the slopes of the parts of the trajectories for which he had data. Instead of graphing usage data against time, he constructed ‘lag-sequence graphs’ that map  $x_t$ , the number of units purchased in any year (on the vertical axis) against  $x_{t-1}$ , the number of units purchased the year before (on the horizontal axis). The points representing each pair of coordinates are marked on these graphs by their respective year and are joined by lines in temporal sequence. If demand for a product is essentially static, the  $x_t$  and  $x_{t-1}$  values will be nearly identical and focused around a point on a line drawn at 45-degrees from the origin. The product in question is then classified as ‘established’. A ‘new’ product will be one for which the set of points on its lag-sequence diagram are almost all above the 45-degree line, with the sequence of dated points normally moving rightwards but eventually tracking toward the 45-degree line as the diffusion process comes to an end. By contrast, an ‘outmoded’ product that is on the way out is one whose lag-sequence graph has points predominantly below the 45-degree line and tending to be closer to the origin as they pertain to more recent dates.

If the diffusion rate of a new product increases over a particular period, the line connecting the points for that period will bow away from the 45-degree line, whereas it will bow towards it if diffusion rate slows, and likewise for the lines linking points for an outmoded commodity if its pace of abandonment speeds up or slow down. In stylized form, the points on a lag-sequence graph for a product’s entire lifecycle will trace a crescent from the origin, above the 45-degree line and back to the 45-degree line in the adoption phase, with short movements in the vicinity of where that crescent ends

denoting that the product is 'established', followed by a crescent, below the 45-degree line, back to the origin, as the product falls out of favour.

Ironmonger attempted to classify commodities during the 1920–1938 period based on which of seven discrete commodity lifecycle stages they best fitted in terms of simple linear regression results. In other words, he recognized that the diffusion and phasing-out crescents can each be approximated as three linear segments, each of which would have a linear equation,  $x_t = a + bx_{t-1}$ , whose hypothetical coefficient values would differ as follows: for 'early new',  $a = 0, b > 1$ ; 'middle new',  $a > 0, b = 1$ ; 'late new',  $a > 0, b < 1$ ; 'early outmoded',  $a < 0, b > 1$ ; 'middle outmoded',  $a < 0, b = 1$ ; 'late outmoded',  $a > 0, b < 1$ . By contrast, 'established products' would not fit a linear equation, for their data points would simply be closely clustered around their mean value (in effect,  $a = \bar{x}_t, b = 0$ ). Based on this, Ironmonger augmented the analysis in his thesis (which had only been able to use Stone *et al.*, 1954) with data from Stone and Rowe (1966) to classify 113 commodities as new (50), established (42) or outmoded (21) in the period 1920–1938.

In chapter 10, Ironmonger attempts to ascertain the significance of diffusion effects, relative to changes in income and relative prices, as drivers of changes in the pattern of demand in the period covered by Stone *et al.*'s (1954) data. He does this for the 25 commodities whose data Stone had not grouped into budgetary categories. Eight of these commodities were ones whose data Ironmonger had depicted in chapter 8 in lag-sequence graphs. All these commodities were food, alcohol, or tobacco products.

As Ironmonger (1972, p. 167) noted, 'This sample is not a very promising set in the sense that it does not include many strikingly new commodities.' Indeed, the absence of consumer durables from this set may to a considerable degree account for him being able to conclude that, among his set, the consumption of 'new' and

‘outmoded’ products appeared to change significantly *regardless* of changes in income and relative price: the ability of British consumers in the interwar period to adopt luxuries such as radios and motor cars would have greatly depended on falls in the prices of these goods or increases in household income.

For ‘new’ and ‘outmoded’ commodities, the limited impacts of changes in prices and incomes on the consumption led Ironmonger to conduct regression analysis to see whether he could isolate diffusion processes by including ‘consumption lagged by one period’ as an independent variable and then examining in which circumstances the coefficients of the lagged consumption variable were significant. Here, he was taking seriously Nerlove and Addison’s (1958) contention that such a variable might signify lags in responses to changes in incomes and own-prices rather than diffusion effects. However, he found that adding a ‘previous period’s consumption’ variable when estimating demand equations for the 25 commodities only resulted in this variable being significant (at the five per cent level) in two cases: where consumption of new commodities in their early uptake phase was rising rapidly, and where consumption of outmoded commodities was falling rapidly. He took this as implying that this variable was a useful indicator of diffusion effects; moreover, adding this variable resulted in the regression equations having ‘income and own-price elasticities more in line with expectations’ (*NC&CB.*, p. 188) than if the variable were not included.

The theoretical analysis in Part I of the book thus needed to include diffusion effects, and this is what he offers as part of chapter 4. The logic of his thinking might have been clearer if his analysis of diffusion had been expanded into a separate chapter, located between his short initial review of the state of demand theory (chapter 1) and the two chapters (chapters 2 and 3) in which he develops his theory of how choices are

made once people have decided what they want and assessed their options via social learning and personal experimentation.

Certainly, his theoretical analysis of diffusion (pp. 77–81) is underdone. In a rare cross-reference to his empirical work, he notes that the diffusion trajectories that he presents in chapter 7 typically take a sigmoid form. Given this, he suggests that they could be modelled, using logistic or Gompertz functions, to characterize what he views as a growth of knowledge process that begins with some consumers become the first to buy new commodities after forming favourable assessments of the latter's want-satisfying capacities. Others observe this and then experiment by trying the new commodities, too, with their choice and favourable opinions leading yet others to experiment similarly, and so on.

If Ironmonger had invested more effort in turning his thesis into *NC&CB*, he could also have considered modelling sigmoid diffusion curves in terms of the integral log-normal function, which his Cambridge contemporary Andrew Bain (1964) had done when analysing the growth of television ownership in the UK; he did not bother to do this, despite adding a note on Bain's work in his chapter 6 review of previous empirical work on the demand for new commodities (see *NC&CB*, p. 128). He could also have invested effort in drawing a careful parallel between the diffusion of knowledge of new commodities and the processes by which contagious diseases spread. Surprisingly, the word 'epidemic' appears only in a footnote on page 78.

Another unfortunate omission in this area was his failure to find out what had been written in the marketing science literature about the uptake of new products. Had he bothered to do so, he could have discovered that his thinking can be viewed as a precursor not merely to the work of Rogers (1962) on the diffusion of innovations but also to a January 1969 paper by Frank Bass, originally drafted in 1966, that referred to

Bain's (1964) work on the uptake of televisions. As well as offering a 'conditional likelihood' model of diffusion (which became very widely used in marketing), Bass provided material on the diffusion of much more modern new commodities than were considered in Part II of *NC&CB*. (See Bass, 2004, for details of the origins and impact of what is widely referred to as the 'Bass model'.)

However, although Ironmonger's theoretical analysis of diffusion is briefer than one might expect from its coverage in Part II of the book and the emphasis that he gave to it when interviewed, it must be stressed that he does offer a formal analysis that is a precursor to modern evolutionary analysis of demand, whereas Lancaster's work does not deal with diffusion effects at all.

In the case of changes in consumption of 'established' commodities in his sample, Ironmonger (1972., p. 174) argues that they mostly resulted from changes in availability that depended on harvest outcomes, with consumption of the established commodities that did not experience fluctuations in availability remaining fairly stable regardless of price and income changes: for example, significant relative price changes for sugar and coffee did not seem to be associated with significant changes in consumption of either of these types of commodities in the sample period.

It was the 'established' commodities from which he inferred a key assumption for his theory, namely that wants are satiable (DSI2015). As real incomes grew, there came a point where consumers did not keep consuming more and more units of commodities that they had adopted previously; rather, they increased their spending on other commodities that helped them meet previously unmet wants. With this view in mind, Ironmonger built his model to represent consumers as if they rank their wants hierarchically, in order of priority, and choose as if they employ linear programming

methods to get as far along their list of wants as their budgets will permit without failing to meet targets for any of their more important wants.

This way of thinking has its roots in, particularly, Menger's ([1871] 1950) view of utility. It also overlapping with the 'hierarchy of needs' idea proposed by Maslow (1943, [1954] 1970) that Ironmonger did not becomes aware of until after *NC&CB* was published (DSI2015). However, it was Ironmonger who formalized it and who modelled it via linear programming. In essence, as he noted (*NC&CB*, p. 34), his linear programming approach was an adaptation of Stiglier's (1945) solution to the problem of finding the cheapest way to meet a set of minimum dietary requirements. (He might also have noted that a similar method had been used by Gorman, 1956b, for working out least-cost sets of food inputs to provide nutrition to farm animals.) However, in Ironmonger's analysis, linear programming solves the problem of finding the commodity (or commodity combination) that maximizes the number of wants that are satisfied in order of priority, subject to an spending constraint.

Ironmonger worked out his analysis just before Cyert and March (1963) portrayed firms rather similarly, with managers giving 'sequential attention to goals' rather than trading off objectives against each other. Cyert and March drew upon Simon's (1955) 'satisficing' view of managerial choices as entailing the pursuit of aspirations levels as a means of coping with uncertainty and limited cognitive capacity. Indeed, in their model, the emphasis on cognitive limitation resulted in managers not being presented as if they take a linear programming approach: focusing on the most important currently unmet aspiration could result in them making decisions that resulted in failures to continue to meet aspirations on which they had previously focused, leading them to seem to end up 'going round in circles'.

Unlike Simon, Ironmonger saw want satiation largely as a psychological or physiological phenomenon rather than as the consequence of people setting aspiration levels as a heuristic method for coping with bounded rationality. However, despite seemingly being unaware of Simon's ideas, it did not escape his attention that focusing on how to meet one's most important unmet need is cognitively much simpler than trading off wants against each other. His hierarchical view of wants readily accommodates the learning that consumers do – not merely about how much is enough in respect of a given want but also about which wants should be on their lists of priorities and where they should be ranked. Indeed, newly discovered wants can be slotted into an established stack of wants in much the same way that an extra card can be slotted into a hand or deck of cards.

Ironmonger's hierarchical perspective implies that individuals may not respond, or may respond discontinuously, to changes in market conditions. Clearly, if people tend to develop rather similar satiation or aspiration levels via social interaction, the adoption of new commodities could increase sharply as the latter's capacities to enable buyers to meet particular wants crossed popular thresholds. But Ironmonger had seen that, historically, diffusion effects seemed to last for decades. Hence, despite the emphasis in chapter 4 of *NC&CB* on the social side of diffusion processes, he ends that chapter by showing how market-level responses may be smoothed out insofar as consumers differ in their priorities and satiation levels.

*Lancaster: addressing theoretical lacunae within the marginalist research programme*

Unlike Ironmonger, Lancaster followed the Cowles Commission/Koopmans method of starting with a theoretical problem – in this case, a pair of related problems – which he then addressed by creating new combinations from his existing theoretical toolbox. The



first problem was that the prediction that the sign of the substitution effect is negative is the ‘only substantive result of consumer behaviour theory’ (Lancaster, 1966a, p. 132). The second was whether an axiomatic theory of choice could be constructed to cover situations in which the set of commodities is not fixed. In relation to the latter, he asserted that ‘Perhaps the most important aspects of consumer behavior relevant to an economy as complex as that of the United States are those of consumer reactions to new commodities...’, an area where the established approach is ‘particularly helpless’ (*ibid*, p.133). Its helplessness arises in the commodity-space analysis because the consumer needs either to be assumed to have preferences for new goods before someone invents them and entrepreneurs start supplying them, or to switch to a new utility function each time a new product appears, with the theory saying nothing about the nature of the switch and how it happens.

Having identified the latter issue, Lancaster made no attempt to obtain empirical clues for designing a more plausible theory. Unlike Ironmonger (1972, pp. 128–9), Lancaster did not even bother to spice up his analysis with a dash of Schumpeterian thinking about the role of innovation as a key driver of economic development. As a result of not operating as Ironmonger did, Lancaster merely saw new commodities as implying a need to adapt conventional theoretical tools to show a way of presenting the adoption of new products and rejection of existing ones via comparative static equilibrium analysis.

Lancaster therefore wrote as if consumers adopt new products as soon as it becomes efficient for them to adopt them, given their income, the set of relative prices and their given preferences for characteristics. He theorizes as if there are no lags associated with consumers taking time to become aware of products, learn how to characterize them and develop a sense of how much they want of newly available

characteristics and how important it is for them to have them. Aside from the shift from commodity space to characteristics space, Lancaster's 'new approach' is completely orthodox. His (1966a) model, and much of his subsequent work, portrays consumers as (to use Ironmonger's phrase) 'infinitesimal calculators' (DSI2015) who trade off characteristics against each other in terms of utility functions that display continuously diminishing marginal rates of substitution between characteristics. Such utility functions preclude the satiation that Ironmonger inferred from his lag-sequence graphs.

Lancaster (1966a, p. 155) closed his analysis with a set of substitution-related predictions, but he did not attempt to test them. He seems to have viewed his role merely as a theorist who had realized that economists (himself included: see *ibid.*, p. 132) had sliced away one layer too far with Occam's razor and needed to introduce an extra layer in consumer theory between goods and utility. Having shown how this could be done, he left it to others to test his new analysis. However, in his first book-length treatment of his 'new' approach, Lancaster (1971) attempted to offer some empirical window-dressing by showing that car manufacturers were not offering ant products that were dominated on all dimensions, including cheapness.

#### *Ironmonger's review of Lancaster's (1971) book*

After having opted in *NC&CB* not to discuss Lancaster's analysis, Ironmonger was given a second chance to do so via an invitation to review Lancaster's (1971) book. This time, he took up the opportunity. He was not impressed with Lancaster's empirical window-dressing, saying (Ironmonger, 1975, p. 213) that, 'Just when the book begins to arouse interest it ends on a rather disappointing example of the characteristics of 22 different models of cars in the United States in 1969.' The 'interesting' aspect to which Ironmonger alluded appears to be that, towards the end of the book, Lancaster had

briefly considered the possibility that some consumers may have hierarchical preferences over characteristics. However, in relation to this, Ironmonger merely notes gently (without explicitly referring to his own hierarchical approach to preferences) that although Lancaster does acknowledge the possibility of hierarchical preferences, he mostly presents a trade-off-based view of preferences.

Ironmonger's restraint is surprising, for he does explicitly refer to *NC&CB* elsewhere in the review. When he does so, the main point he makes is that Lancaster sees the characteristics that interest consumers as being those that are objective and measurable. If so, consumers will characterize a given product in the same way. He points out that, by contrast, in *NC&CB*, he allows for some aspects of the consumption technology to be objective but for others to be 'determined by the consumer's subjective valuation of these characteristics' (Ironmonger, 1975, p. 212). But here, too, readers are left to reflect on the significance the point that Ironmonger makes. He does not accuse Lancaster of taking an objectivist view of commodities as a means of sidestepping the growth of knowledge problem that *NC&CB* begins to tackle via a contagion-based perspective on how consumers acquire knowledge.

#### *Lancaster's perspective on hierarchical wants*

Lancaster soon returned to the possibility of hierarchical preferences for characteristics, first in an essay (Lancaster, 1972) for a festschrift for Lionel Robbins, and then in a paper written for a marketing audience in which he even outlined Ironmonger's perspective (Lancaster, 1976, pp. 8–9 of the electronic version). In the latter, he claimed that, despite its different assumptive structure, Ironmonger's model 'generates results similar to those of Lancaster (1966[a], 1971)'. However, this is not always the case, and the differences can be significant.

Consider, for example, the uptake of battery-electric vehicles (BEVs) in the early 2020s. The key non-price downsides to owning a BEV are its short range and long recharging time compared with the time it takes to refuel vehicles that are powered by internal combustion engines. From Lancaster's standpoint, consumers may be expected to be willing to put up with these shortcomings, to get the benefits of BEV ownership, so long as BEV prices fall to levels that ensure BEVs dominate traditional vehicles in terms of overall value for money. However, from Ironmonger's standpoint, consumers may be expected to resist buying BEVs until the market offers them BEVs that they view both as cheap enough and as having ranges that are long enough, with recharging times that are fast enough, *regardless* of how well BEVs perform in other respects. Even when BEVs become cheap enough, consumers will still hold back from switching to them if the ranges of those that are now affordable remain smaller than what they want and/or recharging remains too slow. Making such vehicles even cheaper does not solve the problem that there are limits to the compromises they are prepared to make as the cost of giving up using cars with internal combustion engines. It is such 'limits' that Ironmonger's linear programming approach readily captures.

Lancaster (1976) also attempted to deflect interest from Ironmonger's work by suggesting that, to the extent that consumers seem not to consider all their wants simultaneously, it is better to think of them as having preference systems that are compartmentalized into groups of characteristics that pertain to particular types of products (e.g., food, clothing), rather as in Strotz's (1957, 1959) notion of a utility tree. Lancaster contended that, within each group, consumers make trade-offs in the conventional manner.

To Lancaster, it was questionable that the consumer focuses on one characteristic at a time, in order of priority. However, this seems to misunderstand what

may commonly be going on within a hierarchical choice process. In considering whether adopting a new commodity will enable us to meet, or get closer to meeting, the most important unmet want on our current list, we may indeed begin with that question. If the answer is in the affirmative, and if excitement at the prospect of now being able to meet that want does not get in the way of further thought, we will then check that success in meeting that want is not achieved at the cost of not satisfying more basic wants that we can already meet. From an Ironmonger-style perspective, our choice may be consistent with a formal model that treats it as a lexicographic process with satiation levels for each want, even though we begin where the choice process is supposed to end. That is a perfectly logical place to begin, for if the new commodity does not better serve our most important unmet want, there is no need then to consider its capacity to meet our more basic wants unless it is cheaper than our existing means of meeting them.

Lancaster's (1976) paper is noteworthy in relation to poor proof-reading, an issue that Ironmonger (1975, p. 213) had noted in his review of Lancaster's (1971) book. In the reference list of Lancaster's (1976) paper it occurs in a way that would doubtless see as a 'Freudian slips' by anyone who harbours suspicions that Lancaster had somehow plagiarized the characteristics perspective from Ironmonger's thesis: two of Lancaster's self-citations are listed there as being authored by D.S. Ironmonger!

As readers may have already inferred from Section 2 of this paper, viewing Ironmonger's thesis at first hand revealed that Lancaster never read it and thus should not be suspected of having developed his theory by plagiarizing parts of the thesis. It is of course possible that Lancaster heard about Ironmonger's doctoral work via a third party, such as one of Ironmonger's examiners or mentors. However, it has been shown here that, although the similarities between the ideas of Ironmonger and Lancaster are at times striking, so, too, the differences between them. The implication seems to be that

Lancaster worked out his ‘new approach’ completely unaware of what Ironmonger had written. We are not able to say whether he did so after reading Gorman’s (1956a) then-unpublished paper and seeing the opportunity for elaborating on it.

#### **4. Reception**

Ironmonger’s view that some commodity characteristics are subjective, and that people differ in how they construe what a give commodity has to offer, is consistent with the different ways in which reviewers characterize new books. It also implies scope for divergence between how an author construes his or her work and how others see it. We mustered eleven reviews of *NC&CB* and they have left us with the impression that the reviewers were typically taking the view – or thought that the readers of their reviewers would take the view – that what counts in a newly published contribution to economic knowledge is the extent to which it enhances the capabilities of researchers to make further contributions, not its heritage value within the history of economic thought. If so, Ironmonger’s strategy of making minimal revisions to his thesis was a grave mistake and what he should have done was invest time in demonstrating that his approach had more to offer than the related work of scholars such as Lancaster that had appeared after he wrote his thesis.

Such a view of the prospects of *NC&CB* is implied in Cowling’s (1973) review in the *Journal of Economic Literature*. He presents a clear description of the book’s key lines of thought and empirical results, noting that he found the empirical work in the final three chapters ‘fascinating’ though not strongly tied to the theoretical material. His key reservations were the lack of attention to the impact of advertising and to how consumers deal with uncertainty. The latter reservation is also the main one raised by

Admiral (1973) in his review in *De Economist* (which Google lucidly translates from Dutch to English).

Cowling (1973, p. 1419) says that, in its original thesis form, Ironmonger's work represented a 'major step forward in a relatively undeveloped area of economic analysis which was potentially of great importance'. However, he then argues that Ironmonger's failure 'to compare his theoretical models with the work of others who have followed ... or [with] subsequent empirical analysis ... is a great pity' as the book's theoretical framework is much more rigorous than frameworks used in subsequent empirical work on product quality. In other words, Cowling's concern is that book will fail to have the impact it should have because Ironmonger seemed to have presumed that the book's usefulness relative to the existing literature would be self-evident. This was a strange mistake for Ironmonger to have made, given his emphasis on the subjectivity of some of the qualities of commodities.

The review that had the biggest potential to ensure that the significance of *NC&CB* was properly understood appeared in the *Journal of Political Economy*. It was significant not merely because of the journal's wide readership but also because it was a substantial joint review of Lancaster (1971) and *NC&CB* that sought to set these works in the context of related literature. The review's author, Mark Nerlove, became a long-term Ironmonger devotee and contributed to the festschrift edited by Hoa (2005). However, through no fault of Nerlove, the review was not published until 1975, and the delay would have helped Lancaster to consolidate his first-mover advantages via his earlier papers becoming more widely known.

Nerlove's review is lucid and carefully details most of the differences between the analyses offered by Ironmonger and Lancaster. Unfortunately, it suffers from a spectacular omission that could have resulted in the misapprehension that their two

theories are essentially the same (a theme introduced at the start of Nerlove's review), deterring those who were aware of, or familiar with, Lancaster's articles from bothering to read *NC&CB*. This omission occurs at precisely the point where Nerlove (1975, p. 1088) begins to consider how the two books diverge, where he should have explained that Ironmonger took a hierarchical view of preferences, with want satiation, and modelled via linear programming, whereas Lancaster worked with a view based on characteristic trade-offs with non-satiation, modelled via calculus. Nerlove misses this crucial difference and instead jumps forward to examine their different ways of dealing with the aggregation problem that arises for both approaches.

No such mistake is made in the short review in *Economica* by Graham Pyatt, who judges *NC&CB* to be 'significant'. He outlines very clearly Ironmonger's theory of choice and how it differs from Lancaster's analysis, commenting that Ironmonger's approach is more testable due to being more restrictive. However, despite Pyatt having been a Cambridge PhD contemporary of Ironmonger, it then becomes evident that he was unaware of the role that the book's empirical chapters played in Ironmonger's original thinking. He writes that 'Part II is ... a comprehensive treatment of new commodities and as such deserves attention. Unfortunately Ironmonger *draws little more from his theory* than a rational[e] for logistic type growth and grounds for using lagged consumption as an explanatory variable in time-series analysis' (Pyatt, 1974, p. 101, emphasis added).

The review in the *Economic Journal* by Prais almost avoids such a back-to-front misapprehension. Prais (1973, p. 578) initially recommends that Part II, the empirical analysis, is best read first. Next, he, too, clearly outlines the essence of Ironmonger's want-based theory. However, just as we might start thinking that the work that Prais did in Cambridge in the DAE either side of his time in Chicago insulated him from



absorbing the Koopmans doctrine on economic method, he slips into Cowles-style thinking, warning readers that ‘in the empirical section of this book, this approach is not followed through’ (*ibid*, , p. 579) with the result that Ironmonger’s theory is left as a ‘conceptual tool having applications in closely definite circumstances.’ It appears that Prais then forgot to read chapter 4 of the book, for he uses most of the remainder of his review to suggest, as an alternative to Ironmonger’s priorities-based choice model, that the uptake of new commodities might be understood via sigmoid models of how disease spread – despite Ironmonger having proposed this in chapter 4.

The *De Economist* review by Admiral (1973) is somewhat like the review by Prais, in that it begins by considering Part II of *NC&CB* – albeit without advocating that Part II should be read first – and because he, too, seemed to have failed to notice Ironmonger’s growth of knowledge perspective. Yet his emphasis on the book’s mechanistic view of choice and its failure to embrace ambiguity and uncertainty is well aimed in relation to the analysis in chapters 2 and 3. Related sentiments are expressed by Murphy (1974) in his review in the *Economic Record*. Like Admiral, Murphy judges Part II of *NC&CB* very favourably. However, he laments that the theory presented in Part I is ‘totally mathematical with no mention of the psychology of consumer behaviour’. While Murphy accepts that Ironmonger is no different from economists in general in not taking account of the impact of psychological factors on choice, he argues that these factors are significant, and that Ironmonger has gone as far as is possible without taking account of them.

The only thoroughly hostile review that we found in a generalist economics journal was that of Bernard (1975), in French, in *Review Économique*. When deconstructed, his sentiments and demolition strategy can be taken as signifying that he is a die-hard enthusiast for the Hicksian goods-space approach to demand.

First, he castigates Ironmonger, not merely for not taking account of related theoretical and empirical contributions from the 1960s, but also for not even taking account of key contributions from the 1950s. Here, Bernard refers to Hicks's (1956) *Revision of Demand Theory*. This seems to be something of a smokescreen tactic, given that, like Hicks's work in the 1930s, the *Revision* does not address the theoretical challenges associated with new commodities (or quality/specification/model changes for established commodities).

Next, Bernard makes what may be called a 'holier than thou' move: he attempts to show his openness to issues pertaining to new commodities by pointing out a range of questions that Ironmonger does not consider, such as the roles of advertising and strengths of brand names, the costs faced by those who switch to new commodities, and how the 'newness' of products affects perceptions of them and the process by which they are chosen. Finally, he expresses doubts about the possibility of quantifying subjective wants and finds it outrageous that Ironmonger (1972, p. 104) had dared to present the choice of cheese as being based purely on knowledge of its nutritional characteristics.

Given the extent to which new food and beverage products figure in *NC&CB*, it is not surprising that the publisher succeeded in getting the book reviewed in the *Journal of Agricultural Economics* (Jones, 1974) and the *American Journal of Agricultural Economics* (Prato, 1973). In the former, Jones initially praises how Ironmonger manages to incorporate both fixed and variable costs of consumption into his theoretical analysis. This review ends with a short paragraph in which, in a rather tongue-in-cheek manner, Jones suggests that the empirical chapters provide a good introduction to the kind of work that can be done but that Ironmonger has provided opportunities for further research via his 'admirable lack of urgency in the quest for

recent data for empirical analysis'. However, the bulk of Jones's review is concerned with the rationality of basing choices on hierarchically-ordered wants – an issue that we expected would raise the hackles of other reviewers of the book – and whether analysts would even be able to imagine a long enough list of wants to account for the great number of commodities that people come to consume as their affluence increases.

By contrast, Prato's review helpfully begins by noting the key difference that Nerlove omitted to signal in his review, namely Ironmonger's linear programming view versus Lancaster's trade-off-based view of choice. However, Prato disputes Ironmonger's suggestion that priority-based choices will tend to produce different behaviour from those based on trade-offs mainly at low levels of income. Hence, even when modelling choices in affluent economies, one should not merely assign arbitrary priority rankings. Later, when outlining Ironmonger's empirical contribution, Prato also takes issue with Ironmonger's view that his regressions provide evidence of diffusion effects rather than lagged adjustments to changes in prices and incomes or a combination of both diffusion and lagged adjustments. But despite these concerns, Prato's review of Ironmonger's 'fresh approach' ends on a generally positive note, saying that one cannot deny that consumers do have priorities and welcoming the idea that diffusion effects should be modelled rather than being left buried in residuals.

Finally, it is noteworthy that two of our set of reviews of *NC&CB* were written by leading marketing scientists. The review in the *Journal of Marketing Research* was co-authored by John Howard, one of the greatest consumer behaviour researchers in the history of marketing. It carries the headline 'Outdated, Flawed, Useful'. Howard and Jagpal (1975) begin by saying that practical marketers will probably find the book disappointing due to its failure to take account of research from that previous decade on new commodities. Despite referring to Lancaster (1966a) as taking a similar theoretical

approach, Howard and Jajpal explain very clearly that Ironmonger's analysis is built around a hierarchy of wants and envisages a growth of knowledge process whereby new wants may be recognized and incorporated into the consumer's hierarchy. They then register their disappointment that the book does not offer analysis of how new wants come to be prioritized or what determines satiation levels. Like Cowling (1973) and Admiral (1973), they emphasize that Ironmonger's model of choice does not take account of uncertainty: in effect, they view the growth of knowledge process as being presented as taking the consumer from complete ignorance of some want-satisfying features to a full appreciation of them in a step-like manner that takes place for different consumers at different times.

When Howard and Jajpal consider Ironmonger's analysis of how diffusion effects may be modelled, they highlight a problem in his analysis in relation to consumer durables, for 'buyers' of such products only purchase them infrequently. Consequently, rather than seeing his contagion perspective as a precursor to the work of Bass (1969), they use this technical slip as a basis for referring to the Bass model as the way to avoid the problem. Finally, when they consider Part II, they raise a technical issue in relation to the appropriate econometric treatment of serial correlation with lagged dependent variables when sample sizes are small. They end up suggesting, as in the review by Prato but via reference to Nerlove and Addison (1958), that Ironmonger's lagged consumption variables may simply imply different short-run and long-run responses rather than a diffusion effect – whereas Nerlove (1975, p. 1089) himself noted at the end of his own review that he found Ironmonger's interpretation of lagged consumption variables 'quite convincing' if not definitive.

We have already quoted (near the end of Section 2) from the closing words of the short review in the *Journal of the Royal Statistical Society, Series A (General)* by

Andrew Ehrenberg (1974), who in the 1970s was arguably the UK's most eminent marketing scholar. Like some of the other reviewers, he notes there that the theoretical part of *NC&CB* is poorly connected to the empirical part. However, his review centres on Ironmonger's failure to update his thesis, which he suggests should have been done in a way that incorporated relevant work in marketing (including that by Howard). Ehrenberg judged that this would not have been a huge task and hence saw Ironmonger's failure to undertake it as a signal that Ironmonger did not view his work as sufficiently important to make that effort worthwhile to ensure its success.

Implied in Ehrenberg's reaction is the importance of understanding the heuristics by which prospective customers assess the qualities of commodities. It is a question that *NC&CB* does not address, despite its recognition that aspects of commodities are personal constructs. It is a question that Ironmonger would have been wise to have considered in the book and to have been more mindful of in relation to what it was necessary for him to do in turning his thesis into a book and positioning it so that it would be well received by its potential readers.

## **5. Impact**

The reviewers' characterizations of *NC&CB* did not bode particularly well for its uptake as a source in research on consumer behaviour. Even so, it has managed to attract interest from heterodox economists who have taken seriously the idea of hierarchical decision-making (though they may have initially encountered the idea elsewhere) and who see changing patterns of demand as being driven in large part by social processes.

If we use Google Scholar citation counts as the widest-ranging indicator of the book's impact, its score after nearly fifty years (as of 4 April 2022) is a respectable 309. This tally is, of course, something of an understatement, for even Google Scholar is

prone not to capture citations in books and papers that have not been digitized in text-based forms: for example, it fails to record citations in Earl (1983) and Stoneman (1978, 1983). However, the count for *NC&CB* is far larger than the tallies achieved by the PhD-based books by Ironmonger's contemporary demand-focused Cambridge doctoral students, Cramer (1962), Bain (1964, and Pyatt (1964), whose respective Google Scholar citation counts were 64, 88 and 110. (The count for Bain's book is surprisingly poor given that it is one of only 13 works cited in Bass, 1969, which Google Scholar listed by the same date as having achieved 10,652 citations.)

The Google Scholar score for *NC&CB* is like those achieved by subsequent books that have attempted to offer a view of consumer behaviour that emphasizes the significance of hierarchical wants and whose authors made two attempts at doing so while addressing the issue of uncertainty and/or psychological aspects of choice. We are referring here (with Google Scholar scores in square brackets) to pairs of books by Earl (1983 [356], 1986 [334]) and Lutz and Lux (1979 [291], 1988 [385]), with the former pair augmenting Ironmonger's subjectivist view via extensive use of personal construct psychology and the latter pair making extensive use of Maslow's ([1954] 1970) hierarchy of needs. Both these pairs of books lacked the mathematical treatment that should have given *NC&CB* a better chance with mainstream readers, so it is less surprising that, like *NC&CB*, they have rarely been cited in mainstream economics journals.

The annual citation figures (available via Ironmonger's Google Scholar profile from 1984 onward) reveal that *NC&CB* continues to be used by small numbers of scholars, even if university libraries are not retaining their copies. (For example, the copy that this paper's corresponding author purchased in 2020 had been disposed of by

the library at the University of Bristol.) The book’s maximum annual citation count of 20 was in 2017 and the second-highest score of 16 was recorded in 2009.

The list of those who have cited the book includes some influential contributors to heterodox approaches to economics, notably Marc Lavoie in Post Keynesian economics and Ulrich Witt in evolutionary economics, both of whom have cited it several times. However, detailed analysis of citations (available on request from the corresponding author of this paper) reveals that *NC&CB* has barely permeated mainstream economics. This is despite it having been swiftly cited in the survey article co-authored by Ironmonger’s PhD supervisor Alan Brown (Brown and Deaton, 1972) and despite Nerlove’s (1975) long and positive review article on *NC&CB* and Lancaster’s (1971) book in the *Journal of Political Economy*.

**Table 1: Impact as Measured by Google Scholar Citation Scores**

	Ironmonger (1972)	Lancaster (1966a)	Lancaster (1971)
Total Google Scholar Citations (as of 4 April 2022)	309	15508	3408
Citation total (and author) of the most-cited work that cited it	1689 (M. Lavoie)	15660 (A. Sen)	41237 (A. Charnes, W.W. Cooper and E. Rhodes)
Citation total (and author) of the 10 <sup>th</sup> most-cited work that cited it	281 (D. Starkie)	5603 (T. Jackson)	4207 (J. Roback)
Citation total (and author) of the 100 <sup>th</sup> most-cited work that cited it	16 (L.D. Taylor, tied with U. Witt))	797 (J. L. Lusk, J. Roosen and J. A. Fox)	396 (N. Lichfield)

The book’s citations would have been far greater if economists had acted on Nerlove’s recommendation that it and Lancaster (1971) should be viewed as

complements rather than substitutes. However, Table 1 reveals its impact to be insignificant relative to the impact of Lancaster's work on the characteristics-based view of demand. The score for Lancaster's (1966a) paper marks it out as deserving the adjective 'seminal' despite the characteristics-based view of consumer demand being rarely covered in undergraduate microeconomics textbooks (one exception is Ferguson, P., Ferguson, G. and Rothschild, 1993; another is Earl, 1995, which also covers the priority-based version – albeit without any reference to *NC&CB* despite it being referred to in Earl, 1983, 1986). Even Lancaster's (1971) book trounces the impact of Ironmonger's work eleven times over.

In Section 4, we began trying to understand the fate of *NC&CB* in a reflexive manner by considering how it was characterized as a new commodity. This reflexive perspective can be taken further by applying Ironmonger's views on diffusion to the uptake of contributions to knowledge. Table 1 also provides some clues about how we might try to view the relative use of *NC&CB* and the rival works of Lancaster from this standpoint. In addition to Lancaster winning vastly more citations than Ironmonger, the citation rates of works that cited Lancaster were far higher than those that cited Ironmonger. This would have made it more likely that Lancaster's works would be discovered by scholars who worked their way back to primary sources from works that cited works that referred to works that cited Lancaster's contributions.

This genealogy-like approach of working back to primary sources was a crucial aspect of the process leading to citations in the era prior to the age of online indexing: in that era, the probability of a contribution being read, applied, and cited would have been shaped by the frequency with which scholars saw it being referenced. But the frequency of citation in highly cited work continues to matter as a determinant of whether a work gets discovered insofar as online search algorithms use such measures as a basis for



ordering search results. Works with smaller citation impacts will come up on later pages of search results and thus have a smaller probability of being noticed by time-pressed researchers. Ironmonger had few initial carriers for his book, and the average impact of these carriers was an order of magnitude less than those who cited Lancaster.

Much of this difference comes down to Lancaster being cited far more often in top-tier journals that are more widely read and cited than the journals that cited Ironmonger's book. Although the top 10 works to cite Lancaster (1966a) only include one journal article, that article (Rosen, 1974), in the *Journal of Political Economy*, has 14,428 citations listed, over three times as many as the total for all the 92 articles among the 200-most cited works to cite *NC&CB*. With Lancaster being widely cited within mainstream economics articles as the person who had solved the problem of incorporating new/improved products and non-price competition into demand theory, *NC&CB* had little chance of attracting the attention of mainstream economists. Even if they did come across it and looked inside, their established way of thinking would tend to inoculate them against Ironmonger's hierarchical view of preferences, given that Lancaster's solution had avoided such a departure.

Finally, it is worth noting that the significance of being the first to publish a new approach in a mainstream, generalist journal is indicated by the fate of work by Quandt and Baumol (1966). They worked out a non-hierarchical characteristics-based model of choice at the same times as Lancaster but did so in the context of transportation choices and published it in the *Journal of Regional Science*. Its citation score, like that for *NC&CB*, was trounced by that of Lancaster (1966a), despite Baumol (1967) swiftly applying it to the economics of product differentiation and retailing in an article in the *Journal of Political Economy*. Both papers acknowledged Lancaster's parallel contribution, which beat Quandt and Baumol (1966) into print by only a month.

However, eclipsed though it was by Lancaster's paper, even Quandt and Baumol's paper has been more frequently cited than *NC&CB*. Its 4 April 2022 Google Scholar count was 430.

## 6. Conclusion

Although Ironmonger and Lancaster were both well established researchers when they published the works on which this paper has focused, the contrasting impacts of their respective contributions offers lessons for today's early-career researchers. The PhD thesis on which *New Commodities and Consumer Behaviour* is based was a bold contribution to economic knowledge that blended original thinking with a technical approach to theory and measurement. Its technical aspects, which included the use of linear programming techniques that were then gaining popularity within economics, gave it potential to have a much bigger impact with mainstream economists than has been achieved by any subsequent attempts to offer a dynamic, hierarchical approach to consumer theory. However, the impact of Ironmonger's contribution fell far short of its potential and of what Lancaster achieved via his far less innovative work.

A plausible way of making sense of this is by viewing academic economists as satisficing agents who have limited aspirations regarding empirical content, and whose discovery and citation processes are driven by their browsing habits, cross-referencing by others, source availability, and pressure from referees. When such academics were trying to make sense of the process by which new commodities get adopted, Lancaster's (1966a) model would likely have seemed good enough, and there were two key reasons why (a) they would discover it and judge it as such before they discovered *NC&CB* and (b) referees would not push them to cite *NC&CB*.

The first reason is that Lancaster had a first-mover advantage by publishing six years before Ironmonger. Early-career researchers need to appreciate, that they should publish their doctoral findings without delay. This matters in academic publishing because referees are not omniscient and hence there is no guarantee that referees will ensure due reference is made to the work of those who pioneer a contribution to knowledge but publish it after a somewhat similar contribution that someone else worked out and published in the interim. This applies even if the first-mover contribution is somewhat inferior to the one that was conceived first. Refereeing processes have, for the past fifty years, almost entirely failed to ensure that those who cite Lancaster also cite Ironmonger, let alone that they consider the implications of differences in the approaches Ironmonger and Lancaster.

The second reason is that Lancaster (1966a, 1966b) published his ‘new approach’ initially in articles in widely read, top-tier journals, not in a book. Early-career researchers should follow Lancaster’s strategy as far as they can. Upper-tier journals will be more readily available than monographs in academic libraries, as well as to holders of personal subscriptions. Moreover, published versions of papers can be supplements via copyright-dodging working papers and preprints. When it comes to availability and the probability of referee awareness, Lancaster’s (1966a, 1966b) articles completely trounce *NC&CB*. Although publishing separate articles makes it more problematic to exploit complementarities between one’s contributions, self-citing cross-referencing can help promote one’s work in the years before one then integrates it into a book.

Economics could have evolved differently if, in the early 1960s, Ironmonger had been an early-career academic rather than a public servant and had appreciated the impact that the positioning and placement of a new academic commodity can have on

its impact. Suppose he had turned the core of his thesis into two or three articles and managed to get them published (ideally in top US journals) immediately after his PhD had been awarded (or even while it was in process): if so, 1972 would then not have been too late for him to publish a book titled *New Commodities and Consumer Behavior* (writing it in American English might also have helped win readers in the United States). In the book that should have been published, he could have updated his statistical work, carefully explained his methodological approach, surveyed related literature that had appeared in economics and marketing during the 1960s on the demand for new commodities, and addressed the reactions of anyone who argued the case for adapting his framework out of his linear programming approach and into a marginalist trade-off treatment.

If this scenario had eventuated and mainstream economists had embraced Ironmonger's analysis, microeconomics textbooks of the 1970s might have followed the Baumol's (1972, chapter 5) approach of introducing students to linear programming as a tool of economic analysis. Baumol himself could have used Ironmonger's model to show how linear programming was relevant in demand analysis – rather than not even bothering to present Lancaster's characteristics-space model and merely providing students with a commodity-space analysis in which cummerbunds were traded off against servings of zabaglione.

### **Acknowledgement**

We are most grateful to Duncan Ironmonger for his time and responses when interviewed in 2015, and to Tim Wakeley and two anonymous referees for their very helpful comments on earlier versions of this paper. However, the usual disclaimer applies.

## Declaration of Interest Statement

The authors have no conflicts of interest to declare in relation to this paper.

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