

Rising to Menger's challenge: A look back on 15 years of "Learning to Consume"

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Abstract. This paper reviews emerging themes in the body of literature that investigates the long run evolution of consumption using the Learning To Consume (LTC) framework (Witt 2001). This approach rises to 'Menger's challenge' of examining the underlying needs of consumers and the learning process through which consumers discover how goods satisfy these needs. Using this framework, research has uncovered important evidence about how slowdowns in demand growth, caused by the satiation of the underlying needs, influence the growth trajectory of industries and can contribute to creating the conditions in which new innovations emerge. It also delivers some insights into how the seemingly insatiable nature of consumption growth is closely linked to the way in which economic conditions have shaped demand. In particular, it highlights how rising income, technological progress and market competition may trigger important changes in both the underlying set of needs that consumers possess and how they learn to satisfy these needs. Critical methodological issues and open questions are also identified and discussed.

Keywords: learning, consumption, needs, endogenous tastes

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“The task of our age is to establish the interconnections between all fields of science and to unify their most important principles... We believe that scholars in the various fields of science can never lose sight of this common goal of their endeavors without causing damage to their research.”¹

- Carl Menger, Introduction, Principles of Economics, 1848.

1. Introduction

Two centuries of continuous economic growth since the industrial revolution have raised living standards and fundamentally transformed consumer lifestyles in Western economies (Lebergott 1993, de Vries 2008). A combination of rising household income and technological progress has delivered both the financial capacity and the technical know-how through which a wide variety of new goods have populated the consumption basket (Saviotti 1996). Yet, as Keynes noted, this begs the question: will consumption always continue expand in the same manner as it has in done in the previous two centuries (Keynes 1933)? Contemporary macroeconomic models typically assume via Say’s Law that any extra income generated by increases in the productive capacity will be converted into increases in demand *ad infinitum* (Stiglitz 2008). The growing recognition that current consumption levels in the West are unsustainable add more urgency to studying the underlying factors driving its expansion (Jackson et al. 2004).

This paper focuses on how some preliminary answers to this question can be found in the progress that has been made studying long run trends in demand using the Learning to Consume (henceforth LTC) approach (Witt 2001). This approach rises to ‘Menger’s challenge’ of examining how the use of goods relates to the underlying needs possessed by consumers, and the learning process by which they come to discover, and subsequently demand, goods that satisfy these needs. It does so by borrowing certain well-established insights about the nature of human needs and learning from neighbouring disciplines, such as psychology and biology. It thereby seeks to connect demand analysis more closely with research undertaken in these disciplines.

Several new insights have emerged in the LTC-related literature about what type of industries tend to experience demand satiation where slowdowns in the growth rate of

¹ “Die Aufgabe unserer Zeit (ist) den Zusammenhang aller Wissenschaften und die Einheit ihrer höchsten Principien festzustellen...Nie werden, so glauben wir, die Forscher auf den verschiedenen Gebieten der Wissenschaft dies gemeinsame Endziel ihrer Bestrebungen ohne Nachtheil aus dem Auge verlieren...”

demand negatively affect the growth trajectories of markets and industries. Moreover, this research also highlights how demand side learning can play an important role in enabling innovations to emerge that stimulate renewed growth in satiated markets. While many of such innovations do originate from entrepreneurial, others tend to originate from consumers discovering new uses for existing goods, what we dub ‘functional mutations.’ Moreover, this body of work has highlighted the precise manner in which the character of demand and tendency for consumers to accumulate knowledge is influenced by a number of economic, social and technological forces which affect the set of needs that drive consumption and the manner in which agents learn to satisfy these needs. We also assess the methodological coherence of LTC and highlight some open questions that are left unanswered.

The paper is structured as follows. Section 2 discusses how a needs-based approach to consumption may help deliver new insights into demand and the role it plays in economic evolution. Section 3 sets out the LTC approach and the various different types of needs that can contribute to the long run growth of consumption expenditure. Section 4 reviews emerging themes in the research that has used the LTC approach to undertake historical case studies and empirical investigations of household consumption. Section 5 discusses the methodological benefits and pitfalls of this approach, as well the broad picture about how household spending patterns coevolve with economic growth. Section 6 concludes.

2. Background

Several decades of empirical research in applied demand leave little doubt that rising household income stimulate dramatic shifts in the composition of household consumption patterns (e.g. Houthakker 1957, Clements et al. 2006). Yet an appropriate theoretical account of what drives these changes is still lacking. The spending behaviour of an entire population is typically modelled using a representative agent approach in which income and price are the sole explanatory variables (Deaton and Muelbauer 1980). Consumer tastes are also assumed to be relatively homogenous across the population and are fixed over time (Stigler and Becker 1977, Swann 2002). Such models do not perform well as they fail to explain most of the observed variation in household consumption behaviour (Lewbel 2008). As Deaton and Muellbauer stated over thirty years ago: “influences other than current prices and current total expenditure must be systematically modelled if even the broad pattern of demand is to be explained in a theoretically coherent and empirically robust way” (Deaton and Muellbauer 1980). Some of the challenges faced here include how to account for the heterogeneity in

spending patterns (Houthakker 1992, Lewbel 2008) and how to account for the manner in which tastes may be endogenously shaped by income and market conditions (Bowles 1998, Calvet and Common 2003).

The character of contemporary demand has also been a topic of ongoing interest in Evolutionary Economics (Anderson 2007). The overarching aim of this literature is to develop a more realistic account of how long run economic growth is an unfolding learning process through which entrepreneurs, firms, consumers, and entire societies accumulate knowledge (Hayek 1937, Dosi 1982, Nelson and Winter 1982, Loasby 1999, Dopfer et al. 2004). Many scholars argue that a comprehensive understanding of the endogenous nature of growth must cover how the demand been transformed through a combination of rising household income and the variety of goods available on markets (Pasinetti 1981, Saviotti and Pyka 2008, Ciarli et al. 2010). Some examples of how the demand side is discussed in Evolutionary Economics include:

- I. **Micro:** In terms of innovations, the demand-side forms the selection environment for new innovations (Rogers 1962). In addition, the knowledge and creativity of highly specialized consumers can also play in the emergence of new innovations role in co-developing novel products and services (e.g. Hippel 2005, van den Ende and Dolfsma 2005). These contrasting roles beg the question: why do consumers exhibit relatively passive, routine-driven behavior in some circumstances but act in creative, active fashion in other cases?
- II. **Meso:** On the industry level, the diverse nature of consumer preferences and the associated presence of niche markets can play a critical role in influencing how competition between firms fosters the emergence of dominant designs and technological trajectories within an industry (Saviotti 1996, Bresnahan and Gambardella 1998, Lipsey et al. 2005, Guerzoni 2010, Malerba et al. 2007).
- III. **Macro:** The industrial composition of the economy tends to undergo important structural changes that can affect unemployment and the income distribution. Many scholars posit that the non-homothetic nature of consumer demand plays an important role in driving these changes (Pasinetti 1981, Aoki and Yoshikawa 2002, Metcalfe et al 2006, Bertola et al. 2006, Pyka and Saviotti 2008, Ciarli et al. 2010).

A central theme in this discourse is a wish to break new ground in understanding how consumer tastes are neither fixed nor homogenous. Rather, tastes seem to be subject to change according to how consumers learn in a boundedly rational way (Nelson and Consoli 2010) and are open to the influences of social and commercial environments (Aversi et al. 1999, Babutsidze 2011, Valente 2012). As Schumpeter himself recognized, understanding the precise magnitude and nature of how such external influences shape consumer tastes ultimately deliver important insights into how market-based capitalist economies grow in a self-perpetuating fashion (Jonsson 1994).

Here an ongoing critique of these contemporary efforts is that they heavily rely on the notion of bounded rationality which delivers an incomplete picture of consumer behavior. Humans possess the ability to be creative and insightfully tackle problems that are directly relevant to the discovery of new knowledge (Bianchi 2002, Vromen 2003). As much as consumers do exhibit relatively rule-bound and passive behavior in many instances (Foxall 1990), in other cases behavior is mainly driven by unbounded and insightful thinking (Anderson 2000). Thus even if consumer demand is endogenously influenced by economic processes, this does not necessarily imply such behavior is unreflective. Indeed market competition processes, by offering detailed information and aiding the relative comparison of goods available in markets may function to stimulate insightful learning (as will be discussed below). The key to progress on this issue is to recognize that different modes of behavior coexist (e.g. Hayek 1960, Gigerenzer et al. 1999, Witt 2001, Kahneman 2003) and to identify how agents may transition between modes and the different circumstances in which each of these modes tend to dominate (Brenner 1999, Lades 2014).

2.1 Menger's Challenge: a needs-based approach

To really understand the market value of goods, it is necessary to first understand how consumers come to discover their usefulness (Nützlichkeit). This proposition was made by Carl Menger in the *Principles of Economics* (1871). Instead of beginning his analysis with a specified utility function in which the set of alternatives and associated payoffs are assumed to be known to agents, he begins with a consideration of the set of needs that consumers seek to satisfy and the subsequent learning process through which they come to associate goods

with the satisfaction of these needs.² This provides a better understanding of the context in which consumption take place and sheds light on how this behavior is more akin to a trial-and-error discovery process rather than a static optimization problem. What is and what is not a good is not fixed as things can lose their ‘goods characteristics’ over time as consumers learn about how to satisfy their wants (Menger 1871:56, Ruprecht 2002). The strength of such associations between needs and goods may thereby change over time and influence markets.

This approach enables scholars to usefully disaggregate consumption activities into separate domains and to consider how the specific character of needs working in these domains may influence the character of demand growth (Georgescu-Roegen 1954, Lavoie 1992, Chai and Moneta 2012). John Maynard Keynes (1933), for example, specified the existence of two types of needs: absolute needs and relative needs. He argued that satisfaction of the latter is linked to a desire for superiority over others, which implies that demand related to this need that may indeed be insatiable. Absolute needs, on the other hand, are satiable and Keynes argued that within a hundred years economic growth will reach level at which such needs will be sufficiently satisfied to the extent that further energies will be devoted to non-economic purposes (Keynes 1933). Irrespective of why this prediction was wrong, Keynes’ narrative highlights the usefulness of considering the nature of needs for thinking about how consumption pattern will evolve as the economy continues to grow.

More recently, several types of needs schemas have been developed in humanistic psychology (e.g. Maslow 1943, Galtung 1980, Max-Neef 1991) and have been used to assess consumption patterns (Jackson and Marks 1999) and evaluate the quality of life (Costanza et al. 2007). These approaches suffer from two shortcomings. First, the needs postulated to exist appear to be relatively subjective in nature and specific to certain cultural paradigms, such as the need for self-determination (Jackson and Marks 1999). This subjectivity poses a challenge to researchers as it is difficult to discern precisely what types of goods and services are used in the satisfaction of such a need. In contrast, earlier drive theories of motivation attempted to explain human behavior as being related to a limited number of objectively identifiable primary reinforcers whose effects can be observed in the laboratory. For example, Hull (1943) argued that all behavior is ultimately based on four primary drives: hunger, thirst, sex, and the avoidance of pain.

² Before Menger, discussing the needs of consumers was quite common among classical economists such as Adam Smith (Chai and Moneta 2010).

A second drawback of humanistic needs schemas is that they presume the set of needs that drive the long run growth of consumption to be constant, preexisting and independent of the socio-economic context of consumption. In that sense, the notion of fixed and exogenous preferences reenters through the back door. This is because the broad pattern of change in consumption behavior that takes place as consumers become more affluent is pre-determined by the hypothesized hierarchy of needs. In other words, the consumer's preferences may be non-homothetic in the sense that as income rises, the type of needs she seeks to satisfy will change, though the manner in which these needs will change is essentially fixed. In that sense, these approaches not only assume that all consumers possess the same set of needs, but also that the income effects on consumption expenditure are identical across the population of consumers. Put differently, the preferences of any two consumers with the same initial income level will alter in an identical fashion in light of some increase in income, irrespective of the individuals' own experiences.

3. Learning To Consume

LTC is a theoretical framework for the formation of preferences from a contemporary, interdisciplinary perspective. To create a more dynamic view of this process that avoids the subjectivity of needs theorizing (discussed in the previous section), LTC borrows key insights from biology and psychology about motivations underlying human behavior and how humans learn. These insights indicate that not all needs are the same: rather there are important differences in terms of how universally shared they are, the extent to which they are stable over time, and the extent to which social influences and individual may autonomously influence them. Taking into account these varying characteristics turns out to be quite useful in explaining how consumption grows, as discussed in the next section. This section will decompose needs into three types: basic needs (fixed, universally shared), acquired wants (subject to some change, not universally shared) and cognitive motivations (subject to fast changes and highly unique). Insights into how the perception of pleasures and pains trigger and guide behaviour found in psychology is used to develop a naturalistic version of the concept of needs (see section 3.1). This effort is driven by the recognition that the utility function underpinning demand theory represents an oversimplified 19th view of how pleasures and pains guide behavior (Witt 2005).

Beyond the pleasures and pains, another set of consumption motivations derive from the human capacity to learn (see section 3.2 and 3.3). Similar to dual process theory

(Gigerenzer 1999, Kahneman 2003), LTC posits that agents possess two type of learning modes (cognitive and non-cognitive learning) through which agents come to possess acquired wants and cognitive concerns, respectively. These learning modes coexist because the enlargement of human brain capacity did not evolve in a way in which there was a smooth substitution of more advanced learning mechanisms for more primitive ones (Flinn 1997:33, Sartorius 2003). Rather, development was sticky: more advanced mechanisms emerged to complement older mechanisms. Thus the consumer specialisation process (discussed in 3.3) highlights how these different coexisting modes by which consumers learn and how these may interact.

3.1 Basic needs

Basic needs are the innate biological drivers of consumption, which are fixed and universally shared by agents due to human biological evolution. They are triggered by hedonic sensations (pleasure and pain) which evolved to guide behavior and enhance the probability survival (Rolls 2002, Damasio 2003). These sensations guide behavior by encouraging (rewarding) or discouraging (punishing) certain behavior that elicit these sensations. Table 1 provides some of examples of ‘primary reinforcers’ which have been experimentally proven to deliver somatic value and thereby encourage or discourage associated behavior.

Some –but not all- of these sensations are related to internal homeostatic mechanisms that require the organism to regularly consume inputs in order to ensure survival. This includes the need for a stable temperature, adequate amounts of water, sleep, nutrition, oxygen, and so on. Lades (2013) models the extent to which a basic want i motivates consumption in category j at some point in time t is function of the need deprivation level:

$$v(\theta_{i,t}, p_{i,t} \cdot c_{i,t}) = f(\theta_{i,t} - p_{i,t} \cdot c_{i,t})$$

Where $\theta_{i,t}$ is the complete satiation level and $p_{i,t} \cdot c_{i,t}$ represents expenditure on the good as a product of prices $p_{i,t}$ and quantities $c_{i,t}$. Citing the matching law, Lades argues that the share of income dedicated to each need is a function of how much its motivational value is relative to the sum of all motivational value across all needs $v(\theta_{i,t}) / \sum_{n=1}^N v(\theta_{i,t})$. Lades develops a demand functions for goods in which demand is dependent on the relative deprivation of the need and the usual budget constraint (Lades 2013:1022).

Within this model there are two main ways through which rising income can impact the how strongly certain needs motivate consumption. Some needs may be harder to satiate than other in that $\partial(\theta_{i,t} - p_{i,t} \cdot c_{i,t})/\partial(c_{i,t} \cdot)$ may vary across needs. As a result, major changes in the structure of composition may emerge as consumers with growing incomes eventually spend a growing share of their incomes on hard to satiate needs. Secondly, similar to Keynes' notion of relative needs, Cordes (2009) and Lades (2013) suggest that for certain socially-orientated needs, rising income can influence $\theta_{i,t}$ such that affluent consumers are driven to consume more in order to attain social esteem (see *inter alia* Frank 1985, Hopkins and Kornienko 2004). Thus as income rises and social peer become affluent, so too does the amount expenditure needed to satisfy this need (Charles et al. 2009; Heffetz 2011;Kaus 2013a).

Other primary reinforcers are linked to the external sensory (rather than social) environment. This includes odours and novel stimuli (see table 1). This begs the question of how the consumer's external sensory environment co-evolved with economic growth, thereby exposing consumers to reinforcing stimuli and generating new types of demand. Urbanization, for example, exposed consumers to crowded, smelly and polluted cities that triggered a new demand for the temporary avoidance of such stimuli through recreational travel (Chai 2007). The grime and dirtiness associated with urban environments, together with the emergence of germ theory, also contributed towards creating new social norm governing the cleanliness of household living environments (Mokyr 2000, Woersdorfer 2010a). In terms of rewarding reinforcers, new information and communication technologies such as books, the radio and the internet has transformed the breadth and quality of novel and entertaining stimuli that consumers can access and learn about (Scitovsky 1976, Chai 2011).

3.2 Acquired wants

Non-cognitive learning is the classical conditioning process that can influence what consumers like and dislike (Skinner 1953). This mode of learning describes situations where consumers appear to be 'uninvolved' and 'uncommitted' whilst consuming (Foxall 1990:14). In such circumstances, it is unlikely that consumers undertake thoughtful, comparative evaluations of choices. Foxall cites studies of how nutrition information is used where it has been found that "the vast majority of consumers neither use nor comprehend nutrition information in arriving at food purchase examples," (ibid). Furthermore, consumers have been observed to consider only a subset of choices, not engage in information about the product available to them, and only use restricted price information.

An important feature of this process is that the set of things which deliver reinforcement can themselves also change with experience. Specifically, secondary reinforcers are formerly neutral stimuli whose repeated pairing with primary reinforcers results in them exerting a reinforcing effect in their own right (Anderson 2000:39). Thus through such learning “acquired wants” emerge that are neither universally shared, nor are they fixed. Consequently, it is possible to construct a taxonomy of goods according to the type of reinforcement that they were originally associated with (Alhadeff 1982:16). In the economy, many advertising strategies are based on encouraging consumers to like good by forming associations between products and reinforcement (Stuart and Shimp 1987). Through this process consumers can thereby acquire likes and dislikes that are unique to their particular learning history. Lades (2014) elaborates how acquired wants may be linked to impulsive consumption behavior (see also Laibson 2001, Bernheim and Rangel 200).

3.3 Cognitive motivations

Another type of consumption motivation is a product of cognitive learning where agents are engaged in a problem-solving sequence of activities, the outcome of which is principally determined by the agent’s intellectual functioning and the way they process information (Howard 1983, Earl 1986). Outcomes depend on the creative capacity of agents to analyze open-ended situations, gain insights and find appropriate courses of actions (Hergenhahn and Olson 1997:263). In many instances consumers develop strategies for consumption that are based on developing complementarities between different consumption domains and their identity (Earl 1986, Earl 1998).

An outcome of this learning is the adoption of higher order goods which serve to transform lower order goods. As Menger observed, the accumulation of scientific and technological knowledge in the course of economic growth has generated a new class of goods which are ‘indirect’ – i.e. they do not directly satisfy needs themselves, but are used as inputs into a transformation process which results in the production of final goods and the cognitive learning process associated with these methods (Loasby 2001). Witt (2001) posits that the much of the long term growth in consumption is due to the increase of such goods which are not subject to satiation. – there is no natural limit on how many higher order goods agents utilize in the process through which they satisfy needs. Rather, this type of demand depends how much they know and their willingness to experiment and modify consumption activities.

This begs the question: what determines the degree to which consumers cognitively learn and discover new knowledge about consumption acts? This has attracted much interest in a new generation of scholars using multi-agent modelling techniques to study learning dynamics and its economic implications (e.g. Babutsidze 2011; Valente 2012). Witt argues that the acquired wants of a consumer may influence cognitive learning since consumers tend to collect information and develop highly differentiated knowledge about the technological and aesthetic details of things they like (Witt 2001:35). Moreover, cognitive learning may also influence non-cognitive learning as consumer knowledge may enable a consumer to enjoy new experiences through which acquired wants may emerge (Witt 2001:36). This interaction between learning modes can result in a specialisation process through which both what consumers know and what they like becomes more refined. Some cognitive concerns that have been studied in the case studies include: Concerns about obesity (Ruprecht 2005, Manig 2010); environmental concerns (Bünstorf and Cordes 2008, Woersdorfer and Kaus 2011), the desire for a consistent self-image (Lades 2014).

4. Emerging themes

A close look at growth trajectories for any given market throughout history reveals that they are rarely ever linear or constant (Kindelberger 1989). Rather, growth tends to take place in a discontinuous fashion in which periods of intense acceleration are mixed together with gradual slowdowns. This section highlights some key themes that have emerged from a number of historical case studies that adopted the LTC approach to examine in detail the manner in which consumption has grown in a particular domain (Table 1 provides a broad overview of these). As a whole, they shed light on some of the demand side factors that may contribute to acceleration and slowdowns in the growth rate of different markets and industries.

4.1 Demand Satiation

A prominent theme in these case studies is that the growth of demand for goods closely relates to the satisfaction of needs which is naturally subject to periodic slowdowns— what we label *demand satiation*: per capita quantity consumption of a good (with a fixed set of characteristics) ceases to rise beyond a particular level even as household income continues to grow and the price of goods tends to fall. This implies $\theta_{i,t} - p_{i,t} \cdot c_{i,t} = 0$ and represents a growth bottleneck. The key point made by many of these case studies is that these slowdowns in demand reflect changes in individual preferences that take place precisely because

suppliers have fully satisfied the underlying needs that originally motivated increases in consumption growth. As a result of demand satiation, markets may potentially stagnate as further gains in income tend to be redirected towards the satisfaction of other needs. In this way, demand satiation contributed to setting the market environment in which a new phase of accelerated growth and product innovations may emerge (as will be discussed in the next section). Several other scholars have noted the important role that critical thresholds in the consumer's demand for certain characteristics play in industry evolution (Lancaster 1971; Christensen 1997, Adner et al 2001, Windrum 2005).

The most prominent example of demand satiation is the case of food consumption used to satisfy the need for hunger (Ruprecht 2005; Manig 2010). Amongst the world's poorest, food spending typically represents over half of total household expenditure (Banerjee and Duflo 2007). As households become more affluent, it has been widely observed that their budget share spending on food tends to decline as household income grows (Clements and Chen 1996; Chai and Moneta 2010). In a case study of the growing demand for food sweeteners among Western economies, Ruprecht (2005) highlighted how per capita sugar consumption, measured in terms of calories consumed is typically subject to strong slowdowns in the 20th century (see Figure below). Throughout the Western developed world, the consumption of sweeteners did not rise above 1,000 calories per capita per day. This slowdown takes place even though household income grew substantially and the actual price of sugar consistently fell throughout the 20th century. Ruprecht argues that this slowdown reflects the fact that as growing income enabled consumers to increase the total number of calories consumed to increase, this demand for additional calories will fall since their need for calories has been satiated. As such, it is a good example of how the evolved biological nature of humans that have partially shaped human needs has important implications for the growth rate and structure of economic systems which have emerged to serve these needs.

Figure 1 about HERE

Moneta and Manig (2014) provide more evidence for satiation in food consumption. In their cross-sectional empirical investigation of contemporary Russian food spending patterns, the authors examine the relationship between calorie consumption and income (see *inter alia* Bouis and Haddad 1992). They find that average calories spent by the household per week tends to flatten out at about 2,857 calories per day. After reaching this level, their results indicate that increasing income appears to stimulate close to no increases in average calories

consumed (See Figure below 2). It should be noted that while average household calorie consumption is flat, there is substantial variation around this average. This indicates that some households do in fact continue to increase their calorie consumption well beyond the average satiation level.³

FIGURE 2 ABOUT HERE

Beyond food, is satiation observed among other types of goods? Several case studies confirm the existence of demand satiation in a wide range of goods that satisfy a diverse set of needs, including the spending on alcohol (Volland 2012), washing machines (Woersdorfer 2010b) and shoes (Frenzel Baudisch 2006). Each of these studies identified periods in which the characteristics of the good in question was relatively stable and demand growth was dramatically slow in spite of both falling prices and rising household incomes. For example, Frenzel Baudisch(2006) examined U.S. shoe spending between 1955 and 2002 and found strong evidence that footwear spending exhibited satiation between 1955 and 1970 (see Left-hand side in Figure 3 below). Although footwear spending accelerated quickly after 1970s, this was preceded by several decades in which the growth of consumption spending on footwear was relatively stagnant. In this period, demand satiation occurred at a spending level where the average consumer purchased about three pairs of shoes per year. The budget share of footwear spending was declining, which implies that footwear was a necessity – rather than a luxury good (see right-hand side Figure 3 below). The author reasoned that the slowdown in the growth rate of demand was due to functional satiation (Frenzel Baudisch 2006). It was only after the 1970s that shoes were used to signal status and more specialized types of shoes, such as athletic shoes, started to be consumed *en masse* by US households (discussed in the next section).

FIGURE 3 ABOUT HERE

Other studies have sought empirical evidence for the satiation hypothesis by investigating the shape of Engel curves using data on household expenditure (Kaus 2013; Chai and Moneta

³ In addition, it should be noted that making inferences of about individual behaviour from such Engel curves assumes that the aggregation process does not substantially influence the shape of Engel curves. There also exist many other potential determinants that influence the shape of Engel curves, such as how consumers change the manner in which they learn from their peers as they become more affluent (Cordes 2009).

2014; Moneta and Chai 2014; see also Bruns and Moneta in this issue). It should be noted that some of expenditure categories used here tend to be aggregated across goods with different characteristics. Moreover, the satiation hypothesis describes slowdowns in the *quantity* of goods consumed, whilst expenditure data includes both price and quantity effects. In spite of this, several of the empirical findings appear to support the conjectures made in the case studies. For example, consistent with Ruprecht's finding of satiation in sugar consumption, the Engel curve for sugar expenditure among British households displays a clear downward trend and a tendency to become flatter between 1974 and 2001 (see Figure 4 below). This implies that the income elasticity for sugar is trending towards zero over time. Similarly flat Engel curves that exhibit downward trends over time were uncovered for several food items such as beef, milk, tobacco and fish (Chai and Moneta 2014). Examining an even broader range of expenditure categories, Moneta and Chai (2014) found that such flat and stable Engel curves (consistent with the satiation hypothesis) tend to be more pronounced in goods relative to services.

FIGURE 4 ABOUT HERE

However, it would be misleading to conclude that it occurs consistently across *all* consumption domains. Several consumption domains exhibit exponential growth rates where no evidence for demand satiation was found. Indeed, a key lesson is that demand satiation is not observable where:

- i) innovations are frequent (e.g. radio and television),
- ii) the underlying need is difficult to satiate (e.g. status goods)
- iii) The goods are higher order in nature (e.g. services)

i) is supported by finding in Bils and Klenow (2001b, see Figure 5), while for iii) Moneta and Chai (2014) observed that many services are higher order in nature and their Engel curves have a relatively lower tendency to exhibit flat lines at high income levels. ii) is supported by the empirical work examining visible spending (Charles et al. 2009, Heffetz 2011, Kaus 2013a, see Figure 5).

FIGURE 5 ABOUT HERE

4.2 Escaping satiation

If demand satiation is periodically present in some markets, how are these conditions typically overcome, if at all? The case studies deliver evidence about how demand side learning can help foster such a transition into renewed phases of growth. In the following, we broadly distinguish between the supply side novelty resulting from entrepreneurial efforts that manifest in the production of goods (e.g. product innovations) and that novelty which results from the creative effort of consumers and manifests in how the good is used to satisfy their needs (Bianchi 1998, Swann 2002). While the former usually results in changes in the physical characteristics in the good during production, the latter may not feature any change to its characteristics but rather a change in the underlying domain in which it is used. We dub these demand side innovation changes as “functional mutations”.⁴

The case studies highlight functional mutations in the case of shoes (Frenzel Baudisch 2006), food (Manig 2006) and seaside resorts (Chai 2007). For example, in the case of U.S. shoe consumption (Frenzel Baudisch 2006), the 1980s witnessed a remarkable acceleration in per capita shoe spending that coincided with the variety of shoes available on the market. Frenzel Baudisch argues this occurred because a shoe was no longer just a shoe: these goods were no longer consumed merely for the sake of comfort. Rather, consumers began to use these to as a way to signal their social status to other consumers. As reflected in Run DMC’s 1986 chart-topping track “My Adidas”, athletic shoes began to be used by urban U.S. youths to signal their group affiliation (Cunningham 2008). A shoe turned into a local communication device which helped consumers signal to others information about the individual’s identity and values. In subsequent years, U.S. spending has experienced a new phase of growth and registered trademarks related to shoes grew.

In the case of food consumption, many studies have pointed out that in spite of slowdowns in the quantity of food consumption, total spending on food nevertheless continues to rise with income (Manig and Moneta 2009; Chai and Moneta 2014). Manig (2010) argues that one explanation for this is that food consumption is an activity which has increasingly come to be associated with other needs beyond the need for nourishment. Rather it is also used as a

⁴ Of course, supply side innovations in the characteristics of goods may also stimulate changes in manner in which good is used to satisfy needs (discussed below). However, one of the main points made by many case studies is that phases of renewed market growth can occur even in the absence of supply side innovations.

stimulant to help consumers relieve boredom and stimulate cognitive arousal (see also Abramson and Stinson 1977; Scitovsky 1976). Increasingly affluent consumers no longer tend to eat food just because they are hungry: they eat food because they enjoy the novelty of exotic ingredients that food can deliver. This insight explains why there exists a growing demand for variety in food consumption (Thiele and Weiss 2003). Moreover, if this demand tends to grow with income as consumers seek more cognitive arousal, this suggests that affluent consumers demand more variety than poor consumers. In this regard, Manig and Moneta (2014) provide evidence from Russian food spending patterns that increases in food spending by wealthy consumers is related to needs other than the need for nutrition, as reflected in change in consumer's willingness to pay for high quality food.

In other cases, satiation conditions have been overcome as a direct result of supply side innovation strategies. The case studies highlight how successful innovations are effective by altering the underlying relationship between the good and the types of needs that they serve. This can happen in three specific ways:

- I. **Appeal to other needs.** Product innovations can alter the physical characteristics of the good such that the good appeals to a wider range of needs (Christensen 1997). For example, Witt and Woersdorfer (2011) studied the evolution of washing machine characteristics as found in advertising which revealed that characteristics of washing machines were initially designed to deliver clean were later modified reduce the time required to undertake washing and require less physical effort. Chai (2007) discussed how the characteristics of British inland and seaside resorts slowly evolved between the 17th and 19th centuries to appeal to wider range of recreational needs through the construction of new entertainment infrastructure such as pleasure pier, a promenading area, and the staging of shows (Walton 2000:95).
- II. **Delay satiation.** Ruprecht (2005) showed that by replacing sugar in food with newly developed artificial sweeteners, food producers reduced the marginal impact that consuming certain foods made toward reaching the daily calorie limit. This enabled a decline in the marginal contribution that consuming each unit of food makes towards reaching satiation level – i.e. $\partial(\theta_{i,t} - p_{i,t} \cdot c_{i,t})/\partial(c_{i,t} \cdot)$. Consumers are thereby able consumers more food items before reaching the satiation level.

III. **Shift satiation.** The satiation level for some needs may be subject to influence from social factors (Cordes 2009a, Lades 2012). Woersdorfer (2010a) studied the evolving demand for cleanliness in clothing and the home environment in Western economies was not the outcome of individual learning but rather strongly governed by social norms which determined the extent to which agent's sought clean clothing and home environments. As these social these norms evolved, so too did the consumer demand for clean materials and tools (Woersdorfer 2010a).

Some preliminary empirical evidence consistent with the notion of satiation-escape can be found by studying the co-movement of between the Engel Curves' satiation level and the average income level of the household population (Moneta and Chai 2014). If indeed a slowdown in demand takes place as household income rises and stimulates entrepreneurs to innovate and improve the quality of the goods, this should trigger an upward shift in the satiation level of consumption. One can therefore hypothesize that there exist co-movements between the satiation level of consumption and the average income. Evidence for such upward co-movements was found in some expenditure categories including: leisure services, travel services, household goods (See Figure 6 below taken from Moneta and Chai 2014).

FIGURE 6 ABOUT HERE

4.3 What fosters specialisation?

If demand-side learning dynamics can be an important source of novelty and market growth, a crucial question is what factors that may accelerate or inhibit the rate at which the consumers accumulate knowledge and develop preferences in a particular consumption domain. These case studies highlight a number of such factors:

I. **Availability of knowledge:** the extent to which agents can store and access information aids cognitive learning (Flinn 1997:36, Mokyr 2002). Technological breakthroughs such as the invention of the printing press, the radio, television, and the internet have with little doubt fostered consumers specialize processes and the emergence of consumer subcultures (DeFleur and Ball-Rokeach 1989:26). For example, Chai (2011) studies how the growing popularity of novel and Romanticist

literature featuring authors such as Goethe and Wordsworth was responsible for triggering a strong interest in visiting European regions such as the Swiss Alps or Thuringian forest that were previously considered barren, forsaken and desolate regions.

- II. **Social Norms & experts:** Consumer learning is guided by the social rules and conventions surrounding how knowledge is accepted and legitimized (McCloskey and Klamer 1995, Mokyr 2002). Social Experts feature prominently here, especially in consumption domains in which goods are increasingly complex (i.e. credence goods) (Earl and Potts 2002, Dulleck et al. 2006). Their advice can actively encourage or discourage consumer learning. For example, Ruprecht (2005) highlights how nutritionists played a key role in promoting the unhealthy consequences of sugar consumption, which encouraged consumers to adopt artificial sweeteners. Similarly, public information campaigns played an important role in encouraging the use of washing machines (Mokyr 2000, Woersdorfer 2010a) and discouraging alcohol consumption in post-war Germany (Volland 2012).

- III. **Modularity of goods:** The extent to which consumer may experiment and customize goods encourages cognitive learning (Langlois and Cosgel 1998, Langlois 2001). The invention and innovation of the mountain bike in the early 1970s provides a illustrative example (Buenstorf, 2003). A group of consumers initially engaged in competitive downhill races, using what they called “clunkers”: homemade bicycles assembled from a variety of components found mostly in basements and junkyards. Later they also mounted derailleur gearshifts to their bicycles and began to ride cross-country in addition to only racing downhill. An important part of the learning process was the ability to modify and change key design features of the mountain bike, including frame geometry, gearshift with thumb shifters, cantilever brakes (see also Hippel 2005).

- IV. **Markets.** Markets are a higher order tool that emerged in the course of economic development to better satisfy the consumer needs (Menger 1950:57). They are a collection of formal and informal institutions that form the basis for exchange and provide information to consumers about the characteristics of goods, how they work and perform relative to other available goods (Swedberg 1994, Loasby 1999).

Suppliers also attain information about which goods consumers are useful and how they perform relative to competitor's goods. Through facilitating this interaction, markets serve as coordination mechanism for the production of knowledge and its distribution across producers and consumers (Hayek 1937, Potts 2001). This distribution may swing towards relatively more knowledge and skills being accumulated by consumers when performance-orientated competition takes place that results in the emergence of goods that requires specific know-how, such as how to operate an SLR camera (Windrum 2005). In other instances, this coordination process may result in 'unlearning' by consumers as they are inclined to adopt more convenient goods that appeal to multiple needs and require less effort and knowledge on their part (e.g. frozen meals, fully packaged tourism, see Chai 2007).

5. Discussion

From methodological perspective, some drawbacks from employing the LTC approach can be observed. Firstly, due an inability to empirically measure the influence of needs, it is not possible to know with full certainty which needs motivate a particular act of consumption. Conclusions can only be reached through developing informed conjectures based on scientific knowledge about the nature of need and carefully studying the behaviour of consumers. More effort needs to be made to develop an empirical methodology that can uncover the underlying forces driving observed expenditure patterns (see for example Barigozzi and Moneta 2011, Chai and Moneta 2012).

Second, the case studies show that many of characteristics of needs are highly domain-specific in nature. This raises the question: how possible is to make generalisations about needs that apply to all consumption domains? The consumption of food, for example is linked to an internal homeostatic mechanism where food is constantly required to preserve the basic functioning of the organism. The same can not be said for other needs, such as the need for cognitive arousal. This need for cognitive arousal can also be satisfied by eating and drinking and its temporal ability to motivate consumption acts to some degree also depends on how deprived other needs are (Parker and Tavassoli 2000). In contrast, the want for food does not depend in the same way on how deprived consumers are of cognitive arousal.

Third, the inability to represent these complex set of ideas as a set of reduced-form equations may render it too complex for some to accept. Compared to the traditional approaches, the LTC approach is less tractable. Even when scholars take care in thoroughly investigating all

primary historical sources and market data, it is difficult to discern what behaviour is driven by cognitive rather than non-cognitive learning processes. Moreover, the ability to identify the relationship between good and the needs that they serve rests on current scientific knowledge about the nature of needs and the consumer's learning patterns. As far as this scientific knowledge is itself fallible and subject to change, so too are the theories based upon these insights.

Nevertheless, these costs must always be weighed against the benefits that the LTC approach delivers. These benefits are substantial. From a methodological perspective, the LTC approach conceives of consumer learning as not some rationalization of what scholars would like learning to be (e.g. Becker 1976). Rather, it is based on decades of scientific research. While parsimonious models have their advantages and place in modelling how short-term and changes in consumer demand that result from marginal changes in price and income, such theory does not offer any insights into what happens to consumption when large, non-marginal changes in income (Prais 1953). Efforts to formally model such long run changes in demand inevitably introduce more complex representations of consumer demand that feature lexicographic preference systems (Bertola et al. 2006).

Moreover, as highlighted in the previous section, the needs based approach can usefully contribute to several open questions, including:

- 1) modelling the presence of thresholds in the characteristics space (see Wadman 2000, Ruprecht 2002);
- 2) understanding the process driving the emergence of niche markets and heterogeneous preferences that can influence industry evolution (Frenzel Baudisch 2007);
- 3) the nature of demand drive structural change (Moneta and Chai 2014);
- 4) when and how consumer expertise develop and how they can contribute to the emergence of innovations (Buenstorf 2003, Babutsidze 2011);
- 5) the nature of welfare (see Satorious 2003, Binder 2010, Schubert 2012)
- 6) developing a more appropriate method for aggregating household and industry data (Chai and Moneta 2012);
- 7) what account for observed differences in income elasticities across different goods (Cordes 2009, Lades 2013, Kaus 2013b).

The case studies also deliver some general insights into the how precisely consumption patterns have expanded and evolved in the course of economic history and their seemingly

insatiable nature. First they reinforce the observation that since the industrial revolution, the underlying needs that drive consumption tends to rapidly change as consumers become more affluent (Scitovsky 1976, Lebergott 1993, Frank 1999). An increasingly smaller proportion of household spending on the satisfaction of basic needs that are linked to human survival, (such food spending) while an increasing proportion of spending is dedicated to goods related to harder to satiate needs, such as social status or cognitive arousal.

In addition, these case studies suggest that knowledge-based demand linked to the cognitive concerns possessed by consumers is a prominent part of contemporary household demand. Such demand that is based on ideas rather than underlying needs is likely to be relatively less stable since ideas are subjective in nature and subject to change via learning. Goods and entire markets related to knowledge-driven demand may thus be rendered obsolete at relatively faster rate than traditional goods and industries serving basic needs because of the way in which the consumer knowledge base can rapidly change. In addition, the growing predominance of knowledge-driven demand may account for the rising demand of services that customize lower order goods in accordance with the consumer specific preferences (Gallouj and Weinstein 1997). Future growth in demand will also be shaped to a much greater extent by the factors that guide cognitive learning, such as social norms, the availability of knowledge, as well as the consumer's own self-image (Earl 1998, Lades 2014).

Furthermore, given that the consumption knowledge is uniquely dependent on the consumer's own set of personal experiences and beliefs, the growing predominance of knowledge-driven demand may help account for why household spending patterns appear to be increasingly indeterminate in nature. There is a well established positive relationship between income and the amount of heterogeneity observed in spending patterns (Chai et al 2014): the residual, unexplained differences in household spending tend to increase at higher income level, as reflected in the heteroscedastic nature of Engel curves (Prais 1953). Houthakker (1992) argues that this variation is likely the outcome that needs of wealthy consumers are becoming increasingly specialized and reflects the growing amount of discretionary power that consumers when their basic needs are satisfied. This suggests that not only will standard representative agent models of demand continue to perform badly in accounting for demand (as reflected in their goodness-of-fit), rather they will perform *worse* as income continues to rise and enables a greater degree of knowledge-driven demand to emerge.

This body of work also highlights various ways in which demand is endogenously influenced by economic conditions and market institutions. First, due to the satiable nature of basic needs, the growth of household income has contributed to important changes in the type of needs that drive consumption. Second, the cognitive learning process has been dramatically enhanced by new technologies for storing and sharing information (Chai 2011), social role models (Frenzel Baudsich 2007, Cordes 2009), social norms (Woersdorfer 2010a) and the modularity of goods (Buenstorf 2003). Third, it is likely that producer advertising also has the potential to generate acquired wants via associatory learning in which products are repeatedly associated with appealing basic reinforcers (e.g. very beautiful people). The experimental evidence makes it hard not to conclude that suppliers, under the certain conditions, possess some capacity to generate acquired wants that motivate spending (Stuart and Shimp 1987). This capacity is however limited by the fact that acquired wants are subject to extinction over time and the manner in which they motivate behaviour is complex (Berridge et al. 2009).

In light of this endogenous nature, an important open question is what implications this has for the extent to which consumers can be considered to be autonomous and possess controlling power over their behavior (Rothenberg 1965:269). It may be tempting to conclude that behavior which is endogenously determined implies agents have little control over their actions. This is particularly evident in the literature discussing how to achieve sustainability in consumption, where there is general pessimism about the extent to which sustainable consumption patterns will emerge on their own accord. Current consumption patterns appear to be 'locked in' for a range of reasons, including social norms (Røpke 1999, Sanne 2002) and individual habits (Maréchal, 2010). This has led some to conclude that to achieve greater sustainability, government should target preference changes, in much the same way that public health campaigns have achieved stunning success in changing consumer behaviour in the consumption of cigarettes and alcohol. Yet, as noted above, the ability to cognitively learn and accumulate knowledge about consumption activities has been enhanced in the process of economic development – not diminished. The knowledge and ideas accumulated by consumers are becoming an important resource for innovation (von Hippel 2005). This does not imply that consumers are more 'knowledgeable' in all consumption domains – indeed it is likely that because the number of skill acquisition opportunities have grown, consumers are becoming much more selective in terms of which consumption domains they tend to specialize in. However, it does imply that, under the right

circumstances, green preferences can indeed emerge in a rapid and autonomous manner (Buenstorf and Cordes 2008, Safarzyńska 2013). A more prudent approach to achieving sustainable consumption patterns would be to engage in interventions that stimulate cognitive learning and enhance the autonomy of consumers (Binder and Lades 2015).

Conclusion

Perhaps the most fundamental problem that motivates the economics is the origin and nature of social value. No account of value will be fundamentally complete unless it can explain how the comparative values of different goods and services are established. Menger's work presents two outstanding challenges to this endeavour. First, the value of goods is inherently connected to how they serve the underlying needs of consumers. These drivers of consumption that underpin economic activity are themselves subject to change as consumer learn and become more affluent. Secondly, it is vital to study the learning process through which goods come to be associated with the satisfaction of the consumer's needs in the first place. By rising to these challenges, LTC introduces a deeper level of analysis which delivers a realistic understanding of how consumption has evolved in the long run. The forces driving the continuous expansion of demand are neither inevitable nor are they an inherent characteristics of human nature. They are largely the result of how agents have adapted to tremendous and ongoing trends in their economic, social and technological environments.

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Tables

Table 1 Some primary reinforcers (source Rolls 2002:19)

Reinforcer	Effect
Salt taste	reward in cases of salt deficiency
Sweet	reward in cases of energy deficiency
Bitter	punisher, indicator of possible poison
Sour	punisher
Putrefying odour	punisher; hazard to health
Pheromones	reward (depending on hormonal state)
Pain	punisher
Touch	reward
Temperature	reward if tends to help maintain normal body temperature
crying infant	punisher to parents
Novel stimuli	Rewards
Sleep	reward; minimizes nutritional requirements
Group acceptance	reward
Breathing	reward

Table 2: Some historical case studies employing the LTC approach

Author, year	Good & time period	Feature d Want	Satiation phenomena	Link to product innovation & satiation escape dynamics	Role of non-cognitive Learning	Role of insightful learning & social norms
Ruprecht 2002	Food Sweeteners 1800 - present	Hunger, arousal and health	satiation identified in the consumption of sugar in post-war US and German markets	artificial sweeteners emerged as a low-calorie substitute for sugar, enabling further growth in overall consumption of sweetness.	Sweetness is a genetic reinforcer and was used by producer in the 19 th century to realising economise of scale in food production by increasing sugar content in a number of foods stuffs.	Social norms concerning health & beauty helped create the demand environment in which artificial sweeteners became popular evidence suggests that Nutritional information about food seems to have little impact on how much consumer's decide to eat
Manig 2009	Food 1990-2000	Hunger, arousal	Recent Russian food expenditure data shows evidence of satiation in the quantity of certain food types consumed, but no satiation in absolute expenditure on food.	increasing the variety of food products has raised the satiation level of food consumption as consumers tend to consume more one particular food if eaten together with arrange of other foods.	As consumers become more affluent, eating for the sake of arousal has superseded the original motive of eating for the sake of avoiding hunger. This change in the predominant motivation has contributed to the rise of the obesity epidemic	
Frenzel Baudisch 2006	Footwear 1960- 1991	Social recognition , comfort	satiation identified in the post-war US and German footwear market with respect to consumers demand for comfortable footwear	satiation drove a separation of process and product innovation in structure of footwear industry in order to achieve economies of scale and scope	As consumers become more affluent, wearing shoes for the sake of status signalling superseded the original motive of wearing shoes for the sake of maintaining comfort	Changing social structure drove changes in how consumer undertook social comparisons & shoe consumption
Woersdorfer 2009	Washing machines / 1850s – present	Social recognition , Health, drudgery avoidance	satiation is found to be present in the current US and German consumption of washing machines.	current Satiation levels washing machine consumption is determined by the socially acceptable standard of cleanliness	The want for drudgery avoidance , health and social recognition, rather than demand for time savings, motivated the adoption of washing machines by low income consumers.	The social norms of cleanliness played an important role driving consumer's adoption of washing machines
Chai 2007	Recreational Travel Services 1800 - present	Arousal, Health	No instances of satiation identified.	urbanisation of domestic environments caused holidays 'away' from cities to be reinforcing, leading to emergence of resort tourism in 19 th century	the habituation effect plays an important role in mediating what types of recreational activities consumer engage in, and the rate at which seek exposure to new travel destinations	New communication technologies triggered historic changes in consumer learning patterns, driving demand for remote locations

Figures

Figure 1: Daily per capita amount consumption of sweeteners consumed (source: Ruprecht (2005:255))

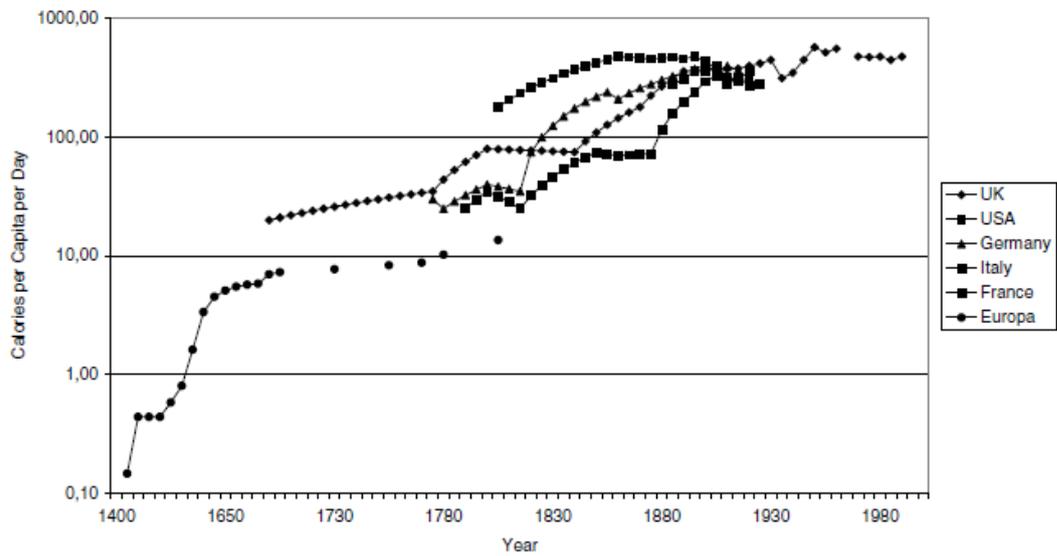


Figure 2: Weekly Russian household food consumption (source: Manig and Moneta 2009).

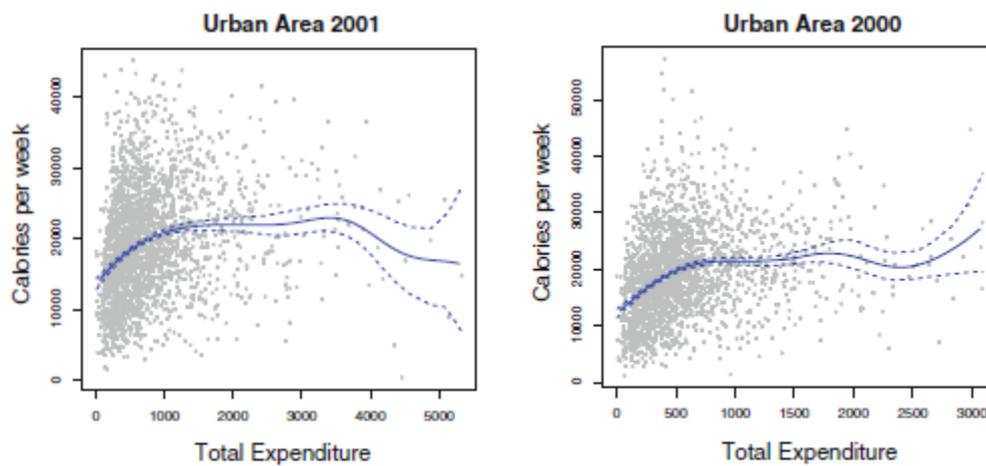


Figure 3: U.S. Shoe consumption (Frenzel Baudisch 2006)

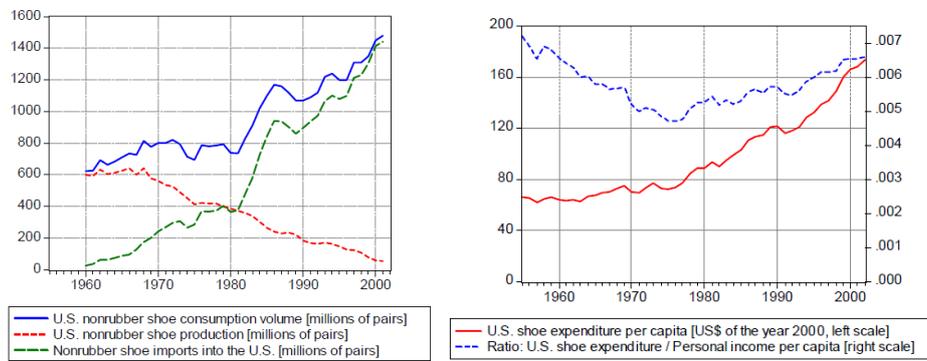


Figure 4: Non-parametrically estimated Engel Curves for Sugar and milk for the UK (source Chai and Moneta 2014).

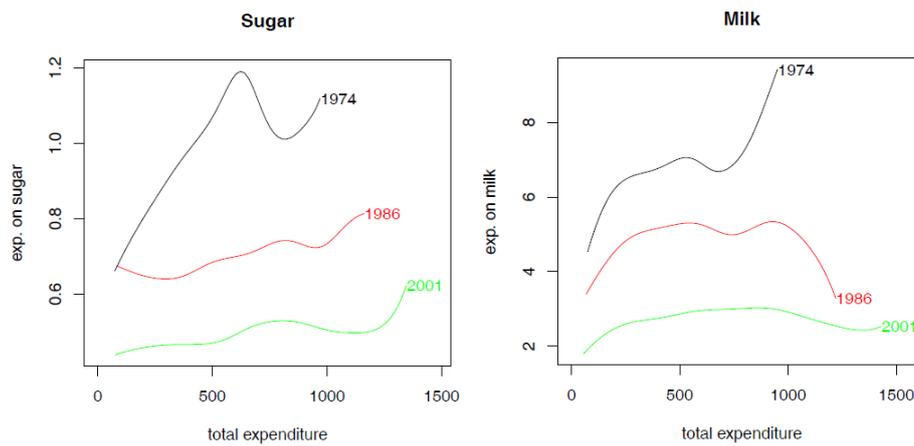


Figure 5: Non-parametrically estimated Engel Curves for clothing and radio & television for the UK (source Chai and Moneta 2014).

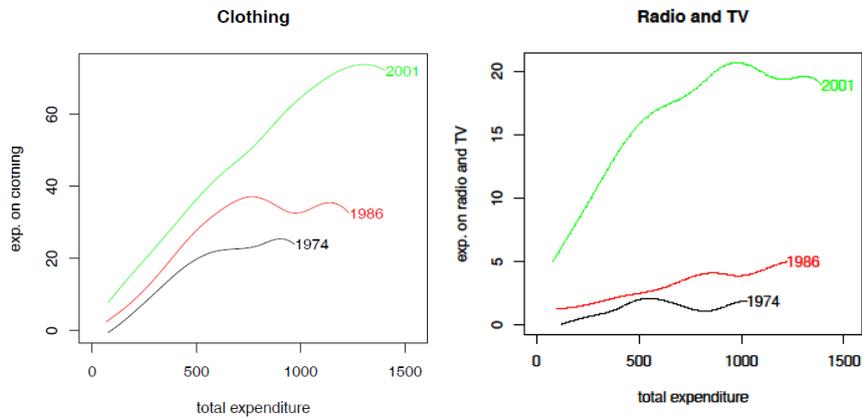


Figure 6: co-movements between estimate satiation points and estimate household income for UK spending on leisure services and personal services (source Chai and Moneta 2014).

