Tackling Keynes' question: a look back on 15 years of Learning To Consume

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1. Introduction

Two centuries of continuous economic growth since the industrial revolution have fundamentally transformed consumer lifestyles in Western economies and raised living standards (Lebergott 1993, de Vries 2008). As John Maynard Keynes noted in 1933 in the “Economic Possibilities of our Grandchildren”, such progress raises an important question: will consumption always continue to expand in the same manner as it has in the previous two centuries (Keynes 1933)? If so, how? Contemporary macroeconomic models typically assume that any extra income generated by increases in the productive capacity will be converted into increases in demand *ad infinitum* (Stiglitz 2008). To explain this, Keynes – like many thinkers preceding him (i.e. Menger 1871) - considered the nature of the underlying needs that motivate consumption and how rising affluence may impact their satisfaction. He conjectured that there are two types of needs: absolute and relative needs. Absolute needs are satiable and Keynes argued that within a hundred years economic these needs would be sufficiently satisfied to the extent that further energies could be devoted to non-economic purposes (Keynes 1933, Pecchi and Piga 2008). However, relative needs are insatiable because their satisfaction is linked to a desire for superiority over others.

This paper critically reviews a body of work that has adopted the Learning to Consume approach (henceforth LTC) to study long run trends in consumption patterns (Witt 2001). By borrowing certain established, contemporary insights from neighbouring disciplines about how consumers learn and what motivates them to consume, we show how this body of work provides a more contemporary answer to Keynes' original question. We also outline how the emerging themes present in this literature make a contribution towards better understanding how consumer learning processes can shape the manner in which economies evolve. This includes the changing industrial composition of growing economies (Metcalfe et al. 2006, Bertola et al. 2006, Pyka and Saviotti 2008), the type of product innovations that emerge as markets mature, as well as the degree of demand heterogeneity faced by industries that can play a critical role shaping their development (Malerba et al. 2007, Guerzoni 2010). Finally,

we also consider how this literature sheds light on the endogenous nature of demand (Bowles 1998) and the cultural and economic factors that influence consumer learning.

The paper is structured as follows. Section 2 sets out the LTC approach and describes the various types of needs that drive consumption. Section 3 reviews emerging themes in the body of work that has adopted the LTC approach. Section 4 summarizes from these studies the various factors that accelerate the accumulation of consumer knowledge. Section 5 outlines how these themes relate to ongoing debates in evolutionary economics and critically discusses the methodological benefits and pitfalls of this approach. Section 6 concludes.

2. Learning To Consume

The goal of the LTC approach is to provide a better account of consumption by studying, from an interdisciplinary perspective, the underlying process by which preferences are formed. Standard microeconomic analysis assumes preferences given and fixed which allows one to further assume that consumers already know and do not need to learn about what goods will deliver them utility (Stigler and Becker 1977, Swann 2002). Yet to properly explain the long run growth of consumer spending it is vital to explicitly study the process by which consumers discover which goods and services are useful in the first place (Menger 1871, Ruprecht 2002). LTC tackles this challenge by borrowing key insights from biology and psychology about what motivates human behavior and how they learn. These insights support Keynes' conjecture that not all needs are the same. Rather there are important differences in terms of how universally they are shared, the extent to which they are stable over time, and the extent to which social influences and individual differences may autonomously influence them.¹ 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).

2.1 The biological influence: 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

¹ The view that needs are dynamic and heterogeneous across a population of consumers also distinguishes this approach from other needs approaches found in the social sciences (i.e. Maslow 1943, Max-Neef 1991).

(Rolls 2002, Damasio 2003). These sensations guide behavior by encouraging (rewarding) or discouraging (punishing) the behavior that elicit these sensations. Table 1 provides some of examples of ‘primary reinforcers’ which have been experimentally shown 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 organisms 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 as:

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

Where $\theta_{i,t}$ is the level of expenditure required to achieve complete satiation of need i , $p_{i,t} \cdot c_{i,t}$ represents expenditure on the good as a product of prices $p_{i,t}$ and quantities $c_{i,t}$. The need deprivation level is thereby defined as the difference between the level required for complete satiation and the current level of expenditure, $\theta_{i,t} - p_{i,t} \cdot c_{i,t}$.² 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).

Such a formulation enables one to consider how rising income can trigger important changes in the composition of demand by enabling consumers to reach $\theta_{i,t}$ for certain wants, but not for others as $\theta_{i,t}$ may vary across needs. Similar to Keynes’ notion of relative needs, both 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* Scitovsky 1976, Frank 1985, Hopkins and Kornienko 2004). Thus the amount of expenditure needed to satisfy such needs will grow as the average household income rises (Charles et al. 2009; Heffetz 2011; Kaus 2013a).

2.2 Acquired wants

Beyond these ‘basic’ needs, new consumption motivations may also emerge as a result of consumer learning. Learning, as defined in the natural sciences, is the general process by which a species adapts to change, where behaviour is modified in response to environmental

² Note that it is assumed that each need precisely corresponds to one expenditure category. Thus j is not present in the formula, since $i = j$.

stimuli (McFarland 1987:2). LTC states the presence of two type of learning modes (cognitive and non-cognitive learning) generate two separate types of consumption motivations: acquired wants and cognitive motivations, respectively.³ The former is related to non-cognitive learning that describes the classical conditioning process (Skinner 1953). 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). For example, if a consumer is repeatedly exposed to a certain type of bed sheet when they sleep (a reinforcer, see Table 1), they may acquire a liking for such bed sheets that exists independently of how tired they are. Thus a wide range of ‘acquired wants’ are likely to emerge as consumers experience reinforcement and form associations between these experiences and the material environment which surrounds them. Because of differences in the material environment and the types of reinforcement consumers are exposed to, these acquired wants will be neither universally shared nor fixed across a population of consumers. It is possible to construct a taxonomy of goods according to the type of reinforcement that they were originally associated with (Alhadeff 1982:16, Foxall et al. 2004). Many advertising strategies are based on encouraging consumers to want goods 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 on how acquired wants may be linked to impulsive consumption behavior (see also Laibson 2001, Bernheim and Rangel 2004).

2.3 Cognitive motivations

A final type of consumer motivation is related to cognitive learning by consumers. In contrast to non-cognitive learning, cognitive learning typically describes a problem-solving sequence in which consumers deliberate and use their imagination to find new solutions to a given problem (Howard 1983, Earl 1986). Outcomes depend on the creative capacity of agents to access socially available information, analyse open-ended situations, gain insights and find

³ 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. This presence of two learning systems is also recognized in dual process theory (Gigerenzer 1999, Kahneman 2003),

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). This process helps create demand for ‘*higher order*’ goods that do not directly satisfy basic needs, but are instead used as inputs into a transformation process for the production of final goods (Menger 1871, Ruprecht 2002). For example, a basic need is the avoidance of pain, such as an illness (see Table 1). As scientific knowledge has generated new socially available knowledge about the human illnesses and how they may be avoided, the consumer’s knowledge of what constitutes a healthy lifestyle has dramatically transformed and now affects a variety of different consumption activities, including what agents eat, where they live and what clothes they wear (Mokyr 2000). In this way, Witt (2001) posits that another source of consumption growth is the increasing degree of scientific and cultural knowledge and the number of higher order goods agents can utilize in satisfying their needs. This type of demand is not subject to satiation and is discussed further in Section 4.

3. Emerging themes

The literature adopting the LTC approach consists of both historical case studies and empirical studies. Table 2 reports a sample of these to illustrate how it covers a wide range of consumption domains and time spans, including non-durable foodstuffs (food and alcohol), manufactured durables (washing machines and shoes expenditure) and services (recreational travel services). One overarching theme present in these studies is that the long run growth rate of consumption in any one particular domain is rarely ever linear (Kindelberger 1989). Rather, consumption growth tends to rise in a discontinuous fashion in which periods of intense acceleration are mixed together with gradual slowdowns in consumer spending. While some of this volatility may reflect variations in income growth, demand side factors also contribute towards shaping phases of accelerations and slowdowns. In the following we detail some these factors.

3.1 Demand Satiation

A prominent theme in these studies is that the growth of demand for goods closely related to the satisfaction of needs is naturally subject to slowdowns. This is labelled *demand satiation*, when 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 increasing 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. By redirecting income toward other goods, demand satiation contributes to setting the market environment in which a new phase of accelerated growth and product innovations may emerge (as will be discussed below).⁴

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. 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 enables consumers to increase the total number of calories consumed, the demand for additional calories falls since consumers need for calories has been satiated. As such, it is a good example of how the evolved biological nature of humans that has shaped human needs has important implications for the growth rate and structure of economic systems which have emerged to serve these needs.

⁴Several other scholars have noted the important role that critical thresholds in the consumer's demand for certain characteristics play in industry evolution (Lancaster 1971, Adner et al 2001, Windrum 2005).

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 Hadded 1992). They find that average calories consumed per person in 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. 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.⁵

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 were relatively stable and demand growth was very 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. 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. 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).

⁵ 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. Many other factors may influence the shape of Engel curves, such as how consumers change the manner in which consumers learn from their peers as they become more affluent (Cordes 2009).

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 2014; Moneta and Chai 2014; see also Bruns and Moneta in this issue). It should be noted that some of the 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 1 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, but much less prevalent in services. This finding that demand satiation is more prevalent in goods is consistent with existing stylized facts that rising household income is positively correlated with a reduction in the share of consumer spending on goods and an increase in the share of consumer spending dedicated to services (Herrendorf et al. 2013, Boppart 2014).

As a result, demand satiation does not take place consistently across all consumption domains. Several markets exhibit exponential growth rates where no evidence for demand satiation is found. Demand satiation is less frequent in markets that:

- i) Serve needs that are difficult to satiate (e.g. status goods)
- ii) Feature frequent product innovations (e.g. radio and television)
- iii) Are related to services (discussed above)

Concerning point i), 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 of expenditure needed to satisfy these needs (Charles et al. 2009; Heffetz 2011; Kaus

2013a). Point ii) above is supported by finding in Moneta and Chai (2014, see Figure 2) and Bils and Klenow (2001b).

FIGURE 1 and 2 ABOUT HERE

3.2 Escaping Satiation

If demand satiation is present in some markets, how can these slowdowns be overcome, if at all? A second theme of the LTC studies is that the ongoing formation and reformation of connections between goods and the underlying needs can trigger renewed phases of accelerated demand growth for industries. As a consequence of this process, the functional nature of goods - what a good is used for - may be subject to rapid change as entrepreneurs search for new profit opportunities and consumers acquire new needs and knowledge from their experiences. In the following, we highlight two demand side factors that were identified as playing some role in the formation of these new connections: short run consumer learning patterns, and long run trends in the set of needs that motivate consumption.

Firstly, short run consumer learning patterns can stimulate rapid consumption growth when consumers creatively discover new connections between their needs and goods. In some instances, this growth may emerge even when no supply side product innovation has taken place and the physical characteristics of the good have remained constant. We dub these “functional mutations”. 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 perceived as just a shoe: these goods were no longer consumed merely for the sake of comfort. Rather, consumers began to use them as a way to signal their social status to other consumers. As reflected in Run DMC’s 1986 successful single “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 communication device which helped consumers signal to others information about the individual’s identity and values. As a result, it is argued, U.S. spending has experienced a new phase of growth and registered trademarks related to shoes grew. Another case of functional mutation is the adaption of bicycles that were formerly used for transport for recreation (Buenstorf 2003). Far from being

random events, such short run consumer learning dynamics highlight the importance, when studying the growth trajectory of markets, of taking into account the knowledge base of consumers and their propensity to innovatively use goods (Bianchi 1998, Hippel 2005). How and when such knowledge accumulates by consumers will be considered further in the next section.

Second, another demand side factor is the long run shifts in the needs that motivate consumption. The underlying needs that drive consumption are subject to major changes as consumers become more affluent (Scitovsky 1976, Lebergott 1993, Frank 1999, Witt 2001). A shrinking proportion of household spending goes to the satisfaction of basic needs that are easier to satiate (such as hunger) while an increasing proportion of spending is dedicated to goods related to harder to satiate needs, such as social status, the demand for novelty and cognitive health concerns. Thus, a possible avenue for overcoming demand satiation and slow demand growth is for entrepreneurs to modify the characteristics of the good such that they appeal to needs that are not yet satiated (Witt 2001). Some preliminary empirical evidence consistent with the notion of satiation-escape can be found by studying the co-movement of the Engel Curves' satiation level and the average income level of the household population (Moneta and Chai 2014). This point is highlighted by Witt and Woersdorfer (2011), who found that characteristics of washing machines initially designed to deliver clean clothes were later modified to reduce the time required to undertake washing and require less physical effort. Chai (2007) discussed how the characteristics of British inland and seaside resorts that were initially based on Roman medical doctrines and used as proto hospitals to treat serious illnesses slowly evolved between the 17th and 19th centuries to appeal to the need for novel stimuli (see Table 1) via the construction of new entertainment infrastructure such as pleasure piers, promenading areas, and theatres (Walton 2000:95).

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). Ruprecht (2005) showed that by replacing sugar in food with newly developed artificial sweeteners, food producers reduced the calorie contents of food that appealed to consumers' growing concerns about their personal health and body weight. Manig (2010) further argues that one underlying factor for this is that food consumption is an activity that has increasingly come to be associated with other needs beyond the need for nourishment. Increasingly affluent consumers tend to no longer eat food just because they are hungry, but because they enjoy the novelty of exotic

ingredients that food can deliver. This may account for why variety demand in food consumption is so prominent (Thiele and Weiss 2003). Moreover, if this demand tends to grow with income as consumers seek more novel stimuli, 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 changes in consumer's willingness to pay for high quality food.

Finally, these studies also highlight how market institutions foster satiation escape by facilitating the formation of new connections between needs and goods via the discovery of new economic knowledge. Through markets, consumers come to discover new good and ways to satisfy their needs, while producers discover how their goods may be too complicated to use or may not serve the consumer needs or their broader lifestyle (Earl 1986, Swedberg 1994, Loasby 1999, Langlois 2001, Potts 2001). This is typically reflected in the messages producers send to consumers via advertisements that highlight the benefits of their products. For example, in the case of washing machines advertisements, these messages changed in character as entrepreneurs sought to stimulate greater demand growth by innovating the characteristics of these durable goods and appealing to a wider set of needs (Witt and Wörsdorfer 2011).

Markets can therefore be seen as a type of social mechanism or tool that emerged to coordinate learning across consumers and producers. As such, the character of market competition is thus to some extent influenced by what consumers know and the needs they seek to satisfy. More knowledgeable consumers tend to modify the consumption act to better suit their own preferences. Hence competition and the type of product innovations present in markets serving knowledgeable consumers tend to be 'performance-orientated' in that they better serve existing needs. Scitovsky (1976) gives the example of sports cars that have acquired more gears, more gauges, more lights, differential locks, and other attributes that are designed to give the driver more control over the vehicle, but at the same time may require more driving skill, which may prove aversive to non-specialized consumers (Scitovsky 1976:273). Another example is cameras, which have become much more performance orientated as a substantial segment of consumers have accumulated knowledge about cameras and seek more technical control in the act of taking a picture (Windrum 2005).

In other instances, where consumers possess relatively little knowledge, market competition and product innovations may tend to be ‘convenience orientated’, as goods evolve to better appeal to a wider range of needs and consumer lifestyles. Here product innovations aim to help the unspecialized consumers learn consumption (Bianchi 2002, Saviotti 2002:122). The effort to make goods and services more convenient and easier to use may involve addressing more aspects of the consumption act and other wants whose satisfaction were previously not addressed. An example is pre-cooked frozen meals available in supermarkets. Whilst these have previously already saved the consumer’s time and effort in not having to cook, a new generation of such meals emerged in the 1990s which are designed to be more “healthy” in that they have reduced the amount of calories and fat contained in such meals. Hence not only is the consumer’s hunger satisfied, but their concern for being healthy is also addressed. Relative to performance-orientated competition, here functional change is more geared toward improving the convenience of goods and how they may efficaciously fit into the consumer’s general lifestyle (Chai 2007).

4. Consumer specialisation

Understanding precisely what determines the degree to which consumers learn and accumulate knowledge has attracted the interest of a new generation of scholars , who use multi-agent modelling techniques to study learning dynamics and its economic implications (e.g. Babutsidze 2011; Valente 2012). LTC posits that the presence of acquired wants of 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 consumer to enjoy new experiences through which acquired wants may emerge (Witt 2001:36). This dynamic 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) and the desire for a consistent self-image (Lades 2014).

Here a crucial question that was not covered tackled in the original LTC framework is what social, economic and cognitive factors may accelerate or inhibit the rate at which the

consumers accumulate knowledge and develop preferences in a particular consumption domain. The LTC studies highlight a number of such factors:

- I. **Social availability of knowledge:** the ability of agents to 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 specialization 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 Goethe and Wordsworth was responsible for triggering a strong interest in visiting European regions such as the Swiss Alps that were previously perceived as barren 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 Klammer 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 awareness of 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). Woersdorfer (2010a) studied the evolving demand for cleanliness in clothing and the home environment in Western economies and found that it 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).⁶
- III. **Modularity of goods:** The extent to which consumer may experiment and customize goods encourages cognitive learning (Cosgel and Langlois 1998, Langlois 2001). The

⁶ Elsewhere, the acquisition of preferences is also shaped by families and the socialization process (Volland 2013) and the availability of (non-working) time (Chai et al. 2015).

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 some design features of the mountain bike, including frame geometry, gearshift with thumb shifters and cantilever brakes (see also Hippel 2005).

In terms of its character, demand that derives from cognitive concerns may be relatively less stable than demand motivated by basic needs. Compared to traditional industries such as agriculture that primarily serve basic needs, industries that serve cognitive concerns are thought to be relatively less stable as the use of the good is based on knowledge that may be rendered obsolete by the ongoing emergence of new scientific knowledge. A good example of this is the 16th and 17th century British resort industry which was originally based on the Roman medical paradigm in which certain element found in the natural environment could be used for the treatment of serious illnesses. Much of this paradigm was rendered obsolete with the emergence of modern medicine and hospitals located in urban areas (Chai 2007). While the emergence of new knowledge may alter production techniques in any industry, the demand faced by more traditional industries producing lower order goods (such as food) is less likely to be subject to such radical changes in character.

Another characteristic of demand related to cognitive concerns is that it is likely to be highly heterogeneous in nature. The types of cognitive concerns possessed by individuals is uniquely dependent on each their own history of experiences and cultural influences. Hence the growing prominence of such demand could account for the increasingly indeterminate household spending patterns, as demonstrated by the well-established positive relationship between income and the amount of heterogeneity observed in spending patterns (Chai et al 2014). Houthakker (1992) argued that the tendency for the residual, unexplained differences in household spending to increase at higher income levels reflects the growing amount of discretionary power that consumers when their basic needs are satisfied. Others have also pointed out that the growth of demand heterogeneity may also help account for the rising demand for services (Gallouj and Weinstein 1997). One particular function of services is that they customize lower order goods in accordance with the consumer specific preferences

(Hipp and Grupp 2005). For example, a travel agent is used to customize the features of a holiday. As such, the predominance of the services sector in developed economies could be linked to the growing predominance of such knowledge-based demand.

5. Discussion

We now turn to briefly discuss connections to evolutionary economics (Section 5.1), the methodological pitfalls and benefits encountered using the LTC approach (Section 5.2), and finally offer a comment on how its findings shed light on the endogenous nature of long run demand growth (Section 5.3).

5.1 Relevance

A central theme in evolutionary economics is to develop a more realistic account of learning and knowledge accumulation by agents, firms and industries (Pasinetti 1981, Nelson and Winter 1982). On the demand side, this implies developing new ground in understanding how consumer tastes are neither fixed nor homogenous. Rather, tastes seem subject to change according to what consumers learn (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 delivers important insights into how market-based capitalist economies grow in a self-perpetuating fashion (Jonsson 1994). Here, the LTC studies have contributed to a greater understanding of the character of consumer learning and the external influences that shape this process (Section 5). A key determinant of the rate at which demand evolves is the extent to which consumers are learning in a cognitive or non-cognitive fashion. In most studies of consumer behavior it is assumed that consumers are either learning in one or the other, but not both. Few studies consider the possibility that both modes of learning may coexist. Doing so enables one to consider what events and conditions, such as the emergence of new goods or new knowledge, may trigger switches in consumer learning modes (Brenner 1999, Buenstorf and Cordes 2008, Chai 2011).⁷ The presence of two learning modes may thereby help explain why consumers display relatively passive, routine driven behavior in some circumstances (Nelson

⁷ 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).

and Consoli 2010), but act in a highly creative and innovative manner in other instances (Bianchi 2002).⁸

Beyond individual consumption decisions, another theme in evolutionary economics is how the heterogeneous nature of demand and niche markets can play a critical role in industry evolution (Saviotti 1996, Bresnahan and Gambradella 1998, Lipsey et al. 2005, Guerzoni 2010, Malerba et al. 2007). The LTC studies show there are several different sources of demand heterogeneity. In a given population of consumers, heterogeneity in demand may be driven by differences in i) what consumers know, ii) the type of acquired wants they possess iii) the connection between goods and the underlying needs they serve. Concerning the last point, it is worth noting that the focus on the evolving connection between goods and wants (Section 4.2) bears some similarity with the recent discussion of ‘disruptive innovations’ that emphasizes how functional change of goods can have major implications for industry structure (Christensen 1997, Markides 2006). Differentiating between these sources of demand heterogeneity thereby helps deliver a better understanding of when and how industries can foster the emergence of niche markets (Buenstorf 2003, Babutsidze 2011).

On the macro level, the industrial composition of the economy tends to undergo important structural changes that can affect unemployment, growth and the income distribution. Many scholars posit that the non-homothetic nature of consumer demand plays an important role in determining the direction of structural change (Pasinetti 1981, Aoki and Yoshikawa 2002, Metcalfe et al 2006, Bertola et al. 2006, Pyka and Saviotti 2008, Ciarli et al. 2010). Here the LTC studies provide a behavioral account for observed differences in income elasticities across goods produced by different industries (Cordes 2009, Lades 2013, Kaus 2013b, Moneta and Chai 2014). The LTC studies thereby help to provide a better behavioural account of why some goods experience slowdowns in demand growth (Section 4.1) and what can be done to overcome such slowdowns (Section 4.3).

5.2 Methodological issues

From a methodological perspective, some drawbacks of employing the LTC approach can be observed. Firstly, due to an inability to directly measure the influence of needs on behaviour,

⁸ This also has implications for welfare economics (see Satorious 2003, Binder 2010, Schubert 2012).

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 characteristics of needs are highly domain-specific in nature. This raises the question as to the possibility of making 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 basic needs, such as the need for novel stimuli (see Table 1, Scitovsky 1976). This need 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 arousal. To some degree, when introducing something as complex as the human genetic endowment into the economic explanatory framework, an inevitable trade-off requires giving up the ability to make general observations for a wide range of phenomena in favour of the opportunity to build explanatory frameworks that rest on real scientific knowledge about human nature.

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 existing 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 (see previous section).

5.3 Endogeneity and the sustainable nature of demand

This body of work has highlighted a number of different ways in which demand is 'endogenous' in the sense that it has been influenced by economic conditions and market

institutions (Bowles 1998). First, due to the satiable nature of basic needs, rising household income has enabled a major shift in the composition of demand as consumers focus marginal increases in income on spending related to needs that are hard to satiate. Second, new technologies and institutions for storing and sharing information (including markets) have enhanced the cognitive learning process (discussed in Section 5) that has contributed towards the rise of knowledge-based demand. This type of demand is not subject to satiation, relatively more volatile in nature, and likely to be more heterogeneous than demand related to the satisfaction of basic needs. Third, it is likely that producer advertising has contributed towards the generation of acquired wants via non-cognitive learning in which products are repeatedly associated with appealing basic reinforcers such as images of very attractive people. The experimental evidence makes it hard not to conclude that suppliers, under 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 these influences, an important open question is what implications this has for the extent to which consumers can be considered to be autonomous and are able to control 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 a general pessimism pervades the literature about the extent to which sustainable consumption patterns will emerge on their own accord (Norton et al. 1998). 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).

6. Conclusion

Returning to Keynes' question, a better account for the long run growth of demand must go beyond merely assuming that consumer demand is homogenous and insatiable. Rather it must consider, as Keynes himself did, the underlying of motives driving consumption and how these may evolve in the long run. By rising to this challenge, the LTC studies make it clear that the continuous expansion of demand is not inevitable occurrence or an inherent characteristic of preferences. Rather, it is the result of how individuals have adapted to tremendous changes in their economic, social and technological environments. It is also a reflection of how economic conditions and institutions have influenced the type of needs that motivate consumers and how much consumers know about how to satisfy these needs. Hence the extent to which demand will continue to grow also depends on how much further future technologies and institutions can continue to shape demand by further enhancing the accumulation of consumer knowledge, promote the generation of acquired wants and direct more spending towards needs that are insatiable.

Together, LTC studies showcase how the adoption of an evolutionary approach to demand analysis delivers a better understanding of the long and short run factors that contribute to the expansion of consumption growth. It suggests that a complete account of the self-transformation of economic systems must include how consumer demand has co-evolved with income growth and economic development. Many open questions for future research still remain. An appropriate empirical approach to identifying the underlying the connection between goods and the needs they serve is lacking and could deliver greater insight into how the satiation of needs stimulate product innovation and the emergence of new goods. The notion of acquired wants and how these are subject to growth and extinction has thus far attracted little attention even though non-cognitive learning is a widely acknowledge to be an important tool for advertising. Finally, more work could be done on formalizing the important differences about how needs motivate consumption. If economists are interested in answering Keynes' question, a closer look at the nature of what motivates consumption is

unavoidable. It is in this difficult task that the LTC approach represents a promising method for studying the evolution of consumption.

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Compliance with Ethical Standards

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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 1: Some historical case studies employing the LTC approach

Author, year	Good & time period	Need	Demand Satiation (Section 4.1)	Satiation Escape (Section 4.2)	Non-cognitive Learning (Section 3.2)	Specialisation (Section 5)
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 producers to realize economies of scale by increasing sugar content across a variety of foods.	Social norms concerning health helped create the demand for artificial sweeteners .
Manig 2009	Food 1990-2000	Hunger, arousal	Recent Russian food expenditure data shows evidence of satiation in the quantity of certain foods types consumed.	Shifts in satiation level thought to be linked to the growth of food varieties as consumers tend to consume more food if eaten together with other types of food.	As consumers become more affluent, eating for the sake of arousal has superseded the original motive of eating for the sake of avoiding hunger.	evidence suggests that Nutritional information about food seems to have little impact on how much consumer's decide to eat
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	Tourism 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: Non-parametrically estimated Engel Curves for Sugar and milk for the UK (source Chai and Moneta 2014).

Figure 2: Non-parametrically estimated Engel Curves for clothing and radio & television for the UK (source Chai and Moneta 2014).