Big brands versus small brands: Matching and demand analyses

By

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Abstract:

This thesis extends the study of consumer behavior analysis, a synthesis between behavioral psychology, economics, and marketing by applying a new method of handling the dataset of four fast-moving consumer goods collected through a panel of British consumers.

Methodology: The aim of the study is to investigate the differences between big brand and small brand choice patterns of consumers in terms of matching, maximisation, and demand at both aggregate and individual level of analysis. Besides, it examines the differences between big brand and small brand groups in terms of demand elasticities with the use of both linear and non-linear models (calculating essential values).

Results: For the former part, interestingly, there are striking differences in results between the two sets of matching analyses. For example, strong support is shown for matching in aggregate whilst undermatching is the rule at the individual level. Besides, demand patterns observed are downward sloping for aggregate analysis while upward-sloping demand curves are observed for all chosen individuals. Last but not least, maximisation at aggregate level is generally observed whereas diverse and inconclusive results of the maximisation patterns are found for individual analysis.

For the latter - demand analyses, the results show that price, utilitarian and informational reinforcement - independent variables - all exert impacts on the quantity purchased. Besides, the demand for cheaper big brands is less elastic than that for cheaper small brands showing that consumers give more serious consideration to price reductions. Moreover, according to essential value's analysis, buying and consuming big brands, which offer higher levels of informational rewards said to give consumers extra nonfunctional satisfactions as well as fulfilling their functional wants and needs. The "double jeopardy effect" is also confirmed when small brand groups that often have the lower price, utilitarian and informational benefits suffer from lower penetration rates as well as less frequency of purchase.

Key words: consumer choice, consumer behavior analysis, marketing, brand

marketing, matching, maximisation, demand analysis, behavioral economics,

behavioral psychology, demand elasticities, essential value.

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Chapter 1: Introduction

This chapter provides an overview of the theoretical context of the thesis. The theories and methodologies of consumer behaviour analysis will be used in this study due to their usefulness in elucidating consumers' buying behaviour and relevant economic variables. The chapter, therefore, includes a description of the research context, research objectives, research questions and research methodology that underpin this thesis, and a description of the thesis structure and the order of presentation.

1.1 Research context

It is believed that the consumer is crucial for any organisation to remain successful and profitable. Companies have to do better than their competitors in terms of satisfying customer wants and needs (Jobber, 2004). One of the tools for achieving this objective is marketing as one of its core values is "to anticipate the behaviour of customers and competitors" (Sheth, Sisodia and Sharma 2000, p. 56). The importance of marketing has been acknowledged, and thus it becomes the focal point of interest of both marketing practitioners and academics (e.g., Kotler, Armstrong, Saunders & Wong, 2001; Jobber, 2004; Keith, 1960). In the latter, for example, Berry and Kunkel (1970) claim that "As far as marketing is concerned, the phenomena to be explained by a theory are certain types of behaviour" (p.26). This means the analysis of consumer choice is a must in developing advanced marketing theories.

Traditionally, marketing academia and practice have different problems and objectives in understanding consumer behaviour. However, as sharing a mutual interest, they should work with each other to bridge the gaps in each area.

Specifically, marketing managers have a vast amount of users' inputs while consumer researchers have theories and methodologies. The collaboration would allow consumer data to be examined and interpreted appropriately, and hence it would ensure that marketing research remains accurate and relevant (McAllister, 2006).

Consumer behaviour is complicated since there are a number of choices an individual buyer has to make such as: whether to buy the product or brand, which brand to buy, which store to make the purchase, how much to buy, at what price and so on. Among different approaches to understanding the essence of consumer choice, Consumer Behaviour Analysis, an interdisciplinary quest, has been built and developed as an attempt to bring theories in behavioural psychology and microeconomics into the modern context of the market (Foxall, 1999; 2002; 2017). The first objective of this combination is to overcome the criticism made by a number of marketers and social scientists that pure economics or psychological approaches are too superficial and imprecise and thus have not shown much success in elucidating real world behaviour. However, it is thought that pieces of research with well-designed and thorough experiments conducted in naturalistic environments could justify the values and purposes of the two disciplines (Hursh and Bauman 1987). Besides, these two (especially cognitive and social psychology) have traditionally provided the theoretical foundations for consumer behaviour (Jacoby, Johar and Morrin, 1998), but, as a sub-discipline of marketing, still lack a universally accepted model (Foxall, 2005). Moreover, the goals for applying insights from psychology to economic models are to extend the behavioural background of economic analysis and to reduce the limitation of applicability of economic theories when dealing with a variety of choice (Albanese, 1988).

Previous studies based on Consumer Behaviour Analysis such as the analysis of the patterns of consumer choice among brands, or the development of the substitutability between different brands and goods has shown the relevance of methods derived from behavioural economics (Foxall, 1990; 2004; 2010; 2017; Wells & Foxall, 2013). Besides, the research also has successfully provided adjustments (e.g. using proper concurrent schedules of reinforcement) to behavioural psychology theories such as the matching law that has been used traditionally in a laboratory, and thus limited researchers in explaining complicated human behaviour. Note that the matching law has developed intellectually and chronologically as a mainstream behaviour analysis of choice behaviour for over half century. Its main point can be stated as relative behaviour (e.g., response rate) matches its relative reinforcement in equilibrium (Herrnstein, 1997). These adjustments are appropriate and necessary to understand and interpret consumer choice in Consumer Behaviour Analysis whose research method avoids cognitive explanations such as emotions, thoughts, intentions or attitudes. These behaviour's proxies that are used overwhelmingly in tradition marketing literature - rather than the behaviour itself (e.g. O'Shaughnessy & O'Shaughnessy, 2002; Bitner, 1992; Dawson, Bloch & Ridgway, 1990; Donovan & Rossiter, 1982; Jacoby et al., 1998). The overuse may come from the idea that these proxies are very useful in cases where the subjects, themselves like consumer choice, are difficult to measure. However, these methods often fail to address the real issues of the subject as a result of false assumptions and inaccurate predictions of what consumer behaviour is actually like (Foxall, 2002). Therefore, Consumer Behaviour Analysis seems to be far superior to those methods which use proxies (Foxall, 1990; 2004; 2010; 2017; Wells & Foxall, 2013). However, further testing is needed to adjust and improve the model. This thesis is, therefore, an attempt to contribute to the

development of Consumer Behaviour Analysis.

In Consumer Behaviour Analysis, the majority of the research work has been concerned with the decisions to be made on brands or products of fast-moving consumer goods (Foxall, 2017). The goods are daily consumer products that need to be regularly bought at a reasonably low price. Therefore, the main characteristics of fast-moving consumer goods are their non-durability and short shelf life span. The products are highly competitive, with little to no switching costs and consumers seem to neglect to search for product information or to compare different brands. As most users spend little time and effort on determining brand choices (Hoyer, 1984), price promotion - usually providing the lowest price to the consumers - can be considered as one of the best promotional strategies to be used by manufacturers in stimulating consumers' interest. Besides, brands of fast-moving consumer goods appear similar and functionally substitutable (Ehrenberg, 1972, Ehrenberg, 1988), and hence consumers have a tendency to exchanges one brand for another for variety (Currim and Schneider, 1991). In addition, most buyers tend to purchase more than one brand within a product category, choosing randomly from their favourite brands (Ehrenberg, 1988). The purchaser typically switches those tried and tested brands because the benefits obtained from one are functionally substitutable with those given by the others (Foxall, 1999). The above conclusion has been drawn as the result of many repeated studies examining a wide range of products and services including food and drink products, gasoline, aviation fuel, automobiles, cleaning and personal care products, television channels and shows, medicines and pharmaceuticals prescriptions, shopping trips, individual stores, store chains, and attitudes towards brands (Ehrenberg, 1972, Ehrenberg et al., 1990, Ehrenberg & Scriven, 1999, Uncles et al., 1995, Goodhart et al., 1984). The huge number of data and reports from these

studies conducted by Ehrenberg and his colleagues resulted in the well-known Dirichlet Model (Ehrenberg et al., 2004, Goodhart et al., 1984), a mathematical model that is able to show law-like patterns of repeat brand purchasing. However, despite the robustness of the studies' data, the model has been criticised for years as it has failed to explain underlying causes of why consumers explicitly choose their repertoire of brands. This may stem from the fact that Ehrenberg's work lacks discussions on the hidden causes for buying and consuming activities (Popkowski Leszczyc et al., 2000). By linking the patterns of consumer decisions of choosing big/small brands to theories of behavioural economics, this thesis attempts to provide reasonable explanations and supporting details of underlying reasons for these choices.

The work based on Consumer Behaviour Analysis has recently become more sophisticated. For example, the size of data set increased significantly from 80 participants in early studies to over thousand recently. In addition, with the use of utilitarian and informational reinforcement (two major sources of benefits consumers receive from their purchases, cf. Foxall 1990; 2004; 2010; 2017), recent findings seem to provide clearer explanations of buying and consuming activities in real-world settings. Nevertheless, the work still has some limitations. For example, in Foxall and Well's study (2013), there were three matching analyses (classical matching, relative demand, and maximisation) and related measures were used. In each of the analyses, the preferred brand of each consumer was identified and used as the base for the analysis (Brand A) in comparison with all the other brands within that analysis (Brand B). The method of dividing brands as above may cause two problems. Firstly, there were many sole buyers who bought one and only one brand during the period of time. As a result, that brand is identified as the preferred brand while there are no other brands left, meaning there is no Brand B is included. This problem can be solved in

two ways: a) removing these consumers' information from the dataset or b) assuming that they just bought a next-to-nothing amount of another brand (e.g., 1 gramme of baked beans) and paid a tiny amount of money (e.g., 1 penny). Technically, the two solutions are acceptable because they do not impact significantly on the final results of the matching analyses. However, the loss of data or the destruction of meaning in matching sense may do more harm than good in this situation. Secondly, the most preferred brand is fairly subjective due to the fact that it varies across participants. Therefore, the aggregated data of the preferred brand may mislead readers about what are the most bought and consumed brands of the four fast-moving consumer goods (baked beans, biscuits, fruit juice, and spreads). This study therefore attempts to provide an alternative method of how to allocate brands into Brand A and Brand B. In the new approach, Brand A consists of big brand names that have dominant consumer spending whilst brand B is made up of small brand ones. Along with making the aggregated data more objective, this method of brand classification will contribute to a better understanding of the battle between big and small brands that is really interesting on its own.

The year 2016 brought plenty of surprises on a global scale such as Brexit and the US presidential race. This leads to both optimism and worries for the business world. Small companies like startups and local businesses that managed to survive during the economic turmoil with an acceptable growth can target a bigger slice of the market share. Running a business, however, in a more demanding, crowded, and connected economy (but that remains sluggish) is not going to be simple. Therefore, small players in the markets will have to work even harder in offering differentiation in order to gain and retain customers. And they have to fight against Goliaths as well. Giant corporations already have a number of advantages because of their size, money

power, brand awareness, and marketing abilities. They, nevertheless, can be beaten due to the inability to know and satisfy their customers directly and the high risks entailed in the decision-making process, which can get them stuck in stereotypes and create negativity in customers' minds.

In fact, one of the top issues that keep a manager up at night is how to make his/her company's brand grow. A question all of them should ask themselves, as the answer may help create growth, is what makes big brands big, and small ones small. According to Ehrenberg (1988), two major factors must be considered: (1) consumer loyalty, which refers to the average purchase rate per user, and (2) market penetration that represents the size of a brand's buyer market. In marketing textbooks, it is argued that consumer loyalty plays a vital role in the company's growth, and thus retaining and improving that loyalty becomes the ultimate goal of the company in order to become a big brand. However, there are a number of reports from consumer data panels provided by well-known marketing research companies such as Nielsen and TNS (Kanta World Panel, recently) indicating that although such loyalty exists as big brands have slightly better consumer loyalty compared to small businesses, the differences are not significant across brands (Sharp, 2010; Romaniuk & Sharp, 2016). On the other hand, empirically evidence-based studies show that market penetration does create brand size variation. That is to say, big brands have much stronger penetration than smaller ones do. Ehrenberg and his colleagues (1988; 1991) came up with the law of double jeopardy that clearly explains why small brands have a smaller size. They suffer from the fact that they have fewer users who are less loyal compared to those of big brands. To overcome this obstacle, small companies have to increase their penetration by gaining more buyers, or decreasing consumer defection, in order to boost sales and achieve greater market share. One of the traditional methods to gain

sales is using price promotion. As a result, understanding how consumers react to the price decrease is the key interest of both retail executives and marketing researchers.

Demand analysis, often used in behavioural economics, is a measure of how sensitive are buyers when facing a price change. Traditionally, the analysis computes the overall quantitative elasticities in which the price is a linear function of the amount bought. This approach does not take into account hypothetical elements like deprivation, value, or strengths (Hursh & Roma, 2013; Christensen, Silberberg, Hursh, Huntsberry, & Riley, 2008; Christensen, Silberberg, Hursh, Roma, & Riley, 2008; Elsmore, Fletcher, Conrad, & Sodetz, 1980; Foster, Sumpter, Temple, Flevill, & Poling, 2009; Hursh, 1991; Jacobs & Bickel, 1999). However, a number of researchers argue that non-linear models seem to fit the real-life data better (Hursh, 1984; Killeen, 1995). Besides, it is problematic to compare linear models of elasticities of demand before and after price changes because the affinity between the demand elasticity and the price level is unstable especially under extreme circumstances (Foxall, 2017). Hursh and Silberberg (2008) suggest a novel method to overcome this problem: calculating the essential value of a product or brand based on a non-linear equation. This thesis attempts to conduct an extensive investigation on the demand elasticities of big brand and small brand groups with the use of both linear and non-linear models.

The approach also allows two kinds of reinforcement, utilitarian and informational, to be taken into consideration. These benefits, according to the Behavioural Perspective Model (BPM), are said to explain consumer choice in terms of the attributes of the products themselves and the benefits they confer (Foxall 1999; 2004; 2017). Note that the BPM has been used as the dominant integrative device to

understand the nature of consumer choice in natural settings that arise within modern market oriented economies (Foxall 1990; 2004; 2010; 2017). Hence, this paper will try to answer the question of what factors, along with price, could affect the demand elasticity of a brand. Moreover, the author will apply a new method of calculating the essential value of brands (the nonlinear model of demand elasticities) which shows the relationship between the utilitarian/ informational reinforcement of the brands and their market size. For instance, it is assumed that big brands possess greater informational reinforcement than do small ones, which can be one of the main reasons for the phenomenon of "double jeopardy" (cf. Ehrenberg, 1972, Ehrenberg et al., 1990, Ehrenberg & Scriven, 1999). As a result, examining essential values will contribute to a better understanding of big and small brand choice patterns.

1.2 Research Objectives

(1) The study is of a quantitative nature to produce objectively-measurable research outputs and aims to contribute theoretically to marketing research in general and to consumer behaviour in particular whose conceptual and methodological depth has remained a concern over the years. In fact, the thesis is designed to provide satisfactory responses to the question to what extent behavioural economics generally can contribute to consumer choice analysis.

(2) In other words, the nature of the analysis undertaken in essence is a methodological exploration of the relevance of behavioural economics to the study of consumer brand choice in real-world situations. As a result, an alternative methodological framework to be used in the future is established, based on a number of previous pioneering studies (Foxall & James, 2001, Foxall & James, 2003, Foxall

& Schrezenmaier, 2003, Oliveira-Castro et al., 2006, Romero et al., 2006), which employed methods from Consumer Behaviour Analysis.

(3) To confirm the robustness of a behavioural economics approach in understanding consumers' purchasing decisions by performing analysis at different levels through a big sample, over a period of one year, in a naturalistic marketing setting. The big sample is achieved through utilising the consumer panel data whilst comparisons can be made between individual analysis and aggregate analysis.

(4) Specifically, to provide a better understanding of how consumers make brand choices between big and small brand groups by applying the theories of matching law, relative demand curve, maximisation, and demand elasticities analyses (linear and non-linear models) to a real-world context of marketing-oriented human consumption like grocery shopping. Hence, this study intends to fill the above research gaps by providing substantial findings on consumer buying behaviour.

(5) Last but not least, the results of this study will assist both marketing practitioners and academicians by providing useful information so that they are able to understand consumer behaviour and to better apply proper marketing mix strategies and campaigns to attract and retain consumers.

1.3 Research Questions

The research question is crucial in any research as it identifies and highlights issues upon which the research should focus. From the objectives of the study, this thesis is trying to answer the specific questions below:

Question one: Under amount matching analysis, does matching, overmatching, or undermatching occur?

Question two: Under cost matching analysis, is the slope of the relative demand upward, downward or neutral?

Question three: Under maximisation analysis, do consumers select small brands over big brands to maximise their benefit?

Question four: Are there differences between the overall price elasticities of the big brand groups and those of the small brand groups? Specifically, are the former's smaller than the latter's, meaning the demand of big brands is less elastic than that of small ones?

Question five: Are intra-brand/consumer elasticities of the small brand groups bigger than those of the big brand groups?

Question six: Are inter-brand/consumer elasticities of the small brand groups bigger than those of the big brand groups?

Question seven: Are essential values of the groups of big brands different from those of the groups of small brands?

Question eight: Due to the greater utilitarian/informational benefit, are the essential values of the big brand groups larger than those of small brand groups?

1.4 Structure of the thesis

The overall aim of this study is reflected by its order of presentation. This thesis is organised into six distinct chapters, each has their own individual focus and they logically build upon each other. The incremental building helps to answer the research objectives and questions that have been introduced earlier in this chapter.

The main purpose of this chapter is to present the introduction and background to the thesis. Chapter one has already introduced the relevance of behaviour analysis, especially consumer behaviour analysis, for consumer marketing; this topic serves as the research context. The objective of the study has been briefly explained and the research questions have been described. The structure of the thesis is presented in order to give a clear and understandable picture of the thesis as a whole and what is to follow over the course of this study.

Chapter two and chapter three present a review of the literature which functions as the basis for the development of this thesis. The chapters include the patterns of consumer choice and marketing schools of thought as established and reiterated in literature. In detail, chapter two discusses the fundamental work of Ehrenberg and his colleagues especially on empirical patterns of consumer choice, which have drawn enormous attention because of its accessible content and application for both theoretical development and empirical investigation. As a critical leitmotiv of this thesis, the effect of price in consumer choice decision making is also explored in more detail. On the behavioural economics side, chapter three focuses on the behavioural economics analysis that considers behaviour as choice behaviour. Behavioural economics is introduced as it is a concept that is beneficial in elucidating human behaviour in consumer choice situations. Its reliable economic analyses are used in this thesis and critical investigation is made of several concepts and principles in behavioural economics. Specifically, it explains thoroughly the matching law and the equations that derive from it, and how those have been applied in consumer behaviour analysis. The literature review also discusses brand choice patterns of consumers in terms of demand elasticities with the use of both linear and non-linear models. The essence of the Behavioural Perspective Model is also explored in this

chapter. The theoretical foundations of this model in understanding consumer choice and situation are discussed in detail. Chapters two and three serve as the basis for the next chapter, the methodology, by spelling out different kinds of analyses used in literature which have previously proven useful and valuable for assessing the adequacy of behavioural economics in the studies about the nature of consumer choice.

After discussing epistemology and ontology, chapter four presents a detailed description of the research strategy and design which address the research objectives and questions. Chapter four introduces methodological reflections, which derive from the literature review and are linked with the presentation of the methodology employed for this study. The chapter incorporates discussions on the sample, the measurement, and the data analysis. A review of the three main matching analyses and two models of demand elasticities is also made in this chapter.

After presenting the results from the Ehrenberg-type aggregate analysis of the data, which demonstrate actual consumer brand choice and market patterns, chapter five presents the quantitative results and discusses the major findings from amount matching, cost matching and maximisation analyses at both aggregate and individual level of analysis including requisite graphs, tables and figures and necessary explanations that have derived from undertaking this study. The findings of linear and non-linear models of demand elasticities are also dicussed. The results in this chapter ascertain the reliability and validity of the dataset used for this thesis.

Finally, chapter six discusses the findings and draws conclusions as to their relevance against the background of both behavioural economics and marketing research. Results from the previous chapters are fully interpreted and put into

perspective. This last chapter also attempts to reach conclusions by examining the evolution of the arguments established through the introduction, the literature review, the methodological section, and the hypothetical questions raised, as well as the results achieved. The chapter reports the contributions and limitations of this study and makes recommendations for further research. The thesis is rounded off by evaluating the application of behavioural economics to the study of consumer behaviour in real-world situations.

Chapter 2: Consumer Behaviour and Pattern of Brand Choice

2.1 Marketing and Consumer Behaviour

There has been a lack of an accurate, clear and concise definition of the fundamental nature of marketing since the term has different meanings to different people. For instance, it means advertising to advertisers, knocking on doors to a sales force, participating in events to public relation marketers, direct mailing to direct mailers, and so on. However, they all share the same view that the ultimate purpose of marketing is using a significant amount of effort to please and retain their customers. Hill and O'Sullivan (1996) describe marketing as a "business philosophy" that focuses on theoretical underpinnings of consumers and their current and future satisfaction. The authors also consider marketing as a managerial function within a company, and thus it can be viewed as the performance of business activities that create and exchange goods and services between producers and consumers. Therefore, the aim of marketing is to satisfy the best interests of the customers through the product or service and build a long-lasting relationship with them (Kotler and Keller, 2006). In other words, marketing is consumer orientation rather than product orientation, pleasing customers is crucial for any organisation to survive and grow (Sheth et al., 2000; Schiffman and Kanuk, 2007). Although the scope of marketing includes many diverse areas such as pricing, consumer behaviour, advertising, sales management, public relation, etc., consumer research is the central point of the marketing function. Berry and Kunkel (1970) suggest that marketing scholars and practitioners need to be familiar with the analysis of consumer behaviour in term of motivations and

situational influences in purchasing as well as the possibilities of controlling demand via the marketing mix that includes product, price, place (distribution) and promotion. Therefore, understanding behaviour of consumers is a cornerstone of the philosophy and practice of marketing.

Consumer behaviour is an active, growing field of marketing over the past decades (e.g. Saunders & Wong, 2001; Jobber, 2004; Keith, 1960) as the result of the growth in size of markets and companies as well as the companies' urgent need for information and knowledge about consumers. Jacoby (1976) mentions that consumer behaviour refers to "the acquisition, consumption and disposition of products, services, time and ideas by decision-making units" (p.332). Hence, there are many decisions an individual has to make such as whether to buy the product, which brand to buy, which store to make the purchase, how many items to buy and at what price, and so on (Schiffman & Kanuk 1983; Engel et al. 1995; Foxall et al. 1998). After the purchase, he/she also consumes those products or services and uses the consuming experience as a learning history (cf. Foxall, 2002) to decide whether he/she will repeat, abandon, or even spread word-of-mouth to his/her friends to root for or against the purchase. As a result, any steps of the decision-making process of buying and consuming activities are inter-correlated and can be explained in terms of a broad range of stimuli-and-response mechanisms (Foxall, 1980). In fact, the purchase of a commodity is rarely just a pure seeking for economic, functional values; it has social and psychological meanings as well (e.g. Levy, 1959; De Chernatony & McDonald, 2003; Karferer, 2001).

Because marketing can be understood and applied in many different ways, it is no surprise that consumer behaviour, as a sub-discipline of marketing, lacks a

universally accepted framework or model (Foxall, 2005). A wide variety of disciplines of economics (the science of how individuals use scarce resources) and psychology (the science of overt and covert behaviour), most of which are highly varied, have traditionally provided theoretical foundations of consumer behaviour (Engel, Miniard, and Blackwell 2001; Harré and Secord 1972; Jacoby, Johar, and Morrin 1998). These theoretical foundations, if used, would become an application to a particular marketing case (Foxall, 1999). John O'Shaughnessy (1992) discusses critical issues in modern philosophy, psychology, and sociology and their relevance to consumer behaviour. Within psychology, he provides the fundamentals needed to understand numerous explanatory systems of consumer behaviour such as (1) behaviourism, (2) physiological psychology, (3) psychoanalytic psychology, (4) cognitive psychology and (5) interpretative psychology. In fact, the study of consumer behaviour can be carried out through consumer psychology. Consumer psychology, in other words, is the study of how consumers' thoughts, feelings, perceptions, and beliefs affect the way people behave (Cherry, 2011).

From the perspective of the first explanatory system - behaviourism, marketing science in general and the study of consumer behaviour in particular is based on behavioural function, which focuses on the impacts of reinforcement and punishment in the task of fulfilment of consumers' needs and wants. This functional approach in marketing has been abandoned since the 1970s after a misleading "paradigm shift" in schools of marketing thought (Shaw & Jones, 2005, p. 243). As a result, the latter four explanatory systems have dominated the field ever since. However, behaviourism still plays an intellectually and critically important role in marketing research (e.g., Foxall, 1999) because of its ability to discuss issues about the consequences of behaviour and to make operant psychology (aka. behaviour

analysis) applicable to marketing science.

In practice, with the significant rise of the latter four schools of thoughts (2 to 5), there have been streams of studies modeling consumer behaviour as a cognitive process in which behaviour can be seen as a mean of internal characteristics and activities (e.g. Jacoby et al., 1998; Andreasen, 1965; Nicosia, 1966; Engel, Kollat & Blackwell, 1968; Howard & Sheth, 1969; Baars, 1986; Gardner, 1985; Mandler, 1985; Robinson-Reigler & Robinson-Reigler, 2004). In fact, the cognitive approach has dominated psychology science since the 1960s (Mandler, 1985, Baars, 1986, Dennett, 1987). As a result of cognitive psychology's impact, marketing has become more separate from economics. The change leads to a decreased number of researchers who have an interest in the role of emotions in purchasing behaviour (e.g. O'Shaughnessy & O'Shaughnessy, 2002; Bitner, 1992; Dawson, Bloch & Ridgway, 1990; Donovan & Rossiter, 1982), whilst others have based their research mainly on consumers' verbal expressions such as opinions, attitudes and beliefs, and thus the work has relied heavily on surveys and questionnaires (Jacoby et al., 1998). For instance, measuring unobservable factors like attitudes or beliefs would offer researchers an easy route to predict consumers' behaviour.

The idea of information processing has been placed in the central of cognitive psychology. It is borrowed from computer science by researchers such as Broadbent (1958) and Newell, Shaw, & Simon (1958). They view the individual as a processor of information, like a computer that takes in information and follows a program to produce an output. The theory with its emphasis on computer metaphors, therefore, concentrates on topics such as learning, attention, perception, categorisation, memory, problem-solving, language, and rationality (Bettman, 1979; Plutchik, 1985; Sternberg,

1999). Since taken into modern marketing, these cognitive concepts have enjoyed an "unambiguous status" among consumer behaviourists (cf. Holbrook & Hirschman, 1982; Foxall, 1996; 2017) and have served as a foundation of a numerous topics such as behavioural decision making, preconscious processing, language, memory and cognitive elaboration, and variety seeking (Simonson, Carmon, Dhar, Drolet, & Nowlis, 2001). Consequently, cognitive models of decision making have been introduced in marketing textbooks and taught in business courses ever since. For example, the Theory of Reasoned Action (Ajzen & Fishbein, 1980) and the Theory of Planned Behaviour (Ajzen, 1985) have been very influential and used extensively to demonstrate the relationship between attitudes and behaviour. Cognitive psychology in marketing, nevertheless, comes up with different and inconclusive results (Kollmus and Agyeman, 2002, Said et al., 2003, Jackson, 2005), which may stem from a poor connection between presumedly hypothetical constructs and real-world buying activities. For instance, the relationship between attitudes and behaviour is far weaker than expected, if specific settings are not taken into consideration (e.g., Lea, Tarpy & Webley, 1987; Perloff, 1993; Wicker, 1969; Foxall 1987). Besides, several traditional models in cognitive studies like Howard-Sheth model are unconfirmable and too general in defining variables (Bennett and Mandell, 1969, Jackson, 2005; Farley and Ring, 1970, Foxall, 1990; 2017). Hence, it is concluded that consumer cognitive theories seem to be purely speculative, and thus the approach inevitably results in false assumptions and inaccurate descriptions and predictions of what consumer behaviour is (Foxall, 2002).

Due to the weak link between attitudes and behaviour, marketers have started to give up such marketing research (e.g., Simonson, Carmon, Dhar, Drolet, & Nowlis, 2001) as well as to come up with a new concept of customer-oriented behaviour that

focuses on action and is clearer and easier to find, analyse and make clear the laws and principles of the behaviour of marketers and consumers (Gronfeldt, 2004). Thus, there is a need for a development of a more objective behavioural marketing model that concentrates on buying and consuming activities per se. The Behavioural Perspective Model (BPM) is one of them. It incorporates situational variables in such a way that consumers' attitudes and behaviours can be explained and predicted, thereby avoiding any unobservable factors that cognitive models rely on too heavily (Foxall, 2004).

Barnes and Holmes (1991) argue that as cognitivism and behaviourism have different philosophical foundations that cannot be directly compared, it would be unwise and unnecessary to conclude which approach is better. Therefore, the ultimate goal is not to find who is the winner between cognitivism and behaviourism in marketing science but to find a reasonable and sensible compromise where both could well feed off each other (Foxall, 2004). For example, subjective internal states such as attitudes, memories and expectations have always been tools to explain and interpret behaviour, and there is no doubt that these hypothetical constructs can be better utilised if behavioural marketing is developed and tested further.

2.2 Patterns of Brand Choice

The ultimate aim of behaviour analysis is to understand and elucidate complex human choices. For example, in marketing, the pattern of buying decisions, determined by non-price impacts such as branding, promotions, advertising, distribution strategies, and social pressures (Penrose, 1959), have been thoroughly scrutinised over the last few decades, especially for fast-moving consumer goods

(Oliveira-Castro et al., 2010). Among these impacts, branding plays a vital role in winning users' hearts by establishing a significant and identified presence. However, there still remain research gaps in the exploration and interpretation of the complexities of consumer brand choice because, in reality, all consumers are always lured by many different brand names and each has its own individual image.

2.2.1 Ehrenberg's School of Thought

The contribution of Andrew Ehrenberg (1st May 1926 - 25th August 2010) is widely known for his lifelong work on law-like regularities and human behaviour patterns in social science in general and in marketing in particular (Bound, 2009). His research's replicability has been proven after the considerable and steady success of various big data studies conducted for different products and services, countries, and periods of time (Ehrenberg 1972; Ehrenberg, Goodhardt & Barwise, 1990; Ehrenberg & Scriven, 1999; Goodhardt, Ehrenberg & Chatfield, 1984; Uncles, Ehrenberg & Hammond, 1995). To describe the regularities of Ehrenberg's work on brand and market patterns, a single statistical framework, known as the Dirichlet Model (Goodhart et al., 1984) has been developed. The so-called "empirical generalisations" (Uncles et al., 1995, p.71), which are mathematically demonstrated by the Dirichlet model, consists of two major topics: product-repeat-buying patterns and brand-buying patterns. For instance, on the latter issue, the performance of any brands can be reliably estimated during particular events such as product launching or price promotions (Ehrenberg, 1991; Ehrenberg, Hammond & Goodhardt, 1994). Besides, each consumer tends to buy a chosen repertoire of brands, and this tendency remains stable over time.

There are two primary inputs of the Dirichlet model, the penetration rate (the

percentage of buyers for a particular product category over a time period) and the average purchase frequency of consumers of that type of goods or a specific brand during the same time (Schrezenmaier, 2005). Based on these two inputs, the model can be employed to answer three major questions: (1) how often buyers purchase, (2) which brands they purchase and (3) the total size of the market and the market share of each brand (Ehrenberg, Goodhardt & Barwise, 1990).

"Double jeopardy", first observed by McPhee (1963), is one of the most shared and famous terms in marketing studies by Ehrenbergians. McPhee mentions that there is a dissimilarity in people's likenesses and tendencies toward items that are functionally similar but different in popularity. McPhee (1963) describes this trend as a statistical selection effect. In his first publication about the double jeopardy phenomenon, McPhee investigates the differences in consumers' attitudes to a famous restaurant with high market share and an unknown one that only lures a small proportion of residents (1963). The aim of his study is to prove that two functionally substitutable restaurant services, located in the same area, are often different in terms of consumers' demand and liking. Therefore, it can be stated that "double jeopardy will arise whenever competitive items differ in their popularity" (Ehrenberg et al., 1990, p.85), i.e. when brands are different regarding their market share. Specifically, according to double jeopardy effect, brands with a small market share would suffer from a reduced repeat buying pattern. That is to say, small brands do not only attract fewer consumers for their offered products and services, but those consumers buy less of the brands less frequently. However, it cannot be concluded that the brands with a smaller market share have less loyal or less committed consumers than those who have a higher market share. Hence, competitive brands are only different from one another in terms of the number of buyers and not in consumer loyalty (Foxall, 2002;

2017).

In Ehrenberg's studies for fast-moving consumer goods, there is only one case that goes against the double jeopardy rule and that is Spanish-language and religious TV stations in the US, which surprisingly enjoy a substantial viewing traffic from their relatively low audiences (Ehrenberg et al., 1990). In other cases, such as the choice between either Mcvities or Kit Kat among a wide range of biscuits brands available, the law-like patterns are mainly observed (Ehrenberg, 1988). Buyers also often learn from their buying history before making their brand selection (Ehrenberg et al., 2004) and they have a tendency to keep buying the brand if it fulfils their needs (Woodside and Uncles, 2005).

Each brand has its own set of sole buyers (Foxall, 1999; 2017), who are totally committed to one and only one brand but according to Ehrenberg and his colleagues (1988), they only account for a small part (around 10%) of the total consumers of any brands within a product category. In addition, they are not particularly heavy users of their preferred brand (Foxall, 1999; 2017). This contradicts the traditional and widespread belief that a loyal consumer would definitely be a heavy buyer, and hence become a valuable asset to the company. In other words, it cannot be concluded that the higher loyalty rates a company has, the more profitable it will be (Reichheld and Sasser, 1990).

In fact, most buyers of fast-moving consumer goods usually show their multi-brand buying tendency, selecting randomly from a small "repertoire" of their frequently bought brands within a particular product group (Foxall & Schrezenmaier, 2003). In other words, consumers seem to reduce their brand options to a small repertoire instead of picking up the items from the full brand set. Most of the chosen

brands are functionally substitutable, or functionally interchangeable. As a result, within the repertoire, buyers often do not prefer one brand over the others since the rewards obtained are directly substitutable as long as the brand meets their requirements in that product category (Foxall, 1999; 2017). In fact, a new brand name, in order to be accepted as a unit of a particular product group, has to provide similar functional attributes to those featured by the existing members of that group (Ehrenberg, 1991).

Also, within a substitutable repertoire of brands, buyers usually purchase the lowest priced ones available (Foxall, 1999; 2017). However, if the available brands are not perfect substitutes, they will tend to buy several brands in that product category. These patterns have been found in a wide range of goods by Ehrenberg and his research fellows since the 1950s (Uncles et al., 1995, Ehrenberg, 1972, Ehrenberg et al., 1990, Ehrenberg & Scriven, 1999, Goodhart et al., 1984). The researchers also confirm the described buying behaviour of different package sizes, of different flavours, and from different retailers (Goodhart et al., 1984).

Ehrenberg criticises currently-favoured marketing models for exaggerating the effects of tactical practices on sales levels which are designed based on indicators such as how many consumers buy the brand, how often and how much they buy the others (Ehrenberg et al., 2004). For example, in a report of door-to-door sales calls using a mobile shop reveals that there is little or no long-term effect from either tactical sales promotions, or out-of-stock situations, or new product launches on the sales levels of any of the selected brands (Charlton and Ehrenberg, 1976). Moreover, Ehrenberg, Hammond and Goodhardt (1994) claim that price promotions do not exert any significant after-impact on fast-moving consumer goods, and thus the repeat

buying behaviour of those products is unaffected by those tactical marketing tools in the long run (Ehrenberg et al., 1994). In other words, sales promotions, as an unsuitable tactical tool, do not actually attract new users since those buying the brand during its sales promotion campaign are highly likely to have bought it before. Sharing Ehrenberg's view, Watkins (1986) discounts price as a quantitative, unambiguous and unidimensional marketing tool, and consequently consumers' brand choices are usually not the result of price changes (Schrezenmaier, 2005).

Levy and his collaborators state that selling a product at the lowest price is not always the best strategy (2004). In a piece of research on price effects, the findings show that price impacts a brand's sales patterns mostly when it has competitive brands, and buyers view all of them as close substitutes (Ehrenberg, 1986; Ehrenberg & England, 1990). Besides, price demand for competitive and differentiated items appears less elastic than others which are functionally similar, and thus their market shares stay fairly constant. Ehrenberg (1986) mentions that brand differentiation provides a useful foundation for an aggressive pricing strategy. In other words, product differentiations and marketing mix strategies may boost a company's market share and sales levels but are unable to change the law-like regularities of the market predicted by the Dirichlet model (Ehrenberg, 1991). Hence, the company should follow the market by using the figures estimated by the model as its sales targets instead of putting in lots of effort on increasing consumer repeat buying behaviour.

Ehrenberg's school of thought has developed over the decades, but it still lacks a thorough investigation of the underlying reasons for consumer's purchase patterns (Foxall & Schrezenmaier, 2003). First of all, the Dirichlet mathematical model is "parsimonious" since it needs only a few inputs for its estimations due to

being defined for unmoving (i.e. indicating few or no trends) and unsegmented (i.e. similar brands attract similar people) markets (Ehrenberg & Uncles, 1999). Second, the presumed stationary condition of the market seems to be questionable, especially in the modern business world with the dynamic of technology, innovations, and environmental changes. That is to say, the Dirichlet model is unable to incorporate short-term, rapid changes and fluctuations into its equation (Sharot, 1984, Bloom, 1984, Phillips, 1984) and, as a result, it cannot address adequately underlying patterns and motivations of buyers for their purchases (Bartholomew 1984; Jeuland, 1984). Therefore, Ehrenberg's work, particularly of market patterns and buying behaviour, is criticised as relatively inadequate to provide in-depth predictions compared to traditional marketing models incorporating complex factors such as daily business activities, the length of the research period, consumer perception, and so on (James, 2002).

In summary, the empirical generalisations and the large amount of data created by Ehrenberg's approach in numerous replications are surely useful for understanding consumer choice patterns. However, it is worth noting that the inputs of the so-called "parsimonious" model are difficult to measure and collect (Schrezenmaier, 2005). Moreover, in-depth and detailed research is imperative to investigate the underlying reasons for consumers' product and brand purchasing habits which have remained mostly undiscovered.

2.2.2 Pattern of Brand Choice based on Reinforcement

In general, some users of high-quality brands tend to be reluctant to look for alternatives in cases of price changes and hence can be viewed as choosing informational benefits as their maximisers (Schrezenmaier, 2005). Some purchasers,

on the other hand, are price-sensitive, always buy the cheapest brands and thus can be considered as utilitarian reward seekers. They seem to use price as a buying criterion rather than a quality indicator. This type of behaviour is in line with matching theory (which is discussed later), which claims that buyers select the product which provides the most economy wise. Most of the rest, typical consumers, are the ones who show a likeness for both types of brands and can be regarded as maximising by multi-brand buying (Foxall & Schrezenmaier, 2003). As discussed earlier, in the short term, each product brand has its own sole buyers, but it is evident that those become multi-brand consumers over an extended period of time. Multi-brand buying is also proven through the fact that even the heaviest users of a particular brand buy the others within the same product category much more than they buy the preferred brand during the time period (Foxall & Schrezenmaier, 2003).

Although buying several brands at the same time, consumers also show a disproportionate interest in top quality brands (Foxall, 1999; 2017). This interest may stem from the attraction of other reinforcement variables such as the limited offerings of the buyers' favourite brands/stores or their different desires with respect to the colour and size of the product. Matching patterns can be predicted among these consumers with a selected "repertoire purchasing" habit, and thus they may be influenced by price differentials (Foxall, 1999; 2017). Besides, switching brands within the chosen repertoire is in accordance with the predictions of melioration and matching. Therefore, Ehrenberg's conclusion that price promotions do not have any impact on sales levels is not always the case. Sales may be unchanged when the promoted brands, which are offered at lower prices, do not belong to the consumer's repertoire, and thus those brand names are not even tested (Foxall, 1999; 2017). Otherwise, those items subject to price deals would be likely to be bought at the

offered price. In this case, brands that are qualitatively similar would be influenced by even a small price reduction (Foxall, 1999; 2017). In short, users have a tendency to purchase the cheapest brand available within their repertoire and not the cheapest of all brands on offer in the entire market, meaning that not all brands are substitutable for others (Foxall et al., 2004).

The above discussion leads to an important suggestion that functional features or utilitarian benefits are not the only reason for choosing a brand. Also, it is evident that brands may share same product attributes but offer different informational rewards. The difference between utilitarian and informational reinforcement is discussed in the Behavioural Perspective Model (Foxall, 1990; 2017). According to this model, consumer choice is formed and affected by the consumer situation, which is a combination of the consumer's behaviour setting and learning history which stem from the experience of buying and consuming consequences in the past. This is in accordance with Winer's suggestion that the key factor influencing a consumer choice is either the marketing mix or the consumer's purchase experience (1986). Besides, consumer choice generates both utilitarian and informational reinforcement that, in turn, impact the rate at which the behaviour is repeated (Oliveira-Castro et al., 2006). Therefore, the pattern of reinforcement, which is a combination of both utilitarian and informational benefits, affects consumers' buying and consuming decisions (Foxall & James, 2003; Foxall & James, 2001).

2.3 The Role of Price

Price influences on buying and consuming activities have been the subject of a heated debate in the academic community over the years. (Rao, 1984; Gijsbrechts, 1993). Overall, literature on the role of price can be divided into studies examining to what extent buyers are aware of prices and price promotions and those looking at influences of price on the perception of quality (Jacoby, 1976). The discussion, however, has not been supported by many theoretically or empirically strong arguments. Along with time and emotions, price is a cost when buying a product or service. As it is the most obvious cost, price is often used as an important buying criterion (Kenesei and Todd, 2003). For example, special discounts are more likely to draw consumers' attention and persuade them to buy the cheapest brand especially when they are faced with the direct comparison between the original and the offer price.

Some scholars claim that quality of products and services are more important than the price when consumers make purchasing decisions (Foxall & Schrezenmaier, 2003). For example, buyers in a convenient store seem not to care about the last digit in any price tags, and thus sellers should round the price up for a better profit (Anderson & Simester, 2003). Moreover, Kenesei and Todd mentions that relatively few buyers remember the exact price of the product they bought (2003). Dickson and Sawyer also point out that 40% of consumers do not even look at price information (1990). Besides, only a few buyers change their shopping locations because of price promotions, and their willingness to switch stores due to those promotions is much less than that to switch brands inside their chosen store (Walter, 1991).

The habit of not checking prices comes from the belief that consumers only

save a tiny amount of money by comparing prices of different brands once buying that product category becomes a routine (Dickson & Sawyer, 1990). The price saving is worth much less than the cost of time and effort. Many marketers believe that, for fast-moving consumers goods where purchasing behaviour will eventually become a habit or routine, then the more loyal to a brand buyers are, the less sensitive they are to price. As a result, brand-loyal customers spend less time searching for available options and less time checking prices, so their knowledge of prices, from occasional checks, is often inaccurate (Kenesei and Todd, 2003). Also, price promotions are said to boost sales temporarily by attracting existing consumers rather than by attracting newcomers to buy the brand (Uncles et al., 1995). Moreover, a rise in sales may stem from the fact that users switch to the cheapest alternative in their brand repertoire and purchase in greater quantity in order to take advantage of that price promotion. Besides, the numbers of active price-information seekers are usually overestimated (Hill and O'Sullivan, 1999; Urbany and Dickson, 2000) because shoppers only judge the listed price in the absence of their reference price (Rao and Monroe, 1989). Because of consumer unawareness of price reductions as mentioned above, it is suggested that retailers should reduce their price-cutting promotions (Le Boutillier et al., 1994) or even set reasonably higher prices (e.g. Kapferer, 2001; De Chernatony & McDonald, 2003).

The law of demand is the most fundamental invention in microeconomics (e.g., Perloff, 2001). It states that when the price of a good or service rises, consumer demand for that commodity will decrease, and vice versa. Graphically, the demand curve has a downward slope with several exceptions in cases of Giffen goods or inferior goods. Although these exceptions are considered to be very rare (e.g., Silberg & Walker, 1984), there has been a consensus in both economics and marketing that

price can exert both positive (e.g., as a quality signal) and negative impacts (e.g., budget constraint) on demand (Rao, 2005; Rao, 1984; Rao & Monroe 1988).

Compared to other factors in the marketing mix, price is the most used and hence important since it directly generates revenue. However, believing that a lower price plays a vital role in being successful in the business world is too naive (Levitt, 1980) as companies can cope with a competitor's price promotions more easily than other promotional activities and distribution tactics like new product attributes, or advertising. Some may argue that £1 shops are clear examples of a successful business model using a very low price strategy. However, the low price in this sense should be considered as a smart business idea (that mixes undervalued and overvalued items together to sell at the same price) rather than a tactic where an item is sold at a price below its value to disadvantage competitors. Actually, in a traditional marketing approach, these types of promotions are perceived as one of the "4Ps" (product, price, place and promotion), and designed to create sales and stimulate consumer demand.

Consumers, in reality, usually consider that price and product quality are positively correlated (Jacoby, 1976). Poliak even insists that "under some circumstances, judging the quality of a product by its price is a rational strategy for an uncertain consumer" (1977, p. 64). Besides, it is claimed that buyers use the combo price-quality heuristically as it is cognitively effective. Thus, upward-sloping demand curves have been traditionally explained as the result of cognitive processes. However, according to a number of studies, the relationship between quality and price is poor (Gerstner, 1985; Riesz, 1979; Tellis & Wemerfelt 1987). This may come from budget constraints being taken into account when the price goes up dramatically.

In fact, with the growth of marketing science as an independent discipline that

separates gradually from economics, the role of price is in decline while, conversely, the role of non-price factors, especially ones relating to brand differentiation, grows rapidly (De Chernatony & McDonald, 2003; Jary & Wileman, 1998; Watkins, 1986). Sparks (1993, p.62) contends that the "relative balance between price, service and quality has moved away from price decisions and towards decisions based on quality or service". Price has rarely been utilised in interpreting consumer brand behaviour aside from promotional activities which are known as tactical deviations of marketing plans and strategies (Ehrenberg et al., 1994). In other words, other non-price elements in the marketing mix have been heavily emphasised at the cost of ignoring the influence of price (Romero et al., 2006). While price has been considered as a "quantitative, unambiguous and unidimensional" marketing tool (p. 21), there is a fundamental consensus that effects of the small price differentials between brands on consumer choice are relatively small (Watkins, 1986), and thus they cannot change the formed patterns of brand choice (Foxall & James, 2001). Scriven & Ehrenberg (2003) even put forward the suggestion that it is not worth considering price as a product attribute.

From the supply perspective, it is believed that setting an optimal price is highly complicated and multi-dimensional for managers who need to consider an extensive variety of factors including promotion, competitors' marketing strategy, price elasticities, complementary and substitute products, and so on (cf. Levy et al., 2004). Therefore, an optimal price should be the most strategically reasonable, not necessarily the lowest one. Taking the economics theory of maximisation into consideration, this suggests customers clearly do not only focus on acquiring the highest value for money spent by selecting the cheapest brand on offer because they see price as just a part of the value along with other product attributes, all of which

provide an extensive variety of fulfillments (Watkins, 1986).

However, there have been pieces of evidence supporting the role of price in understanding consumer behaviour. For instance, Gabor and Granger (1961) claim that researchers should not overlook the price consciousness of consumers as its importance appears to be considerably higher than described by many scholars and practitioners (Schrezenmaier, 2005). This consciousness helps buyers to build up an alleged reference price for a brand or an item, which is recalled from the memory of the price information in the past (Lattin and Bucklin, 1989). Specifically, the level of concentration on the price and its qualities, which is used as a criterion for selecting a brand, influences both processes of encoding and recalling the previous pricing levels of the brand (Dickson and Sawyer, 1990). That is to say, after checking and comparing prices, buyers tend to create their own expectation of the price in the future. Besides, despite the fact that consumers often got the wrong ideas regarding price information, they are more than capable of recognising the most attractive price before making purchasing decisions (Vanhuele and Dreze, 2002). The attraction of a price deal, in turn, may lead to consumer switching behaviour in terms of brands and package sizes (Dickson and Sawyer, 1990). Moreover, by examining the matching law for substitute and complementary products, Foxall and his associates indicate that even small price differentials could impact consumer brand/product choice in affluent markets (Foxall, 1999; 2017, Foxall & Schrezenmaier, 2003, Foxall et al., 2004, Oliveira-Castro et al., 2005, Foxall & James, 2001). Similarly, in his study of the demand for near-identical brands, Ehrenberg (1986) comes to the same conclusion. In general, although buyers are becoming more price-conscious than predicted besides being highly diverse regarding their sensitivity to price, relatively little research has been done on how price and price promotions are used as important criteria for

choosing products or services (Rao, 1984). Besides, the inconsistency in research on the role of price highlights the need for further investigations.

Chapter 3: Behaviour Analysis

Behaviour analysis refers to the science of learning that includes a number of research areas such as the experimental analysis of behaviour (identifying basic principles of learning), applied behaviour analysis (implementing those principles to real-life situations), operant psychology, operant conditioning, behaviourism and Skinnerian psychology (Vaughan, 1989; Foxall, 1996; 2001; 2017). Consumer behaviour analysis, as a major branch of behaviour analysis, views learning as "unconscious changes in overt and verbal behaviours", and thus is the result of consumers' experiences and environmental impacts (Foxall et al., 1998, p. 76; p. 90). In affluent markets, it is based mainly on the contribution of three dominant behaviourists, Ivan Pavlov, John Watson and Burrhus Frederic Skinner with the aim to examine "human behaviour in naturally occurring settings that are subject to marketing influences" (Foxall, 2002 as in Foxall, 2013, p. 105). Specifically, through interaction with the environment, consumers unconsciously shape their complex behaviour via the mechanisms of classical and operant conditioning (Skinner, 1972).

3.1 Behaviourism

Behaviourism is known as a philosophy of psychology making use of the core concept that everything an organism does could be counted as a behaviour (Burghardt, 1973, Wheldall, 1975). The influential researcher John B. Watson, who is regarded as the founder of behaviourism, first bought psychologically analytical methods to the field of consumer behaviour. According to his doctrine, current wants and needs of buyers can be created or modified through those methods like classical and operant conditioning that are well-known techniques employed in non-human

experiments (Buckley 1982; DiClemente & Hantula 2003; Skinner 1987). It is also believed that the influence of nurture (e.g., environment influences) on human behaviour is greater than that of nature (e.g., genetics). However, Watson's belief had not been proven until the first empirical study examining the application of operant theory of consumer behaviour was conducted by Lindsley (1962). Later, the topic was mainly employed in the area of applied behaviour analysis with a growing number of the operant-approached studies focusing on several important consumer behaviour issues like recycling, or gas and energy utilisation (Baer, Wolf, & Risley, 1968). These researchers, following Watson's approach, have mainly investigated the relationships between behaviour and environment influences. For example, DiClemente and Hantula (2003) test the importance of environmental conservation to consumer choice via social marketing. Nevertheless, despite many striking results about relationships between applied behavioural analysis and consumer behaviour, the techniques seem to be abandoned in consumer marketing. One possible reason for this is the lack of studies incorporating behaviour principles into natural settings which are able to employ a non-laboratory approach to either consumer or marketer behaviour (Foxall & Schrezenmaier, 2003).

3.2 Behavioural economics

Because consumer behaviour analysis is based on behavioural economics, it is necessary to discuss it as the theoretical framework of the study. Behavioural economics can be defined as a field of economics which aims to understand and explain human behaviour and in which human complexities and limitations are discovered through investigations and experiments (Kagel and Winkler, 1972). Similarly, it employs empirical methods and results to learn and predict how

consumers allocate limited economic resources for buying and consuming activities (Pratt 1972). Besides, according to Simon (1987), behavioural economics refers to "a commitment to empirical testing of the neoclassical assumptions of human behaviour" (p.221). Its main purpose is to highlight key characteristics that are mutually shared and possible benefits that are mutually gained by both psychology and economics in order to draw more attention to studies that incorporate theories derived from the two disciplines (Kagel et al., 1975; Lea, 1981; Rachlin et al., 1976). For example, Rachlin (1980) insists that "economists and psychologists have not realised that microeconomics and behavioural psychology are one and the same field". In fact, from the psychology perspective, behavioural economics, mainly formed of the theories operant conditioning and behaviour analysis, has integrated fundamentals of microeconomics like the consumer demand or labour supply theory into its pool of core concepts (Allison, 1983; Allison, Miller, & Wozny, 1979; Green & Freed, 1998; Lea, 1978; Rachlin, Green, Kagel, & Battalio, 1976; Staddon, 1979; cf. Watson & Holman, 1977). From the economics perspective, on the other hand, the two main purposes of borrowing psychology concepts for economics studies are (1) to expand the behavioural foundation of economic analyses, and (2) to increase the level of applicability of economic theories (Albanese, 1988).

3.2.1 Behavioural Economics from the Perspective of Psychology

3.2.1.1 Classical Conditioning

Ivan Pavlov (1849 - 1936) was a Russian physiologist whose findings on the physiology of digestion (1927) can be considered as a fundamental paradigm that

introduces and advocates classical conditioning, and as the first experimental model of learning. The underlying theory of Pavlov's work is known as the stimulus substitution theory (Mazur, 2006). Like many other great scientific findings, Pavlovian conditioning was accidentally discovered. Classical conditioning occurs when a conditioned stimulus is paired with an unconditioned one. In his experiment with a hungry dog, a bell or a metronome acted as the Conditioned Stimulus (CS) that has to be neutral, while food, biologically potent, acted as the Unconditioned Stimulus (US). With the impact of the US, the dog salivates as the result of an unlearned reflex response, called the Unconditioned Response (UR). After pairing CS and US for a while, the dog would keep responding to the metronome (CS) even in the absence of food (US), and consequently, the salivation can be now called the Conditioned Response (CR). When the CS appears just before and during the presentation of the US, this is known as forward or traditional conditioning, when these stimuli are presented simultaneously this is referred as to simultaneous conditioning and when the presentation of the CS is after the US this is called backward conditioning (Macklin, 1986).

Classical conditioning became famous in the US during the first decades of the 20th century after Watson abandoned introspection, which examines one's own conscious mental states and processes, and limited psychology to only experimental methods (Foxall et al., 2008). Later, the theories and applications of classical conditioning have been largely used in marketing, especially in the field of advertisement. For example, in a number of studies (e.g. Schiffman and Kanuk, 1983, Allen and Madden, 1985, Engel et al., 1995), music, content, and sources - common advertising tools - are incorporated into the presentation of products or brands to test whether classical conditioning can be the main reason for positive advertisement

outcomes. In the 1980s, behaviourists started to employ classical conditioning applications in consumer research and gain positive results about those applications' validity (Bierley et al., 1985, Stuart et al., 1987). Nevertheless, indirect measures of consumer behaviour concerning preferences or attitudes are heavily used in most of those studies (Foxall et al., 2008). For instance, Nord and Peter (1980) attempt to pair famous sports casters' excited voices (the unconditioned stimulus) with particular products (the conditioned stimulus) in order to possibly develop positive feelings (consumer preferences) about that product. The use of an indirect measure, which is more likely to eliminate the core value of behaviourism, may stem from the difficulty of demonstrating impacts of classical conditioning on the actual behaviour (Di Clemente & Hantula, 2003). Besides, studies may lose their validity as the result of acquiring pseudo-conditioned responses, which is elicited by a formerly inadequate stimulus that never pairs with an unconditioned stimulus (US) (Allen and Madden, 1985, Kellaris and Cox, 1989). Bierley et al. (1985) conclude that the issue may come from the lack of "trial and error" testing or from the implementation of improper control procedures.

3.2.1.2 Operant Conditioning

Operant conditioning, is a change of behaviour achieved by the use of reinforcement (or punishment) given after the desired response (Skinner, 1938). In other words, operant conditioning is a type of learning in which the consequences of behaviour are manipulated in order to increase or decrease that behaviour in the future. The ultimate objective of studies using operant conditioning is to establish fundamental rules and functional relationships as a means to understand the type of non-reflexive behaviour shaped, as well as the situational conditions in which that

behaviour can be produced (Mazur, 2006). Foxall (1992) insists that economic human behaviour is considered as operant because it operates on the environment to create consequences. Skinner (1938; 1974) identifies three types of responses or operants that are able to follow behaviour, namely, reinforcers, punishers, and neutral operants. Specifically, reinforcers increase the behaviour they follow, and punishers decrease the behaviour they follow while neutral operants have no effect at all on the strength of the behaviour they follow.

The antecedent stimulus also plays a vital role in the contingency. Specifically, the stimulus indirectly elicits the response by setting a specific situation for it to be reinforced. Since the participant discriminates in the stimulus' presence, that stimulus is called a discriminative stimulus, and thus the response is under stimulus control (Ormrod, 1999). Besides, there is a change (an increase or decrease) of behaviour in shape, strength or frequency, depending on the consequences which follow. Therefore, to experimentally analyse human and animal behaviour, each behavioural act can be divided into three key parts that are a discriminative stimulus, an operant response, and a reinforcer/punisher (Skinner, 1953). These parts constitute the simplest form of the 'three-term contingency'. The three-term contingency, initially introduced by Skinner, illustrates how behaviour is elicited by the environment and how the consequences of that behaviour can influence its future occurrence (Skinner 1953).

The three-term contingency are shown:

$$S^{D} \rightarrow R \rightarrow S^{r^{+/-}} \quad (1)$$

Where S^{D} represents the discriminative stimulus for consequences that exists

or occurs before a response, R is the response that is either reinforced (S^{r+}) or punished (S^{r-}). Due to the undisputed value of reinforcement and punishment as one of the core concepts of operant conditioning, several classifications have been examined.

(1) Positive and negative reinforcement (and/or punishment)

Both reinforcement and punishment can be classified as positive and negative. Positive and negative here do not mean good and bad; they mean adding and removing a stimulus, respectively. Therefore, positive reinforcement is the presentation of a stimulus after a response so that the response will occur more often (Skinner 1953). Negative reinforcement is the removal of a stimulus after a response so that the response will occur more often. Similarly, positive punishment is the presentation of a stimulus after a response so that the response will occur less often (Skinner 1953). Negative punishment is the removal of a stimulus after a response so that the response will occur less often.

(2) Primary and secondary reinforcement (and/or punishment)

The common classification of reinforcement is between primary and secondary (Blackman, 1974, p. 93; Foxall, 1997a, p. 85). Primary reinforcers, like food, drink, and pleasure, are available from birth and apply to all kinds of species. The featured characteristic of primary reinforcers is that their effects on behaviour do not rely upon other reinforcers. They act naturally to determine the rate of behaviour. In contrast, the power of secondary reinforcers is gained through an individual's experience. Their effects on the rate of behaviour, rely upon how they pair with primary reinforcers. Money is the most used example of secondary reinforcers, as it is

used to obtain many primary reinforcers.

(3) Utilitarian and informational reinforcement (and/or punishment)

This kind of reinforcement is well known in marketing studies, so it is worth overviewing the history of operant conditioning in marketing research. It is noted that Nord and Peter (1980) are regarded as the first scholars producing theories based on the principles of operant conditioning. However, in reality, it has attracted less attention from consumer behaviourists than has classical conditioning due to its longer operational time. Besides, classical conditioning is believed to be much more easily incorporated into the favourite mainstream of cognitive research with common constructs like attitudes and preferences (Di Clemente & Hantula, 2003). Bucking the above trend, in order to prove the applicability of operant conditioning, Foxall (1987) first introduces the principles of radical behaviourism and the vital role of that kind of conditioning in consumer behaviour. According to his doctrine, the importance of operant behaviour analysis in marketing, generally, and in consumer research, particularly, is to understand consumer choice in terms of the consequences it generates as well as reinforcement and punishment contingent upon it (Foxall, 2001; 2017).

Based on rule-governed behaviour, one distinction worth considering between utilitarian and informational reinforcement has been demonstrated (Foxall, 1992). Utilitarian reinforcement may be best defined as functional benefits of purchasing and consuming activities as well as material satisfaction of consumer situations (Foxall, 2004; 2017). It is mediated not by other people but by the product or service itself (Foxall et al., 2006). On the other hand, informational reinforcement is performance feedback, that is usually mediated by the responses of others, and hence it is

concerned with social status, or self-satisfaction (Foxall, 1997; 2017; Foxall et al., 2006). It is worth noting that primary reinforcement often mainly focuses on the utilitarian aspects of consumption although there might be an informational component in real-world situations, whilst secondary reinforcement can be both utilitarian and informational (Foxall, 1997; 2017). Moreover, some reinforcers, like money, can have both utilitarian and informational value. As a result, the consumer situation that provides the context of purchase and consumption has to be taken into consideration when explaining buying and consuming activities. In fact, utilitarian and informational reinforcement have been conceptualised as the consequences of consumer behaviour in the theoretical model of the BPM (Foxall, 1987; 1990; 2017) that will be further analysed in following sections.

3.2.1.3 Methods in Behavioural Economics

Most researchers have heavily used laboratory experiments as the research method in their behavioural economics studies (e.g. Kagel and Battalio, 1980, Kagel et al., 1975, Lea, 1978, Battalio et al., 1981, Kagel et al., 1981). The work has played a vital role in explaining human economic behaviour because it is evident via those experiments that non-human subject's behaviour often shares considerable similarities with human behaviour in consumption. For example, the behaviour of non-human subjects meets basic requirements of the law of demand in economics or the empirical law of effect in psychology (Rachlin, 1980).

During the 1970s, behavioural economists used both human and non-human subjects in laboratory experiments to test economic measures including price and types of reinforcement on human behaviour (Madden, 2000). The research proved the capability of some economics constructs, like downward-sloping demand curves, in

properly predicting animal behaviour with the use of both response and reinforcement rates (Kagel and Battalio, 1980). In fact, behavioural economics concepts have shown clear advantages in interpreting environmental influences for a wide range of product categories in closed systems, explaining variables affecting the allocation of behavioural resources among alternative reinforcers (Hursh, 2000), and providing a framework to analyse relevant human economics behaviour (Berry and Kunkel, 1970, Foxall, 1999; 2017). Also, behavioural economics has been used successfully in elucidating consumer brand choice through a number of different reinforcers in a real-world situation (Foxall & James, 2003, Foxall & Schrezenmaier, 2003, Foxall et al., 2004, Oliveira-Castro et al., 2005, Foxall et al., 2006, Foxall & James, 2001).

However, experimental methods have several limitations that may lead to excess formalism (Lea, 1981). For example, laboratory conditions that are artificially constructed can be criticised as an over-simplified economy, in which non-human subjects could be easily manipulated to obey the researcher's orders. Another problem worth considering is that animal behaviour is limited by its ecological constraints. As a result, designed choice tasks must be compatible with the animals' natural capabilities (e.g. key pecking for pigeons and lever pressing for rats) (Lea, 1981).

3.2.1.4 Matching Analysis

Response rate, stimulus control, and schedules are at the very heart of operant conditioning as a natural science (Skinner, 1938). Later, Herrnstein (1961) makes his contribution by adding other fundamental terms such as relative response rate, the matching law, and the psychophysics of choice. Based on these quantitative terms, theories and applications used in the basic behaviour analysis have been transferred from non-human laboratories into the investigations of patterns of consumer

behaviour in natural settings (cf. Foxall, 2007; 2017). Note should be taken of the fact that the transfer has mostly taken place within the framework of the matching law.

In operant conditioning, the matching law is a quantitative relationship that holds between the relative rates of response and the relative rates of reinforcement in concurrent schedules of reinforcement (Herrnstein, 1961). Theoretically, the matching law has been demonstrated in many different forms and its equations allow parameters to have been tested at the same time, which mathematically improves the field of behaviour analysis study (Baum, 2002). In other words, it plays a vital role in encouraging the cooperation between economics and behaviour analysis. In fact, it is perceived as one of the most successful behavioural laws regarding reliability and generalisation (Herrnstein, 1997), and the law has recently been successfully used in consumer choice research (e.g., Foxall, 1999; 2017; Foxall, James, Oliveira-Castro, & Ribier, 2010; Oliveira-Castro, Foxall, & Schrezenmaier, 2006; Romero, Foxall, Schrezenmaier, Oliveira-Castro, & James, 2006; Wells & Foxall, 2013).

a. Schedules

To understand matching analysis, it is necessary to closely scrutinise the schedules of reinforcement. A reinforcement schedule (Ferster and Skinner, 1957) results in behavioural patterns because it involves procedures that control under which conditions the reinforcement is delivered (the fact is not every form of behaviour is followed by a reinforcer).

Schedules, usually implemented automatically (Allison, 1986), have been investigated for many decades. They determine regular state behavioural patterns and resistance to extinction. In experimental analysis of animal behaviour, schedules induce lawful behaviour, but their influences on human behaviour are more

controversial and complicated (e.g., Lowe, 1979; Pierce & Epling, 1999). In operant conditioning, schedules of reinforcement play a vital part. Typically, reinforcement is designed to increase the probability of repeat choices. The rate of response is highly impacted by the time and frequency of the behaviour reinforced. Schedules of reinforcement are categorised into two types: continuous, and intermittent (partial) reinforcement. Continuous reinforcement is usually employed at an early stage of an operant conditioning experiment to help the subject become familiar with the basic rules of the experiment. Typically, this kind of reinforcement is provided promptly and consistently. On the other hand, intermittent or partial reinforcements are used when behaviour is reinforced only part of the time. It is most often the rule in a real environment.

While continuous reinforcement offers reinforcement independently of whether the subject is responding or not, the intermittent type can be classified as either ratio schedule or interval schedule reinforcement. Specifically, ratio schedule is based on a number of behaviours or responses while interval schedule, in contrast, is timing-based, meaning that the schedule delivers reinforcement after a particular behaviour is performed / when some time has passed since the last reinforcement. Both of two types of schedules are further classified as fixed or variable. Fixed schedule reinforces after a fixed number of responses or length of time. Variable schedules, however, rely on fluctuating rates of reinforcement. Hence, there are four major types of partial reinforcement rules: fixed ratio (FR), fixed interval (FI), variable ratio (VR) and variable interval (VI) (Ferster and Skinner, 1957):

(1) Fixed-ratio schedules, where reinforcement is given every time a specific number of responses have been emitted by the subject, independently of the time taken.

(2) Variable-ratio schedules, where a response is reinforced after an unpredictable or random number of responses.

(3) Fixed- interval schedules provide reinforcement every time a specific (fixed) interval of times has elapsed after a response has been made by the subject.

(4) Variable-interval schedules, where a response is rewarded after an unpredictable or random amount of time has elapsed.

b. Concurrent schedules of reinforcement

De Villiers and Herrnstein (1976, p. 1131) emphasise that "choice is merely behaviour in the context of other behaviour". In other words, it is necessary to study behaviour as a choice among various alternatives. This idea is even more pertinent to research into consumer behaviour within the marketing context. It has forced the managers of companies to take into consideration the competition from other brands in order to win consumers' hearts and make them choose their own brand over those of others. There also exists a complex reinforcement situation in which the participant can choose any one of two or more simple reinforcement schedules that are available simultaneously. The situation is called a concurrent schedule of reinforcement (McDowell 1988). Concurrent schedules of reinforcement whose aim is to assess animal and human choices have frequently been used in behaviour analysis (Rachlin et al., 1976, Green and Rachlin, 1991; Pedersen and Jensen, 2007).

In operant conditioning, concurrent schedules of reinforcement are employed where the participants (both human and animal) are capable of making natural responses to the simultaneously available reinforcement. For instance, a pigeon in a non-human experiment is provided with two different lights to be pecked, and thus

switches back and forth between the options. Experimentations based on concurrent schedules are able to explain how subjects make their decisions choosing one from two or more simultaneously and, often, continuously available reinforcements (Mazur, 1991). Behaviourists prefer an experiment well designed with concurrent schedules because it allows them to observe and evaluate not only subjects' choice allocation between two available options but possible impacts a manipulated response has on others.

In fact, in the field of choice situations, many studies making use of concurrent variable-interval variable-ratio (VI VR) schedules have simultaneously measured both time spent (for the interval schedule) and numbers of responses given (for the ratio schedule) (Herrnstein and Vaughan, 1980). In marketing research, those concurrent schedules have been used to measure consumers' preference for one benefit over others as those consumers always have to deal with numerous options when shopping in an open, natural setting like a supermarket (Fisher and Mazur, 1997; Schrezenmaier, 2005). Originally, concurrent variable-interval (VI) schedules of reinforcement had been used in laboratory experiments with animal subjects like those Herrnstein employs in his examination of matching law (1968). In the experiment, pigeons were required to distribute their pecks to the button when the reward (food) was shown. Each peck on the buttons was reinforced on VI schedules of reinforcement designed to make sure a reinforcer was delivered immediately after the response. Under a VI schedule, an interval of time must elapse once the last reinforcer was delivered and the next response is reinforced after the interval is over (Herrnstein, 1997). It is argued that concurrent variable-interval schedules, working independently, are essential for the experimental measures of choices because the ratio schedules are not independent (responding on one schedule reduces the rate of

reinforcement on the other) (Pierce & Epling, 1983).

However, it is believed that VR schedules acquire higher and more constant rates of responding than VI schedules do (Herrnstein, 1964, Herrnstein, 1970; Schroeder and Holland, 1969, Conger and Killeen, 1974, deVilliers and Herrnstein, 1976, Pierce and Epling 1983). Besides, concurrent VR VR schedules are frequently observed in everyday situations including consumer behaviour in the real-world marketing context (Herrnstein et al., 1997; Foxall et al. 2004). In overall, concurrent variable schedules like VR VR or VI VI produce an allocation of behaviour, which allows for the measurement of direct choices between simple schedule alternatives, whilst on concurrent fixed schedules, subjects show an exclusively constant preference for the better schedule (Herrnstein et al. 1997; Pierce and Epling 1999). The concurrent variable schedules, therefore, are traditionally used in an experimental matching analysis, on animals, that also incorporates a changeover delay (COD) - a control procedure that is used to stop rapid switching between alternatives on concurrent schedules of reinforcement (Herrnstein, 1961).

c. The Strict Matching Law

One of the most famous and well-documented theories in both non-human and human experimental contexts (Davison & McCarthy, 2016) is Herrnstein's General Matching Law. It states that subjects will "match" their behaviour to the relative reinforcement affected by the environment, rather than maximise, or, in other words, exclusively choosing the "best" option in terms of return rate (Herrnstein, 1970). This is different from the traditional views of consumption in economics making use of an underlying assumption that maximisation is rationality (DiClemente and Hantula, 2003). Based on the core belief that choice is behaviour and conversely, the ultimate

aim of studies in behavioural psychology is to explain and interpret the behaviour of both human and non-human subjects in making any decisions (Rachlin et al., 1981). Therefore, the matching law can be re-expressed, in "choice" terms, as a proportional relationship between the pattern of behavioural choices among available options and the pattern of reinforcers which those choices create (Foxall, 1999; 2017).

Since the matching law has also worked on complex behaviours, it has functioned as a means of understanding and predicting human choice in a large number of natural settings (McDowell 1988, Baum, 1975, Pierce and Epling 1983, Conger and Killeen, 1974, Schroeder and Holland, 1969). The settings continuously offer numerous alternatives with different quality and strength of reward requiring an individual to respond differently. A consumer may choose a short-term reward (reinforcement) over a long-term benefit if the short-term reward is perceived as stronger than the long-term benefit (reward).

Taking concurrent schedules into consideration, the matching law claims that the relative amount of behaviour, measured in either rate of response or time spent, matches the relative rate of reinforcement on alternatives (Herinstein 1961; 1970, Pierce & Epling 1983). It, thus, does not merely focus on explaining the actions or behaviours of the organism, but the proportion of time spent in doing those activities. For example, in a professional football match, a player is believed to face a number of choices like shooting, passing, dribbling, or even doing nothing but wait for the ball. The matching law is concerned not with the actions the player would choose, but more on the time spent by him/her on each of those. If in a time interval, there are more than two available options as in the above example, the subject will allocate their behaviour to the reward in exact proportion to the value derived from each

(Herrnstein, 1997). In other words, when the behaviour is freely variable, the response rate is similar or equal to the rate of reinforcement, and thus the matching law is about equality.

Originally, Herrnstein (1961,1970) found that under concurrent variable-interval schedules, subjects allocate their behaviour between the two alternatives on offer dependent on the reinforcement rate responding to each respective option. In his experiments, animal subjects like pigeons and rats can choose between key X or key Y, each of which provides food pellets (a reinforcer R) on its own variable-interval schedule. According to the strict matching law, they will allocate their responses to the available options in the same ratio as the available reinforcements. Herrnstein (1997) insists that choice is not a cognitive process but a rate of observable events that are temporally distributed. The matching equation is expressed as follows:

$$\frac{B_x}{B_x + B_y} = \frac{R_x}{R_{x+} R_y} \quad (2)$$

In the equation 2, B represents the response rate on available options, and R accounts for the rate of acquired reinforcement. When represented graphically, perfect matching is displayed as a 45-degree diagonal line through the origin. The independent variable is the reinforcement rate (R) illustrated on the horizontal x-axis; The relative frequency of responding, or behaviour (B), is regarded as the dependent variable, and thus it lies on the vertical y-axis of the graph. To sum up, the strict matching law measures the relative relationship between the distribution of rewards and the allocation of behaviour (Myerson and Hale, 1984). For more accurate and consistent predictions from the matching law, the size and strengths of reinforcers as well as how the changes in both the response rate and amount/length of time influence those reinforcements must be pre-estimated.

d. The Generalised Matching Equation

Matching analysis can take different forms. In order to describe data that does not conform to the strict matching law, a power-function equation between ratios of behaviour and ratios of reinforcement, namely the generalised form of Herrnstein's matching law, is needed (Lander and Irwin 1968; Baum 1974, 1979). In fact, the generalised matching equation is established as an attempt to explain the data of experiments that violate the strict one. By doing so, a generalisation of the strict matching law has developed "in the sense that the strict matching law is a special case of the generalised law" (Davison & McCarthy 2016, p. 48). Therefore, the matching law formula, traditionally expressed in terms of proportions, could be re-expressed as a matching of two ratios:

$$\frac{B_x}{B_y} = \frac{R_x}{y} \tag{3}$$

B_x , B_y , R_y and R_y represent behaviours and reinforcers as in the equations above. The equation is also presented in a log-ratio form:

$$log\frac{B_x}{B_y} = s\, log\frac{R_x}{R_y} + logb \tag{4}$$

If the generalised matching law is taken out of logs, it becomes a power function:

$$\frac{B_X}{B_Y} = b\left(\frac{R_X}{R_Y}\right)^s \quad (5)$$

The parameter s represents sensitivity to reinforcement or the extent to which unit changes in reinforcer ratios are accompanied by unit changes in response shifting. The parameter b represents bias toward a particular response not accounted for by the reinforcement schedules in place. If both b and s are equal to one, the data shows strict matching.

e. Bias

In Baum's equation (1974), the constant b stands for bias. If b is greater than one, the individual has a bias towards the left key ("X" in Equations 4 and 5); on the other hand, if b is less than one, the subject exhibits a bias towards the right key ("Y" in the equations). Bias represents a failure to take account of all of the independent variables impacting preference, and consequently, it diminishes potential independent variables increasingly taken into accountable consideration (Baum, 1974). Hence, it should be considered as a fault of the experiment design rather than that of the experimental subject. The bias value indicates that an individual consistently prefers one response over the other more than the matching equation predicts, regardless of the actual sizes of the two schedules (Baum, 1974). In general, bias may stem from undetected costs that only apply for one response but not for the other(s) (i.e. an additional effort required to peck a key for food pellets), or from a qualitative difference between reinforcers (i.e. an unanticipatedly additional value for one reward but not for the rest) (Baum, 1979; Pierce & Epling 1983; Davison & McCarthy, 2016). In a marketing context, bias may come from the physical layout of the store, the arrangement of substitute and complementary products, the arrangement of different brands within a product category, and so on (Foxall & Schrezenmaier, 2003;

Schrezenmaier 2005).

f. Sensitivity

In equation 4, the slope s, as a measure of sensitivity, can represent matching, undermatching or overmatching (Baum, 1974). The behaviour of an individual who disproportionately selects the thinner reinforcement schedule is then exhibiting undermatching, and the slope is less than one ($s < 1$). In this case, the response rate is lower than the reinforcement rate. Undermatching implies that either switching between options is unintentionally reinforced or those alternatives are poorly allocated (Herrnstein, 1997). Davison and Jenkins (1985) claim that, in addition, under-matching takes place when people are unable to determine which response generates each of those reinforcers. Under the marketing scenario, undermatching shows that a buyer does not always choose the cheapest brand of his/her repertoire because he/she underestimates the differences between the reinforcement qualities (Hennstein & Vaughan, 1980).

An individual is said to be exhibiting over-matching when he/she disproportionately chooses the richer schedule of reinforcement where the slope is larger than one ($s < 1$) (Baum, 1974). The phenomenon occurs when the response proportions are more extreme than those of the reinforcement, and thus the individual emits more behaviour than is reinforced. In other words, that person may overestimate the reinforcement differences between the available options, particularly if there is no delay in reinforcement when the behaviour introduces a new choice controlled by a different schedule, or if the rates of deprivation differ between the schedules (Baum, 1974; 1979). Moreover, overmatching may occur when there is a significant penalty for switching between two alternatives (Baum, 1979; Fisher and Mazur, 1997). In the

laboratory where the experimental rewards are supposed to be the same, overmatching can be perceived as a design deficiency occurring when one of the alternatives is qualitatively different, or the act of switching between them is punished too severely. In practice, nevertheless, under concurrent variable interval schedules, overmatching is very uncommon (Mazur, 1991).

Kagel and his co-authors (1995) suggest that there also exists anti-matching, the opposite of matching, occurring when researchers use qualitatively different reinforcers or qualitatively different response requirements. For example, in a marketing context, two products like red wine and coke are not substitutable and indeed independent from each other (Foxall & James, 2001; 2003; Schrezenmaier, 2005), and thus purchases of one product do not affect those of the other (Foxall & James, 2001). Therefore, an experiment, if any, based on the two products will lead to an anti-matching phenomenon.

3.2.1.5 Applications of the Matching Law

As mentioned above, the matching law has been successfully used in both human and non-human experimentations for both simple and advanced purposes. For instance, fundamental research has been conducted where the simple goal is to have a better understanding of human behaviour by identifying relevant factors influencing the way the subjects distribute their choice among available options (Fisher & Mazur, 1997). Advanced studies with a real-world mindset, on the other hand, attempt to take advantages of findings derived from basic ones in order to come up with helpful suggestions for real human problems in natural settings.

At the very beginning, animals like rats and pigeons are non-human subjects

used in simple studies to confirm the usefulness of the matching law. They allocate their choice between different keys providing different amounts of food pellets, and the matching is supported when the responses on both keys are in proportion to the relative reinforcement rate according to the distribution of reinforcement. The matching law has also been used to understand human behaviour with promising results under tightly controlled conditions. Matching, for instance, has been confirmed with humans pressing buttons for money in a context directly analogous to the typical animal experiment (Bradshaw et al., 1976), with people conversing in small groups (Conger and Killeen, 1974), and with subjects engaged in vigilance tasks (Baum, 1975, Schroeder and Holland, 1969). However, the amount of research on human behaviour is clearly smaller than that which has been done on animal behaviour (Pierce and Epling 1983). In fact, for human behaviour, there are three kinds of closed settings that are experimental settings (e.g., Bradshaw & Szabadi, 1988; Chritzfield, Paletz, MacAleese, & Newland, 2003; Goltz 1999; Hantula & Crowell, 1994; Home & Lowe, 1993; Lowe & Home, 1985; Shroeder & Holland, 1969), hospitals and mental institutions (e.g., Martens & Houk, 1989; Oliver, Hall, & Nixon, 1999), and schools and universities (e.g., Beardsley & McDowell, 1992; Conger & Killeen, 1974; Martens, Lochner, & Kelly, 1992; Mace, Neef, Shade, & Mauro, 1994).

Later, Baum (1974) carried out a quasi-experiment testing the matching law on a group of free wild pigeons resident in his house. The pigeons were fed through a designed apparatus under a wide variety of concurrent variable interval schedules. The results also confirmed the matching law, and this is the first study with an animal subject outside the laboratory. Graft, Lea, & Whitworth (1977), follow the same procedure that does not control deprivation, allowing the subjects to freely select different reinforcers. In addition, the findings of a study about the equivalent foraging

model of optimal human choice distribution, conducted by Kraft & Baum (2001), supported the law of matching. Moreover, there is research on severe behaviour problems aiming to understand matching relations (Martens and Houk, 1989) and on assessment of time allocation between communication and problem behaviour (Oliver et al., 1999). The results showed that problem behaviour and communicative behaviour do match according to the reinforcement distribution. All of the above studies proved the matching law can be applied to elucidate both animal and human behaviour in more natural environments (but still closed settings). Nevertheless, there is still little attention paid to the matching law's practical application to these naturally-occurring behaviour-environment interactions (Foxall & Schrezenmaier, 2003).

As discussed before, most studies on the matching law have employed concurrent VI VI schedules and calculated frequencies of responses (cf. deVilliers 1977; Pierce & Epling 1983). Nevertheless, some researchers whose aim is to examine the matching law's generalisability have conducted their studies under different conditions such as using different reinforcement schedules or different species as subjects and with a vast variety of independent and dependent variables (cf. de Villiers, 1977). Firstly, for example, Herrnstein (1961) attempts to measure time spent responding instead of response distribution. Brownstein and Pliskoff (1968) go further by testing time allocation on concurrent VT VT (variable-time) schedules delivering reinforcement independently of any responses made after different time periods. Similarly, Baum and Rachlin (1969) investigated the time people spent in a specific place. Strict time-allocation matching was confirmed in all of the above studies. As a result, it is said that laws of time allocation are more widely applicable than that of response distribution (Herrnstein, 1961; Brownstein & Pliskoff, 1968;

Baum & Rachlin, 1969). Hollard and Davison (1971) subscribe to the same theory by insisting that time allocation measures are far superior to response allocation ones in terms of empirical support.

Secondly, all possible combinations of reinforcement schedules such as mixed fixed-and-variable and mixed interval-and-ratio schedules have been used (e.g. Myerson & Hale, 1984). Studies of temporal discounting (also known as delay discounting, time discounting, time preference), for instance, are normally designed to have subjects select between a small, but immediate reinforcer and a bigger but more delayed reinforcer (Fisher & Mazur, 1997; Rachlin & Green, 1972; Rachlin, 1995). Participants opting for the former reinforcer are perceived as "impulsive" if they often chose the former option, whereas they are said to have good self-control if selecting the more delayed reward. Fisher and Mazur (1997) mention that both non-human and human subjects can be taught to avoid being impulsive in order to have a better long-term benefit. Last but not least, there are different reinforcers (including secondary reinforcers such as purchasing on credit) utilised in these experiments although money and food are perceived as most typical rewards (Fisher & Mazur, 1997).

3.2.1.6 Token economies

It is believed that using laboratory experiments has its own advantages (e.g. variables control) and disadvantages (e.g. no interaction between subjects). Behaviourists attempt to increase the good side as well as limit the bad one by building up an experimental economics system - called token economies - with the use of field experiments, that takes into account behavioural principles and reinforcement theories. Specifically, token economies are "simple small, closed economic systems "(Winkler, 1980, p.277) that provide researchers with the same

degree of control of the variables in laboratory settings. Besides, it simulates the real-world situations by putting participants in an environment where they can socially interact with others and use tokens, just like money, earned from their jobs for buying and consuming activities (Battalio et al., 1974). All of their behaviour is recorded 24/7 (24 hours a day, 7 days a week) during a particular course of research and is said to be similar to economic behaviour in real economies.

There are two main uses of token economies so far. Firstly, token economies are thought to be a very useful technique for therapists who work in the fields of behaviour modification, psychological operations, and drug abuse control (Kazdin and Bootzin, 1972, Winkler and Burkhard, 1990, Hursh, 1993). Participants in this kind of closed economic system earn tokens as rewards for appropriate behaviour. In fact, therapeutic token economies, based on operant reinforcement principles, are found in various environments including classrooms, hospitals, and institutions. Winkler and Burkhard (1990) argue that the applications can be viewed as a success in encouraging appropriate behaviour of aberrant patients (both adults and children).

Another benefit of token economies worth considering is their structures, similar to those of a closed economy, which provide researchers with a sure method of gaining advanced knowledge of economic behaviour (Kagel & Winkler, 1972). Specifically, token economies allow behavioural researchers to control behaviour and examine the impact of independent variables on that behaviour in the same way economists use to study economic behaviour. Besides, due to its small size and relative simplicity of economic structure, the token economy system is able to maintain a routine of controls and measurements of observational errors and to allow the researchers to take part in and observe directly primary data (Battalio et al., 1973).

As a result, the variables which are easily manipulated under the controlled environment can be used to determine the basis of consumer behaviour (Kagel and Winkler, 1972).

In the literature, there are a large number of successful studies building on token economies (used as a mean of closed economies) including research on biological reinforcement like food or water (see Bauman, 1991; Collier, 1983; Hall & Lattal, 1990; Hursh, 1978, 1984; Hursh & Natelson, 1981; Hursh, Raslear, Bauman, & Black, 1989; Hursh, Raslear, Shurtleff, Bauman, & Simmons, 1988; LaFiette & Fantino, 1989; Lucas, 1981; Foltin, 1992; Roane, Call, & Falcomata, 2005), research on self-administered psychoactive drugs (see Griffiths, Bigelow, & Henningfield, 1980; Hursh & Winger, 1995; Johanson, 1978), and research on price elasticities and the relationship between income and luxury expenditure (Winkler, 1971).

However, the second application of token economies, unlike the first one, has caused some ethical concerns. Participants in some of purely research-minded studies such as the ones on marijuana and alcohol consumption are claimed not to receive many benefits like those psychiatric patients received on therapeutic research (Winkler, 1980). This criticism is valid but seems to discredit the logical structure of the application in discovering and generalising the variables and relationships to bigger and more realistic economies (Battalio et al., 1973). Besides, although first applied in therapeutic environments, the use of a token economic system is not limited to that field of research and the benefits patients received should be viewed as a bonus only. Moreover, as long as volunteer participants are fully informed about the research programme and feel comfortable in the research environment, they can actually contribute to the success of investigations of socio-economic behaviour as

well as learning something from their participation (Bigelow and Emurian, 1974). For example, Van Houwelingen and Van Raaij (1989) describe that subjects who receive daily reports on their energy consumption would be more likely to reach their saving goals than people who do not participate in the programme and have to self-monitor their energy consumption. The result is said to come from the fact that the participants have opportunities to learn about their energy use behaviour during the research.

In fact, to sum up, both ways of using token economies (therapeutic and purely research-minded) possess a practical approach, and thus they can be employed as a base for experimental analyses of behaviour (Kazdin and Bootzin, 1972). Hursh (1993) suggests the use of token economies can be extended into field experiments, a study area of applied behaviour analysis, with the use of numerous procedures usually designed to change behaviour in chosen desirable ways, which focus on the benefits of the whole society. It is said that these field studies have also been used in non-experimental econometric studies to understand price elasticities and other economic behaviour (cf. Kagel, Battalio & Walker, 1979).

3.2.1.7 Generality of the Matching Law

The level of generality of a theory is determined by the external validity of studies based on that theory. Therefore, it is evident that the matching relation is a general law of choice as the matching law is found in a wide variety of different studies in terms of species (pigeons, humans, monkeys, rats), responses (key pecking, lever pressing, eye movements, verbal responses), and different reinforcers (food, brain stimulation, money, cocaine, verbal approval) (Williams, 1988). However, the generalisability of the matching law is sometimes put into question. Firstly, there has been some research in which matching relation does not show (e.g. deVilliers, 1977).

Lowe and his colleagues, for example, claim that (1) the participants' behaviours do not follow the prediction of the matching law due to weak and difficult-to-separate reinforcers, and (2) human behaviour appear to be rule-governed and not contingency-shaped (Lowe, 1983; Home & Lowe, 1993). Secondly, differences in research protocols make the findings and principles in animal experiments impossible to transfer into the human context, and thus animal and human behaviour are considered as fundamentally different from each other (Home & Lowe, 1993). Last but not least, the changeover delay (COD) may affect the generality of the matching law (De Villiers, 1977). Herrnstein (1961), first introduced the term COD as a tool to stop rapid switching between alternatives on concurrent schedules of reinforcement. In fact, the results of a number of studies confirming the predictions of the matching law show an extremely high correlation between the COD and the matching relation; that is, the behaviour rate cannot match the reinforcement rate without the existence of the COD (De Villiers, 1977). However, the COD is species-dependent since the length of delaying time varies across species, e.g. pigeons needs less time than rats. Therefore, the external validity of the matching law is low if the COD is taken out of the equation, and, as a result, the matching relation is limited and not broadly applicable (De Villiers, 1977).

Doubt about the generality of the matching law has led to criticisms of the theory. One of the most severe disapprovals is expressed by Rachlin (1971). He claims that the matching law has a tautology problem, and thus it does not deserve to be called an empirical law (this concern will be addressed in a later section). Besides, he labels the matching relation as "law of contingencies" because the choice situations are not really free; in other words, the participant's selections between options is under no constraints except those the contingencies of reinforcement create. As a

result, Rachlin (1971) concludes that the matching law does not have an empirical approach.

Another criticism worth considering is the matching law is limited as a molar theory when it attempts to account for matching by assuming that subjects are sensitive to relatively long-run average differences in schedules and choose based on these differences (Reed, 2011). This approach is opposite to molecular theories derived from a basic assumption that subjects are responsive only to short-term factors, i.e. local, single responses. Researchers, supporting the molecular school of thought, even argue that the matching relations are "averaging artefacts" (Silberberg et al., 1978, p.395), which come from an unintended consequence of using molar measures, and not from a psychological process (Shimp, 1966; Silberberg et al., 1978).

Despite all of the criticisms above, the matching law keeps attracting both scholars and practitioners to replicate their studies under different contexts of choice behaviour and to defend the theory by arguing those criticisms (cf. Killeen, 1972). Besides, studies built on the matching law have shifted their focus from the laboratory experiments to daily human situations (Pierce & Epling, 1983). By doing so, in order to evaluate the generalisability of the matching law in human environments, stimulus control and reinforcement schedules have to be carefully monitored and analysed (Foxall & Schrezenmaier, 2003). The reason is, with this extensive analysis, the law-like relationships between response rate (or time allocation) and reinforcement rate occurring in laboratory experiments are more likely to be confirmed in more natural, realistic settings (McDowell 1988). In fact, a number of studies have successfully employed the matching law in explaining consumers' buying activities in a marketing

context (Foxall, 2017; Foxall & Schrezenmaier, 2003, Foxall et al., 2004, Foxall & James, 2001; 2003). This thesis, therefore, is an attempt to enhance the success of these studies.

3.2.2 Behavioural Economics from the Perspective of Economics

Moving away from the original belief that wealth is the central of the economics, Ely (1930) and neo-classical economists claim that economics refers to a science of man rather than of wealth, and thus it focuses on wealth-obtaining and consuming activities. In other words, it is best perceived as the study of the rational allocation of scarce resources with a heavy use of mathematical models and analytic techniques (Simon, 1983). Individuals in models of traditional classical and neo-classical economics, to maximise their utility, are said to be wholly free, socialised, entirely self-interested, and able to make rational choice decisions based on their preferences and relevant information (Coleman, 1986). Those individuals are typical "economic man" whose ultimate goal is to maximise utility (Herrnstein 1990; Simon, 1983). The notion of the "Homo Economicus" (Economic Man) is distinguished from the "Homo Sapiens" (Wise Man) in a "mock zoological spirit" (Lea, Tarpy & Webley, 1987, p.108). Utility maximisation or optimisation theory, thus, can be viewed as the cornerstone of economic theories. Optimisation is a term borrowed from physical science but has been employed extensively in the field of social study since (Bordley, 1983). However, the theory of rationality and optimisation has been criticised as too simplistic and misleading because humans are thought to behave irrationally when making tough decisions, within limits imposed by given conditions and constraints (Sen, 1987; Rachlin et al., 1976). As a result, they are not always maximising their

own interest and well-being.

Classical economists have traditionally focused on what decisions are made while psychologists are interested in answering the question of how the decisions are made (Simon, 1982), and thus the two disciplines - economics and psychology - are closely linked and complement each other in understanding human behaviour. However, during the neo-classical economics era, the psychological approach was ignored. One reason for this is that there exist differences between the two disciplines in terms of methodology. For example, economists are willing to work with mathematical tools and theorems, while psychologists prefer the use of verbal constructs in their experiments (Camerer, 1999).

After seeing that many unwanted mistakes and errors came from the separation of economics and psychology, Herbert Simon with his popular theory "Bounded rationality" (1957), is the first researcher trying to bring the two disciplines together again. The theory takes human limitations such as time, money, information in decision making into consideration, and thus makes economic concepts meaningful and applicable in psychological analyses and vice versa. Hence, the combination, which often provides striking results, can contribute to a better understanding of human behaviour and of the interaction between the behaviour and economics and psychology variables (Simon, 1957; 1982; 1983).

3.2.2.1 Rationality and optimisation

a. Maximisation

With the development of economic theory and neo-classical economics in the 19th century, the notion of rational and optimising behaviour has been translated into

the maximisation of utility. Besides, one of the basic assumptions of behavioural economics is that maximisation is the ultimate objective of all organisms' behaviour. In fact, the explanatory theory of maximisation is the theory of rational choice or optimal choice, which is traditionally used as a framework for modelling and interpreting social and economic behaviour of individuals. The theory is thought to be the core paradigm and central concern of neo-classical economics (Becker, 1976), the currently-dominant among various schools of thought.

The essence of rational choice theory is that economic man is a maximiser, who, among several courses of action, will settle for the best overall outcome yielding the utmost satisfaction (Coleman, 1973; Simon, 1982; Elster, 1989). The “rationality” here adopts a more specific and narrower definition as it only describes how human beings differ from other organisms in terms of capability of reasoning (Friedman, 1953). Moreover, since rationality is similar to consistency, a rational person’s decision must be consistent with others (Sugden, 1991). That is to say, every choice is determined by the human preferences, and thus people with rationality follow a particular style of behaviour to achieve given goals despite being under a lot of pressures and constraints (Simon, 1983).

The theory is built on the ideas of ancient Greek philosophers such as Aristotle who argues that rational choice is central to the goals of life. According to them, all human beings, namely "Economic Man" or "Homo Economicus", are said to be well-organised and can gain access to full knowledge of their environment, and thus they are good at calculating and maximising their subjective utility for their best self-interest (Lea et al., 1987; Simon, 1955; Rachlin, 1980; Herrnstein, 1988). Later, Darwin's evolutionary theory that explains how natural selection leads to organisms

being adapted to their environments and appearing designed to maximise their fitness exerts its impact on not only physical scientists but social researchers. As a result, the maximisation/optimisation theory becomes a central principle of those researchers' work (Bordley, 1983). In the marketing context, the theory states that, after balancing costs against benefits of possible alternative courses within a set of constraints, consumers arrive at purchases that maximise their personal advantage (Vaughan and Herrnstein, 1987). In detail, consumers are said to act rationally if (1) they act consistently, i.e. their brand choice remains unchanged such that they prefer brand A to brand B, and (2) they act according to transitivity logic, i.e. do not prefer brand C to brand A if they prefer A to B and B to C (Watkins, 1986).

On the other hands, human beings would be perceived as irrational if they acted in a non-optimising way. From the economics viewpoint, the behaviour of the "Wise Man" (as opposed to those of the "Economic Man") is the result of memory's errors, understanding, reasoning, or patience. Rationality theory, therefore, is used as a description of how individuals, aside from their above inadequacies, actually behave. The theory remains unchanged despite a huge number of real-life situations where human behaviours appear irrational due to the failure of obtaining optimal outcomes. All consumers, for instance, who change their brand choice or purchase impulsively would be considered as irrational (Watkins, 1986). One possible reason for this is humans might be rational under certain circumstances, whereas they act irrationally and emotionally under others (Simon, 1955).

The theory of rationality and the rationality-irrationality dichotomy, unsurprisingly, has been much criticised over decades. Firstly, in a piece of research on real human choice behaviour, Lea and his colleagues (1987) claim that

assumptions of the rational theory are unproven, unhelpful or even clearly false. Furthermore, being rational or irrational, maximisation or non-maximisation are used for describing a particular behaviour not for explaining its underlying mechanisms because people can act rationally (i.e. sensibly) without conscious and critical reasoning and vice versa (Lea et al., 1987). Simirlarly, many psychologists cast doubt on Darwin's evolution theory by mentioning that there are no evolutionary pressures on modern human behaviour (Rachlin et al., 1976; Kagel, 1987). Kagel (1987), for example, claimed that people nowadays, especially in affluent countries, only live under a short time period of surplus conditions, and thus they are not subject to any evolutionary pressures for changing their optimising behaviour; as a result, the evolution-based optimality theory has lost its compelling function. Therefore, in real-world scenarios, choice decisions are not always a means of maximising utilities (Rachlin et al., 1976).

Another criticism worth noticing is the rationality theory is too normative (focusing on “what should be”) that leads to poor explanations of the actual behaviour (“what is”) (Herrnstein, 1990; Sen, 1987). The theory's core assumptions are often taken for granted although some of them like "the more, the better" are not even true in animal studies, i.e. rats prefer a moderate to a large amount of sugar. These principles, thus, are invalid in the context of human behaviour (Herrnstein, 1990). Similarly, mainstream economics theories with a heavy use of the rationality theory often ignore "free agents" situations, like donations or providing public goods, where maximising an individual’s well-being is not the ultimate goal (Sen, 1987). Besides, "systematic irrationalities" in human behaviour are found too often, meaning the concept of rationality and utility maximisation is inapplicable (Herrnstein, 1990). Moreover, human behaviour is context-dependent, and thus the utility itself is

subjective and varies from person to person. Rationality theory, in turn, can only be perceived at best as an interpretation of behaviour (Rachlin, 1980; Thaler, 1987; Herrnstein, 1990b; Lewin, 1996; Gabor & Granger, 1961). The subjective utility of an individual, for example, may include taking drugs or eating too much fast food, which would be as opposed to the objective utility of ignoring this kind of self-destructive behaviour. The rationality theory, thus, fails when making use of the wrong assumption that human beings are sensitive to total utility or changes in marginal utility (Herrnstein, 1988).

b. Utility functions and indifference curves

Economists have used mathematic models and illustrated graphs to calculate and depict economic concepts. Maximisation in the rational choice theory is no exception, and hence utility functions and indifference curves are believed to describe the term mathematically and graphically, respectively. Utility functions are numerical representations of how an individual feels, prefers and values different consumption alternatives (Fishburn, 1987). He/she is believed to show no preference for any of the points locating on the indifference curve, and thus the slope of this curve represents the relative substitutability in consumption between the two goods or behaviours. The consumer's behaviour then will be considered as rational if the highest possible indifference contour is chosen (Rachlin, 1981). One of the core assumptions in maximisation theory that consumers' preferences and their indifference curves are constant seem inconsistent with real-life activities. This leads to determinable or highly variable indifference curves as human preferences and tastes often change over time. The maximisation theory, as a result, loses its precision and significance, and consequently, it becomes irrelevant to the elucidation and prediction of behaviour

(Rachlin et al., 1981; Thaler, 1987).

Besides, in the marketing scenario, as consumers' choices are usually limited because of environmental constraints, i.e. a budget limitation (Rachlin et al., 1981), they tend to consume more of cheaper and less of higher priced products (e.g. Battalio et al., 1973). Thus, the maximisation theory seems to be unable to determine a universal combination of utilities as well as certain points of behavioural optimisation due to the impacts of budget or income changes on the patterns of consumption. There is one possible solution for better consumer behaviour studies related to maximisation that is not only to concentrate on the utility aspects of consumption but to take other dimensions such as the symbolic nature of consumer behaviour into consideration (Foxall & Schrezenmaier, 2003). For example, utilitarian and informational benefits can be employed as different types of reinforcement generated by the commodities to better measure consumption value (Foxall, 1999; 2017).

3.2.2.2 Alternatives to Rationality

a. Bounded Rationality

There are several drawbacks to strict rational choice theory:(1) it is only usable without risk and uncertainty concerns, (2) short of information related to available options, and (3) complex in terms of cost, functions, and limitations of the environment (Simon 1955; 1983; 1987). Therefore, the idea of rationality needs an adjustment to overcome those criticisms, and "bounded rationality" can be the answer when it takes into account the fact that humans indeed are not good at decision making, especially in complicated and challenging situations (Simon, 1987). The main reason for their limited capabilities is that they seem unable to anticipate

possible results of different options as well as in temporally discounting those alternatives in a practical way (Simon, 1955). The theory of bounded rationality plays a vital role in studies of consumer behaviour due to its discussion about the effects of environmental limitations on human beings' information-processing capacities (Simon, 1983). The limitations, imposed from outside, could be session constraints, time constraints, ratio constraints, or interval constraints (Rachlin et al., 1981). With those in mind, organisms are believed to satisfice instead of maximising; that is, as long as an option is good enough to produce the desired outcome, people can choose it over the best available which is often harder to achieve under the same conditions. Human behaviour, therefore, may be inconsistent but can still be regarded as rational (Simon, 1987).

b. Melioration

Influenced by their living surroundings, humans are said to learn, develop, and socialise over time; thus, it could be a costly mistake to assume human preferences are fixed (Green and Rachlin, 1991). In order to solve this problem, Herrnstein (1990) develops the notion of melioration, clearly indicating that people tend to make choice decisions based on an ongoing concern instead of a once-and-for-all basis, the core assumption of maximisation). In other words, they shift their preference with respect to the option that provides the best rewards (Tunney & Shanks, 2002). As a result, Davison and McCarthy (2016) suggest that melioration should be considered as " the process in which a difference between local rates of reinforcement leads to a continuous change in the distribution of behaviour in the direction of an equality of local reinforcer rates" (p.136). In melioration, the local reinforcement rates are a crucial factor (Herrnstein, 1997). If one reinforcement is better than another,

individuals will select it and when it is no longer better than the other, they will shift to the other in order to ensure that they always receive the best altenative available. This best option also has the highest reinforcement rate at that point (Herrnstein, 1997). In the consumer research scenario, the switching among all brands made by most buyers is thought to be suggestive of both matching and melioration (Foxall, 1999; 2017).

An illustrative example of the concept of melioration is how a PhD candidate working on his/her thesis with a deadline for submission. The student is expected to concentrate and pay full attention to the thesis. Along the long journey, distractions and procrastinations come in different forms such as watching football matches on TV, going to a cinema, playing games, babysitting, and so on. As long as the student has interest and dedication to the thesis, he/she would ignore those distractions, and thus the thesis would be his/her top priority. This situation may be the case especially when the student is in his/her writing-up year. However, in the early years, the student might shift his/her attention to these distractions rather than focusing on carrying out the research because the level of motivation is low and the deadline is still far away. On a daily basis, he/she may go out with the family and consider taking on the literature review task later on that day. As can be seen, the PhD student's choice is said to be a random switching, based on the reinforcement rates, between available options such as writing a good thesis that can boost career prospects, or having fun and enjoying life with family and friends.

3.2.2.3 The Matching/Maximisation Controversy

The topic of whether matching or maximisation is the right theory to predict choice behaviour accurately has been a heated debate over the years. Specifically, two

different school of thoughts have been developed: behavioural economics, led by Kagel (1995), whose studies provide experimental evidence for maximisation, and behavioural psychology, exemplified by Herrnstein et al. (1997), whose studies show evidence for melioration in which consumers choose the rewarding option without necessarily maximising their returns overall. As discussed before, the maximisation theory argues that human beings allocate their behaviour among different alternatives to maximise a set of properties in the environment (Rachlin et al. 1981).

In research into consumer brand choice, there are two main assumptions of utility maximisation one, that brands within a product class are said to be perfectly substitutable and two, buyers fully know how the market works as well as what impacts their purchase exert on the utility gained (Herrnstein, 1997). According to the maximisation theory, consumers prefer best value for money, i.e. the cheapest brand on offer. On the contrary, in real-world situations, according to the matching and melioration theory, this is not always the case because people tend to engage in multi-brand purchasing and not to purchase the cheapest brand available on their shopping occasions. By doing so, individuals continuously shift their behavioural responses to the "best" option which provides higher average utility. This may lead to a suboptimal choice because it is evident that consumers are unable to comprehend all of the possible results and potentially gained utilities. Melioration, thus, is believed to be a more momentary, or molecular account of choice which takes "irrational behaviour", often caused by the lack of knowledge, into consideration (Rachlin, 1989). Therefore, one of the biggest differences between the two is that maximisation theory is based on rational choice theory while matching law is not. Sigurdsson (2008) believes that this is an advantage of the matching law over the maximisation theory because it has the ability to predict behaviour that violates assumptions of the rational choice theory

such as people's decisions to discount delayed rewards in favour of rewards gained in the near future.

Another difference worth pointing out is reactions to reinforcement. Maximisation is based on the assumption that individuals are unaffected by the differences in reinforcement rate from the available options. Melioration, on the contrary, refers to a molecular behaviour mechanism which attempts to describe behaviour moment by moment because behaviour keeps shifting towards the better of two alternatives until the ratios are equal and matching occurs (Herrnstein, 1997; Herrnstein and Vaughan, 1980). In fact, melioration and matching can produce sub-optimalities in the case of allocating behaviour where one alternative's distribution of choices influences the returns received from the other (Herrnstein, 1990a, Herrnstein and Vaughan, 1980, Herrnstein, 1990b). Finally, for time considerations, the maximisation/optimisation theory discusses future utility in the context of maximising total utility. Melioration only focuses on the present moment, and thus future concerns do not influence the decision-making process. Davison and McCarthy (2016) argue that, under melioration, organisms will increase the response rate of one alternative as long as it pays off more than another at that particular point, even if the total payoff will suffer in the future.

The differences in usages of the two theories under different schedules of reinforcement are also worth considering. On concurrently available VI VR and VI VI schedules, there exists a disagreement about the convergence of the predictions (Herrnstein, 1988). While Herrnstein and Heyman (1979) believe that matching instead of maximisation is a tool for explaining choice behaviour, Rachlin et al. (1981) and Green, Kagel and Battalio (1982) confirm the opposite via their studies.

On the other hand, under concurrent variable-ratio schedules, the two theories share a similar conclusion that the richer schedule is favoured (Herrnstein & Loveland, 1975). Baum (1981), from the above findings, attempts to draw up a rule of thumb about the convergence of the predictions made by both theories. He claims that maximisation seems to be more accurate for studies on single schedules whereas the matching law is the way to go for studies on concurrent schedules. Therefore, matching can be employed as the choice mechanism in the context of consumer choice because concurrent schedules are said to be more closely analogous (e.g. McDowell 1988; Mazur, 1991).

Some researchers mention that results from empirical research should function as the main criterion for comparing the two schools of thought. Herrnstein (1990), for example, gave three reasons why matching is superior to maximisation. First of all, it is argued that as long as people satisfy melioration and matching, their given utilities will be maximised. Second, in cases of disagreement in predictions from the two theories, the actual choices seem to show matching rather than maximisation. Finally, Herrnstein (1990) insists that when maximisation does not narrowly constrain allocation, individuals are said to comply relatively strictly with the matching law. Another empirical piece of evidence favouring matching and melioration over maximisation is found in research on time allocation (Herrnstein 1961; 1970, Pierce & Epling 1983). The findings show that melioration is much more flexible in its prediction than maximization, which is rigid as the result of its adherence to strict rationality, and thus melioration can be incorporated into real-world situations such as taste changing or frequent suboptimal selecting. Herrnstein (1997) further discredits the maximisation concept calling it merely a "convenient fiction" praised by economists but offering little practical value, and thus it cannot be subject to

empirical testing (Herrnstein, 1997; Vaughan & Herrnstein, 1987). On the other hand, maximisation has been given some support when several researchers questioned the validity of the matching law and asked for more evidence in both experimental and applied studies (Fantino, 1981). In fact, there has been a dominance of maximisation over matching and melioration in the context of economics.

As can be seen, the controversy between the two theories has remained unsolved. Timberlake (1982), however, with a practical approach, mentions researchers should focus on providing a proper background that helps the occurrence to be described accurately rather than being named correctly. He emphasises that "The animal is clearly doing more than just matching and less than perfect maximising. What we call the phenomenon is considerably less important than what we find out about it" (p. 562). Miller, Heiner and Manning (1987) also suggest that it could be practically helpful if researchers use both theories as "zones on a continuum of behavioural assignations" (p.284). It is believed that maximisation and melioration theories, regardless of their differences, are similar to some extent. Firstly, they are both utilitarian, hedonistic-focused approaches created and influenced by the consequences of behaviour (Herrnstein, 1997). Both theories, besides, heavily stress the importance of adaptiveness, meaning that individuals strive for improvement, not just repetition of the first successful act (Herrnstein, 1970). Moreover, internal motivations, external motivations such as environmental feedback, and their relationship are closely scrutinised in both maximisation and matching as a requirement for a better prediction of human behaviour (Herrnstein, 1997).

Choice behaviour is said to be governed by the combination of matching and maximising processes, and therefore maximisation theory and matching law are not in

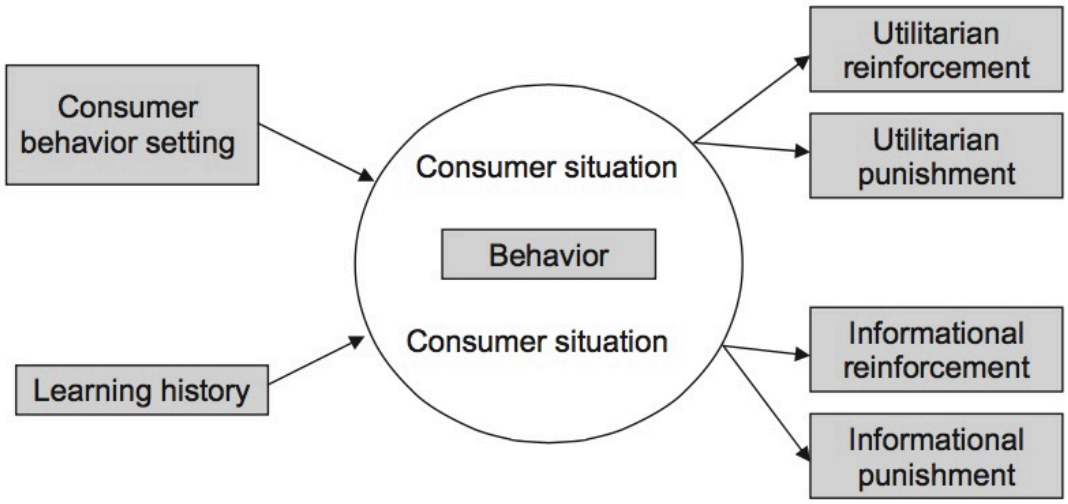
conflict but support each other (Prelec, 1982; Schwartz, 1984). According to previous work in consumer behaviour research (Herrnstein et al. 1997; Foxall et al. 2004), the parameters of matching in marketing contexts lead to a similar pattern of choice in both maximisation and matching theories (Wells & Foxall 2013). Hence, maximisation is also called probability matching in consumer behaviour analysis. Probability matching analysis has been carried out to identify the fixed probability of gaining a reinforcer for each response. For example, a concurrent reinforcement schedule VR10 VR15 means there is a probability of 1/10 and 1/15 of getting a reinforcer on that schedules.

3.2.3 The Behavioural Perspective Model (BPM)

Consumer behaviour analysis, as discussed previously, has been derived from basic behavioural laws and principles of behavioural economics. Behavioural economics' theories have been developed and tested in the context of animal experiments. Thus, when applying them to the context of consumer behaviour analysis, researchers have to take into consideration that there are some determinants of human choices, such as preferences for brands and retail outlets, that cannot be simulated in experiments with animals. In an attempt to add the effects of a real consumer environment, the Behavioural Perspective Model (BPM) comes in as a comprehensive consumer behaviour model. Foxall, the founder of the model, stated that it is intended to provide consumer behaviour analysts with "a conceptual and methodological system that makes extensive behaviour-environmental analysis possible" (Foxall, 1990; 2002; 2017).

The Behavioural Perspective Model (Foxall, 1993; 2017) aims to examine the systematical relationship between patterns of buying and consuming activities and the

consumer situations in which they take place. The model is theoretically based on three essential doctrines, namely Skinner's three-term contingency, Darwin's evolution neo-analysis (Nicholson and Xiao, 2010), and the contextual stance (Foxall, 1999; 2017). The contextual stance claims that after bringing meaning into the factors forming the behaviour settings, consumers' learning history transform the settings into discriminative stimuli which, in turn, trigger particular outcomes to buying behaviours created in advance under these consumer situations. In other words, the BPM interprets consumer choice via the intersection between antecedent events of the consumer behaviour setting and individual learning history, with the emphasis on utilitarian and informational consequences as reinforcers or punishers (Foxall, 1994; 2011; 2017, Foxall et al., 1998, Foxall and Greenley, 2000, Yani-de-Soriano et al., 2002, Xiao and Nicholson, 2009).



Source: Foxall, 1999.

As can be seen in the behavioural perspective model (BPM), predictions and interpretions of consumer behaviour are built on two aspects of situational influences: (1) the consumer behaviour setting, and (2) the utilitarian and informational reinforcement signalled by the setting, under the impact of the consumer's learning

history (Foxall, 1993; 2017). Both the consumer and the setting are said to be crucial to defining the consumer situation. Firstly, the consumers' learning history determines what can act as discriminative stimuli, and hence it shows the individuality of the consumer. Secondly, the setting, in turn, plays a role in activating the learning history so both can influence the consumer behaviour (Foxall, 1992; 2017). A consumer situation, therefore, is best perceived as a specific natural setting alongside the individual's learning history (Foxall, 1997; 2017).

3.2.3.1 Consumer behaviour settings

A consumer behaviour setting, interacting with the consumer's learning history, plays the role of a discriminative stimulus signalling probable outcomes when the approach or avoidance response is either induced or inhibited (Foxall, 1993; 2017). Foxall and his colleagues (1998) mention that, in real-world situations, as long as people are involved with either pre-, ongoing or post-consumption activities (e.g. shopping at supermarkets, attending sports matches, wandering public libraries, taking flight journeys, and so on), they are said to be in a particular consumer behaviour setting. In fact, there are four kinds of discriminative stimuli: physical (point of sale advertising, product array), social (others shoppers, salespersons), temporal (business hours, limited duration promotions) or regulatory (self and other rules) (Foxall, 2010; 2017). Discriminative stimuli are argued to exert some control on consumers' choice behaviour. The stimuli then constitute the consumer behaviour setting scope whose strengths are significantly impacted by the consumer's learning history that consists of similar behavioural consequences in the past (Foxall & Greenley, 2000, Foxall et al., 2006; Foxall, 1998).

The position on the continuum of closed-open behaviour settings shows the

degree of control researchers have over the environment. It is derived from but not identical to the open and close setting definition of Schwartz and Lacey (1988), who emphasise that all experiments need to be carried out in closed settings as the experimenter is the major controller of the conditions and reinforcers provided. Experimentation on animal behaviour in the laboratory can be an example of the most closed setting related to the matching law. In contrast, an open setting refers to a situation where the researcher has little control over the environment. One of the most open settings in which the matching law has been studied on human behaviour is the supermarket (Foxall et al. 2004) because it has many reinforcers, where many can have a strong impact on behaviour, and the researcher has no control over deprivation or satiation.

In fact, as consumer situations tend to be much more open than any experimental context, the consumer behaviour settings differ from one another regarding two dimensions: the locus of control and the prescribed behaviour programme (Foxall, 1999; 2017). The BPM, thus, is developed to account for consumer behaviour in open contexts with consideration of important environmental determinants. As a result, the relative continuum from closed to open settings should be used instead of the absolute continuum presented above. "Relatively closed settings" refer to those in which reinforcers that have influences on behaviour can be easily controlled by the researchers or marketing executives. For example, a convenience store can be viewed as a relatively closed setting because the owner can decide how many brands within a product category (reinforcers) are available and has control over those. "Relatively open settings" are those in which the researchers are unable to specify accurately and control the contingencies of reinforcement. Supermarkets, once again, are a typical example of relatively open settings as they

allow for an abundance of choices and alternatives (Foxall, 1999). The relative openness or closeness of settings relies on three elements: (1) whether there are readily available options to being in particular situations, (2) whether the buyers or someone else controls access to or deprivation of the reinforcement, and (3) whether the contingencies are set up by sales agents who are themselves not subject to the contingencies (Foxall, 1999).

3.2.3.2 Consequences of consumer response

Two types of behaviour consequences are utilitarian and informational reinforcement. Utilitarian reinforcement is related to the term utility in economics that means a product or brand can bring pleasure, satisfaction, and positive emotional outcomes to consumers (Foxall 1998; Foxall & Greenley, 2000). It hence can be considered a function of particular economic consequences. The consequences are tangible and either positive (e.g. benefits like prizes, money derived directly from purchase, ownership and consumption) or negative (e.g. removal and avoidance a bad consequence). On the other hand, informational reinforcement refers to performance feedback which shows how well the buyer is doing. It is different from utilitarian reinforcement in that it does not provide the buyer direct tangible utilitarian satisfactions. Informational reinforcement is symbolic and akin to value in exchange. The reinforcement stems from the level of social status, prestige, and acceptance gained. Informational consequences thus are intangible, in verbal forms (e.g. gestures, speeches), and mediated by other people rather than by himself/ herself (Foxall 1994; 1997). Examples of informational reinforcement can be the amount of recycling an individual has collected and the amount of water he has saved. Utilitarian and informational reinforcement may decrease the rate of consumer behaviour as well.

These are so-called aversive consequences. It is also observed as a combination of utilitarian and informational reinforcement in consumer behaviour (Foxall, 1994; 1999; 2007; 2017).

3.2.3.3 Levels of Interpretive Analysis

The interpretation of consumer behaviour can be done through a reconstruction of the environmental causes of observed behaviour (Skinner, 1987). Based on this principle, the model identifies three interactive levels of interpretive analysis, namely, the operant class, the contingency category and the consumer situation (Foxall, 2010). Overall, the three levels of interpretive analysis can be examined by using the BPM mechanism. The table below shows the three levels of interpretive analysis.

Level of Analysis	Environmental Stimuli	Behaviour Units
Operant Class	Pattern of Reinforcement	Operant equifinality class
Contingency Category	Schedule of Reinforcement (e.g. single, dominant)	Accomplishment, Hedonism/Pleasure, Accumulation and Maintenance
	Pattern of Reinforcement, behaviour setting scope	General pattern of behaviour appropriate to closed/ open setting, subset of operant equifinality class
Consumer Situation	Pattern of reinforcement, relative strength of immediate reinforcement and punishment (e.g. schedule, delay, quantity)	Approach, Escape, Avoidance, and responses including browsing, purchase, saving, buying, leaving the behaviour setting
	Personal learning history	
	Behavioural setting scope	
	State variable (e.g. mood, ability to pay)	

Table 3.1: Three Level of Interpretive Analysis (Source: Foxall, 2010)

a. Level I: The Operant Class

Consumer behaviour, regarding the pattern of utilitarian and informational reinforcement, takes one of four equifinal operant classes, namely, Accomplishment, Accumulation, Hedonism (Pleasure), and Maintenance. Equifinality occurs where all member of a particular class of behaviour share the same pattern of consequences (Foxall, 2010). The table shows the four operant classifications of consumer behaviour by the level of utilitarian and informational reinforcement.

Utilitarian Information	High Utilitarian Reinforcement	Low Utilitarian Reinforcement
High Informational Reinforcement	Accomplishment	Accumulation
Low Informational Reinforcement	Hedonism/Pleasure	Maintenance

Table 3.2: Operant Classification of Consumer Behaviour (Source: Foxall, 1997; 2007).

Firstly, accomplishment refers to personal achievement such as driving a luxury car which consumers can afford to purchase or going shopping at famous department stores like Harrods (Foxall & Soriano, 2005). These instances of conspicuous consumption, which indicate both social and economic achievement, are typical examples of this type of behaviour. Accomplishment indicates consumer

behaviour which involves relatively high levels of both utilitarian and informational reinforcement.

Second, Hedonism/Pleasure is said to be sustained and strengthened by high utilitarian but low informational reinforcement. Attending a party, reading romantic fictions, watching sports channels on TV or going to the cinema are instances of this situation used in past studies (Foxall & Soriano, 2005).

Third, Accumulation is behaviour which has limited utilitarian content, but which is principally informational. Such behaviour is maintained by the provision of rewards given in the future including interest earned from a bank account, coupon prizes exchanged in competitions and collecting loyalty points from frequent buying (Foxall & Soriano, 2005). Finally, Maintenance is the planned acquisition of a series of reinforcers low in both utilitarian and informational reinforcement. This group is often regarded as consumer activities that are routine behaviour, boring but necessary to survival like eating or grocery shopping. It also relates to those buying and consuming activities that are obligatory to a member of society like paying taxes, or even waiting for a flight at an airport terminal (Foxall & Soriano, 2005).

b. Level II: The Contingency Category

According to the BPM, the four operant classes based on the level of utilitarian and informational reinforcement combine with the degree of closedness or openness of the environments (aka. consumer behaviour setting scope) to give the eight contingency matrices. Specifically, the eightfold categorisation of the contingencies, which is used to control human behaviour, comes from the combination of utilitarian (high-low), informational (high-low) and behaviour setting (open-closed). The table shows the eight contingency matrixes of consumer behaviour

setting and operant classification of consumer behaviour.

CB Setting Operant Conditioning	Closed	Open
ACCOMPLISHMENT (high utilitarian, high informational)	Contingency Category 2 FULFILMENT	Contingency Category 1 STATUS CONSUMPTION
HEDONISM/ PLEASURE (high utilitarian, low informational)	Contingency Category 4 INESCAPABLE PLEASURE	Contingency Category 3 POPULAR PLEASURE
ACCUMULATION (low utilitarian, high informational)	Contingency Category 6 TOKEN-BASED CONSUMPTION	Contingency Category 5 SAVING AND COLLECTING
MAINTENANCE (low utilitarian, low informational)	Contingency Category 8 MANDATORY CONSUMPTION	Contingency Category 7 ROUTINE CONSUMPTION / PURCHASING

Table 3.3: The BPM Contingency Matrix (Source: Foxall, 1994; 1999; 2010)

First of all, in Accomplishment, there are two contingencies categories (CCs): Status Consumption (CC1) and Fulfilment (CC2). An open setting, according to

Foxall and Soriano (2005), is demostrated by Status Consumption which includes the purchase and consumption of status goods, like luxuries and radical innovations. Since there are many different ways to achieve the reinforcers, researchers are believed to have little control over the consumer setting and buyers have many options available in the situation. In a more closed setting, the Fulfilment category consists of personal attainment, which generates congratulations or excitement, and personal achievements like the completion of a training course (Foxall & Soriano, 2005). In terms of available means of receiving the reinforcers, compared to Status Consumption, researchers have more control over the consumer setting, and the buyers have fewer sets of contingencies to select.

Second is Hedonism/Pleasure, where there are two contingencies categories involved: Popular Pleasure/ Entertainment (CC3) and Inescapable Pleasure/ Entertainment (CC4) (Foxall & Soriano, 2005). Popular Pleasure represents an open setting; for example, watching a talk show or reading fiction is said to provide hedonic rewards and sensations. There are many means by which the reinforcers may be obtained. Marketers have little control over the consumer setting and the consumer has many alternatives to being in the situation. On the other hand, the situation in a more closed setting is called Inescapable Pleasure like enjoying an in-flight movie. Buyers do not find it easy to escape from the consumer setting because the setting is closed by physiological influences beyond their control. They, nevertheless, still enjoy the situation; thus, this kind of behaviour is unavoidable but still pleasurable (Foxall & Soriano, 2005).

Third, Accumulation in an open setting may be saving and collecting (CC5) including the collection of coupons or other kinds of tokens before exchanging those

for a product, and instalments payment for commodities (services included) that can only be completed when the full amount has been paid (Foxall & Soriano, 2005). There are some important reinforcers and highly specific tasks that need not be committed. Researchers have little control over the consumer setting and the decision process is under the buyer's control. Accumulation in a closed setting is known as token-based consumption (CC6), like airmiles collected via frequent flyers programmes, loyalty points accumulated when staying at a hotel chain, and credit card points collected and redeemed for a specific reward. In Accumulation specific tasks are required, and the whole process of behaviour is rule governed. Researchers have more control over the consumer setting, and there is almost no other option to being in this kind of situations (Foxall & Soriano, 2005).

Finally, Maintenance represents two contingencies categories (CCs): Routine Consumption/ Purchasing (CC7) and Mandatory Consumption (CC8). In an open setting, maintenance is said to be routine purchasing and consumption (CC7), such as habitual purchasing of grocery items (Foxall & Soriano, 2005). There are many means available to obtain the reinforcers but the reinforcers are insignificant in size. Hence, to obtain the reinforcers, tasks have to be performed. Researchers have little control over the consumer setting, and the decision process is under the buyer's control. Maintenance, in a closed setting, can be regarded as mandatory consumption (CC8), which consists of all forms of behaviour necessary to remain a member of the whole community (such as tax payments). The term is also used for the inescapable "hassles" of everyday consumer situations, such as being delayed in a long queue at the gate of an airport terminal waiting for a flight to leave (Foxall & Soriano, 2005). In this situation, purchase or consumption may be compulsory, and there exist few means available to gain the reinforcers. Researchers have significant control over the

consumer setting, and there is no alternative, for the buyer, if the other reinforcers are to be achieved.

c. Level III: The Consumer Situation

The consumer situation is the most detailed level of analysis which consists of a wide range consumer responses including browsing, evaluating and purchasing based on the main parts of the consumer situation (Foxall, 2010). Consumer behaviours are said to be approach, avoidance or escape (in cases buyers escaping from an aversive setting); and the consumer situation, in turn, induces or inhibits these particular consumer behaviours. Therefore, it is believed that, using these situations, marketers can give fairly accurate predictions of consumer choices (Foxall, 1997; Foxall, 2011; Yani-de-Soriano et al., 2002; Xiao & Nicholson, 2009). The usage of the consumer situation also helps behavioural researchers to challenge the dominant cognitive approach of consumer behaviour research in which the term "behavioural" is misleading as it refers only to psychological factors instead of being used as a true adjective of "behaviour" (Foxall, 1998). In fact, there have been extensive reviews of cognitive consumer research in which the information-processing-based approach has been heavily criticised because of mixed, and thus, unconvincing, results in elucidating consumer behaviour (Foxall, 1990).

3.2.3.4 Tautology Concerns in Consumer Behaviour Analysis

As discussed previously, behavioural economics' theories have been mainly used in animal experiments. Hence, when applying the theories to a consumer behaviour context, researchers have to take into account that there are several elements of human behaviour that cannot be replicated like in experiments with

animals. As a result, careful adjustments must be made when transferring theories of behavioural economics into the analysis of consumer choice in naturalistic marketing contexts (Foxall, 2017). For example, the matching for the context is assumed to concur in concurrent variable-ratio schedules. Alternatively, it is claimed that there are two kinds of matching: amount matching is the classical one that is described above, and cost matching developed by Kagel (1995) with the use of economic analogues such as price, quantity demanded, and payment. However, because of adjustments, one of the concerns of using the matching law in marketing settings is the risk of tautology in some versions of consumer research. Specifically, tautology is suspected in case of amount matching when response ratio, relative amount of money spent on a product (the dependent variable), and reinforcement ratio, relative amount of the product (the independent variable). In this case, the variables are inter-dependent; therefore, amount matching is inescapably circulated (Sigurdsson, 2008). This can be algebraically explained. The generalised matching law states that:

$$log\frac{B_x}{B_y} = s\ log\frac{R_x}{R_y} + logb \tag{4}$$

where B_x and $B_y$are response rates and R_x and R_y are the corresponding reinforcement rates. Applying it to consumer behaviour analysis, the generalised matching becomes:

$$log\frac{S_x}{S_y} = s\ log\frac{Q_x}{Q_y} + logb \tag{6}$$

with S_x, and S_y are the amount spent on the commodity, and Q_x, and Q_y refer to the quantity of the commodity purchased.

However, S and M are linked by the price of the commodity P:

$$S = Q \times P \tag{7}$$

Therefore,

$$\frac{S_x}{S_y} = \frac{Q_x \times P_x}{Q_y \times P_y} \tag{8}$$

The formula in log-form:

$$log\frac{S_x}{S_y} = log\frac{Q_x}{Q_y} + log\frac{P_x}{P_y} \tag{9}$$

So if prices remain constant, exact matching with a bias is definitely observed. This means that there is essentially no interest in plotting the relationship between the relative response ratio and the relative reinforcement ratio and the application of the matching law here is meaningless (Sigurdsson, 2008).

Cost matching can be a solution by looking at the relative amount of products as the dependent variable and the relative price as a predictor. Economic behaviour is not only reinforced but also punished by its consequences. The price is the secondary and negative reinforcer. However, cost matching is not a perfect answer because it still lacks the presence of a positive reinforcer in the right of the matching equation. Matching in consumer behaviour analysis is still subject to tautology, but it is believed that tautology should be examined to find out whether it is a severe problem rather than abandoning matching practices (Curry et al., 2010). To avoid the tautology

concern when conducting matching over consumer store choice, researchers used the aggregate level in previous consumer behaviour studies. The reason for this is that aggregated analysis minimises the effect that individual differences could have on the behaviour (Foxall & James 2001, 2003; Foxall & Schrezenmaier 2003; Foxall et al. 2004), and thus the analysis is proven as a good way to avoid a serious or extreme tautology. By doing so, the researchers have found out that consumers' brand choices seem to confirm the prediction of the generalised matching equation for different levels of substitutability. As a result, amount matching has been a useful technique in marketing (Sigurdsson, 2008). Moreover, Romero et al. (2006) suggest that further research is needed to clarify whether amount matching analysis is a proper method to analyse the substitutability of brands.

3.2.4 The Value Of Reinforcers

Hursh and Roma (2016) pointed out that behavioral economics plays a vital role in the consideration of the consumption of reinforcers as a main dependent variable of behaviour as well as how that consumption changes due to the cost of reinforcers. Consequently, the value of reinforcers can be defined based on the relationship between their cost and consumption. Behavioural psychologists and behavioural economists, therefore, in attempt to examine and measure that value, have utilised a number of different constructs of reinforcers' strengths (Hursh & Roma, 2016) including response rate (Ferster & Skinner, 1957), relative response rate (Hernstein, 1970), behavioral momentum (Nevin, 1992; Nevin & Grace, 2000; Nevin, Grace, Holland, & McLean, 2001), ratio breakpoint (Hodos, 1961; Hodos & Kalman, 1963; Nevin, 1992), and the slope of the demand curve (Allison, 1983; Hursh, 1980, 1984; Lea, 1978).

3.2.4.1 Demand analysis

Among the measures listed above, demand elasticity analysis, which describes the sensitivity of consumption to price changes, is said to be the most straightforward method. Specifically, the demand curve, a definition borrowed directly from traditional economics, indicates the relationship between the cost and consumption of a reinforcer. In general, an increase in the cost of a product or service will lead to a decrease in that commodity's consumption. The decreasing rate of consumption, i.e., sensitivity to price, relatively compared to the previous level of consumption, is well-known as the elasticity of demand.

Demand can be inelastic as well. It happens when consumption remains inflexible or decreases only slightly after proportionately big price rises. The typical example of the inelastic demand is gasoline as its use is too important to abandon in modern life. For example, when the price of gasoline went up by 300% during the 1970s as OPEC countries started squeezing prices, consumption declined by only 10%. One of the advantages of demand analysis, like other microeconomic concepts, is that it avoids the use of hypothetical elements like deprivation, value, strength, or probability (Christensen, Silberberg, Hursh, Huntsberry, & Riley, 2008; Christensen, Silberberg, Hursh, Roma, & Riley, 2008; Elsmore, Fletcher, Conrad, & Sodetz, 1980; Foster, Sumpter, Temple, Flevill, & Poling, 2009; Hursh, 1991; Jacobs & Bickel, 1999). Besides, elasticity of demand is thought to be an appropriate benchmark for comparing the value of different reinforcers (Bickel et al., 1993).

However, these direct comparisons of demand elasticity among reinforcers has been criticised over the years (Hursh, 1984; Killeen, 1995). One reason for this is that demand elasticity analysis does not take into account the continuity of the price

changes (Killeen, 1995). For example, it is evident that price change varies from product to product and the demand data collected from real-world situations often shows non-linear results rather than log-linear results assumed in microeconomic models. This comes from the fact that, along with price points, the determinants of demand elasticity include the nature of the chosen products or services, the species of buyers, the availability of alternatives, and the extent of openness of the economic setting (Hursh, 1984). Despite the above criticism, demand analysis is still believed to offer a promising method to calculate the value of reinforcers (Foxall, Oliveira-Castro, & Schrezenmaier, 2004; Hursh, 1980, 1984; Kagel, Battalio, & Green, 1995; Lea, 1978; Rachlin, Green, & Battalio, 1976).

3.2.4.2 Essential value

Attempting to provide an alternative to a linear model of demand analysis, researchers have put their efforts recently into the study of essential value, which is a novel approach to defining and quantifying reinforcement introduced by Hursh and Silberberg (2008; see also Christensen, Kohut, Handler, Silberberg, & Riley, 2009; Christensen, Silberberg, Hursh, Huntsberry, & Riley, 2008; Christensen, Silberberg, Hursh, Roma, & Riley, 2008; Foster, Sumpter, Temple, Flevill, & Poling, 2009). According to this theoretical framework, reinforcing efficacy is not determined by consumption at any particular price, not the highest price at which any consumption occurs, nor the price at which maximum consumption occurs. Reinforcement, instead, is defined by sensitivity to the price which is calculated based on changes in consumption across the whole range of prices. Essential value is developed by Hursh and Silberberg (2008) as the value of reinforcers, presented in a demand model first introduced by Allen (1938):

$$logQ = logQ_0 + k(e^{-aP} - 1) \quad (10)$$

where Q refers consumption, Q_0 is the maximum consumption at zero price, while k indicates the range of the dependent variable in logarithmic units, and P denotes the cost of consumption. Log of consumption (log Q) is a function of Cost and is maximal at zero cost (log Q_0) and specifies the highest level of demand. Minimum consumption is calculated as $LogQ_0 - k$, and a is the rate of change in the exponential function (Hursh & Silberberg, 2008).

Equation 10 has been often modified into equation 11 by normalising the demand:

$$logQ = logQ_0 + k(e^{-\alpha Q_0 C} - 1) \quad (11)$$

where C is the varying cost of the reinforcers measured either as responses or units of time per reinforcer. The normalised price hence is Q_0C, showing a reinforcer's cost needed to defend the demand when the maximum consumption occurs. According to Hursh and Silberberg (2008), the slope of Equation 10 is jointly determined by k and α. The value of k refers to a scaling constant indicating the range of the consumption data in the logarithm form and is fixed as a universal constant for all product categories or brands. As k is said to be constant as predetermined by the range of the data, the slope of the demand curve that indicates the elasticity is dependent on the rate constant of the exponential function which is known as α. More importantly, the value of α forms the basis for defining the "essential value" of the reinforcer via sensitivity of consumption to changes in cost. Specifically, α determines the rate of decrease in relative log consumption when the cost rises (Hursh & Silberberg, 2008). Higher values of α indicate steeper demand curves and smaller

essential values, whereas lower α values reflect shallower demand curves and higher essential values. That is to say, the α value is negatively correlated to essential value.

One of the disadvantages of the traditional demand research worth mentioning is that the rate of change of the demand curve varies with a broad range of price points. The approach of essential value, therefore, is said to be superior in achieving a constant rate of change of the demand curve (Killeen, 1995). Besides, normalising consumption into a common scale, a method founded by Hursh and Winger (1995), would eliminate scalar differences, and thus the approach of essential value allows researchers to compare different types of reinforcers. Hence, behavioural studies making use of the essential value are thought to show a better understanding and interpretation of choice behaviour (Hursh & Silberberg, 2008).

3.2.4.3 The Exponential Model

Hursh and Roma (2013) claim that the Exponential Model should be used as a descriptive tool instead of a predictive model; its main purpose is to determine reinforcing efficacy. Specifically, based on the empirical demand curve that provides both price and consumption, the Exponential Model is fitted to the fixed data in an attempt to identify the two parameters Q_0 and α. These two fundamental values, in turn, are employed in the quantitative model by quantifying the price sensitivity to price, or demand elasticity (Hursh & Roma, 2013; Banks, Roma, Folk, Rice, & Negus, 2011; Bidwell, Mackillop, Murphy, Tidey, & Colby, 2012). It is worth noting that as the reinforcing efficacy varies across the whole price range, demand elasticity is believed not to be constant across the price points. The shift in elasticity then leads to an apparently unique definition of the reinforcer efficacy indicating the price sensitivity (Hursh & Roma, 2013). In detail, as discussed previously, a small *a*

reflects low sensitivity to price, and hence high essential value as the reinforcement is highly valuable, and thus buyers are willing to pay any price to maintain the preferred level of consumption (Q_0). On the other hand, a large *a* reflects high sensitivity to price, and hence low essential value because the buyers consider the baseline level of consumption not worth sustaining.

The applicability of essential value has been examined in a number of closed settings with different subjects like hens, pigeons, and rats (Christensen, Silberberg, Hursh, Huntsberry, et al., 2008; Christensen, Silberberg, Hursh, Roma, et al., 2008; Christensen et al., 2009; Foster et al., 2009; Hursh & Silberberg, 2008). Specifically, Foster and his colleagues (2009) generate different menus for hens that can be considered as "qualitatively different" reinforcers to test different behavioural economic models. Hursh and Silberberg (2008) develop the models based on research about food and drugs selection by rats (Hursh, 1984; 1988) and baboons (Elsmore et al., 1980). Later, there are several studies examining the differences between food and cocaine consumption with rats as the subjects (Christensen et al., 2008a; Christensen et al. 2008b; Christensen, Kohut, Handler, Silberberg, & Riley, 2009). These experimental studies show good fit by employing the exponential model to create demand curves. Therefore, the application of the research based on the essential value to animal experimentations has been successful (Hursh & Roma 2013). Another advantage of this kind of experiment is that researchers find it easy to compare different drugs regarding their quality and characteristics (Hursh & Silberberg, 2008; cf. Christensen et al., 2008a; Christensen et al., 2008b; Christensen et al., 2009). It is hence believed that as long as the conditions in these experiments are properly controlled, apples and oranges are comparable (Hursh & Roma, 2013). Thus, the most useful function of the Exponential Model is to offer a reliable quantitative research

tool for comparing qualitatively different kinds of reinforcement.

Nevertheless, there are several drawbacks to the research method of essential value (Foster et al., 2009). First of all, the way of choosing the *k* value produces varied and inconsistent results. As a result, *a* values differ for the same set of reinforcers significantly because of the selection of a particular *k* value. For example, in the study of food choice with the changes of *k* values, Foster and his co-researchers (2009) find out that the finding does not support the hypothesis when the less preferred foods have the highest essential value. Secondly, normalising consumption into a common scale seems not to work in cases where chosen reinforcers are not substituting alternatives (Sørensen, Ladewig, Ersbøll, & Matthews, 2004). Next, the findings of the approach of essential value may be biased as the result of differences in quantity of reinforcers; that is, a large volume of reinforcers can lead to the variation of the goods' essential value (Powell, 1969).

Last but not least, the method has to be tested more, especially in research on human behaviour, as it has been limited regarding subjects (animal only), situations (experimental only), and reinforcers (homogenous mostly) (Hursh & Roma 2013). In an attempt to resolve this problem, Yan, Foxall, and Doyle (2012) employ the Exponential model to a human consumer context incorporated with differences regarding quantities, price points, and brands of several product categories. The study also suggests that utilitarian and informational reinforcement (UR and IR), concepts stemming from the Behavioural Perspective Model (BPM), can be used as another qualitative variation.

3.2.5 Substitutability and Matching

3.2.5.1 Definition of Substitutability, Complements, and Independence

Substitute goods are similar items that meet largely the same need; that is to say, two different goods may be used for the same purpose. Two goods are complements if they satisfy different parts of a compound need, and two goods are independent if their consumption or use is not related (Henderson and Quandt 1958; Lattin and McAlister 1985). Consumers usually seek a substitute when their first-choice product/ brand soars dramatically in price. Therefore, it is believed that price is the most likely reason for the consumers' choice of a substitute product/ brand over their preferred one. Another factor is individual income. When it decreases, a consumer is forced to spend more wisely. As a result, he/ she has to select less expensive but substitute products/ brands in order to maintain a good quality of life. This situation is called “comparison shopping” for similar items from different stores: If all conditions are said to be equal, a buyer will choose to shop at the store providing the lowest price. In reality, most consumers compare commodities that are not perfect substitutes.

3.2.5.2 Own-price and cross-price elasticity

Own-price elasticity of demand is defined as the slope of the demand curve for a product/brand when employed into a log–log graph with the purpose of showing relative changes in consumption of the commodity when there are proportional changes to its own price (Hursh and Roma 2013). The Exponential Model of Demand demonstrated in equation 10 is believed to be able to quantify and compare the own-price elasticities of any given commodities. In other words, as discussed previously,

the a parameter of the equation describes the change rate in the demand elasticity with the following rule: the faster elasticity increases with price, the greater the elasticity is at any particular price (Hursh and Roma 2013). Therefore, a values are said to be a useful tool for comparison products/brands across experimental conditions.

On the other hand, cross-price elasticity, probably the most well-known and widely accepted, has been used as a measure of competitive influences of products/brands on one another. Mathematically, an extension of the exponential model, incorporating choice procedures with concurrent reinforcers, may be employed to fit cross-price demand curves (Hursh and Roma 2013). In fact, cross-price elasticity is based on the assumption that the demand for a fixed-price product/brand will change as a response to a change in the price of the other. For instance, if the price of fuel went up 5%, and the demand for new cars decreased by 10%, the cross-elasticity of demand would be: $\frac{-10\%}{5\%}$ = -2.

If the function has a positive slope, the fixed-price alternative product/brand is called a substitute for the primary one (Lattin and McAlister 1985). Similarly, if the slope is negative, the fixed-price alternative is known as a complement of the primary product/brand. Finally, if the slope is zero, the reinforcing efficacies of both products/brands are regarded as independent of each other. The logic for this rule of thumb is quite simple. For example, if two products X and Y are substitutes, a fall in demand of X stems from a rise in the quantity demanded of Y. Thus, if the price of product Y decreases, the demand curve of Y will move rightward and cause the demand curve for product X to shift to the left, decreasing X's demand and resulting in a positive value for the cross elasticity of demand (both price change of Y and

quantity change of X are negative).

3.2.5.3 Brand Substitutability

As described before, most consumers are multi-brand buyers and the rest, relatively few, are sole buyers who are 100% loyal to one and only one brand (Ehrenberg, 1988). While loyalty is a clear reason for the buying behaviour of sole purchasers, brand substitutability can be used to explain multi-brand purchasing activities. Substitutability in consumer and marketing research implies that when two different goods/brands have almost the same physical attributes or even equal monetary and symbolic value, they are perceived as interchangeable and can be functionally substituted for one another. Therefore, the notion that a commodity is evaluated by its interdependency with other available options is central to the concept of substitutability. In economics studies, to ensure substitutability occurs, consumers are assumed to be able to easily switch their preference to another product/brand which provides them with similar perceived utility outcomes. The switch usually came from a price reduction of a product/brand leads to an increase in the quantity demanded of the other, and, of course, a decrease in its quantity demanded.

It is said that, nevertheless, that the extent of substitutability between products or brands is impacted by the qualitative similarity or dissimilarity of these products/brands' reinforcers (Green & Freed, 1993). The typical example of goods that are qualitatively similar, share similar functions and hence are substitutable is Coca-Cola versus Pepsi-Cola. Such examples are not often found in real life though. Rather, there are (1) qualitatively similar items that may still have little substitutable value, like tennis balls and oranges or (2) qualitatively dissimilar items surprisingly discovered to be substitutable for each other, like brain stimulation and food (Green &

Freed, 1993; Myerson & Hale, 1984). In fact, the degree of substitutability of brands depends on the degree of functional similarity as well as on qualities promoted by marketing activities like branding (Foxall, 1999; 2017). Besides, Green and Freed (1993), taking the imperfection of real markets into consideration, argue that product/brand substitutability is indeed affected by immediate availability. That is, buyers would prefer "the second best" reinforcer that is immediately available to "the best" one that is not easily accessible.

Moreover, substitutability is also said to be dependent on economic conditions, aka open or closed economies (Hursh & Baumann, 1987). Closed economies refer to situations in which consumption is constrained by what is earned by a participant under the designed schedule of reinforcement (Hursh, 1984). In an experiment, for instance, if the subject fails to follow the apparatus (does not press the levers), it would not earn any food reinforcers. As a result, the researchers cannot use the subject's weight as a dependent variable as it is uncontrolled since the subject will be fed later outside of the course of the experiment. A token economy can be viewed as a human subject example of a closed economy. In this economy, performing certain tasks and following particular rules, individuals earn tokens, a so-called currency, to buy products for their wants and needs. As the subjects are allowed to control their own level of consumption and hence the control of deprivation has been eliminated, closed economies are employed to investigate the relationship between responding and consumption (Hursh 1980). Conversely, in open economies, the subjects are believed to have more freedom when receiving different kinds of reinforcement like free food in between or after the research session. They, thus, have little motivation to work harder to earn items once the ‘price’ of those items themselves increase during the session (James, 2002). As a result, some variables

such as the subject's weight, which is the most used in closed experiments, are unlikely to be considered in an open economy situation as the subjects are thought to be fed for free in between and after the research course. Besides, price elasticity of demand is empirically proven to be generally higher in open economies (e.g. Hursh, 1980) due to the fact that the subjects realise that they do not have to force themselves to earn more items in the sessions when there exists a substitutable source of supply outside the session (Hursh and Baumann, 1987).

In demand theory, since indifference curves reflect consumer preferences, their contour can be used to explain the substitutability of any two goods/brands (MacCrimmon & Toda, 1969). It is worth reviewing some of the most important points of indifference curves developed by a number of economists in the early years of the 20th century like Francis Ysidro Edgeworth, and Vilfredo Pareto. Firstly, indifference curves have a negative slope as they come downward from left to right. Secondly, the curves cannot intersect because consumers always prefer more of either good to less. Lastly, the curves are convex, since consumers require more of a commodity to compensate for the shortage of the other. An individual is said to be indifferent about any two commodities if he/she likes the one as much as he/she does the other, and thus receives similar satisfaction or utility from the two. He/she actually has no preference for any points on the indifference curve. As a result, the shapes of the indifference contours demonstrate the substitutability of the two commodities (Schrezenmaier, 2005). Specifically, the flatter the indifference contours, the more substitutable the commodities arc will be, and conversely, the more curved the contours, the less substitutable the commodities arc will be (Rachlin, 2003). For example, the contours for beer and soft drink would be flat whereas the contours for beer and chips would be steep or bent. Moreover, if the indifferent curves are convex,

buyers are said to be willing to give up one product/brand in exchange for more of the other. If the goods/brands are perfect substitutes, the curves will be parallel lines (the straighter the line, the more linear the relationship between the two), whereas if they are perfectly complementary, the indifference curves should be L- shaped (Schrezenmaier, 2005).

It is no surprise that reinforcers can have different values to different species; that is, humans and animals are impacted differently by varying reinforcers. As a result, it is said that species influences the price elasticity of demand (Schrezenmaier, 2005). For instance, food is considered a primary reinforcer for animals as they need it to survive but in most countries, food is only a secondary reinforcer since eating is no longer the top priority. Therefore, the demand of the latter is far more inelastic than that of the former. Moreover, there remains a heated debate of whether primary reinforcers are more important than secondary ones regarding their effect on the elasticity of demand. Rothschild and Gaidis (1981) are researchers rooting for the significance of primary reinforcers like products and claiming the reinforcers have more power than secondary ones like money. In contrast, Peter and Nord (1982), based on the flexibility and versatility of money (e.g., can be exchanged quickly and easily) argue to discredit food as a powerful reinforcer. This seems to be a strong argument when consumers have not faced any serious food deprivation.

Baum's sensitivity parameter in the matching equation, as discussed before, can be considered as a reliable measurement of substitutability (Rachlin, 1980; 1982, Green & Freed, 1993, Foxall, 1999; 2017). Therefore, matching analysis is said to show the degree of substitutability, complementarity and independence among economic goods due to its significant history in the research field of behavioural

economics (Foxall et al., 2010). Similarly, Hursh (1980) believes that reinforcers can have different impacts on buying behaviour along the continuum of choice. Specifically, perfectly substitutable goods/brands (Coca-Cola and Pepsi, for all but diehard fans of either) are located on one end of the continuum, while complements (for example, coffee and sugar) lie on the other end. Besides, independent commodities are thought to sit in the middle of the spectrum (Romero et al., 2006, Schrader and Green, 1990).

In fact, the list of empirical findings (Foxall & James, 2002; 2003; Foxall & Schrezenmaier, 2003; Foxall et al., 2004; Wells & Foxall, 2013) keeps expanding with the foci of defining product categories, subcategories, and brands (Foxall, 1999; 2010; 2017). The research on stores behaving as brands shows similar results (Bui Huynh & Foxall, 2016). Later, with the integration of the BPM's elements such as utilitarian and informational reinforcement (e.g. Olivera-Castro et al.,2010; Bui Huynh & Foxall, 2016; Sigurdsson & Foxall, 2016), consumer behaviour analysis has successfully proven its ability of providing useful insights into the psychological measures of microeconomics concepts like substitutability, complementarity, and independence (Foxall, 2017). This thesis, therefore, aims to provide another piece of empirical evidence in the field of behavioural economics as well as to gain further the validity and usefulness of the BPM as a conceptual device.

Chapter 4: Research Methodology

The methodology chapter is best perceived as a link between the literature review of the study where the topic of this thesis has been identified and examined and the results and discussion sections in which findings are presented and discussed. Therefore, this chapter presents the research strategy and methodology with the aim to address the research objectives and questions. Firstly, the review of the epistemological issues will be discussed. The central part then consists of a detailed description of the sample, the measures and analyses as well as the operationalisation of the latter. The chapter concludes by raising reliability and validity issues. The methodology of this thesis is set out to investigate the application of consumer behaviour analysis to the consumer brand choice in terms of big versus small brands by discussing the choice patterns associated with three types of matching (amount matching, cost matching, and probability matching) and two models of demand elasticities (linear model and non-linear model). Consumer panel data is used in conducting the analyses and is expected to give more robust findings because it refers to detailed information of buyers in real-world or actual consumption situations.

4.1 Research Philosophy

The first and foremost step in conducting research is to examine research philosophy. The research philosophy aims to clarify the research design as well as provide guidance on the research strategy, concerning the nature of knowledge and how the knowledge is developed (Saunders et al., 2009). It is also made up of fundamental assumptions on how researchers view the world and these assumptions, in turn, underpin the chosen research methods. Additionally, the philosophy helps to

provide an abstract map of existing knowledge and refine the research methods which a researcher employs (Benton & Craib, 2001).

A quality research study depends crucially on the research paradigm, along with the context of the study and the nature of the research questions. A paradigm is an interpretive framework, within which theories are developed, that significantly impacts how people see the world, identifies their perspectives and shapes their understanding of how things are connected (Voce, 2004). It is said that different paradigms allow researchers to view and study phenomena in a variety of ways and, as a result, various kinds of knowledge which stem from examining those particular events are derived from different philosophical perspectives (Hatch & Cunliffe, 2006).

Since there is a strong connection between ontology, epistemology and methodology, it is crucial for a researcher to determine the research paradigms and issues of ontology and epistemology when undertaking research. That is to say, the core beliefs that define a particular research paradigm utilised to guide a scientific examination may be regarded as ontological, epistemological, and methodological stances (Guba & Lincoln, 2008). These elements are fundamental as they affect how a research study is carried out from the design to the conclusions. They are hence part of decisions that a researcher has to make clear as they are associated with the research problem (Blaikie, 1993) and thus a lack of focus on these elements would lead to incompatible research methods as well as incoherencies in the overall research structure.

First, ontology and epistemology are reviewed below. Epistemology and ontology are aspects of philosophy that attempt to explain the existence of a

phenomenon. Strongly linked with ontology, epistemology is perceived as the nature of knowing or construction of knowledge which answers the question of how and what (Easterby-Smith et al., 2008; Eriksson & Kovalainen, 2008). In other words, it discusses the relationship between knowledge and reality and is concerned with the nature and scope of knowledge (Hughes & Sharrock, 1997). The relationship is argued to be developed when researchers accept that knowledge can be considered as either objectively knowable or only subjectively knowable (Burell & Morgan, 1979). Epistemology also refers to the theory or science of the method or grounds of knowledge consisting of a number of claims or assumptions about which possible methods to obtain knowledge of reality, what can be known, how what exists may be known, and what criteria must be met in attempt to be registered as knowledge (Blaikie, 1993). Similarly, Hatch and Cunliffe (2006) try to summarise epistemology as (1) knowing how people can know, (2) how knowledge is shaped, (3) what particular criteria separate good knowledge from bad knowledge, and (4) how knowledge should be introduced or demonstrated.

As the matters of ontology are closely paired with epistemology, understanding the position of a researcher's ontological positions obviously would help to explain his/her epistemological selection. Ontology is the philosophy of reality, that is, the study of how something exists (Krauss, 2005). Ontology can also refer to the study of conceptions of reality and is related to the nature of reality (Saunders et al., 2007). Blaikie (1993) thus considers ontology as the science or study of being, to know (1) what exists, (2) what it looks like, (3) what elements make it up and (4) how those elements interact with each other. Besides, the ultimate purpose of ontology is to discover the form and nature of reality and hence to see what can be known by researchers (Guba and Lincoln, 1994).

Morgan and Smircich (1980) propose an ontological spectrum, ranging from the highly subjective to the highly objective. Researchers with a subjectivist perspective believe that reality has been formed by "human imagination" while those with an objectivist stance view reality as a "concrete structure". As the figure shows, researchers adopting different positions on the ontological spectrum seem to hold different epistemological views.

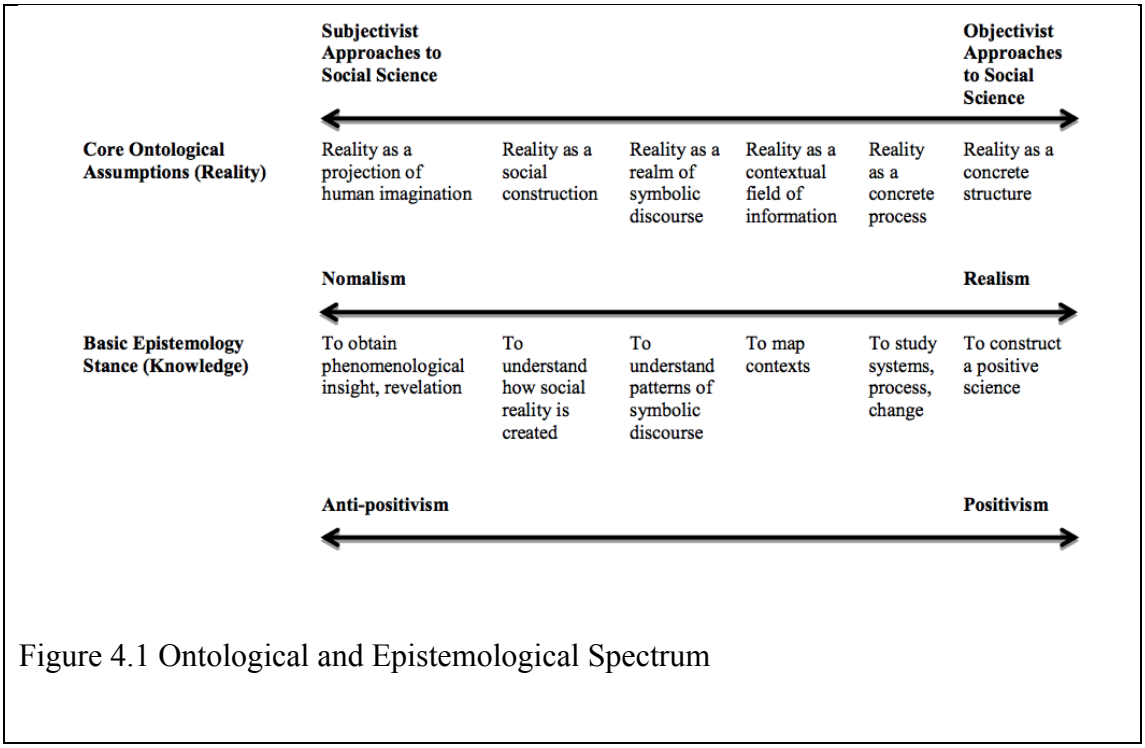


Figure 4.1 Ontological and Epistemological Spectrum

Positivism stems from an objectivist ontological perspective (Johnson & Duberley, 2000). Thus, it is an epistemological consideration rooting for belief in an external, real world that can be explored and understood by scientists. Morgan and Smircich (1980) emphasise that extreme positivists view the world as a "concrete structure of determining relationships between constituent parts". They only accept accurate observations and measurements. Observation, in this sense, must be objective and value-neutral and hence subject to empirical testing (Johnson &

Duberley, 2000). Therefore, the ultimate aim of a positivistic approach to research is to generate and test hypotheses coming from theories in an attempt to explain and assess the theories. Positivism is well known with its objective analysis and intense concentration on using quantifiable observations and statistical measurement of the data such as tests of reliability and validity employed to test hypotheses and figure out general patterns of specific behaviours (Ragin, 1994). A positivist is thought to view "reality" to be external to the individual, and thus he/she merely studies behaviour patterns that establish a structure of clear relationships between ontology, epistemology and methodology (Kolakowski, 1993). Moreover, from a positivist perspective, things can be described and explained as hard facts, and the correlations between these facts can be observed and witnessed like scientific laws (Smith, 2004), and therefore proven deductive methods in natural science can be used in the social sciences (Bryman, 2012). A revision will be needed to have a better understanding and prediction when results do not meet the original hypotheses derived from the proposed theories. As a result, predicting, explaining and generalising the phenomena are said to be the objectives of a positivist paradigm. For ontological concerns, positivists believe in a reality which can be observed and conceived (Bryman, 2012). Specifically, a single, objective reality is believed to exist independently of what people perceive where the social world is viewed as real, concrete underpinned by unchanging structures. Precise, detailed observations and measurements of this world, thus, are achievable (Hudson & Ozanne, 1998).

Since a large number of marketing researchers and practitioners have attempted to build, measure and test models of consumer behaviour and to compare different kinds of behaviour, positivism has been dominantly used in the field of study (Belk, 2007). Jacoby (1977, p. 263) pointed out one of the most important reasons for

this is researchers have been highly motivated by “the availability of easy-to-use measuring instruments...and the almost toy-like nature of sophisticated quantitative techniques”. The positivist approach mainly using quantitative research methods allows them to answer a vast variety of questions regarding the environmental and typical determination of behaviour (Zettle & Hayes, 1982; Hayes & Chase, 1991). Moreover, those who view purchasing and consumption activities as radical operant behaviour have claimed that a positivist approach would provide a unique insight to contribute to an overall better understanding of consumer behaviour (Foxall, 2017).

However, over the last three decades, there has been a growing interest in interpretive epistemology. In the early 1980s, an alternative to positivism started to emerge as a fundamental requirement for understanding the nature of consumer behaviour that had become more social, and complex, and even irrational and unpredictable. Researchers began to employ a more subjectivist approach using cognitive-based research methods to study proxies of consumer behaviour regarding attitudes, values and the experiential nature of consumption (Holbrook, 1995). A more subjective ontological approach leads to an interpretative epistemology in which researchers argued that an external, social, and natural reality is simply a creation of consciousness.

One example of those interpretative epistemological positions is constructivism. Those advocating this interpretive perspective can view themselves as extreme anti-positivists; they believe that there is no "pure" data "as all data are mediated by our own reasoning as well as that of participants" (Johnson & Duberley 2000, p. 59). This mediation, according to positivists, is "either a form of advocacy or a form of subjectivity", which severely undermines key aims of objectivity (Guba &

Lincoln, 1994). As a result, constructivists find themselves unable to stand the tenets of positivism. They even have gone further when differentiating constructivism from the traditional form of interpretivism by mentioning that the approach is supposed to be "a form of a participatory phenomenon" that encourages social action (Guba & Lincoln, 1994). By doing so, consumers, for instance, within a marketing research sample are considered not only as respondents but also as active participants who are able to raise questions of interest or take advantages of research findings.

Another approach situated in the middle of the ontological spectrum is critical realism. In this perspective, there is no single, defined ontological or epistemological standpoint. Critical realists share a strong belief with positivists that there exists an external reality and, consequently, natural science methods of collecting and analysing data can be employed to resolve social problems (Bhaskar, 2010). However, they distance themselves from positivists by arguing that no matter how many times an event is empirically observed, it is impossible to understand its causes (Sayer, 2000). Moreover, they stress that those repeated observations could lead to an epistemic fallacy - confusion between ontological matters and epistemological ones (Bhaskar, 2013). The major difference between the two objectivity epistemologies, hence, is that those rooting for critical realism acknowledge that all kinds of observations are falsifiable and thus all theories are subject to revision. That is to say, critical realism is essential of the researchers' capability for understanding the external reality with absolute certainty (Bhaskar, 2013).

Due to the close link between ontology, epistemology and methodology, researchers usually develop their methods based on their ontological and epistemological point of view. For example, positivism, as discussed above, has long

been considered a “pejorative conservative term” whose main use is to "describe crude and superficial data collection" (Bryman & Bell, 2011, p. 15). As a result, positivists tend to overlook qualitative research methods that could be the key to understanding the meaning of complicated consumer behaviour. This could be a huge mistake, and thus consumer behaviour researchers are supposed to pay more attention to methodological pluralism rather than monism one in order to make significant contributions to both marketing theories and practices (Foxall, 2017).

However, although it might be possible to applaud those who employ methodological pluralism, that is, seek to reconcile the differences between quantitative and qualitative paradigms, differences between these paradigms are mostly irreconcilable (Kuhn, 2012). The argument, in my opinion, is reasonable in case it criticises some types of methodological pluralism such as mixing qualitative data collection with quantitative data analysis. In this way, it is impossible to develop the research methods because they could be named either qualitative or quantitative one. Furthermore, quantitative analysis accidentally ruins the nuances and richness of the qualitative data; as a result, the collection of that qualitative data becomes unnecessary and wasteful (Gephart, 2004, p. 455).

There is no doubt that researchers should not employ these “mixed” methods. Instead, they are supposed to use both as two separate parts of their study as a mean of triangulation or complementation techniques (Mason, 2006, p. 10). The reason for doing this is that when things are multi-dimensional, this kind of mixed method allows researchers to think outside the box. The approach is based on a rule that a qualitative part is micro-oriented while a quantitative one is macro-oriented; therefore, the both are not in the opposite direction and minimise the risk of

unresolved conflicts (Mason, 2006). Moreover, Guba and Lincoln (1994) claimed that in order to reconcile the two paradigms, key positivist criteria should be replaced by proper interpretivist terms. Firstly, internal validity should be changed to "credibility". In this sense, the aim of qualitative research is to describe and understand the events through the participant's eyes, and thus they are the only ones who can legitimately judge the credibility of the findings. Secondly, external validity becomes "transferability" - the degree to which the current results can be utilised in other contexts considering the similarity between them. Next, reliability in a quantitative approach is "dependability" in a qualitative one. This emphasises the need for researchers to describe changes that occur in the context and how those changes impact the participants within the study. Lastly, objectivity should be called "confirmability" in reference to the extent to which the findings could be confirmed or corroborated by other researchers (Guba & Lincoln 1994).

As the research method of this research is mainly quantitative, the use of a positivist paradigm in examining buying and consuming activities as well as price responsiveness seems to be a reasonable choice. In other words, this study employs a deductive research approach under a positivist paradigm. A deductive study is said to be a piece of research whose conceptual and theoretical structure is built and examined by only empirical observations (Hussey & Hussey, 1997). The approach has a "top-down" orientation as well, meaning specific instances are deduced from the general and concluded with particular reasons. The research process, thus, is said to come from the general theory to specific, testable assumptions or hypotheses. Specifically, once the hypotheses have been transformed from the theory, necessary data are collected and then investigated in order to accept or reject the theory. Based on the results, if the hypotheses are supported, the initial general theory is said to be

correct and acceptable. Conversely, if the data does not fit the facts properly, the hypotheses need to be revised in an attempt to have a better prediction of reality (Hussey & Hussey, 1997; Saunders et al., 2007).

4.2 Research Design

A research design refers to the structure or foundation of a study, taking all the relevant elements needed for a research project into account. It should be produced based on the objectives of the study (Bryman, 2012; Kroll & Neri, 2009). Researchers need to establish a comprehensive framework for the data collection and analysis so that the study is congruent with the chosen methodology (Halcomb & Hickman, 2015). Therefore, researchers have to gain knowledge of how to create a proper research design that plays a vital role in the development of a research project. Research designs are grouped into three traditional categories - exploratory, descriptive and causal (Churchill & Iacobucci, 2002).

According to Burns and Bush (2006), exploratory research is conducted to obtain necessary background information, to define relevant terms, to establish the study's priorities, and to clarify research problems and hypotheses. There are several methods of undertaking exploratory research such as secondary data analysis, experience surveys, case analysis, focus groups and projective techniques. Studies using an exploratory approach are said to provide researchers with a number of benefits. Firstly, this method can be done quickly if secondary data analysis is used. Secondly, it is cheaper than collecting primary data for the conduct of the study. Lastly, it assists the development of the following descriptive or causal research study (Burns & Bush, 2006).

Descriptive research is designed to depict the chosen participants and phenomena in an accurate way by answering questions such as who, what, where, when, and how. This approach is often employed to test research assumptions and hypotheses (Churchill & Iacobucci, 2002; Burns & Bush, 2006). Besides, descriptive research is cross–sectional in nature as data collection is undertaken at one single period of time and thus is best perceived as snapshots of the entire population. These studies contrast to longitudinal ones, which repeatedly examine particular subjects of a population during the course of the research. Causal research is different from both exploratory and descriptive research designs because of its focus on cause and effect relationships between variables (Burns & Bush, 2006). A typical example of a causal approach is experimental studies whose traditional practice is to control an independent variable to discern its influences on the dependent variable. Based on the nature of the research problem as well as the purpose of testing hypotheses, descriptive research with the collection of data through a quantitative method is believed to be the most appropriate approach for this study.

4.3 Research Method

Research methods are developed and applied in various ways and at different levels; however, the most well-known classification is between a qualitative or a quantitative approach, as each has its own strengths and weaknesses it can be employed according to the philosophy the researchers follow (Creswell et al., 2003). Simply, research methods are tools and techniques a researcher uses to investigate a particular phenomenon. The ultimate goal of using these techniques is to have better, more precise results. This depends on how the researchers cope with the process of data collection and on how much information they decide to gather to increase the

study's reliability and validity. Besides, Denzin and Lincoln (1994) argue that, along with their philosophy, the researchers' experience, personal values and beliefs greatly influence their decisions on which methods should be utilised.

The discussion now focuses on the quantitative approach as it is chosen research method in this current study. The approach is thought to interpret and elucidate human behaviour by employing mathematical and statistical techniques and tools to test hypotheses derived from theories concerned with a specific phenomenon (Bryman, 2012). In other words, quantitative researchers produce and test hypotheses whereas attempting to acquire facts and causes of behaviour and mathematical terms are usually used in reporting the results. The aim of the quantitative approach is, thus, to develop statistical models to explain what is being observed. By doing so, a researcher should clearly state the research objectives which cover all aspects of the study.

As quantitative analytical approaches attempt to deliver results that are as unbiased as possible through the gathering of numerical data, findings are often expressed in statistical terms as a sign of specified degree of confidence (Abeyasekera et al., 2000). In other words, the data are usually displayed in the form of mathematical terms and numbers, collected via quantitative methods such as questionnaires and surveys. Moreover, quantitative measures are put at the central of the quantitative process of studying, bridging the gaps between empirical observation and mathematical formulation of quantitative relationships. In fact, positivists usually apply these measures to their experiments to test and generalise hypotheses (Hoepfl, 1997), and thus they strongly believe in the capability of quantitative research in revealing causal relationships between manipulated variables (Denzin & Lincoln,

1998).

4.4 The Analysis

4.4.1 Sample Description

Panel data are chosen as they are believed to be advantageous for longitudinal studies. It is a method of studying and surveying a group of people over consecutive periods of time. Tracing the purchase history of individual consumers (information on both the items bought in the panel and the sequence of purchases) is an effective way of understanding the consumer's buying pattern as well as changes in purchasing behaviour (Crouch & Housden, 2003). Panel data is a diagnostic tool with continuous measurements for obtaining the necessary information. The consumer panel data is a reliable and feasible data source for understanding consumer buying behaviour (Ehrenberg, 1972, Ehrenberg, 1988). It is said that the gathered information is accurate and less susceptible to errors, because of the use of barcode scanning procedures, than those acquired via consumers' answers of their past behaviour in questionnaires (Churchill, 1999).

Panellists are drawn from AC Nielsen Homescan data which consists of 10,000 randomly selected British households. Information from a total of nearly 1600 consumers who made purchases of four fast-moving consumer products purchased during a period of a year (July 17, 2004 to July 15, 2005) is analysed in this thesis. The four product categories that are used in this research are baked beans, fruit juice, spreads and biscuits. The information recorded for each respondent is as follows: respondents' ID number, age, social class and working hours, product description, brand specification (i.e., different versions of the same product category were

classified as different brands, e.g., Baked Beans with Sausages and Baked Beans in Tomato Sauce by Heinz), store name, item's weight, package size, number of units purchased, date purchased, price per item and total amount spent.

AC Nielsen Homescan is known as the first consumer panel company in Europe using the latest technology of home barcode scanners in collecting data from panellists and producing tailored reports to their clients. AC Nielsen has specialised integrated information on the European countries covering more than seven decades. The company is famous for its effective market tracking and consumer diagnostic tool, which gives helpful insights about buyers' purchasing attitudes and choices in the marketplace. This allows retailers to have a profound understanding of their customer's loyalty and purchasing patterns.

The hand-held barcode scanner devices sent to the participants ensure the reliability and consistency of the data. The data used for this study is based on individual shopping records and the data collection follows a number of procedures. Specifically, voluntary participant members, who are rewarded with cash-converted points earned through each interaction, scan their bought items into a sophisticated handheld barcode reader after each shopping trip by passing the scanner across the product codes. The information gathered through the scanner is then sent electronically to AC Nielsen's mainframe computer for central processing without any further contribution from the panel participants.

A distinct advantage of using panel data is data collection which does not require a thorough or painstaking effort in acquiring the data as compared to other mechanism like interviews or questionnaires. Besides, diary panel data are guaranteed by the A.C Nielsen Company to be very precise and reliable, if not error-free,

(Churchill, 1999) and thus are particularly valuable when collecting information on numerous variables such as price, shopping occasion, brand name and so on. Moreover, another merit of utilising panel data is that the data are received systematically from the company's database while researchers can monitor consumer purchasing in a real life market at the same time. The table below shows the data used in this study that includes the total number of purchases, the total number of consumers, and the total number of brands for each product class. Only consumers who made at least three purchases in the product category were included in the analyses.

	Baked beans	Biscuits	Fruit juice	Spreads
Number of purchases	13,729	75,563	21,394	30,906
Number of consumers	832	1,594	895	1,354
Number of brands	36	310	91	86

Table 4.1 Basic Information of the Sample

According to the table, the number of purchases and number of consumers is very high. This is a big help to increase the reliability of the study. Specifically, each consumer, on average, made 16.50 purchases of baked beans, 47.40 of biscuits, 23.90 of fruit juice, and 22.83 of spreads. There are 310 brands of biscuits available whereas buyers could find baked beans with only 36 different brands.

4.4.2 Data analysis

The main analyses conducted are amount matching (classical matching), cost matching (relative demand analysis), and probability matching (maximisation analysis) derived from a behavioural economics approach. The two models of demand elasticities are also explained in detail. Each type of analysis will be looked at and described. The data in this study has been transformed and analysed by using R. R is a free software programming language and software environment for statistical computing and graphics. The detailed data transforming and analysing is shown in appendix A. The data analyses have all been performed within the framework of the generalised matching equation where matching between different variables in the consumer environment (brand amount, brand price, and reciprocal brand price). The methodology of these analyses was developed and based on consumer behaviour analysis demonstrated by Foxall (1999; 2017), the approach includes methodological features of behavioural economics and psychology. Regression analysis was carried out in all three kinds of matching, and the results were demonstrated graphically to make information easier to visualise. The data are also transformed into logarithmic form, which is widely accepted as standard in behavioural psychology and animal experiments in matching (see, e.g., Baum 1974). The logarithmic transformation has been proven to be more realistic (Slater and Ashcroft 1990) for both the standard and generalised matching laws as well as to make comparisons to other experimental data much easier.

Traditionally, “brand B” represents the remaining brands purchased by a particular respondent apart from the most often bought brand (“brand A”) in his/her repertoire. This study, hence, attempts to provide an alternative of how to assign

brands into “Brand A” and “Brand B”. In the new approach, “Brand A” consists of big brand names that have dominant market shares while “brand B” is made up of small brand names. Besides, making the aggregated data more objective, this method of brand classification can be used for further testing demand elasticity with the underlying assumption that demand for big brand names is less elastic compared to that of small ones. Moreover, applying the method to calculating the essential value of a brand can reveal the relationship between the informational reinforcement of the brand and the size of its market share. For instance, big brands possess greater informational reinforcement than small ones.

Steps of the Analysis process are described below:

Step 1: Loading the original files into R

Step 2: Removing missing values that can affect the correction of the analyses

Step 3: Splitting of the data into two categories: big and small brands

Step 4: Proportional calculations for Matching, Relative Demand and Maximisation Analyses

Step 5: Regression Analysis

Step 6: Parameter calculations for linear and non-linear Price Elasticities models

4.4.2.1 Amount matching (classical matching)

As discussed in the previous chapter, one of the merits of matching analysis is its usefulness to determine the substitutability of products, or of brands within a product category. The analysis is derived from an experiment of Herrnstein’s (1961)

in which animal subjects are given two alternatives to respond (pecking key X or key Y), each of which delivers reinforcers (food pellets) available in X and Y on its own variable interval (VI) schedule. They then distribute their responses to X and Y in proportion to the reinforcement rates (Foxall & Schrezenmaier, 2003). From a marketer's perspective, the matching relations insist that the ratio of money spent for a product/brand (i.e. in pounds and pence) will match the ratio of reinforcers earned (i.e. purchases made as a result of that spending) (Foxall, 1999). As ratio calculations are used in this study, which are the amount bought ratio and amount paid ratio, the matching analysis is thus shown as the relative amount bought ratio of the big brand group/small brand group as a proportion of the relative amount paid ratio for these brand groups. This way of calculation is in accordance with that of Baum (1974). The amount bought ratio is calculated as:

$$\frac{\text{Amount bought of Big Brands}}{\text{Amount bought of Small Brands}} \tag{12}$$

"Brand A" refers to the relative amount bought ratio of big brands while "Brand B" represents the small brands purchased by a particular respondent as distinct from the big brands in his/her repertoire. Amount bought was determined for liquids by the number of millilitres bought and for solids by the number of grammes bought which were then translated into units purchased, which followed the standard size of one purchase (Foxall et al., 2010).

The amount paid ratio is calculated as:

$$\frac{\text{Amount paid for Big Brands}}{\text{Amount paid for Small Brands}} \tag{13}$$

Amount Paid for "brand A" Amount Paid for "brand B" which is equivalent to

the amount paid for the big brands divided by the total amount paid for small brands purchased in the respective product category (expressed in pounds and pence).

The values of the amount bought and the amount paid ratio each lie between 0 and 1, showing if there is any exclusive preference for the big brands (“brand A”). A ratio of 1 of the amount bought ratio indicates a strong preference for "brand A"; if the result is closer to 0, this implies that there is a preference for the small brand group (“brand B”). The same goes for the amount paid ratio: 1 signifies exclusive spending on "Brand A", while a ratio of 0 indicates more spending on small brands. A value of 0.5 shows that equal numbers of purchases are made for “brand A” and “B”. These ratios will reveal the distributions between the big brand group, "A", and small brands in the product category, "B". However, the ratios will not uncover any spending or buying patterns of both brand groups, which consist of many brands combined. The results of these ratios are then transformed into logarithmic form. Indeed, the Generalised Matching Law (cf. Baum, 1979), expressed logarithmically, permits further assessments to be made of the data on which the matching analysis is based. Hence, the equation becomes:

$$log(amount\ paid\ ratio) = s\ log(amount\ bought\ ratio) + logb \qquad (4')$$

where s represents sensitivity and b represents bias.

As discussed earlier, a participant who disproportionately selects the leaner schedule of reinforcement, meaning he/she selects the reinforcer more often than is predicted by the matching law, shows undermatching (Baum, 1974; 1979). Thus, the slope s of Baum's equation indicates the sensitivity is less than one (s<l). In a

consumer research scenario, this can be interpreted as a buyer does not choose the cheapest product/brand in his/her limited repertoire as often as the strict matching would predict. On the contrary, a consumer who selects the cheapest product/brand more often than the prediction of the strict matching is believed to be over-matching (s>l). In short, s values between 0.90 and 1.10 can be considered as near perfect matching (refers to as matching in this study); s values over 1.10 stand for overmatching, and s values between 0 and 0.90 describe undermatching (Baum, 1974; 1979). Kagel (1995) stresses cases where the predictions of the matching law are expected to be reversed; these cases are called antimatching (s < 0). These extreme cases reported in previous work occurred between brands of different product categories; they do not complement but fulfil different needs and wants of consumers. Graphically, perfect matching is presented as a 45° line. Where the slope s (the beta) is less than 1, there is undermatching whereas it is called overmatching in case the slope is more than 1.

In the Baum' matching equation, the intercept b represents the bias, and if its value is greater or less than one (b>1 or <1), preference is said to be biased by some unknown but invariant asymmetries between the available options (Baum, 1974). Indeed, bias is a preference for one alternative rather than the others regardless of the rates of reinforcement in operation. For example, in experiments with pigeons, the bird may find lever easier to peck than the other (e.g. Baum, 1974). The qualitative difference between reinforcers (e.g., an unanticipated additional value counted for only one reinforcer) can be viewed as one possible reason for bias (Baum, 1979; Davison & McCarthy, 2016; Pierce & Epling, 1983). In the real world, marketers can create bias by the placing of alternative brands in designed positions within the store, allocating different space for different brands on the shelves, using stock-outs, or

positioning of substitutes and complements (Foxall et al., 2007). These activities are believed to prevent consumers being neutral and impartial towards the available brands as well as to make branding effects of the product itself work.

Generally, in economics, functional relationships between two quantities, which are the subject of the matching law, can be either linear or non-linear. A linear relationship is observed when both quantities are proportional, indicating that any changes of a quantity would show the similar amount of changes in the other. Linear functions are then plotted on a graph as a straight line and their slope is said to be constant. Conversely, in non-linear relationships in which the slope is not constant, there are always changes in quantity which do not bring about the same amount of changes in the other. A non-linear function, therefore, is used where one variable increases and the other changes faster or slower, disproportionately. In fact, non-linear relationships seem to be more realistic as the dependent variable is influenced by many predictors (Silver, 1997). For example, an increase in working hours from 6 to 8 certainly causes a much smaller growth in salary than a permanent rise from a part-time job to a full-time one would cause. Therefore, it is more realistic to assume a non-linear relationship in both strict and generalised matching law.

Moreover, linear models used to describe non-linear relationships are likely to give rise to errors (Silver, 1997). Therefore, to overcome this problem, the data are transformed into the linear form by applying logarithms to the results of the variables. In fact, the logarithmic transformation of experimental data in behaviour analysis has been used extensively as a usual procedure because logarithms reduce or squeeze together the values at one end of the range, and thus they make the data amenable to the analyses (Levine, 2001; Lowe, 1985; Osborne, 2002; Schrezenmaier, 2005; Slater

& Ascroft, 1990). For the result comparison, the current study, thus, will employ a logarithmic transformation in accordance with the method of data manipulation in previous research.

4.4.2.2 Probability matching (Maximisation analysis)

Behavioural economists and psychologists cannot agree on the issue of whether non-human consumption is governed by maximising satisfaction or by other notions like satisfying or melioration (Herrnstein, 1997, Rachlin, 2000). This debate is even more heated in cases of human consumption, in which decisions on commodities are drawn into account (Green and Freed, 1993). According to the theory of maximisation, human beings as consumers choose an option as long as it maximises their utility (Krishnamurti & Raj, 1988). In general, maximisation theory is based on the assumption that an individual would always look for the cheapest option and consider it the best value. By the same token, within a product category, consumers choose the cheapest brand out of all the available alternatives that are said to be functionally substitutable.

The assumption, however, is questionnable because in real life the best value-for-money brand may not necessarily be the cheapest one as consumers take other non-observable values, along with price, into consideration when making buying choices (cf Kapferer, 2001; De Chernatony & McDonald, 2003). Besides, Krishnamurti and Raj (1988) mention that the utility consumers maximise is invisible to an observer such as a researcher when intepreting consumer behaviour. As a result, some critics emphasise that utility maximisation is impossible to test and thus can be only viewed as an assumption at best (cf. Rachlin, 1980). They also use ambiguous results from non-human experiments as the evidence for their arguments (Schwartz &

Reisberg,1991).

In the marketing context, there has been a lack of specific data from the domain of consumer behaviour despite the fact that marketers repeatedly attempt to make sense of maximisation in human consumption such as purchasing decisions of products and brands in natural settings like shopping malls (Green & Freed, 1993). There are several exceptions though. Researchers making use of consumer behaviour analysis (Foxall & James, 2001; 2003; Wells & Foxall, 2013; Foxall & Schrezenmaier, 2003) have successfully reported the application of maximisation in real supermarket environments. This adds weight to the argument for maximisation in the debate about its importance as those studies have provided substantial evidence to help behavioural economists and psychologists have a better understanding of consumer choice. Maximisation is visualised by graphing the behaviour ratio against the probability of reinforcement ratio. The amount bought ratio is plotted against the probability of reinforcement ratio which is a similar procedure to that used by Herrnstein and Loveland (1975) and Herrnstein and Vaughan (1980) to ascertain the existence of maximisation. This is expressed as the reciprocal of the schedule parameter.

Specifically, the two ratios, used in order to examine whether maximisation is occurring, are the amount spent ratio and the probability of reinforcement proportion. The amount bought ratio refers to Amount Bought of Big brands (A)/ Amount Bought of Small brands (B). Probability reinforcement ratio is the reciprocal of the price of the big brands (l/P_A) over the reciprocal of the price of the big brands (l/P_A) plus the reciprocal of the mean price of the small brands (l/P_B) (cf. Herrnstein & Loveland, 1975; Herrnstein & Vaughan, 1980).

$$\frac{1/\text{Average Price of Big Brands}}{1/\text{Average Price of Big Brands} + 1/\text{Average Price of Small Brands}} \quad (14)$$

On ratio schedules, the dependent variable refers to the amount bought ratio while the independent variable is the relative probability of reinforcement (Foxall & James, 2001; 2003; Wells & Foxall, 2013; Foxall & Schrezenmaier, 2003). For instance, in pricing an item, if a can of baked beans costs 50 pence, the probability of obtaining the baked beans is 1/50 per response. A consumer would only receive the baked beans once the 50 responses have occurred, or in a consumption situation, after 50 pence has been paid. This method of calculating the probability of reinforcement is regarded as a significant improvement from non-human experiments. The probability, in fact, lies between zero (no probability) and one (full, i.e. 100% probability). A value of less than 0.5 indicates that a big brand is favoured by the consumer more often than a small one. Conversely, in cases where the probability of reinforcement is larger than 0.5, participants buy the smaller brand more often than the bigger brand and are then said to maximise.

Following the above rule, the maximisation analysis is demonstrated graphically to determine the extent of maximisation behaviour and is represented graphically by a step function. If the step function described by the data points falls to the right of the 0.5 line on the abscissa then buyers are maximising by selecting the more expensive brands; in reverse, if it lies on the left of the 0.5 line, smaller brands are what buyers maximise (cf. Herrnstein and Loveland 1975; Foxall et al. 2004). The probability matching analysis will thus indicate if buyers are maximising their utility by choosing either products of relatively smaller brands or products of big brands that offer high value in terms of utilitarian and informational consequences.

4.4.2.3 Cost matching (relative demand analysis)

The last analysis employed in this thesis is the relative demand analysis, which is also a ratio one. It is an attempt to elucidate consumer choice related to competing sources or reinforcement provided at a wide range of programmed behavioural costs or prices. Although following established procedures of design and analysis conducted in behavioural economics research (cf. Kagel et al., 1980), cost matching uses a different way of analysis. Specifically, on the one hand, amount matching analysis plots the quantity obtained of a good/brand (i.e. the actual amount of a reinforcer) as a positively accelerating function of the amount paid for it (i.e. the actual amount of behaviour spent in acquiring the reinforcement). On the other hand, demand analysis is employed to describe sensitivity to price and is well known in economics as "price elasticity of demand" which discusses the percentage change in amount expended to the percentage change in price (Houston & McFarland, 1980; see also Hursh, 1980; Hursh & Bauman, 1987). There are three major predictions of demand analysis made by economists (Madden et al., 2000). First of all, an increase in price would usually lead to a reduction in the amount expended by consumers, i.e., demand curves on a logarithmic graph indicate the level consumption can be regarded as a positively decelerating function as the unit price of an item increases. The demand curves are said to demonstrate the relationship between price and quantity demanded while other elements remain constant (Begg et al., 1997). Secondly, Madden (2005) and Delmaldo (2000) claim that, as the result of the previous statement, the unit price is the only determinant of consumption and response output whilst other factors like cost and benefits are assumed to be unaffected. That is to say, consumption is price-driven only and thus context-free and product-independent. This notion directly contradicts common ideas derived from classical marketing theory

such as branding, product design, availability and accessibility or interesting advertisement campaign. Last but not least, according to traditional economic theory, consumers are always expected to pick the cheaper of two qualitatively similar commodities (Madden et al., 2000). This indicates that demand analysis is in the same line with utility maximisation as predicted by traditional economics.

Emphasis should be placed on the fact that the demand analysis in this thesis is called relative demand analysis since it is an investigation of “relative” demand analysis across the brands bought, showing the relative amounts of brand groups as a function of their relative prices (Schrezenmaier, 2005). The aim of using relativity is to draw into account characteristics of daily natural settings in the real-life market because the availability of numerous brands in the open setting of grocery stores often results in price influence on consumer brand choice. Relative demand analysis, besides, is argued to differ from the traditional economic demand analysis as it usually employs simple models predicting the relation between quantity and price. Moreover, relative demand analysis has been utilised successfully in previous studies (Foxall & Schrezenmaier, 2003, Foxall et al., 2004, Oliveira-Castro et al., 2005, Foxall & James, 2001; 2003), in which the regression results show conclusive evidence of the extent to which price has a function in explaining consumer brand choice.

Two ratios are used to obtain relative demand curves: the amount bought ratio (the amount purchased of big brand group versus the mean value of the small brands) and the average price ratio (a ratio of the relative average prices of "Brand A” and "Brand B”). Again, “brand A” represents the big brands whereas “brand B” accounts for the small brands.

Amount Bought Ratio

$$\frac{\text{Amount bought of Big Brands}}{\text{Amount bought of Small Brands}} \quad (12)$$

Average Price Ratio

$$\frac{\text{Average price of Big Brands}}{\text{Average price of Small Brands}} \quad (15)$$

For average price ratio, a value of greater than one implies that the average price of the big brands (“brand A”) is higher than the mean price of the small brands (“brand B”), whereas a value of less than one indicates that "brand A” has a lower average price than the remaining brands in the category. Plotted on logarithmic coordinates, demand curves are expected to be downward-sloping as the different brands in one product class are said to be close substitutes; that is, buyers have other available option to switch when the price of their usual brand is higher (Foxall & Schrezenmaier, 2003, Foxall et al., 2004, Oliveira-Castro et al., 2005, Foxall & James, 2001; 2003). However, relative demand curves which are neutral, downward and upward-sloping in aggregated studies are also observed in previous studies using consumer behaviour analysis (Foxall et al., 2007). Flat or upward-sloping demand curves stand for non-substitutable brands, meaning buyers are said to be less sensitive to any price changes.

4.4.2.4 Linear demand elasticities

The simplest forms of demand function, used in operant behavioural economics, is a log-log function that discusses the quantity of consumption in connection with the price (cf. Hursh 1980, 1984; Kagel et al., 1995):

$$\text{Log (Quantity)} = \text{a} - \text{b Log (Price)} \quad (16)$$

Overall price elasticities are computed for each product category, fitting Equation 16 to data points from all consumers, and from the big brand and small brand groups for comparison. In this model, quantity and prices are regarded as continuous variables, which is different from what has been employed in previous pieces of research where quantity bought is interpreted as a discrete variable (cf. Gupta, 1988). To calculate Equation 16 parameters, values of quantity and price were divided by the mean figure of each consumer in each product category (Foxall, Oliveira-Castro, & Schrezenmaier, 2004; Foxall, Yan, Oliveira-Castro, & Wells, 2013; Oliveira-Castro, Foxall, & James, 2008; Oliveira-Castro, Foxall, & Schrezenmaier, 2005). In this way parameters from different products become comparable. It is worth noting that inelastic demand occurs when consumption remains inflexible or decreases slowly with a proportionately significant price rise. Although elastic and inelastic reinforcers can be considered as a binary system, elasticity in general lies along both ends (extremely elastic and extremely inelastic) of the continuum of demand (Hursh & Roma, 2013).

Oliveira-Castro and his colleagues mention that an overall elasticity consists of two major parts that are intra- and inter-consumer elasticities (Oliveira-Castro et al., 2006; Oliveira-Castro et al., 2005). While the former is calculated for each buyer across all product categories, the latter attempts to look at the whole picture. Specifically, on the one hand, an intra-consumer elasticity shows whether an individual decides to purchase a larger amount of a particular brand when its price goes down as a result of the price reduction. This kind of elasticity also takes into account (by dividing) the mean values of each buyer when measuring quantity and

price observed on each shopping trip (Oliveira-Castro et al., 2006; Oliveira-Castro et al., 2005). On the other hand, inter-consumer elasticity, as an indicator for the entire dataset, measures whether buyers who purchase larger quantities, on average, spend more on cheap brands, on average, than ones who buy the smaller amount. For the purpose of normalisation, Oliveira-Castro and his co-authors (2005; 2008) calculate the inter-consumer price elasticity by adding in Equation 16 one pair of data points for each buyer for each product class. Each pair of data is said to include the average quantity, across shopping trips, a given buyer expended for a particular commodity divided by the mean of the amount bought by all consumers in that same product category.

The overall elasticity is also called the intra-brand elasticity. As previously discussed, its notion in the traditional economics sense has been criticised as too simplistic when it does not take any factors outside of price into account. Foxall and his colleagues (2004) have come up with a solution to make overall elasticities more applicable to marketing practice. They argue that along with intra-brand elasticities, there are also two kinds of inter-brand elasticities. These are utilitarian inter-brand and informational inter-brand elasticities (Foxall et al., 2004). These inter-brand elasticities indicate that utilitarian and informational benefits are said to exert an impact on the amount of goods a consumer buys. To investigate differences in the intra-brand elasticities and two kinds of inter-brand elasticities between different brand groups, the researchers use a log-log elasticity equation that consists of three elasticity coefficients, namely intra-brand coefficient, utilitarian inter-brand coefficient and informational inter-brand coefficient.

Olivera-Castro and his fellows (2008) have successfully combined the

elasticities from brands with those from consumers. This study, therefore, follows their idea of elasticities combination to examine differences between the big brand group and small brand group regarding four kinds of elasticities including intra-consumer intra-brand, intra-consumer inter-brand, inter-consumer intra-brand, and inter-consumer inter-brand elasticities. Overall, an intra-consumer intra-brand elasticity implies that buyers purchase larger quantities of a specific brand when the price of a given package is lower (intra-pack), and when switching to a bigger size of the package that often labels a lower price (inter-pack). Next, an intra-consumer inter-brand elasticity indicates that buyers have a tendency to purchase larger quantities when buying brands that are cheaper than the average brand price they pay, and when purchasing brands that offer higher utilitarian or informational benefits than usual (Olivera-Castro et al. 2008). Moreover, an inter-consumer intra-brand elasticity shows that users who buy a given brand cheaper because of a price promotion of the package size (intra-pack) or package size switching (inter-pack), on average, have a tendency to purchase larger quantities than those who pay more, on average, for the same brand. Last but not least, an inter-consumer inter-brand elasticity indicates that users who purchase cheaper brands or more differentiated brands regarding either utilitarian or informational reinforcement, on average, tend to purchase larger quantities (Olivera-Castro et al. 2008).

Equation 17 of multiple regressions is used to measure the inter- and intra-components:

$$Log Q_{cpbo} \quad (17)$$

$$= \beta_1 + \beta_2 Log\left(\frac{P_{cpbo}/P_{pb}}{\left(P_{cpbo}/P_{pb}\right)_c}\right) + \beta_3 Log\left(\frac{P_{pb}/P_b}{\left(P_{pb}/P_b\right)_c}\right) + \beta_4 Log\left(\frac{P_b}{PBC_c}\right)$$

$$+ \beta_5 Log\left(\frac{U_b}{UB_c}\right) + \beta_6 Log\left(\frac{I_b}{IB_c}\right) + \beta_7 Log\left(\frac{P_{cpbo}}{P_{pb}}\right)_c + \beta_8 Log\left(\frac{P_{pb}}{P_b}\right)_c$$

$$+ \beta_9 Log(PBC_c) + \beta_{10} Log(UB_c) + \beta_{11} Log(IB_c)$$

where (1) *Qcpbo* is the quantity bought by consumer *c* of package *p* of brand *b* on shopping occasion *o*,

(2) (*Pcpbo/Ppb*) is the price paid by consumer *c* for package *p* of brand *b* on shopping occasion *o* divided by the average price of package *p* of brand *b* (this average is calculated across the entire sample),

(3) (*Pcpbo/Ppb*)c is the mean value of (*Pcpbo/Ppb*) computed for consumer *c* and is known as the measure of inter-consumer intra-brand intra-pack elasticity,

(4) $\left(\frac{P_{cpbo}/P_{pb}}{\left(P_{cpbo}/P_{pb}\right)_c}\right)$ is a measure of intra-consumer intra-brand intra-pack elasticity,

(5) (*Ppb/Pb*) is the mean price of package *p* of brand *b*, computed across the entire sample, divided by the average price of brand *b*, calculated across the entire sample as well,

(6) (*Ppb/Pb*)*c* is the average of (*Ppb/Pb*) computed for consumer *c*, and is known as the measure of inter-consumer intra-brand inter-pack elasticity,

(7) $\left(\frac{P_{pb}/P_b}{\left(P_{pb}/P_b\right)_c}\right)$ is a measure of intra-consumer intra-brand inter-pack elasticity,

(8) (*Pb/PBCc*) is the mean price of brand *b* divided by the average price of brands

bought by consumer *c*, the measure of intra-consumer inter-brand price elasticity,

(9) (*Ub/UBc*) is the utilitarian level of brand *b*, divided by the most frequently utilitarian level purchased by consumer *c*, and is perceived as the measure of intra-consumer inter-brand utilitarian elasticity,

(10) (*Ib/IBc*) is the informational level of brand *b* divided by the average informational level of brands bought by consumer *c*, a measure of intra-consumer inter-brand informational elasticity,

(11) *PBCc* is the average price of brands purchased by consumer *c* and refers to the measure of inter- consumer inter-brand price elasticity,

(12) *UBc* is the average utilitarian level of brands purchased by consumer *c*, a measure of inter-consumer inter-brand utilitarian elasticity,

(13) *IBc* is the average informational level of brands purchased by consumer *c*, a measure of inter-consumer inter-brand informational elasticity,

and (14) β*1* to β*11* are empirically estimated parameters (Olivera-Castro et al. 2008).

4.4.2.5 Exponential demand elasticities (Essential values)

Equation 10 is used to compute the essential value (Hursh & Silberberg, 2008) where Q refers to consumption, Q_0 is the maximum consumption at zero price, k shows the range of the dependent variable in logarithmic units, and P indicates the cost of consumption.

$$logQ = logQ_0 + k(e^{-aP} - 1) \quad (10)$$

Q_0 and a are said to be the most important parameters in the Exponential

Model (Hursh & Silberberg, 2008). Firstly, the Q_0 value created for each demand curve is used as a baseline consumption when the price of goods is zero. Mathematically, this predicted consumption based on the trajectory of the curve at zero price is not affected by consumer effort or product cost. As a result, Q_0 is believed to eliminate factors relating to motivational effects such as reinforcer magnitude, qualitatively measurement differences, or individual differences in terms of underlying physiology (Hursh & Roma, 2013). This would mean the essential value approach is a better measurement of relative reinforcing efficacy compared to the traditional method. Secondly, the a value, the most unique parameter in the model, and its derivatives (e.g., $1/a$; Banks, Roma, Folk, Rice, & Negus, 2011; Bidwell, Mackillop, Murphy, Tidey, & Colby, 2012) measure the reinforcing efficacy, based on differences in the baseline consumption Q_0, by quantifying the elasticity of demand across the price range. While the demand elasticity, or the sensitivity to price, is fixed in traditional microeconomics, its shifting can be measured in The Exponential Model with the help of the a value calculation (Hursh & Roma, 2013). It is stated that a bigger a value shows a steeper demand curve and a smaller essential value, whereas a smaller a value reflects a shallow demand curve with a bigger essential value. Hence, values of a are inversely related to essential value (Hursh & Silberberg, 2008).

Another parameter that should be noted is C which refers to the varying cost of the reinforcers. C values are said to normalise the demand with the support of Q_0: $P= Q_0C$. Therefore, The Exponential Model can be re-written:

$$logQ = logQ_0 + k(e^{-\alpha Q_0 C} - 1) \quad (11)$$

The independent variable is Cost (C) measured as responses per reinforcer.

Log of consumption (log Q) refers to a function of Cost and is maximal at zero cost (log Q_0) and specifies the highest level of demand. The constant value of *a* indicates the rate of decrease in relative consumption (log consumption) with an increase in cost (C). The value of k can be regarded as a scaling constant that shows the range of the consumption data in log units and is meant to be a common constant across comparisons (Hursh & Roma, 2013; Hursh & Silberberg, 2008). The slope of the demand curve, or elasticity, when k is constant, is dictated by the value a. The a parameter, in turn, is used to determine the essential value of the reinforcement via consumers' sensitivity to price (or cost) changes.

The reliability of studies using The Exponential Model relies upon price standardisation over the various quantities bought, pack sizes, variations in unit prices over time, and other marketing-based variations (Hursh & Roma, 2013; Hursh & Silberberg, 2008). It is worth mentioning that in the case of packaged goods, unit price can be employed as the standardised price (Foxall et al., 2013). The unit price is thus computed as total money spent on a particular shopping trip divided by the total quantity bought at that time. As a result, parameters of Equation 11 is calculated with the use of the total quantity purchased of a brand on one shopping occasion and the unit price paid (Foxall et al., 2013; Yan et al., 2012).

Equation 18 incorporates utilitarian and informational reinforcers and aversive outcomes as causal consequences of consumer choice:

$$LogQ = LogQ_0 + k(e^{-\alpha_1 Q_0 C + \alpha_2 UR + \alpha_3 IR} - 1) \quad (18)$$

where Q and Q_0 are the consumption unit and the consumption when the price is zero, C is the standardised price, and UR and IR are utilitarian and informational

reinforcers, respectively (Yan et al., 2012). This study aims to measure the essential value of four food product categories and to determine whether the essential value takes into account different informational and utilitarian levels varying across the two brand groups.

4.4.3 Analytical Issues

4.4.3.1 Defining big versus small brand group

In order to ensure the replicability of the research, the big-small distinction needs to be well-defined. Traditionally, market share has been regarded as the most important criterion. It is the proportion of total sales a company claims to have in a particular market over a period of time. Total sales may be measured by volume (unit share) or value (revenue share). While unit market share determined based on the basis of product (or brand) quantity sold can be very useful for calculations and comparisons, the term "market share" in this thesis is understood and computed as revenue market share. This helps analyses in this study based on Ehrenberg's approach to be in line with the previous work whose ultimate goal is to draw the big picture of how brands grow (Sharp, 2010). Therefore, the market share is calculated by dividing the total sales earned of a given product (or brand) by the total sales earned by all products (brands). Big brands, therefore, are responsible for the major share of the market pie whilst small brands, which are usually dominant in terms of the number of brands, only account for tiny portions.

The tables for the four fast-moving consumer goods showing the percentage of market share can be found in the Appendix B. According to the tables, approximately 20% of the total number of brands for each product category account for over 80% of

the market share. Interestingly, these results seem to be in line with the Pareto rule, which has not been confirmed in recent studies by Ehrenbergians. Therefore, it is believed that one way to objectively and justifiably allocate the brands into either small brand or big brand groups is to use the 80:20 Pareto rule. Specifically, small brand groups who have smaller market shares make up 80% of the total number of brands, while big brand groups with the biggest market share make up 20% of the total number of brands.

The issue turns out that how the researchers decide the method of obtaining/calculating the market share. One solution is to use the market share information collected by professional marketing research companies such as Mintel. This might be costly and unnecessary because standard reports provided by these enterprises include plenty of other variables, not just market share. Furthermore, that information has to be current. Buying outdated reports at a high price is obviously wasteful. Another solution is to calculate the market share based on the total amount of money spent - the information is available in the dataset. This information may not represent the real market share of each brand name but seems to provide the researchers with a reasonable alternative. Therefore, in this study, the total amount of money spent is used as a measure to determine big and small brand names.

4.4.3.2 Proportional versus Ratio calculations

The main difference between Strict Matching Law (Herrnstein, 1961) and Generalised Matching Law (Baum, 1974;1979) lies in the method of calculating the parameters of the equations. That is, according to Herrnstein (1961), both the relative response rate and the relative reinforcement rate can be expressed in terms of proportions, while they are said to be shown in ratio calculations of the Generalised formula Baum (1974,1979). Both equations, in principle, are acceptable and have been tested in previous studies built on consumer behaviour analysis. On the one hand, if the data is computed and analysed based on the Herrnstein's strict matching law (1961), proportions would have been appropriate to adopt. Baum's (1974) Generalised Matching Law, on the other hand, is in line with the use of log ratios that is commonly used in research based on economic theories. Therefore, this study will employ ratio calculations in order to address different issues of both behavioural economics and psychology.

4.4.3.3 The common denominator

It is believed that the raw data acquired from the consumer panel needs to be prepared and transformed for the actual calculations. One problem is associated with the package size when the information on all of the brands provides a wide range of different packs. That is to say, whilst the core units of the products in all the four categories are said to be grammes for baked beans, biscuits and spreads and litres for fruit juice, each product’s brands are wrapped in different ways in terms of sizes and weight. For instance, whereas most biscuits brands are available in packets of 150g and 200g, 300g or 400g packets, Coop and Asda come in packets of 294 and 192 grammes, respectively. In the case of spreads Tesco offers 500-gramme packs, Costco

provides an option of 2000 grammes.

As one of the objectives of this study is to compare different brand groups, mean values such as the average price per unit for each brand need to be calculated. To do that, a basic unit of comparison is used as a benchmark for each product class in which all available pack sizes could be determined at the very beginning. The lowest common denominator in each product class, hence, should be found. This procedure contributes to better calculations and to ensures findings are comparable. The above method, for example, allows researchers to add up quantities of different brands for aggregate analysis as well as to compute the average price for each brand so as to make a meaningful comparison with that of the other brands in the same product category.

4.4.3.4 Aggregate Level of Analysis

Economists are often known for their habit of using aggregate data in testing hypotheses in consumer studies. For instance, researchers are believed to forecast and predict buyers' responses towards changes in price based on the aggregate data of household consumption. One of the underlying assumptions of the aggregate data is that the relationship between economic variables is homogeneous across people. This so-called “representative agent” assumption may lead to bias, and thus the conclusions derived from regression analyses are thought to be less precise. Bias is found if the impacts of the omitted or neglected variables are related to the included variables. It also occurs if the slopes and intercepts of the regressions vary through time, even if those for each respondent appear similar during that period (Hsiao, 2003). These known problems of analysis at the aggregate level have drawn a great deal of attention. Some economists, in an attempt to defend the analysis, argue that it

usually provides stronger relationships and more reliable correlations than those at the individual level. On the other hand, critics believe that the predictions of aggregate outcomes using aggregate data can be less precise than those based on analyses at more micro levels (Hsiao, 2003). Moreover, fallacies associated with the interpretation of aggregate data are often found in consumer research (Hannan, 1971, James, 1982). Ostroff (1993), for example, mentions that any inferences about individual choices based on the correlations at a more macro level, or vice versa, may lead to an expectable fallacy. In other words, the correlations stemmed from an aggregate analysis and those from an individual level are sometimes not in the same line (Robinson, 1950). Therefore, economists should be cautious when attempting to make any assumptions about the relationship or correlation between variables across different analysis levels. For example, there have been a number of serious methodological problems in studies using the consumer-demand theory, which discusses individual consumer behaviour, using aggregate data collection and analysis (Kagel et al., 1995).

However, consumer information from the panel data, often used for carrying out aggregate analysis, is still believed to be an effective way of elucidating consumers' buying patterns (Foxall, & Schrezenmaier, 2005). Moreover, using aggregate data is based on observations of representative consumers, which are not necessarily meant to be imprecise empirical outcomes. Panel data indeed refers to a diagnostic tool for gathering the necessary information. It has proven to be more accurate than a respective cross-section or time-series data and thus it can improve the empirical analyses significantly (Churchill and Iacobucci, 2002, Crouch and Housden, 2003, Gujarati, 2003). Moreover, data from consumer panels like The A.C. Nielsen Homescan are more accurate and less susceptible to errors, particularly when the

collection process follows barcode scanning procedures, than those acquired via consumers' reports on their past behaviour such as surveys or questionnaires (Churchill, 1999). In short, panel data produces a wide range of data on consumers' choice in everyday buying situations, providing researchers with an opportunity to conduct a more realistic and comprehensive analysis. The data is believed to represent complicated processes of daily economics life (Hsiao, 2003). The researchers thus have an opportunity to take individual differences in everyday consumption into consideration. Leaving out some of the elements or variables that are insignificant is usual and necessary to avoid making the tested equations too complicated. Nevertheless, ignoring the individual or time-specific influences occurring among cross-sectional or time-series units can be a costly mistake as it results in parameter heterogeneity in the model specification (Hsiao, 2003). Hence, choosing suitable variables for examining their relationship plays a vital role in social studies in general and in consumer research in particular.

As this study uses information collected from consumer panel data, it is worth understanding which numbers should be put into the equations. For example, in the case of the "amount bought ratio", after "Brand A" and "Brand B" are determined, their amounts are each added up separately. In the level of aggregate analysis, those consumers who made at least one purchase in a specific product class over the course of the data collection are not treated individually. All of their purchases, instead, are added, and thus all consumers are treated as one block of buyers choosing products in a week within that product class. The procedure for calculating the "amount paid ratio" is the same: amounts of money paid by all consumers making at least a single buy during the 52-week period are added up. Again, this is separated into amounts paid for big and small brands groups. For the average price ratios, the mean prices of

all brands which make up "Brand A" and "Brand B", for example, are averaged to one mean value for the two brand groups, respectively, as required by equation 15.

4.4.3.5 Individual Level of Analysis

As mentioned above, although investigations of consumer behaviour have employed different types of data, behavioural economists usually focus on consumer choice at the individual level. Therefore, this study also examines individualistic behaviour in order to provide empirical evidence as well as to contribute to the literature of consumer research in behavioural economics. One of the reasons for the emphasis on individual subjects in behaviour analysis is that it provides the researchers with a proper tool to investigate the relationship between the subject and its environment (Foxall, & Schrezenmaier, 2005). Besides, an individual behaviour approach is said to have the edge over the group or the entire sample analysis in reducing variability. Moreover, Johnston and Pennypecker (1993) insist that behaviour is a biological function of an organism, and a group is not an organism, and thus it cannot fully express that behaviour. In other words, an analysis that is conducted on an aggregate level explains the behaviour of a group/sample as a whole but says little or nothing about the behaviour of individuals. In addition, when empirical analysis and testing is carried out at the individual level, the close relationship between theoretical specification and appropriate estimation technique becomes evident (Blundell, 1998). Furthermore, and importantly, individual analysis avoids any aggregation bias, discussed earlier, which can lead to complicated and unnecessary interactions between individual attributes and price effects (Blundell, 1998). Last but not least, there exist differences between each individual not included in the aggregate analysis that needs to be considered and examined. A detailed

investigation of the behaviour of each individual, thus, would provide valuable information for designing further studies and for suggesting corrections for hypotheses as well as modifications for theories (Battalio et al., 1973).

4.4.4 Utilitarian and Informational Reinforcement Calculations

As mentioned earlier, brands in a particular product category are said to consist of both the utilitarian and informational benefits that serve as the discriminative stimuli signalling utility and symbolism, respectively (Foxall, 1990; 2017). Whereas utilitarian benefits are related to the functional and technical issues of the product, informational rewards refer to the symbolic meaning or social status in purchasing as well as possessing those products. The methods used for measuring the levels of informational and utilitarian benefits in this study are adopted from the previous work (cf. Foxall & Schrezenmaier, 2003; Foxall et al., 2004, Oliveira-Castro et al., 2005, Oliveira-Castro et al., 2006; Oliveira-Castro et al., 2008; Oliveira-Castro et al., 2011; Wells and Foxall, 2013; Foxall & James, 2001; 2003). It is worth noticing that there are no general units in scaling the levels of both the informational and utilitarian reinforcement. A ranking system with two utilitarian levels and three informational levels, therefore, has been developed and tested based on the assumption that each brand shows programmed reinforcement contingencies arranged by producers and marketers (Foxall et al., 2007).

Specifically, there are two utilitarian reinforcement levels, in the marketing context of fast-moving consumer goods, determined based on the features of the product brand (Foxall et al., 2004; Foxall et al., 2007; Oliveira-Castro et al., 2005). A higher utilitarian level is given to those brands with added qualities and attributes. In detail, unadorned formulations of items are ranked as having a lower utilitarian

benefit (UR level 1) while sophisticated formulations with more added features, such as baked beans in tomato sauces, are ranked as higher utilitarian reinforcement (UR level 2). These features, therefore, are said to add desirable value to the product or its consumption and are visibly advertised on the package or are part of the product name (Foxall et al., 2004; Foxall et al., 2007; Oliveira-Castro et al., 2005). Additional attributes to the product usually serve as the rationalisation for an increase in price.

Informational benefits, on the other hand, are associated with the brand differentiation in which best or famous brands are often related to prestige and social status, which, in turn, results in the price differentiation (Foxall et al., 2004; Foxall et al., 2007; Oliveira-Castro et al., 2005). Brand differentiation, for instance, between two brands of baked beans such as Tesco and Heinz obviously represents the different level of informational reinforcement not only in terms of the price but quality, taste and packaging. The ranking of informational benefits is thus based on the predominant difference that an individual can find between products, offered by different brands that usually have very similar attributes or qualities (Foxall, 1999; 2017). In fact, the informational benefit offered by each brand is obtained and analysed by using a simple, convenience questionnaire, with a total of 33 participants. The questionnaire was carried out by Foxall and his colleagues in October and November 2006. Participants of the questionnaire are those who had been living in the UK for all or most of their lives. They were asked to rate the brands by answering two questions: firstly, how well-known they judged it (0 = not at all, 1 = a little, 2 = quite well known, 3 = very well known) and secondly, their estimates of the brand's perceived quality (0 = unknown, 1 = low, 2 = medium, 3 = high). It is worth noting that different pack sizes and product formulations for each brand are regarded as the same brand. General brand names such as Asda or Tesco, nevertheless, with many

brand extension lines are considered as different brand names (Foxall et al., 2007).

Those same participants were required to answer questionnaires for each of the four products; baked beans (23 respondents), fruit juice (22 respondents), spreads (22 respondents) and biscuits (33 respondents). As can be seen, more respondents were needed for biscuits because its total of brands is greater than that of the others. Scores for both pieces of information were combined, and a mean score for knowledge and quality computed for each brand and participant. The average of these mean values calculated for each brand across all participants is known as MKQ (Foxall et al., 2007). Later, Oliveira-Castro and his associates (2010) carried out a reliability test of MKQ by randomly allocating questionnaire participants into two or three (in the case of biscuits) groups that have approximately the same sizes, and the entire average MKQs attached to each brand correlated across all brands. This analysis shows MKQ can be trusted as a mean to measure informational reinforcement. Therefore, in this thesis, this method of calculating informational benefits is employed in the sessions of non-linear demand elasticities and essential values.

4.4.5 Validity and Reliability

It is believed that the thesis's methodology cannot be completed without taking on the concerns of validity and reliability. This task will also provide the reflection and acknowledgement of potential limitations of the study. Moreover, reliability and validity are a required step in the research process of studies incorporating a positivist epistemology (Watling, 1995). Therefore, they are believed to be the fundamentals of a quantitative study. Reliability is the extent to which the present study would create the same results under a similar methodology with

constant conditions at different points in time (Bell, 1999). In other words, reliability shows the consistency and stability of the measurement each time it is adopted with repeatable results (Joppe, 2000). Previous studies conducted by Foxall and his associates (e.g., Foxall and James, 2001; 2003, Foxall and Schrezenmaier, 2003, Foxall et al., 2004, Oliveira- Castro et al., 2005, Romero et al., 2006, Wells & Foxall, 2013), for example, are said to have high reliability when they employed similar behavioural economics measurement and techniques on different samples and received consistent results of patterns of consumer brand and store choice. Therefore, this study following the behavioural economics analysis in examining patterns of consumer behaviour towards different brand groups is expected to have a reasonable reliability as a result of consistent and reliable findings. Besides, the current study's reliability also obtains a boost with the help of the panel data. Because of its nature, recording errors can be ruled out, and thus the data collection indeed needs no cognitive effort from both the researcher and the participants. Some might say that the consumers taking part in the consumer panel could forget to scan in their purchases, which would lead to incomplete data. However, AC Nielsen Homescan panel data has a proud history of reliable data for decades and has deservedly earned trust among marketers and managers. In fact, the company has promoted its data as extremely accurate and error-free because the data is gathered in a non-experimental, computer-assisted method, with the purpose of monitoring consumers' expenditure on four kinds of fast-moving consumer goods.

Validity, on the other hand, is to ensure the study measures accurately or how trustworthy the results and interpretations are (Bryman, 2004, Joppe, 2000, Saunders et al., 2007), meaning it is concerned with actual measurement problems such as unreliable items or constructs in questionnaires or surveys. The researchers determine

the validity of their study by asking themselves the question: "Are you measuring what you think you are measuring?" (Kerlinger, 1979). In fact, the central point of improving a validity of any experiment or investigation is to find out which facts and information need to be collected, prepared and analysed in order to test proposed assumptions, hypotheses, and theories. For a purely quantitative study like this thesis, the issue of validity can be associated with the accuracy of the consumer panel data as well as the carefulness in gathering the shopping details of its participants. Hence, the validity of this study seems to be assured as the consumer panel provides information collected over a long period of time (52 weeks) for the same individuals.

Chapter 5: Results

In the first part of this chapter all the information of the dataset will be described in detail. This will help readers to have a better understanding of the data as well as to make the results of analyses more reliable. In addition, the thesis shows consumer brand choice patterns with the same techniques used by Ehrenberg and his colleagues (cf. Riley, Ehrenberg, Castleberry & Barwise, 1997; Ehrenberg, 1972; Ehrenberg, Goodhardt & Barwise, 1990; Ehrenberg & Scriven, 1999; Goodhardt, Ehrenberg & Chatfield, 1984; Uncles, Ehrenberg & Hammond, 1995). Besides, three kinds of matching analyses are conducted at different levels. Last but not least, demand elasticities are examined closely by running both linear and non-linear models.

5.1 General Overview

A.C.Nielsen is well known as the leading data provider with a panel consisting of around 10,000 individuals in the UK. The study's dataset provided by the company includes purchasing information of four fast-moving consumer goods, which are baked beans, fruit juice, spreads and biscuits between July 2004 and July 2005. Table 5.1 depicts the number of buyers, the prices paid for each of the product with the mean value of purchases made by each of the buyers in total and for big and small brand groups, as well as the number of brands available in the market in total and the both groups.

Biscuits are the most bought product among the four while baked beans appear at the other end with only ten purchases each buyer per annum. There is an

apparent trend to use own brands as differentiations in terms of price and quality. For example, the top-four stores - Tesco, Asda, Morrison, and Sainsbury's - have their own store brands for each product class. Besides, most of the brands have their own brand line extensions regarding different attributes, flavours or packaging sizes. For instance, although Jacobs is not a big company, it still provides some brand line extension for its biscuits such as Jacobs biscuits, Jacobs biscuits with cheese, Jacobs Baby Barbecue and others.

	Number of buyers			Number of purchases			Average number of purchases			Number of brands		
	Total	Big brand	Small brand	Total	Big brand	Small brand	Total	Big brand	Small brand	Total	Big brand	Small brand
Baked Beans	832	747	475	13720	9204	4516	16.5	12.3	9.5	36	7	29
Biscuits	1594	1592	1188	75555	69362	6193	47.4	43.6	5.2	310	62	248
Fruit Juice	895	892	446	21368	19212	2156	23.9	21.5	4.8	91	18	73
Spreads	1354	1341	792	30877	26209	4668	22.8	19.5	5.9	86	17	69

Table 5.1: Number of consumers, total purchases, average number of purchases, and number of brands

Table 5.1 depicts the number of purchases made by the households from the panel data. The number of consumers varies from product to product. Spreads and biscuits rank first and second in the list of the number of buyers with a total 1594 and 1354 respectively. Biscuits have the biggest number of brands on the market with a total number of 310 brands, which implies fierce competition from the supply side's perspective. Therefore, unsurprisingly, biscuits also record 75,555 of purchases made by consumers, leaving other product categories far behind. The average number of purchases made for baked beans, spreads and fruit juice is 16.5, 22.8, and 23.9 purchases respectively while biscuits show a clear lead with a mean value of 47.4.

The double jeopardy theory is said to be confirmed when consumers prefer big brands over small ones concerning not only the number of buyers but also the number of purchases and the average number of purchases. For instance, 747 people buy big brands of baked beans whilst only 475 consumers choose small brands. Besides, one interesting observation should be emphasised that big brands - the minority in the market for all product categories - dominate the market while a large number of small companies have to fight for the small remaining piece of the pie. This is usually known as Pareto's rule of 80:20 in marketing. For example, there are only 62 biscuit big brands (20%), compared with 248 small ones (80%), but the number of purchases for the big brand group is larger than that for the small brand group by over 63,000 purchases.

It is noted in this thesis that not every respondent bought all the four product categories and not every one of those purchased both big brands and small brands at least once within the four product categories. Hence, in an attempt to analyse the pattern of consumers' big/small brand choice across the product class, it is more

useful to select and analyse data from the 24 respondents chosen from the consumer panel data, who purchased both big and small brands all the four product categories at least once within the specific period (52 weeks).

	Number of purchases			Average number of purchases			Number of brands		
	Total	Big brand	Small brand	Total	Big brand	Small brand	Total	Big brand	Small brand
Baked Beans	497	226	271	20.7	9.4	11.3	26	7	19
Biscuits	2334	2046	288	97.3	85.3	12.0	141	60	81
Fruit Juice	932	650	282	38.8	27.1	11.8	48	16	32
Spreads	695	514	181	29.0	21.4	7.5	45	15	30

Table 5.2: Number of total purchases, average number of purchases, and number of brands

Table 5.2 presents the description of the data of a group of 24 consumers; that is, summarising how many purchases in total are made during the period, how many purchases in average they make in each of the four respective product categories, and the number of brands on offer per product class. The number of consumers varies widely from only 497 for baked beans to 2334 for biscuits, and once again, biscuits have the highest total number of purchases. As a result, it tops the rank of the average number of purchases because the number of consumers is the same for all products. Typically, a consumer buys an average of 20.7, 29.0, 38.8, and 97.3 for baked beans, spreads, fruit juice, and biscuits, respectively. Between the big brand and small brand

group, there are smaller differences in terms of the number of purchases, and the mean value of purchases, compared with those in the aggregate level. However, big brands are still the winners in the market even where the number of them is less than that of smaller ones. For example, only 60 different biscuit big brands are listed as opposed to 81 different biscuit small brands.

5.2 Brand Choice and Market Patterns

5.2.1 Average repertoire and average number of purchases

Tables 5.3, 5.4, 5.5, and 5.6 show the annual market share, penetration, and average purchase frequency. Non-sole buyers tend to limit their purchases to a small repertoire of brands rather than spreading them across the whole range of brands on offer, and even sole buyers are not often heavy buyers of their chosen brand (Foxall and Schrezenmaier, 2003). For example, whilst a baked beans buyer typically makes about 6 purchases of their favourite brand in one year, they are also responsible for about 18 purchases of the product category as a whole. From these figures, it is possible to compute the annual "share of category requirement" (SCR), which is the average number of brands purchases as a percentage of the average number of product category purchases over a year. SCRs vary considerably among product classes: 34 percent in the case of baked beans, 9 percent for biscuits, 29 percent for fruit juice, and 22 percent for spreads.

Baked beans	Market share %	Penetration %	Average purchase	Average purchase
			Brand	Any
Heinz	43.4	59.5	9.0	16.9
Tesco	6.6	23.8	5.3	17.0
Crosse & Blackwell	6.1	18.6	3.4	19.5
HP	6.1	18.5	3.4	18.2
Sainsbury	5.6	15.6	6.2	16.9
Asda	5.5	15.9	5.7	18.5
Tesco Value	4.8	18.3	7.2	18.5
Asda Smartprice	4.5	16.2	8.3	18.2
Average brand	10.3	23.3	6.1	18.0

Table 5.3 Average repertoire and average number of purchases for baked beans

Biscuits (cookies)	Market share %	Penetration %	Average purchase	Average purchase
			Brand	Any
McVities	13.7	81.6	7.4	52.1
Kit Kat	6.9	51.9	4.3	60.4
Fox's	5.1	55.1	3.9	60.1
Jacobs	5.0	61.0	3.7	56.2
Tesco	4.5	39.9	6.5	53.8
Cadbury	4.2	45.4	3.2	62.5
Asda	3.9	29.6	7.5	59.2
Sainsbury	2.9	25.3	6.1	55.0
Average brand	5.8	48.7	5.3	57.4

Table 5.4 Average repertoire and average number of purchases for biscuits

Fruit juice	Market share %	Penetration %	Average purchase	Average Purchase
			Brand	Any
Tesco	15.0	40.0	7.6	27.0
Tropicana	11.6	26.3	6.0	26.1
Asda	11.0	30.8	8.8	26.4
Sainsbury	10.0	27.3	7.1	26.4
Tesco Value	7.1	27.3	9.2	25.7
Morrisons	5.7	22.5	5.4	25.9
Asda Smartprice	4.7	20.3	9.7	26.9
Aldi	4.2	17.2	7.7	25.2
Average brand	8.7	26.5	7.7	26.2

Table 5.5 Average repertoire and average number of purchases for fruit juice

Spreads	Market share %	Penetration %	Average purchase	Average purchase
			Brand	Any
Flora	43.4	44.0	7.8	24.9
Lurpak	10.8	25.7	6.7	26.2
Clover	9.3	22.8	7.0	24.3
St Ivel	7.3	38.8	4.5	23.1
Anchor	6.1	26.3	4.4	26.7
I Can't Believe its not Butter	4.4	25.6	4.1	22.6
Country Life	4.3	19.3	4.8	28.9
Tesco	3.9	23.0	4.6	25.4
Average brand	8.1	28.2	5.5	25.3

Table 5.6 Average repertoire and average number of purchases for spreads

The choices of those consumers then vary across products and brands regarding penetration rates and market shares. The market share shows the percentage of product sales composed of each brand while penetration measures the proportion of potential purchasers who bought it before during the course of the research. For fruit juice, for example, market share ranges from 4.2% to 15% and annual brand penetration ranges from 17.2% to 40%.

The four tables also exhibit the mean number of purchases and the average number of different brands bought for consumers overall. Unsurprisingly, for biscuits, there are not only more buyers in the current dataset, but the mean number of purchases of any different brands are also clearly higher than for the three other product categories. The tables show that consumers make an average repertoire of 6.1, 5.3, 7.7, and 5.5 purchases for baked beans, biscuits, fruit juice, and spreads, respectively. It is important, however, to know that these figures do not reveal information about the actual amount bought of any products at the purchase point in time and what is being calculated here, based on frequency, are the purchase occasions only.

5.2.2 Sole and Multi-brand purchasing

Table 5.7 shows the number of sole buyers, multi-brand buyers, and total numbers for each product category. As can be seen, most buyers of any brands are also buyers of other brands. In other words, multi-brand purchasing is a fact for all four products as over 90% of consumers for biscuits, fruit juice, and spreads while that number for baked beans is also very high (74.16%). This result is the same as studies in marketing about aggregate patterns of brand choice, carried out by Ehrenberg and his contributors. Another observation is that consumers are more likely to multi-brand purchase when they have a relatively bigger repertoire of brands. In this study, the large set of brands is biscuits, which is also the top regarding the number of consumers, the number of purchases made, the total sum of brands on offer as well as the average amount of purchases made by consumers.

On the other hand, as attracting relatively few consumers, obtaining few purchases within the period of time, having fewer brands available, baked beans

purchasers make relatively fewer buys and, among those, fewer different brands on each of their shopping trips. In summary, there is a positive correlation between the average size of consideration sets and the mean number of purchases and how many consumers make multi-brand purchases on the same shopping occasion. In contrast, there are exclusive or sole buyers for each product class. They are the minority though, with the most loyal consumers being baked beans purchasers (215 people). This suggests a negative relationship between consumers' average size of repertoire, their average value of purchases in a product class and the proportion of sole purchasers that product class possesses.

	Sole purchasers		Multi-brand purchasers		Total purchasers	
	Number	Percentage	Number	Percentage	Number	Percentage
Baked Beans	215	25.84	617	74.16	832	100
Biscuits	4	0.25	1590	99.75	1594	100
Fruit Juice	68	7.60	827	92.40	895	100
Spreads	97	7.16	1257	92.84	1354	100

Table 5.7 Sole buyers and multi-brand buyers

5.2.3 Purchase duplication

Baked Beans, UK, annual	Percentage who also bought							
Buyers of	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**
1. Heinz		21	21	25	15	15	11	10
2. Tesco	54		23	13	25	20	32	7
3. Crosse & Blackwell	68	29		33	19	15	23	12
4. HP	79	17	33		13	18	14	14
5. Sainsbury	58	38	23	15		21	11	9
6. Asda	55	30	17	20	20		13	30
7. Tesco Value	36	41	23	14	9	11		29
8. Asda Smartprice	38	10	13	16	9	29	33	
Average Duplication	55	27	22	19	16	18	20	16

Table 5.8 Duplications of Purchases between Brands of baked beans

Biscuits, UK, annual	Percentage who also bought							
Buyers of	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**
1. McVities		55	60	65	40	50	30	26
2. Kit Kat	86		65	67	43	56	34	26
3. Fox's	89	61		70	40	57	34	25
4. Jacobs	87	57	63		43	52	32	28
5. Tesco	82	56	55	66		46	22	24
6. Cadbury	90	64	69	70	40		37	24
7. Asda	83	60	63	67	29	57		24
8. Sainsbury	85	53	54	67	38	43	28	
Average Duplication	86	58	61	67	39	52	31	25

Table 5.9 Duplications of Purchases between Brands of biscuits

Fruit Juice, UK, annual	Percentage who also bought							
Buyers of	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**
1. Tesco		28	26	30	41	21	14	12
2. Tropicana	43		28	35	11	23	9	11
3. Asda	34	24		22	20	25	38	15
4. Sainsbury	44	34	25		20	19	10	12
5. Tesco Value	60	11	22	20		16	28	19
6. Morrisons	38	27	34	23	20		17	17
7. Asda Smartprice	27	12	58	14	37	19		18
8. Aldi	28	17	27	19	30	22	21	
Average Duplication	39	22	31	23	26	21	20	15

Table 5.10 Duplications of Purchases between Brands of fruit juice

Spreads, UK, annual	Percentage who also bought							
Buyers of	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**
1. Flora		24	23	38	28	27	18	20
2. Lurpak	41		20	37	32	24	28	25
3. Clover	44	23		55	30	39	15	22
4. St Ivel	43	24	33		26	45	17	26
5. Anchor	47	31	26	39		27	27	28
6. I Can't Believe its not Butter	46	25	35	68	28		17	22
7. Country Life	41	38	17	33	37	22		34
8. Tesco	38	28	21	44	31	25	29	
Average Duplication	43	28	25	45	30	30	22	25

Table 5.11 Duplications of Purchases between Brands of spreads

As mentioned above, non-exclusive buyers of any brands in the past have been found to also buy other brands at some later time and this phenomenon, called purchase duplication, is exhibited in the tables - the table shows the buying duplication of eight biggest brands concerning market share. The vertical axes list the names of the brands, and the horizontal axes contain the number accordingly, with the grey-shaded fields indicating unused cells. Penetration is positively correlated with

the purchase duplication (Uncles, Ehrenberg and Hammond, 1995). This is proven within the database as, for all product categories, that bigger brands, namely Tesco (baked beans and fruit juice), Heinz (baked beans), McVitie's (biscuits) and Flora (spreads), attract more purchasers from other brands than smaller brands do. One reason for this is the percentages of "who also bought" and their average duplication for these brands seem higher than for the smaller ones. For instance, for baked beans, 54% of consumers buying Tesco also bought Heinz, and the average duplication of Heinz is 55%-highest compared to the rest of brands during the period of the research. It is worth noting that level of purchase duplication may have a relationship with the product's penetration rate. The higher penetration rate a product has, the higher level of purchase duplication (i.e. biscuits have a higher level than baked beans do).

5.3 Matching Analyses at Aggregate Level

5.3.1 Amount matching analysis

The results of the amount matching at the aggregate level strengthen the idea that there exists a matching relationship in natural consumer settings. This means that if there is perfect matching, the proportion of funds spent on a particular brand would be equal to the ratio of that brand bought. Besides, due to the fact that the amount matching analysis is calculated in its logarithmic form as a power function, unity of the exponents can be interpreted as a sign of the actual substitutability of alternative reinforcers within one product class (Baum, 1974, 1979).

As previously noted in the methodology chapter, amount matching analysis is performed as a mean of measuring the substitutability of brands where the relationship between the amount purchased ratio and amount expended ratio is tested

and visualised in a plotted graph. The Beta (sensitivity values in Baum's equation) and the intercept (bias values in Baum's equation) as the output from the regression equations for all four product categories are demonstrated in Table 5.12. A slope that falls within 1.10 and 0.90 is considered as matching; under-matching if the slope falls below 0.90, while a value of over 1.10 is regarded as over-matching. Anti-matching, conversely, is represented by a slope of less than zero. Additionally, Figure 5.1 exhibits the schedule results for baked beans, biscuits, fruit juice, and spreads each in a separate graph.

	n	p-value	R^2	Beta	Intercept
Baked beans	390	0.00	0.93	0.93	0.34
Biscuits	1186	0.00	0.73	0.80	0.37
Fruit juice	443	0.00	0.76	0.91	0.05
Spreads	779	0.00	0.90	0.97	0.03

Table 5.12 Amount matching analysis

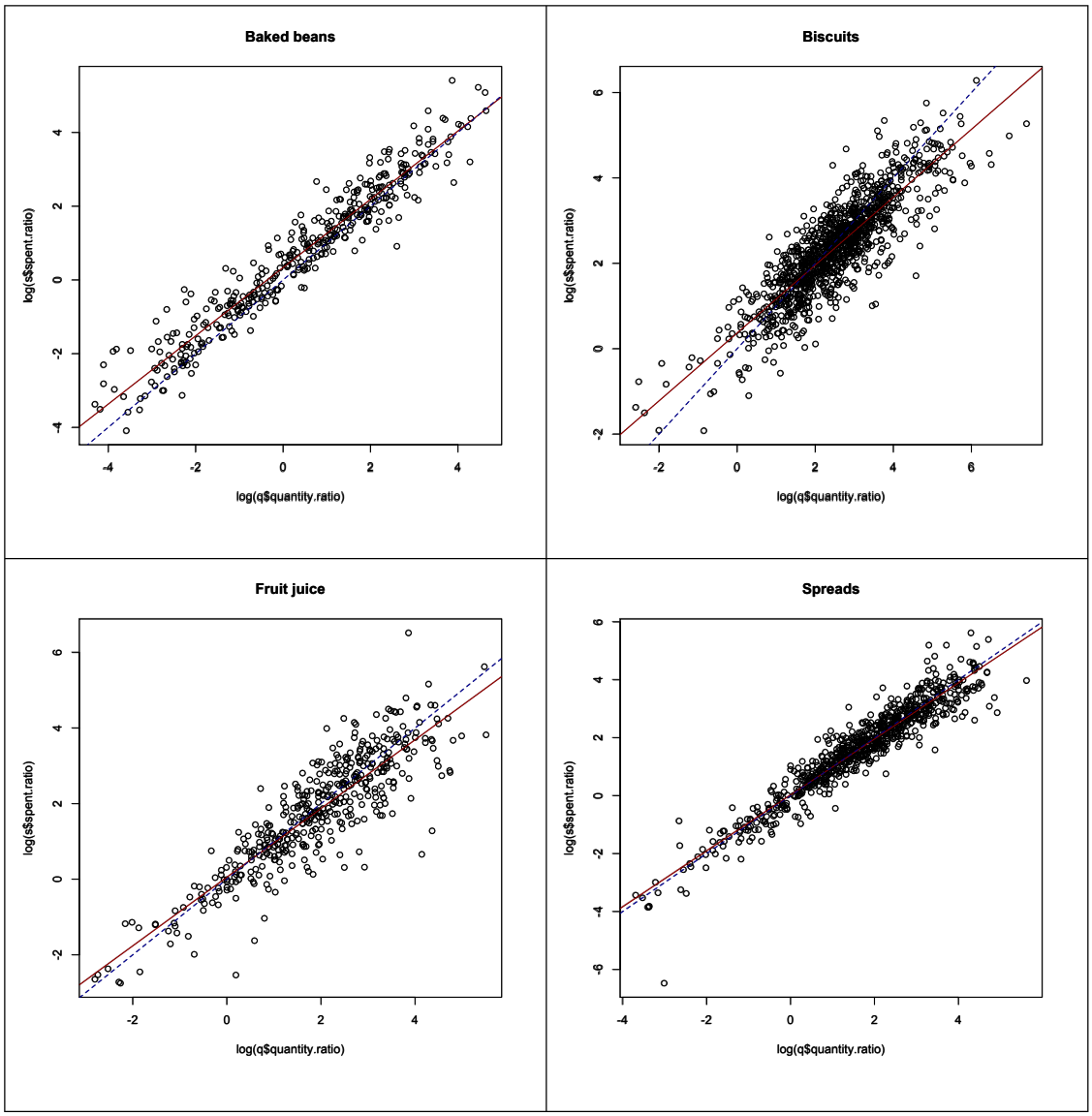


Figure 5.1 Amount matching analysis

At the aggregate level, the general matching equation explains the data very well; all multiple regressions are statistically significant ($p < 0.05$) and ranges from 0.73, for biscuits to 0.93, for baked beans. The number of data points (n) used to calculate each regression ranges from 390 for baked beans to 1,186 for biscuits. This is reduced from the original dataset since the study only examines purchasers buying both big and small brands. The data points only count consumers who buy products from both big brand and small brand groups. Specifically, in the case of baked beans, 442 buyers, accounting for 53.13% of the total, get eliminated from the analysis as they are sole buyers or only buy either big brands or small brands. Biscuits, on the other hand, lose only 25.60% of the buyers in the raw data because most of them are multi-brand buyers. The number of consumers used in matching analyses is 443 and 779 for fruit juice and spreads that make up of 49.50% and 57.53 % of the total, respectively. In general, except biscuits, the loss of data points is remarkable; however, the remaining is still large and sufficient for a quality quantitative approach.

Values of the intercept are very close to zero especially for biscuits and spreads, indicating the absence of strong bias when the reinforcing attribute is relatively constant. Values of the beta are significant for all product categories ($p < 0.05$), suggesting that the ratio of amount bought is a true reinforcement. Also, the betas are all positive, ranging from 0.80 for biscuits to 0.97 for spreads. This indicates that increases in reinforcement are associated with increases in spending. The betas show slight and ignorable undermatching for biscuits and near-perfect matching for the other three products. Overmatching is not observed at the aggregate level. The betas being greater than 0.9 demonstrate that within three of the four product categories, matching analysis reveals that the big brands and small brands are close substitutes. The findings can be examined visually as fitted values of regression (the

red line) have a smaller slope than the 45-degree line (the blue line). Accordingly, the straight lines are diagonally upward-sloping from the left to the right.

This general pattern of substitutability is consistent with the findings of earlier analyses, in which anti-matching and substantial undermatching are established only for independent and highly complementary products, respectively (Foxall & James, 2001; 2003; Foxall et al., 2010) whereas, by contrast, substitutes followed a near-perfect matching pattern. Therefore, consumers view big and small brands as highly substitutable products. This supports Sharp's idea (cf. Sharp, 2010; Romaniuk & Sharp, 2016) that consumers, especially when shopping for fast-moving consumer goods, do not have much brand loyalty and they tend to show multi-brand buying behaviour.

5.3.2 Cost matching analysis

Figure 5.2 exhibits the results of cost matching analysis for baked beans, biscuits, fruit juice, and spreads in a separate graph. Additionally, the R^2, Beta and Intercept values for all product categories are summarised in Table 5.13.

	n	p-value	R^2	Beta	Intercept
Baked beans	390	0.00	0.05	-0.81	0.70
Biscuits	1186	0.00	0.12	-0.66	2.48
Fruit juice	443	0.00	0.02	-0.26	1.89
Spreads	779	0.04	0.00	-0.23	1.66

Table 5.13 Cost matching analysis

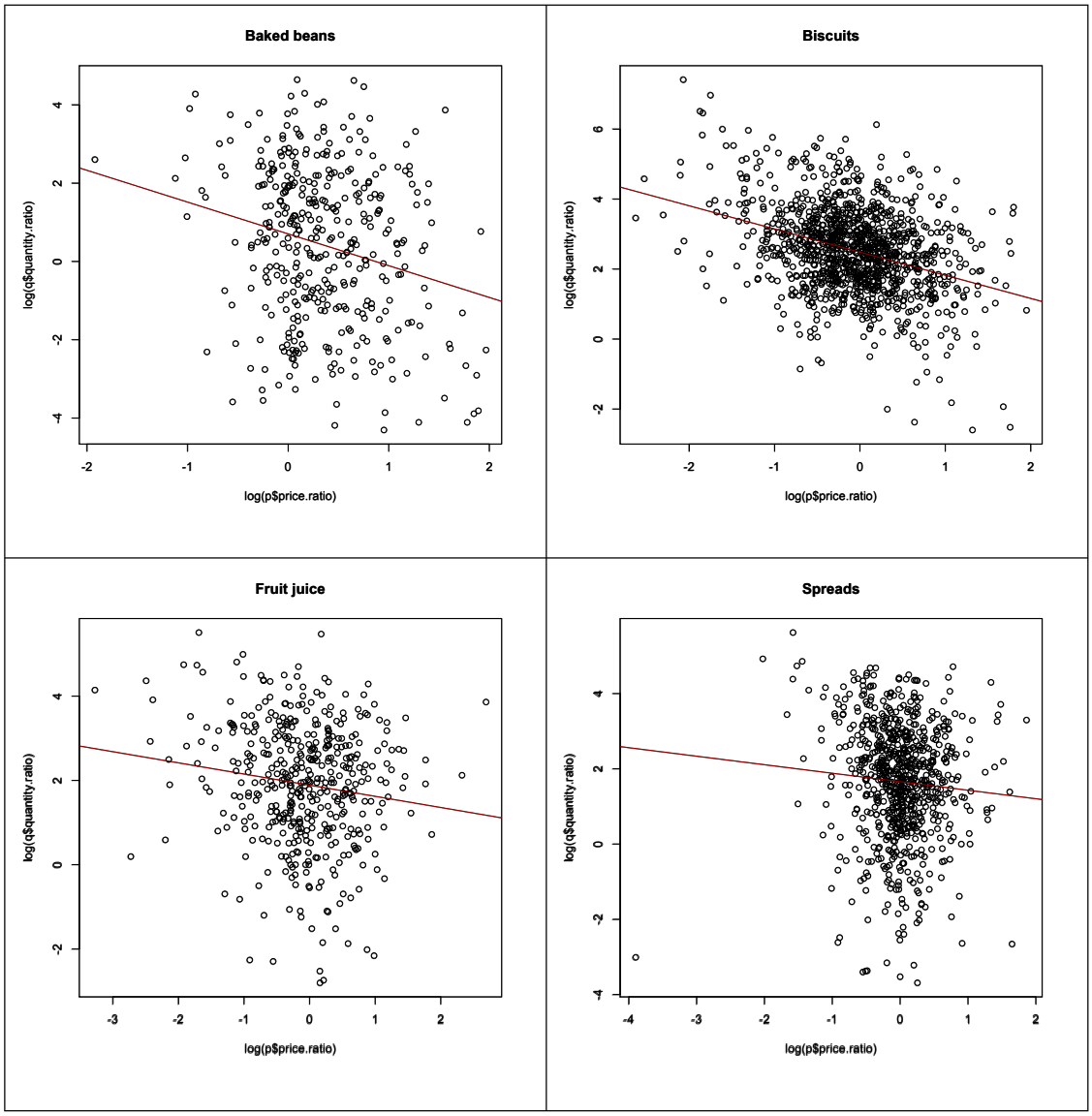


Figure 5.2 Cost matching analysis

As the table 5.13 indicates, all the values of beta are significant ($p < 0.05$), suggesting that the ratio of price is a true reinforcer; however, R^2 values are very small, ranging from 0.00, for spreads, to 0.12, for biscuits. The betas are all negative, ranging from -0.23, for spreads, to -0.81, for baked beans. As cost matching is also called relative demand analysis, this indicates that increases in price are associated with decreases in amounts bought, meaning that downward-sloping demand curves are observed, which demonstrates price sensitivity. As discussed in the previous chapter, this result is similar to that of the study of Madden and his colleagues (2000), in which "increasing the unit price of a reinforcer decreases consumption of that reinforcer".

The results are expected and do support Consumer Behaviour Analysis Group's earlier studies where the expected downward patterns are observed (Foxall & James, 2001; 2003; Foxall et al., 2007). Taken together with the above finding in the amount matching analysis section that the brands investigated within most of the product classes have been found to be close substitutes, downward-sloping demand curves are suggested to show substitutability among brands. In other words, consumers buy less of a brand at higher prices because they can switch easily to other brands. Following the same logic, the results of this study indicate that buyers did find big brands and small brands to be acceptable substitutes for one another and thus are sensitive to price changes.

5.3.3 Probability matching analysis

Figure 5.3 exhibits the results for baked beans, biscuits, fruit juice, and spreads each in a separate graph. Additionally, the R^2, Beta and Intercept values for all four product categories are summarised in Table 5.14.

	n	p-value	R^2	Beta	Intercept
Baked beans	390	0.00	0.04	3.47	-1.03
Biscuits	1186	0.00	0.11	2.89	1.04
Fruit juice	443	0.00	0.02	1.22	1.27
Spreads	779	0.02	0.00	1.19	1.06

Table 5.14 Probability matching analysis

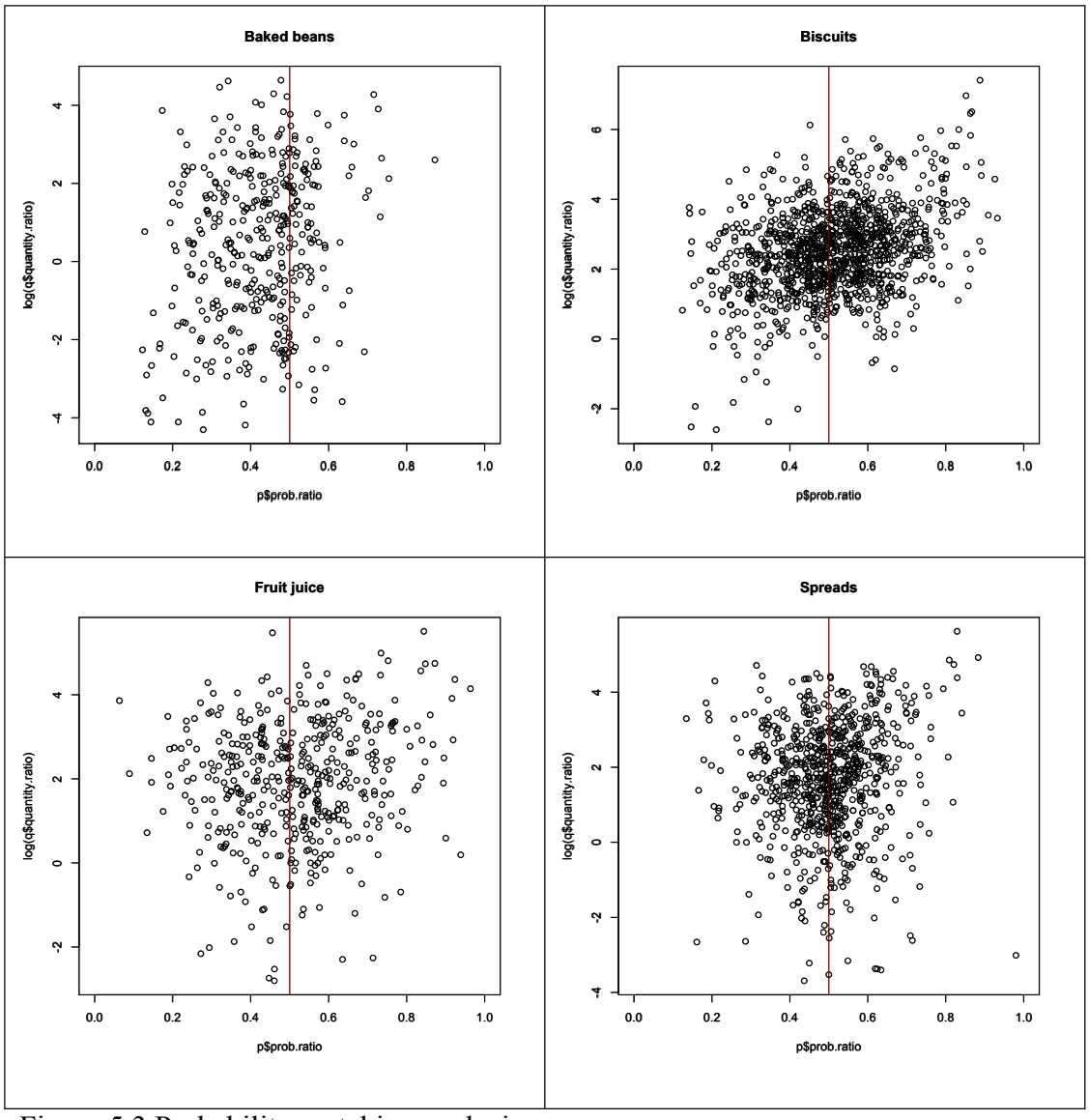


Figure 5.3 Probability matching analysis

As is apparent from table 5.14, all multiple regressions but spreads' are significant ($p< 0.05$). The multiple coefficients of determination R^2 values, nevertheless, are very small. A step function pattern rather than probability matching is observed in all four product categories. The data points of biscuits, fruit juice, and spreads graphically fall to the right of the 0.5-line on the x-axis while those of baked beans fall to the left. For maximisation analysis, this means that buyers are maximising by choosing small brand names in case of the former three products whereas big brands are the chosen ones to maximise when they buy baked beans. This might be the result of the large number of baked beans sole purchasers compared to those for the other three. As discussed earlier, the number of baked beans brands are limited and big brands like Heinz enjoy a dominant share of the market and they are likely to provide medium to high priced product lines accordingly. Therefore, price seems not to be the top priority for consumers when they buy baked beans.

5.4 Matching Analyses at Individual Level

The previous sections have run the regressions drawn on the aggregate data, which are the main focus of this chapter. However, Begg, Fischer, and Dornbusch (1997) mention that logically examinations at both aggregate and individual level are needed because "what is true for the individual is not necessarily true for everyone together, and what is true for everyone together does not necessarily hold for the individual". Therefore, the study now turns to investigate different kinds of matching for big versus small brands at the individual level.

In general, the results obtained from the individual analyses vary considerably across product categories based on relatively few observations, which leads to many

confusing outcomes and thus the following results are described with caution. A reason for this lies partly in the size of the database at the individual level: for many of the chosen purchasers, very few data points are available, making it impossible to perform either a matching analysis, relative demand analysis or maximisation analysis. To overcome this problem, the dataset of the 16 consumers of the four products will be merged to provide more data points for the matching analyses. The method is still able to fulfil the aim of this section, that is to investigate whether the choice of big brands matches that of small ones at the individual level.

5.4.1 Amount matching

Table 5.15 exhibits the results of matching analysis for fast-moving consumer goods combining all four of baked beans, fruit juice, spreads and biscuits. The number of chosen consumers on the panel data, the values of the R^2, Beta (s values in Baum's equation) and the intercept (bias in Baum's equation) are summarised in the table. Overall, the R^2 of the matching analysis for fast-moving consumer goods is average, ranging from 0.02 to 0.95. Beta values vary across consumers where 22 out of 24 consumers are positive and less than 0.90, and hence under-matching is mainly observed for fast-moving consumer goods. This means big brands and small brands are complementary products in cases of fast-moving consumer goods at the individual level. In fact, consumers face a wide range of both big and small brands, which offer a diversity of attributes, quality, and prices that they can choose from. As a result, with price and quality consciousness, they would deviate once in a while; looking for a better taste and quality from highly differentiated and expensive big brands for special events whilst being happy with smaller brands, which often attract buyers with their low prices, for daily consumption. In other words, with the vast availability of fast-

moving consumer goods, consumers can buy both big and small brands in order to meet their preference in terms of price and utility outcomes.

Panel No	R^2	Beta	Intercept
8010766	0.40	0.55	1.33
8046321	0.14	0.35	0.96
8046611	0.36	0.50	1.44
8047878	0.57	0.89	-0.07
8110664	0.02	0.32	-0.09
8160263	0.15	0.25	0.50
8180223	0.59	0.64	0.20
8240965	0.49	0.55	0.71
8251022	0.45	0.63	0.42
8252715	0.82	1.01	0.80
8260017	0.28	0.45	0.70
8300652	0.42	0.75	0.08
8450791	0.95	0.69	0.90
8461049	0.27	0.49	1.40
8500373	0.10	0.45	0.19
8561565	0.31	0.43	0.54
8561978	0.02	-0.18	0.97
8590640	0.07	0.20	0.48
8611352	0.49	0.57	0.77
8641120	0.35	0.73	1.12
8660558	0.65	0.82	1.06
8671967	0.29	0.47	-0.00
8690487	0.35	0.42	0.41
8700780	0.24	0.51	0.93

Table 5.15 Amount matching analysis for fast-moving consumer goods (grouped by four products)

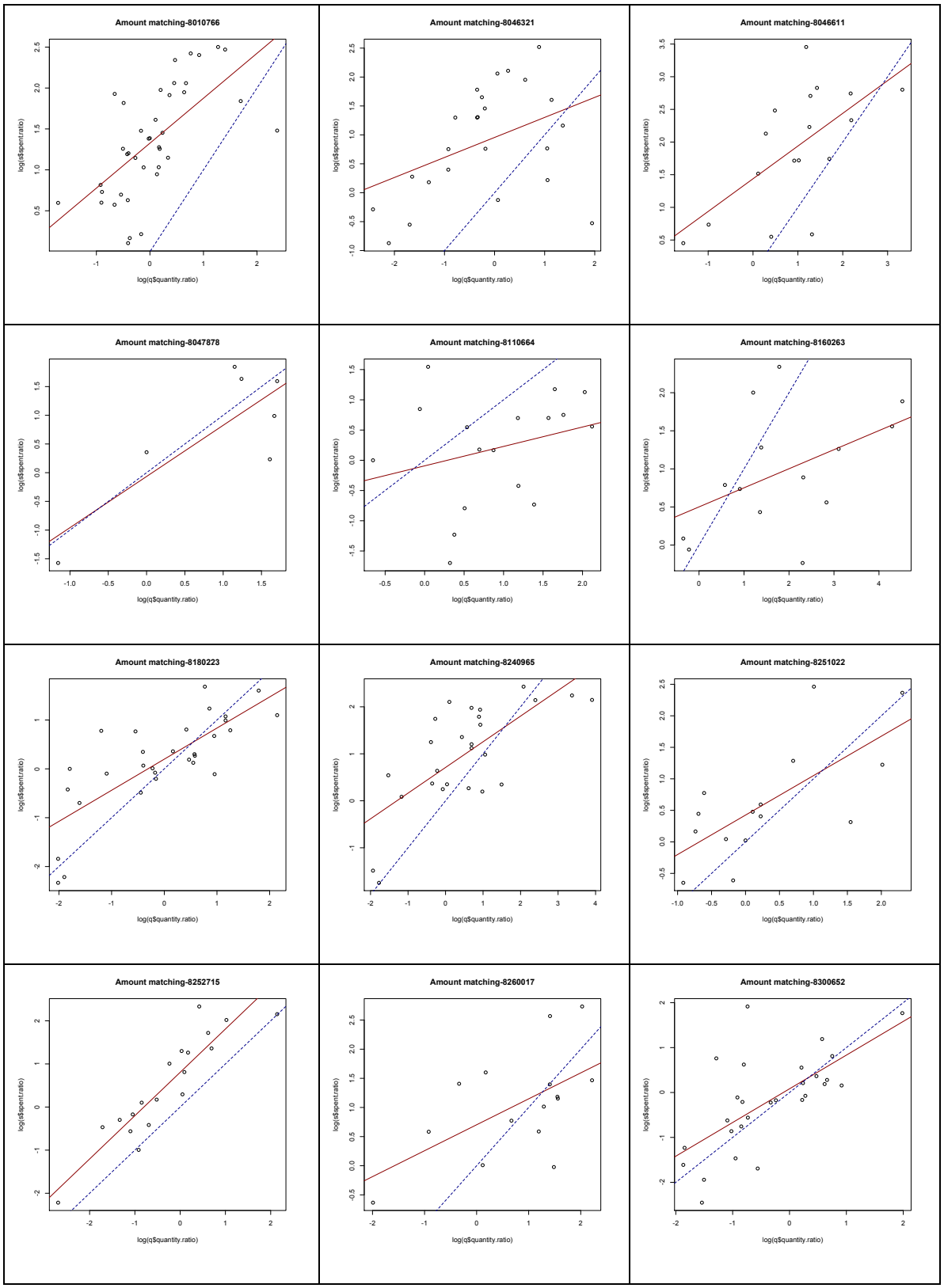


Figure 5.4 Amount matching for fast-moving consumer goods (grouped by four products)

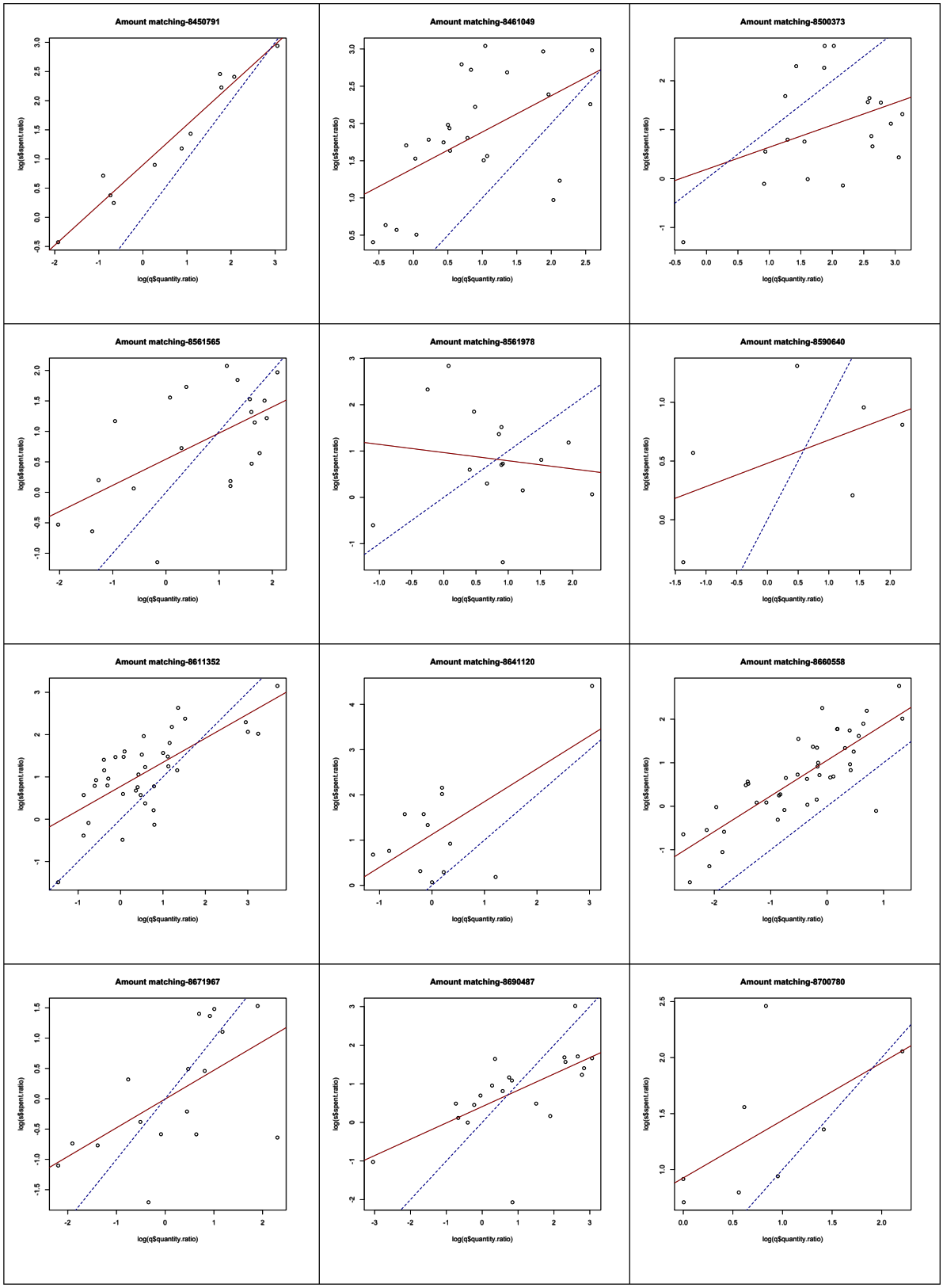


Figure 5.4 Amount matching for fast-moving consumer goods (grouped by four products) (cont'd)

5.4.2 Cost matching analysis

Cost matching or relative demand analysis, as previously noted, measures the sensitivity of consumers towards changes in price. Based on the review of demand curves, this study aims to answer the question of whether demand elasticity of big and small brands for each individual is consistent across product categories. A downward-sloping demand curve, represented by a negative Beta, demonstrates that increases in unit price decrease the quantity purchased of a product while an upward-sloping curve indicates that unit price and the quantity have a positive correlation. The value of adjusted R^2, Beta and intercept are shown for so-called fast-moving consumer goods combining all four of baked beans, fruit juice, spreads and biscuits in the table 5.16. It is also to be noticed that a wide dispersal of data points reflected in the many low values of R^2 and Beta, indicating a weak relationship between the relative price and relative quantity demanded, suggests that more precise methods need to be found for the demonstration of price-demand associations.

Positive values of Beta are observed for the fast-moving consumer goods. In other words, upward-sloping demand curves are found for all of the consumers when buying these products. Besides, as a range of matching patterns, from under- to over-matching, is observed for the consumers according to the generalised matching law, the demand curves show the consumers' insensitivity to the price fluctuations. This might be attributed to the multi-brand purchasing pattern shown by the consumers, as discussed above, choosing brands that range from the cheapest to the most expensive. Consumers are switching from a small brand to a big brand, back and forth. Consumers might even purchase both the most expensive brands, which obviously belong to the big brand group, as well as the cheapest brands, which often locate in

the small brand group, on a single shopping occasion. It is evident after reviewing the consumers' buying history that consumers usually buy several brands that are different in benefit, quality, and price.

Panel No	R^2	Beta	Intercept
8010766	0.24	0.42	-0.62
8046321	0.02	0.20	-0.42
8046611	0.52	0.88	-0.69
8047878	0.64	0.66	0.51
8110664	0.04	0.18	0.89
8160263	0.31	1.19	0.63
8180223	0.59	1.03	-0.26
8240965	0.11	0.51	0.02
8251022	0.21	0.45	-0.03
8252715	0.70	0.65	-0.74
8260017	0.20	0.77	-0.10
8300652	0.44	0.61	-0.27
8450791	0.77	1.10	-0.92
8461049	0.19	0.53	-0.15
8500373	0.14	0.38	1.56
8561565	0.13	0.70	0.19
8561978	0.00	-0.05	0.82
8590640	0.08	0.52	0.14
8611352	0.38	0.77	-0.45
8641120	0.01	0.07	0.06
8660558	0.59	0.84	-0.97
8671967	0.17	0.69	0.03
8690487	0.44	1.12	0.13
8700780	0.02	0.14	0.64

Table 5.16 Cost matching analysis for fast-moving consumer goods (grouped by four products)

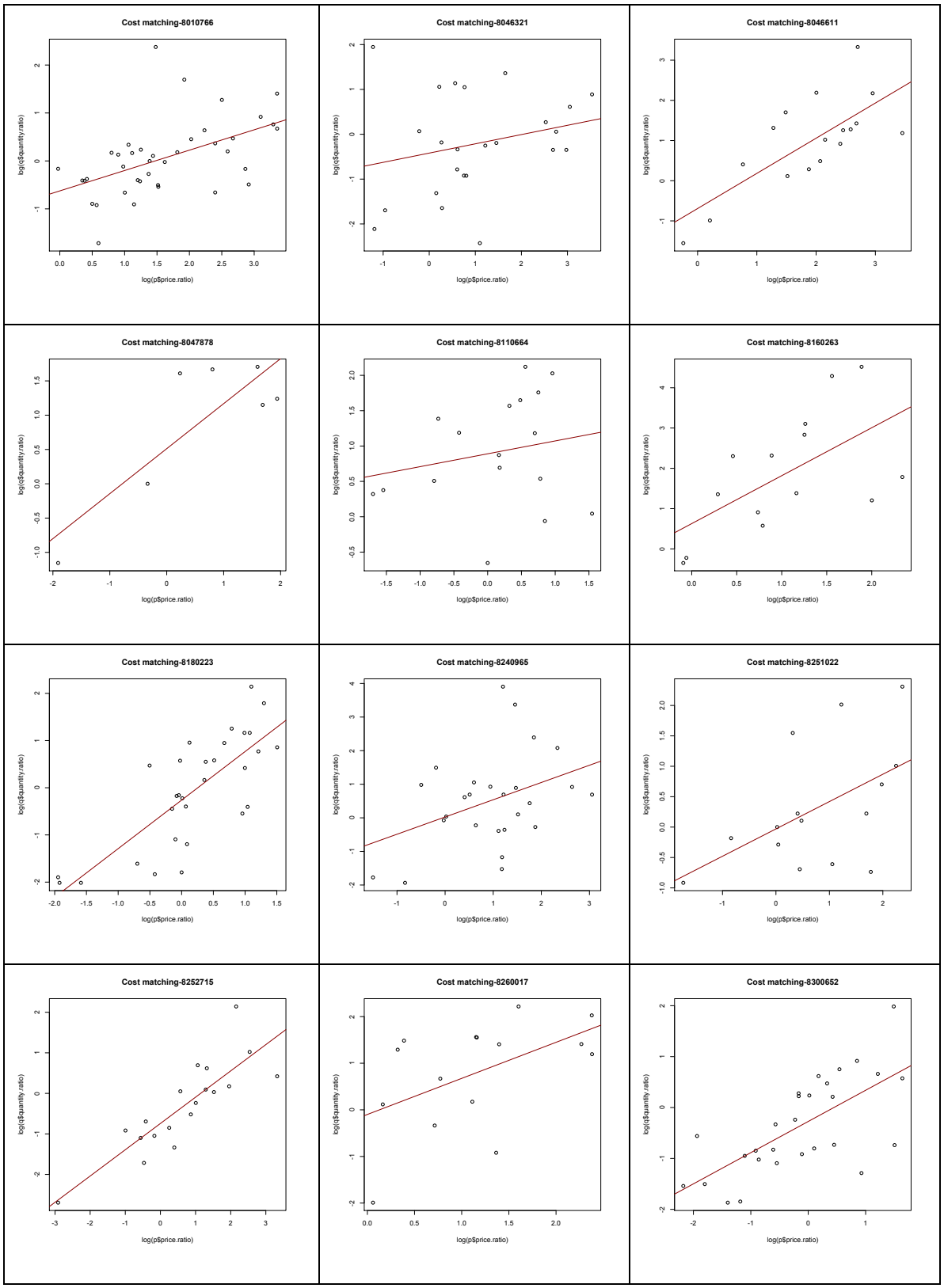


Figure 5.5 Cost matching analysis for fast-moving consumer goods (grouped by four products)

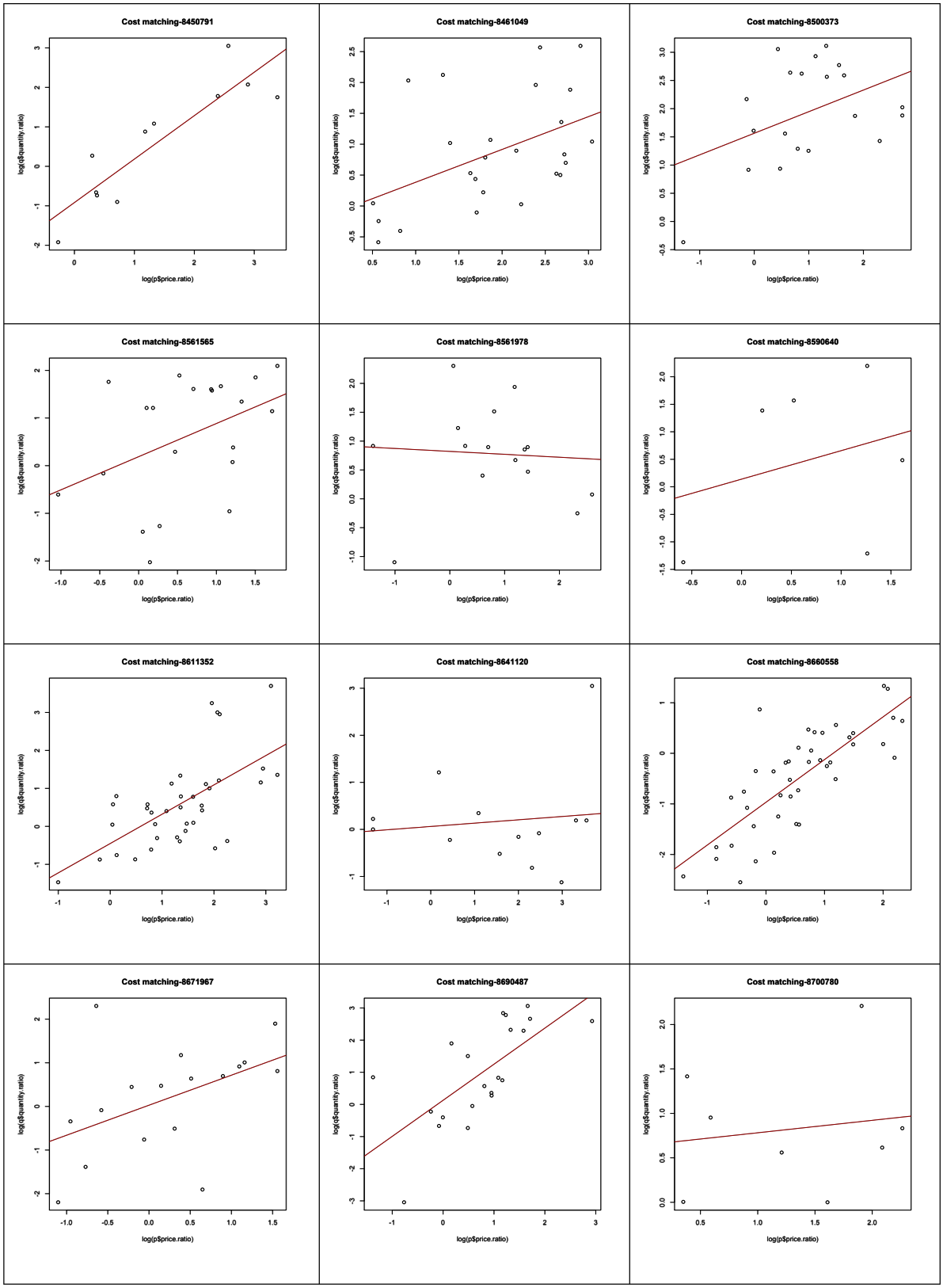


Figure 5.5 Cost matching analysis for fast-moving consumer goods (grouped by four products) (cont'd)

5.4.3 Probability matching analysis

Probability matching analysis discusses how consumers maximise. As this research applies individual analysis, it should be emphasised that the data points tend to be scattered rather than clustered vertically, as shown by the aggregate analysis. The data points, however, can still seen to be either on the right or left of the 0.5 mark to determine how the consumers maximise. Some consumers can be seen as maximising their returns, by purchasing the small brands in their repertoire most often. In this case, the data points on the graphs are found to the right of 0.5. This is in accordance with the behavioural economics approach founded by Herrnstein and Loveland (1975). Other buyers, however, consistently purchase big brands that are more expensive brands or even the most expensive brands of their repertoire more often than the small ones, implying relative indifference towards the price differentials. These buyers, in reality, do not maximise solely on monetary values but informational benefits (taste, quality, or satisfaction) that are often offered by big brands. As discussed in previous sections, in this case, the data points in the graphs are located to the left of the mid-point 0.5. Some consumers' buying patterns are indeed found to lie both to the left and the right of 0.5, indicating that their price sensitivity changes on a weekly basis. It has been suggested, previously, by Foxall et al. (2004) that these consumers maximise some combination of utilitarian and informational reinforcement. The R^2 values range from 0.01 to 0.71 and most of them are low demonstrating the poor fit of the regression models. This may explain the diverse and inconclusive observations of the maximisation patterns.

Panel No	R^2	Beta	Intercept
8010766	0.24	-3.18	0.70
8046321	0.00	-1.09	0.14
8046611	0.58	-6.14	1.99
8047878	0.68	-3.36	2.16
8110664	0.05	-0.87	1.32
8160263	0.38	-6.95	3.83
8180223	0.60	-4.85	2.13
8240965	0.12	-2.81	1.39
8251022	0.18	-2.20	1.08
8252715	0.72	-3.74	1.08
8260017	0.22	-4.61	2.01
8300652	0.45	-2.94	1.19
8450791	0.84	-7.71	2.59
8461049	0.19	-4.03	1.49
8500373	0.24	-2.53	2.71
8561565	0.12	-3.15	1.76
8561978	0.00	-0.09	0.82
8590640	0.10	-2.65	1.42
8611352	0.33	-4.31	1.62
8641120	0.00	-0.01	0.18
8660558	0.61	-4.18	1.11
8671967	0.16	-2.96	1.52
8690487	0.45	-5.73	2.94
8700780	0.02	-0.74	0.10

Table 5.17 Probability matching analysis for fast-moving consumer goods (grouped by four products)

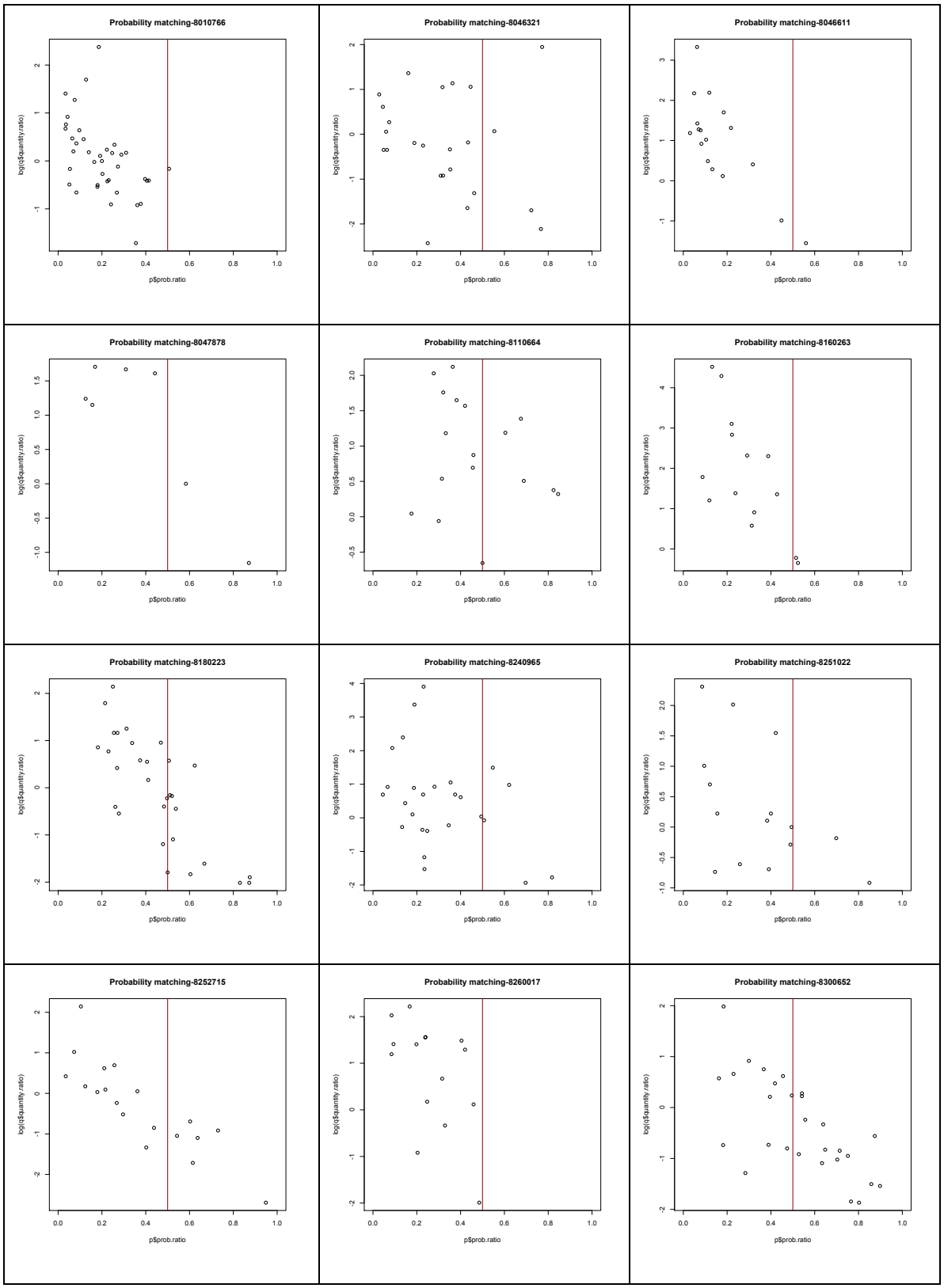


Figure 5.6 Probability matching for fast-moving consumer goods (grouped by four products)

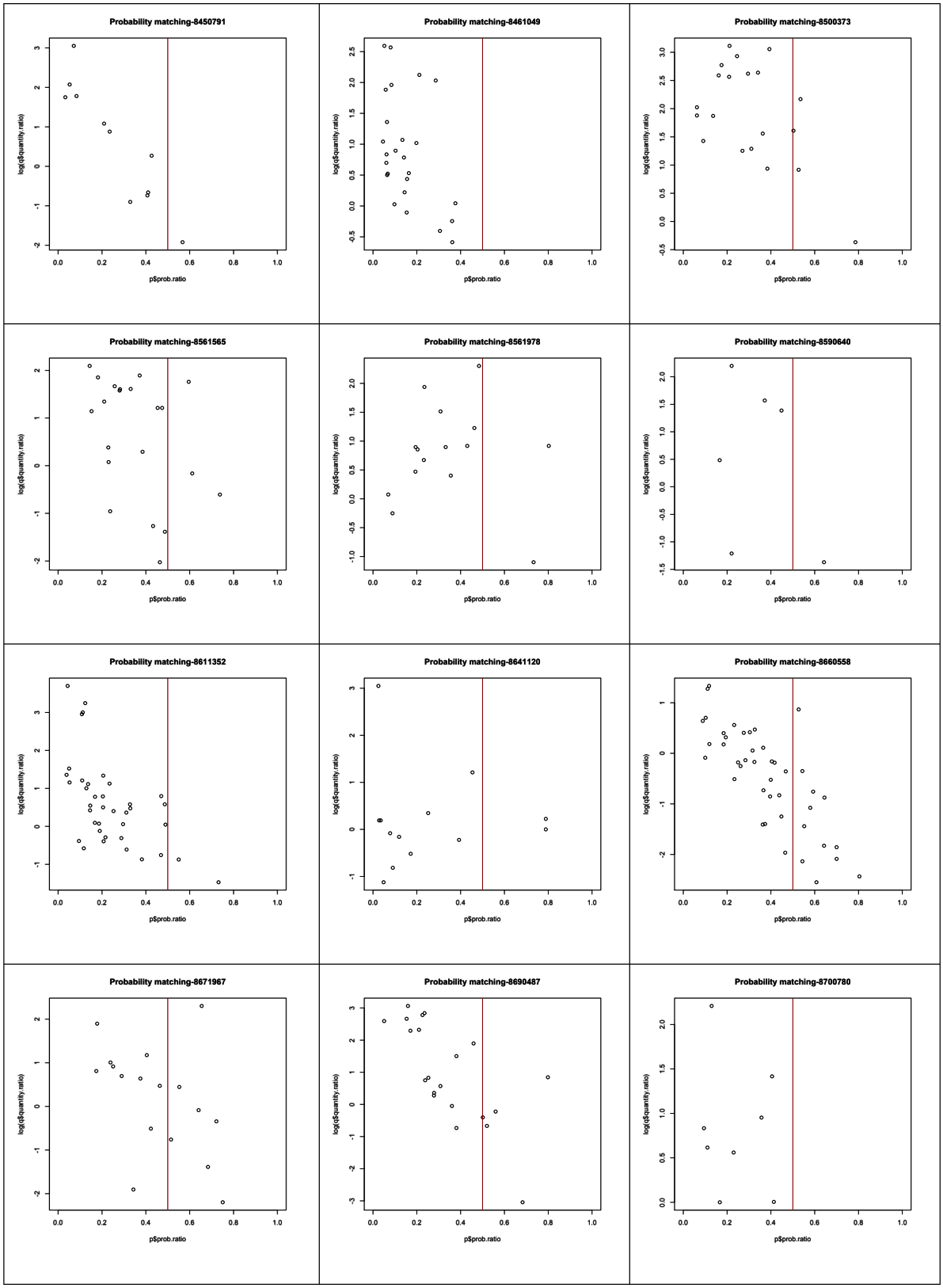


Figure 5.6 Probability matching for fast-moving consumer goods (grouped by four products) (cont'd)

5.5 Overall Price Elasticities (Linear demand elasticities)

5.5.1 Simple version

	p	R^2	Beta (b)	Intercept (a)
Baked beans (big brands)	0.000	0.290	-0.741	0.161
Baked beans (small brands)	0.000	0.118	-0.428	0.724
Biscuits (big brands)	0.000	0.371	-0.569	0.277
Biscuits (small brands)	0.000	0.421	-0.508	0.328
Fruit juice (big brands)	0.000	0.196	-0.249	1.686
Fruit juice (small brands)	0.000	0.388	-0.396	1.276
Spreads (big brands)	0.000	0.164	-0.383	1.055
Spreads (small brands)	0.000	0.266	-0.580	0.607

Table 5.18 Overall price elasticities (simple model)

Overall price elasticities are calculated for the eight brands groups, two for each product category, fitting Equation 16 (Log Quantity = a + b log Price) to all data points from all consumers. To calculate the Equation's parameters, values of quantity and price are divided by the obtained average for each consumer. In doing this, parameters from different products, which differ with respect to absolute values and ranges of quantity and price, become comparable. Thus, the amount bought and price paid on each shopping occasion for each consumer, divided by their corresponding average (for each consumer in each category), are used in the equation.

Results show all the regression analyses are significant ($p \leq .005$) and the values of R^2 vary from .118 to .421, suggesting that there are differences between the two brand groups for each product category in terms of the goodness of fit of the model. The values of a, the intercept, are close to zero and positive, indicating that at the average price of the category (i.e., log price equal to zero) consumers tend to buy a little more than the average quantity. Elasticity coefficient estimates, b in Equation 16, are all negative, indicating an inverse relationship between price and quantity demanded, as predicted by consumer demand theory. Elasticity coefficients with the absolute value of less than one also show that demand in the eight groups is inelastic; that is, increases in prices are accompanied by proportionally smaller decreases in quantity demanded.

Elasticities between big brand and small brand groups for each product category are quite similar, meaning that there is little difference in term of the quantity bought if both big brand and small brand groups decide to apply a price promotion strategy. The simple version of the overall price elasticity has a poor value of R^2 indicating that the price model offers little explanation of the variability of the response data. Hence, the complex model of elasticity that takes into account not only price as adverse consequences of purchasing but also utilitarian and informational benefits of purchasing should be examined thoroughly.

5.5.2 Complex version

The overall elasticities may result from a combination of intra- and inter-consumer elasticities or intra- and inter- brand elasticities (Olivera-Castro et al. 2008). There are complex relations between the quantity consumers buy of a given product and changes in its price. Intra- and inter-consumer elasticities can each be subdivided into intra-brand and inter-brand elasticities. Inter-brand elasticity can be further subdivided into the three variables that, according to the BPM, can influence consumer choice; that is, regular price, utilitarian benefits, and informational benefits. When varying within brands - that is, intra-brand elasticity - the price would be the only differential consequence for buying larger or smaller quantities, because utilitarian and informational benefits are constant. However, changes in prices within a brand can be related to changes in intra- and inter-package sizes.

In general, intra-consumer intra-brand elasticity indicates that consumers buy larger quantities of a given brand when the price of a given package is lower (intra-pack) and when switching to a larger package size that usually offers a lower price (inter-pack). Intra-consumer inter-brand elasticity shows that consumers tend to buy larger quantities when purchasing brands that are cheaper than the average brand price they pay, and when buying brands that offer higher utilitarian or informational benefits than they usually get.

Inter-consumer intra-brand elasticity indicates that consumers who buy a given brand cheaper due to a price reduction of the package size (intra-pack) or package size switching (inter-pack), on an average, tend to buy larger quantities than those who pay more, on an average, for the same brand. Inter-consumer inter-brand elasticity reveals that consumers who buy cheaper brands or more differentiated

brands concerning either utilitarian or informational benefit, on an average, tend to buy larger quantities (Olivera-Castro et al. 2008).

Equation 17 of multiple regressions is used to measure the inter- and intra-components:

$$Log Q_{cpbo} \tag{17}$$

$$= \beta_1 + \beta_2 Log\left(\frac{P_{cpbo}/P_{pb}}{\left(P_{cpbo}/P_{pb}\right)_c}\right) + \beta_3 Log\left(\frac{P_{pb}/P_b}{\left(P_{pb}/P_b\right)_c}\right) + \beta_4 Log\left(\frac{P_b}{PBC_c}\right)$$

$$+ \beta_5 Log\left(\frac{U_b}{UB_c}\right) + \beta_6 Log\left(\frac{I_b}{IB_c}\right) + \beta_7 Log\left(\frac{P_{cpbo}}{P_{pb}}\right)_c + \beta_8 Log\left(\frac{P_{pb}}{P_b}\right)_c$$

$$+ \beta_9 Log(PBC_c) + \beta_{10} Log(UB_c) + \beta_{11} Log(IB_c)$$

	p	R^2	b2 (IacIabIap)	b3 (IacIabIep)	b4 (IacIebPr)	b5 (IacIebUt)	b6 (IacIebIn)	b7 (IecIabIap)	b8 (IecIabIep)	b9 (IecIebPr)	b10 (IecIebUt)	b11 (IecIebIn)
Baked beans (big brands)	0.000	0.568	-0.333	-1.541	-0.486	**-0.252**	*0.075**	*-0.063**	-2.066	***0.032****	**-0.500**	**-0.605**
Baked beans (small brands)	0.000	0.141	-0.191	-0.543	-0.287	0.518	**-0.048**	-0.306	-0.753	-0.423	*0.064**	***-0.019****
Biscuits (big brands)	0.000	0.453	-0.206	-0.789	-0.570	0.318	0.086	-0.186	-0.876	-0.555	0.468	0.353
Biscuits (small brands)	0.000	0.453	-0.129	-0.648	-0.539	*0.052**	**-0.031**	-0.198	-0.680	-0.532	***-0.012****	**-0.041**
Fruit juice (big brands)	0.000	0.815	-0.026	-1.040	-0.296	0.444	0.210	**0.035**	-1.089	-0.194	0.238	0.270
Fruit juice (small brands)	0.000	0.585	*-0.028**	-0.806	-0.611	*0.081**	*0.020**	**0.068**	-0.739	-0.572	0.307	0.045
Spreads (big brands)	0.000	0.368	-0.037	-0.953	-0.346	**-0.438**	0.396	***0.036****	-1.025	-0.421	**-0.494**	0.385
Spreads (small brands)	0.000	0.307	-0.251	-0.653	-0.535	**-0.242**	0.060	-0.462	-0.677	-0.660	**-0.141**	0.136

Note: * and *italic*: insignificant statistically

Bold: unexpected outcome

Table 5.19 Overall elasticities (complex model)

As table 5.19 appears to be very complicated, it is important to give examples of how to interpret these columns of numbers from b2 to b11. The findings of biscuits big brand group are shown below.

- (b2) IacIabIap: consumers would increase 1 unit of quantities they buy of a given big brand of biscuits if the price of a given package decreases 0.206 units due to price promotion.

- (b3) IacIabIep: consumers would increase 1 unit of quantities they buy of a given big brand of biscuits if they decide to switch to a larger package that offers a lower price by 0.789 units than others.

- (b4) IacIebPr: consumers would increase 1 unit of quantities when buying big brands of biscuits that are cheaper than by 0.570 units the average brand price they pay.

- (b5) IacIebUt: consumers would increase 1 unit of quantities when buying big brands of biscuits that offer higher utilitarian benefits by 0.318 units than they usually get.

- (b6) IacIebIn: consumers would increase 1 unit of quantities when buying big brands of biscuits that offer higher informational benefits by 0.086 units than they usually get.

- (b7) IecIabIap: consumers who buy a given big brand of biscuits cheaper by 0.186 units than others due to a price reduction of the package size, on an average, would buy larger quantities by 1 unit than those who pay more, on an average, for the same

brand.

- (b8) IecIabIep: consumers who buy a given big brand of biscuits cheaper by 0.786 units than others due to package size switching, on an average, would buy larger quantities by 1 unit than those who pay more, on an average, for the same brand.

- (b9) IecIebPr: consumers who buy cheaper brands of biscuits big brand group by 0.555 units than others, on an average, would buy larger quantities by 1 unit than other consumers.

- (b10) IecIebUt: consumers who buy more differentiated brands of biscuits big brand group in terms of utilitarian benefits by 0.468 units than others, on an average, tend to buy larger quantities by 1 unit than other consumers.

- (b11) IecIebIn: consumers who buy more differentiated brands of biscuits big brand group in terms of informational benefits by 0.353 units than others, on an average, tend to buy larger quantities by 1 unit than other consumers.

Estimated coefficients in Equation 17 are shown in the table 5.19. As can be seen, 69 of 80 estimated parameters are statistically significant at the 0.05 level, suggesting that, in general, the individual variables are associated with changes in the quantity consumers buy. Price coefficients (i.e., b2, b3, b4, b7, b8, and b9) are negative in 44 out of 48 cases and significant in 44 out of 48 cases. This corroborates the expectation that the quantity consumers bought tends to decrease with increases in price, both within and across brands and within and across consumers.

As for the sizes of coefficients, in all eight regressions, intra-brand inter-pack

coefficients vary from 0.543 to 2.066 and are the largest ones in both intra-consumer (b3) and inter- consumer (b8). This indicates that the changes in the quantity consumers buy are mostly related to the changes in brand price due to switching across package sizes. Moreover, five coefficients are over one and belong to the big brand groups (baked beans, fruit juice, and spreads) meaning that the demands for big brands in case of package size switching are very elastic (the change in the quantity bought is greater than that in price). The coefficients for biscuit big brand group are also very high (0.789 and 0.876). Therefore, consumers tend to increase considerably their amount of purchases when big brands make large package size offers.

Inter-brand price coefficients vary from 0.032 to 0.611 and are the second largest coefficients in both intra-consumer (b4) and inter-consumer (b9), in 12 out of 16 cases. These results indicate that consumers tend to buy smaller quantities when buying more expensive brands and that consumers who buy, on an average, smaller quantities tend to buy, on average, more expensive brands. In addition, most of the inter-brand price elasticities (b4 and b9) of big brand groups are smaller than those of small brand groups. This means the demand for cheaper big brands is less elastic than that for cheaper small brands.

Intra-brand intra-pack coefficients vary from 0.026 to 0.306 and are the smallest (or second smallest) among price coefficients in both intra-consumer (b2) and inter-consumer (b7), in 10 of 16 cases, indicating that consumers have a slight tendency to buy larger quantities of a given package of a given brand when its price is lower than its average price. This may come from the fact that the price promotion of a given package can easily go unnoticed. In addition, most of the elasticities for small

brand groups are larger than those for big brand groups, showing that the consumer takes price reduction more seriously into consideration when purchasing small brands than when buying big brand names.

All but five informational coefficients (i.e., b6 and b11) are positive, and 13 out of 16 are significant, suggesting that consumers increase the quantity they buy when purchasing brands offering higher informational benefits and that this occurs within and across consumers. Utilitarian coefficients (i.e., b5 and b10) tell the same story. 9 out of 16 of them are positive, and only four are insignificant. These results suggest that the quantity consumers buy depends on the positive influence of utilitarian benefits.

The sizes of utilitarian coefficients are in the same range with informational coefficients, and these two types of coefficients are expected to be smaller than price factors. Utilitarian coefficients (b5 measured across consumers and b10 measured within consumer) vary from 0.012 to 0.500 while informational coefficients (b6 measured across consumers and b11 measured within consumer) range from 0.019 to 0.605. These suggest that the tendency to buy larger quantities when buying brands offering higher utilitarian benefits and informational ones. The sizes of utilitarian and informational coefficients for big brands groups are also larger than those for small brands groups. This means that consumers tend to consider big brands as more differential brands in terms of both utilitarian and informational reinforcement and desire increased quantities when the big brands offer greater utilitarian and informational benefits.

5.6 Essential values (Non-linear demand elasticities)

Tables 5.20 and 5.21 show nonlinear regression results in two scenarios: (1) without and (2) with utilitarian and informational reinforcement, both presenting the a value, constant k value for each product, Q_0, the unit consumption when the price is in minimum value, the predictive adequacy R^2, and the significant value of the F test.

	a	k	Q_0	R^2	p
Baked beans (big brands)	0.002030	4.840	2,020	0.483	0.000
Baked beans (small brands)	0.002723	4.840	1,115	0.802	0.000
Biscuits (big brands)	0.001229	6.109	533.5	0.481	0.000
Biscuits (small brands)	0.002657	6.109	550.1	0.962	0.000
Fruit juice (big brands)	0.000150	2.590	1,204	0.433	0.000
Fruit juice (small brands)	0.001031	2.590	1,319	0.925	0.000
Spreads (big brands)	0.003566	4.451	1,192	0.332	0.000
Spreads (small brands)	0.003902	4.451	965.8	0.894	0.000

Table 5.20 Non-linear demand elasticities without Utilitarian and Informational Reinforcement

	$a1$	$a2$	$a3$	k	Q_0	R^2	p
Baked beans (big)	0.304716	0.070800	0.305256	4.840	1,080	0.533	0.000
Baked beans (small)	0.403596	0.067144	0.000840	4.840	1,006	0.803	0.000
Biscuits (big)	0.002083	0.033405	0.047194	6.109	359.0	0.495	0.000
Biscuits (small)	0.002371	0.000557	0.000574	6.109	540.9	0.962	0.000
Fruit juice (big)	0.000803	0.000812	0.049290	2.590	1,054	0.448	0.000
Fruit juice (small)	0.001298	0.000547	0.047282	2.590	1,223	0.926	0.000
Spreads (big)	0.003338	0.000345	0.251107	4.451	743.9	0.354	0.000
Spreads (small)	0.004682	0.000247	0.098898	4.451	818.6	0.902	0.000

Table 5.21 Non-linear demand elasticities with Utilitarian and Informational Reinforcement

As can be seen in table 5.20, all regressions are significant at the 5% level ($p < .05$). The k values pre-determined by the range of datasets for each product category are 4.840, 6.109, 2.590, and 4.451 for baked beans, biscuits, fruit juice, and spreads, respectively. The a value ranges from 0.000150 in the big brand groups for fruit juice to 0.003902 in the small brand groups for spreads. Big brands are believed to create smaller a value than small brands. For example, the a value of biscuits in the big brand groups of 0.001229 is lower than 0.002657, the a value of biscuits in small brand groups. Besides, Yan et al. (2012) conclude that the smaller the a value, the smaller the elasticity of demand. Therefore, consumers' price sensitivity for big brands is lower than that for small ones. This finding is in line with those in previous sections of this chapter. Last but not least, considering the a value varies inversely with essential value, i.e., is the reciprocal of essential value, it is clear that the essential value of the big brand groups is higher than that of the small brand groups across all four products. The finding, in summary, indicates that small brand groups obtain higher a value, a bigger elasticity of demand function, and a smaller essential value of commodities than big brand groups.

The main reason for running another non-linear regression that incorporates utilitarian and informational benefits is to test whether these kinds of reinforcement exert any impact on essential value across the product categories and brand groups. It is important to note that big brands are thought to provide more utilitarian and informational rewards than small brands do. The table 5.21 shows that significant values of *F* tests are all less than 0.05, indicating that all regressions were significant at the 95% level. Similar to the regression models without utilitarian and

informational reinforcement, the k values have been determined by the range of datasets for each product, which are 4.840, 6.109, 2.590, and 4.451 for baked beans, biscuits, fruit juice, and spreads, respectively.

There are three parameters associated with the essential value in these regressions that are (1) $a1$ value is the rate of price change, (2) $a2$ value represents the change in utilitarian benefits, and (3) $a3$ parameter stands for informational variations. Firstly, the $a1$ value ranges from 0.000803 in the big brands group for fruit juice to 0.004682 in the small brands group for spreads. Secondly, the $a2$ parameter for baked beans (big brands), baked beans (small brands), biscuits (big brands), biscuits (small brands), fruit juice (big brands), fruit juice (small brands), spreads (big brands), and spreads (small brands) are 0.070800, 0.067144, 0.033405, 0.000557, 0.000812, 0.000547, 0.000345, and 0.000247 respectively. Thirdly, the $a3$ value ranges from 0.000574 for biscuits (small brand group) to 0.305256 for baked beans (big brand group). Bearing in mind that the $a1$ value varies inversely with essential value whereas $a2$ and $a3$ are positively correlated with essential value, the results imply that big brand groups have a lower price elasticity of demand, but a higher variation in terms of utilitarian and informational reinforcement, and, as a result, bigger essential value than small brand groups. The findings, thus, do support earlier study results (Yan et al., 2012) where brands with the lowest combination of utilitarian and informational reinforcement have smaller essential values than those with the highest combination of utilitarian and informational benefits.

Chapter 6: Discussion and Conclusion

6.1 Patterns of Brand Choice and Market

This thesis follows previous studies (cf. Foxall & Schrezenmaier, 2003) using Ehrenberg's law-finding approach to assessing the relevance of behavioural economics analyses to the study of consumer behaviour. This is also an attempt to establish and analyse the patterns of big and small brand groups with the focus on testing the dataset's generalisation and accuracy. Firstly, the double jeopardy law can be confirmed that is in line with the findings of Foxall and Schrezenmaier (2003), as the penetration rate and the purchasing frequency of small brands are lower than those of big ones. It is believed that the penetration rate can be expressed via the number of buyers whilst the number of purchases and the average number of purchases can be used as a mean of the purchasing frequency (Ehrenberg, 1993; Uncles et al., 1995). Secondly, Pareto's rule of 80:20, meaning there exists a small number of big and dominating players in the market, is supported in this study. This is against recent Ehrenbergian's studies such as Sharp et al. (Sharp, 2010; Romaniuk & Sharp, 2016) arguing that the rule seems exaggerated and the statement that big brands accounted for 20% of the total brands enjoy 50% market shares is best described of the phenomenon. Combining this observation with the double jeopardy rule, it is said that the market is clearly in favour of big names. Thirdly, most customers, through their tendency to duplicate purchasing across all four of product categories, can be named as multi-brand buyers. Bass (1984) and Ehrenberg (1993) emphasise this multi-brand buying (or brand switching) as the natural order of consumer choice behaviour. This

study's result also supports the argument made by Foxall and Schrezenmaier (2003) that most buyers are not 100% loyal to any single brand in a product category, and tend to purchase several brands of the same product on the same shopping occasion.

Although there are only four grocery goods in this current studies, they seem to have different patterns in terms of penetration levels, purchasing frequencies, and other measures used in Ehrenberg-type work. For example, whilst baked beans have lower penetration levels than others, there seem to be more sole buyers, and thus may well affect the number of buyers who choose both big and small brands. On the other hand, biscuits are the typical example for multi-brand buying behaviour. This may come from the fact that there is fierce competition with numerous brands. The other two product categories, fruit juice and spreads, are quite similar concerning penetration rate and purchasing frequencies and lie in the middle between the two extreme ends, baked beans and biscuits. The comprehensiveness of the study, therefore, is achieved thanks to the particular patterns of these product categories. The focus on product groups in the study is also different from Ehrenberg's work that mainly concentrates on particular brands. However, most of the observations at the brand level are also clearly seen under analysis on the products. For example, similarly to the cases of biscuits and baked beans above, brands with excessively high or low results for loyalty-related aspects can easily be determined (Bass, 1984; Ehrenberg, 1993; Uncles et al., 1995). The behavioural reason for this low/high loyalty can also be identified, e.g., the high level of loyalty is often a result of a greater-than-average rate of brand purchasing.

Opposed to multi-brand buying, exclusive brand buying in this study appears

to deserve more attention; that is, it may be generally low but still varies across product classes and brand groups. The size of the current dataset is sufficient to make conclusions about consumer loyalty based on sole brand buying behaviour such as the loyalty pattern demonstrated in the purchase of baked beans compared with that of the other goods tested. Moreover, this thesis has shown evidence for the idea that buyers consider brands within one product category and within one brand group to be functionally similar, with the former also being found in the research of Foxall and Schrezenmaier (2003). This functional similarity is at the very heart of the work of Ehrenberg and his co-workers, in which it plays a vital role in determining the quality of a particular brand. Bearing it in mind, Ehrenberg discredits any marketing tools that focus on improving customer loyalty or sales figures like branding or price promotion. These activities, according to him, barely influence the company's market share and are easily copied by competitors, and thus they are not worth considering (e.g. Ehrenberg, 1991; Ehrenberg et al., 1994; Ehrenberg et al. 1995; Ehrenberg & Uncles, 1999; Sharp, 2010; Romaniuk & Sharp, 2016). Ehrenberg's point of view appears to serve better for big brand names who are not concerned too much when losing several percentage points of market share because in the long term all market patterns are believed to remain the same with unsegmented markets. For managers of small brands, they simply cannot afford those kinds of loss due to financial restraint and achieving a small increase in terms of market share can be considered a remarkable victory.

6.2 Matching Analyses

6.2.1 Classical Matching

Interestingly, there are striking differences between the results of the two amount matching analyses. At the aggregate level, the results in Chapter Five show strong support for a matching relationship as the betas show slight and ignorable undermatching for biscuits and near-perfect matching for the other three products. The result is in line with the "double jeopardy law" of Ehrenberg, which implies the matching pattern of consumer choice. As a result, there are no reasons to cast doubt on the rule of matching overall. On the other hand, at the individual level, undermatching is found in all of 24 cases. The "fallacy of composition", stating that if something is true for an individual, it is not necessarily a fact for others as a group and in reverse (Begg, Fischer and Dornbusch, 1997), can be seen here. Undermatching happens mostly as a result of poor discrimination between available alternatives or of an inconsistency of preference (Baum, 1974). Poor discrimination between brands may happen if two packaging labels are so similar that consumers can easily pick up the wrong one when rushing shopping. However, this might not be the case for the 24 consumers. They are chosen because they buy both big brand and small brand names in all of four different products over a year, meaning it is very likely that they are well aware of their brand choices after doing research on brand differences in terms of price and utility outcomes.

Undermatching, thus, stems from the inconsistency of preference. They all are multi-brand buyers, that is, they do not show any constant preferences for either big

brands or small brands over time. As discussed previously, they may select big and small brands for different shopping purposes. The inconsistency of preference is also expressed through bias. Bias has been defined as the case when an individual consistently prefers one response over another, regardless of the relative sizes of the two schedules in operation (Baum, 1974). At both levels of analysis, the intercept values in a logarithm form, representing bias, are very close to zero in all cases. This means that not only the 24 chosen consumers but most of the households in the dataset do not have any significant preferences for either big or small brands. In other words, while they can be said to make a number purchases of big brand names, they also buy "relatively cheaper, less differential" ones very often. This may come from the fact that fast-moving consumer goods markets are highly competitive with a vast variety of choices. In fact, without bias of brands, there is no consumer brand loyalty, and thus the idea behind the concept of branding is to create bias. This tendency of bias is actually in line with Ehrenberg's conclusion that buyers often do not make enough purchases to prove their loyalty to the brands, and even sole buyers are not often heavy ones of their chosen brand (1972; 1991).

For the discussion of substitutability of brands, as the very-nearly perfect matching at the aggregate level found, the analysis undertaken here does confirm that big brands and small ones within one product category are indeed substitutes, at least in behavioural terms. This conclusion is very similar to the idea of Ehrenberg that brands within a product class are substitutes due to the similarity of their physical and functional features. As a result, buyers will keep purchasing a brand in their repertoire if it remains the same compared to the average standard of the products in that specific category (cf. Ehrenberg 1972; 1991). There is a different story at the

individual level. The study's findings show that the 24 buyers find big brands and small ones complementary or even independent from one another. Bear in mind that they are only 24 participants selected from a sample of over thousands of households. Therefore, there is no doubt that the view of substitutability between the big brand and small brand group may vary from consumer to consumer. This reflects the wide range of needs of consumers that is easily understood but very difficult to master and thus remains a tough challenge for brand managers. This also reveals the logic behind the idea of developing the brand extension lines: launching a new product is not only time-consuming but also needs a big budget to create brand awareness and to promote the product's benefits.

6.2.2 Cost matching

Once again, the finding of cost matching at the aggregate level is different from that at the individual level. On the one hand, the results of cost matching or relative demand analysis at the aggregate level showing the downward-sloping for all product categories prove the traditional belief in microeconomics that the quantity bought will increase if the price of the product goes down, confirming the substitutability of big brands and small brands as groups. This shows demand for big brands, relative to small brands, is price sensitive, to some extent. As a result, price promotion can be considered as a marketing tool to build up the consumer base. However, as the R^2 values of all regressions are extremely low, the tool may not be a good one. Moreover, it can be seen at the individual level when all of 24 consumers' relative demand analysis shows an upward trend, demonstrating price-insensitivity. These price-insensitive customers are not influenced by the price of a product when

choosing whether or not to buy it. Specifically, when a big brand even increases its product price, the quantity bought does not go down but often increases rather. Similarly, when a small brand reduces the price as a promotion strategy to boost sales, the actual results do not meet their expectation. The reason for this phenomenon might be there is low to no cost when brand switching between fast-moving consumer goods. By switching back and forth, consumers are able to buy both big and small brands in order to achieve their buying purposes in respect to the brands' benefits, quality, and price. This is in line with previous research results claiming that brand choice is also influenced by positive reinforcement such as utilitarian and informational benefits (cf. Foxall 2004; 2017).

6.2.3 Probability matching

In aggregate, it can be seen that buyers maximise by choosing small brand names in the cases of biscuits, fruit juice, and spreads whilst they select big brands as a way to maximise their utility when buying baked beans. These diverse results of probability matching or maximisation analysis raise a question about how and what consumers maximise. In order to answer this question, the integration of behaviour and reinforcements needs to be taken into consideration. In the latter case, for example, consumers seem to take informational reinforcement into consideration as there is no doubt that big brands offer a higher level of product differentiation. In the other three products, consumers maximise reinforcement on each shopping occasion is mainly drawn from the utilitarian rewards or price reduction they receive from these particular purchases. However, in all product categories, the data points do not completely lie on either side of the line of 0.5. That is to say, the consumer may have

a set of big brands based upon informational benefits and also be a “maximiser” by choosing the cheapest, smallest brands on each shopping trip with the simple purpose of achieving some degree of utilitarian reinforcement. At the individual level, there are also diverse and inconclusive results of the maximisation patterns. Therefore, it is believed that, in the context of fast-moving consumer goods, consumers maximise a unique combination of features and reinforcements consisting of price and a personal combination of utilitarian and informational benefits such as the appeal and convenience of the packaging design, or concerns about promotions, taste or health issues. This conclusion, as a result, disagrees with the traditional theory of overall maximisation that focuses only on utilitarian benefits found in animal experiments while rooting for a moment-to-moment maximisation that takes into consideration both utilitarian and informational reinforcement.

Traditionally, researches on maximisation are usually based on results from non-human experiments. However, maximization in human subjects is much more complicated than in animal subjects. Specifically, in the case of multi-brand purchasing, buyers on a single shopping occasion are physically capable of buying more than one brand in the same product class. However, when given several options, animal subjects in an experimental situation are physically capable of making only one response at a time. Therefore, the findings of the study on maximisation are really valuable in terms of theoretical and methodological implications.

6.3 Demand Analyses

6.3.1 Linear Demand Elasticities

The results of relative demand analysis showing a downward-sloping line for all product categories and those of the simple version of demand elasticities prove the traditional belief in microeconomics that the quantity bought will increase if the price of the product goes down. However, the complexity of maximisation reveals that consumers' buying behaviour depends not only on price changes but also on utilitarian reinforcement and informational reinforcement (Foxall, 2004; 2017). Therefore, the complex version of demand elasticities that take into account both kinds of reinforcement should be examined closely.

The current findings show that, when routinely buying grocery products, customers reveal at least three choice patterns and each of these patterns was observed in eight product classes examined here. First, the quantity consumers buy tends to decrease with increases in price, both within and across brands and within and across consumers and the changes in the quantity consumers buy are mostly related to the changes in brand price due to switching across package sizes (i.e., intra-brand inter pack elasticity). More specifically, for example, the demands for big brands in case of package size switching are very elastic (the change in the quantity bought is bigger than the change in price) and thus consumers tend to increase considerably their amount of purchases when big brands make large package size offers. However, in overall, the demand for cheaper big brands is less elastic than that of cheaper small brands. This may come from the fact that consumers take price reduction into consideration more seriously when purchasing small brands than they do when buying big brand names.

Consumers, secondly, usually purchase larger quantities of brands

incorporating higher utilitarian rewards (i.e., utilitarian inter-brand elasticity). Lastly, they have a tendency to buy larger amounts of brands that offer higher informational reinforcement (i.e., informational inter-brand elasticity). Big brands, that often provide higher levels of utilitarian and informational benefits, are said to have higher regular prices than small ones offering lower levels of such reinforcement. As a result, the current findings do not support Gupta's conclusion (1988), which argues that buyers have a tendency to purchase smaller quantities of brands which are normally more expensive. In fact, the sizes of utilitarian and informational coefficients for big brands groups are also larger than those for small brands groups. This means that consumers tend to consider big brands as more differential in terms of both utilitarian and informational reinforcement and are keen to increase quantities bought when the big brands occasionally offer greater utilitarian and informational benefits. This tendency of big brand users to buy mostly brands that provide high levels of both informational and utilitarian reinforcement is believed to be in accordance with two common phenomena that have been discussed in the relevant literature. The first one is "double jeopardy effect", showing the fact that users of big brands are more loyal (i.e., higher average purchasing frequency) to these big brands than are users who often buy small brands, which usually provide less informational and utilitarian reinforcement (cf. Ehrenberg, 1988; Ehrenberg et al., 1990; Uncles et al., 1995; Sharp, 2010; Romaniuk & Sharp, 2016). The second notion is the asymmetrical effect of price promotions, concluding that price promotions of big brands attract consumers of small brands more than similar promotions of small brands attract big brands lovers (cf. Blattberg and Wisniewski, 1989).

The discussion of utilitarian and informational benefits indicates the crucial

role of the BPM as a conceptual framework for analysing and elucidating consumer choices. Specifically, Foxall's model arms researchers and practitioners with appropriate methods to understand the relationships between consumer behaviour and situational variables, in which features offered by different brand groups are taken into account (Foxall, 2004; 2017). Foxall points out one outstanding merit of the BPM approach is that, instead of assuming that consumer maximisation is subjective, it encourages the investigation of the impact of actual features of brands and products that have been proven to influence buying and consuming activities. According to the model, consumer behaviour is affected by aversive consequences (price), utilitarian reinforcement, and informational benefits (Foxall, 1999; 2017). In other words, consumers are suggested to maximise utilitarian and informational benefits whilst minimising aversive consequences like spending money (Foxall 2004; 2017).

6.3.2 Essential values

The findings show that either increases in utilitarian reinforcement or informational benefit lead to increases in essential value; these observations, in fact, are in line with the results of Yan et al. (2012). Considering the a value varies inversely to the essential value, it indicates that small brand groups obtain higher a value, bigger elasticity of demand function, and smaller essential value of commodities than big brand groups. The results corroborate earlier study results (Yan et al., 2012; Olivera-Castro, 2011) where brands with the lowest combination of utilitarian and informational reinforcement have smaller essential value than those with the highest combination of utilitarian and informational benefits. The finding, therefore, supports the conclusion of Yan and her colleagues (2012) that brand

groups, formed by different informational and utilitarian rewards, attract consumers by providing various combinations of functional and symbolic benefits. Differences in essential value between big brand and small brand groups thus indicate that levels of purchasing behaviour across brand groups vary according to the pattern of the benefits perceived by users. This result supports the above discussion and the findings of Foxall et al. (2012) stating that consumers maximise their utility not only by spending less money but also by achieving more functional benefits as well as non-functional values from the products or brands.

As explained in the BPM, utilitarian reinforcement is associated with biological satisfaction that is seen to be directly created by the brand itself (Foxall, 2004; 2017). The more attributes a brand, either big or small, offers, the larger its essential value, and the smaller its price elasticity. In contrast, it is thought that informational rewards are nonbiological satisfactions mediated by other people (i.e., family or friends) or via the user's self-appraisal (Foxall, 2004; 2017). The more famous or higher quality (i.e., more differentiated) the brand, the more informational reinforcement the consumer receives, and therefore, the larger its essential value. Thus, buying and consuming big brands, like Heinz in the case of baked beans, which offer higher levels of informational rewards are said to give users extra nonfunctional satisfactions as well as to fulfil their functional wants and needs.

6.4 Further research

Yan et al. (2012) suggest that the role of individual differences should be taken on board. This is the reason why this thesis has important parts studying

individual consumers. The findings appear promising and give researchers food for thought of how to individualise consumer behaviour analysis in the future. Firstly, analyses at the individual level should be taken more into consideration with a better data set in terms of time period. This will help researchers to have more consumers buying both brand groups. This leads to the testing of a new hypothesis that consumers may have low brand loyalty but relatively high brand group loyalty. They may go for the second best option if it offers a great price promotion or belongs to a new product line which provides extra utilitarian or informational benefits.

Secondly, in demand elasticities analyses, each individual transaction is treated as one data point and no specific characteristics of each consumer such as age, social class, working status, or gender, are included for investigation. These demographic differences, however, are able to function as classified criteria for matching analyses and elasticity investigations. An in-depth study at the individual level with a focus on the heterogeneity of demography is more likely to show the preferences of different consumers about the market size or fame of brands. For example, a possible solution is to disaggregate the data by gender or working status and carry out regression analyses on the sub-groups or individuals. In this study, as the dataset is separated into two major subsets: big brand and small brand groups and the utilitarian and informational reinforcement are incorporated into the essential value's model, different consumer subgroups regarding of demographics can be formed for exploration. These analyses can determine whether the impact of price and two kinds of reinforcement on quantity varies according to consumer demographics.

Thirdly, individual opinions on utilitarian and informational reinforcement of

bought products and brands should be collected via the data panel in the future by follow-up questionnaires. In the current elasticities analyses (both elasticity of demand and essential values), using a different questionnaire like MKQ as a proxy of consumers' assessment of commodities' reinforcement could lead to serious problems of validity. With the use of the follow-up questionnaires, future studies can take into account buyers' individual characteristics and their specific impact either on utilitarian reinforcement when extra product attributes are added or on informational rewards as decided by their own recognition of the quality and reputation of a particular product/brand.

Further work should pay more attention to the comparison between big brand and small brand groups in open and closed settings. Different consumer situations can be used as a classification criterion to test the impact of the independent variables (i.e., price, utilitarian and informational reinforcement) on the dependent variable (i.e., quantity) within and across different brand groups. Brand choice and store choice need to be examined together as consumers often have to make buying decisions based on the brand's price, the product's quality, and the store's location. Another area for further examination is product category and type. As discussed before, the current dataset only has four grocery goods but still provides conflicting and striking results such as consumers maximise by choosing big brands in the case of baked beans but decide to buy cheap brands that usually give low utilitarian and informational benefits in the other cases. This thesis shows that the influence of these independent variables varies across the nature of the products. Further research should expand the range as well as the type of products examined including goods and services beyond routine grocery products to provide a deeper understanding of the

impact of the above variables on the consumer choice of different kinds of the product classes.

In fact, the type of products that is grocery goods is believed to produce enough data points for the analyses, at least at the aggregate level, due to its high frequency of purchase. In studies in the future, if the usage of products changes into luxury, durable goods, or services, that have relatively lower buying frequency, the research methods are said to be based on ones that do not generate the data point loss like the demand elasticities models rather than the traditional matching approach. Besides, it is believed that for those high price product categories, consumers' budget could be a major concern. Therefore, the data collection should include information about income. The economic demand theory can be tested further with the focus on income effects and indifference curves. These future studies, hence, will be in line with some previous animal experiments in behavioural economics such as Kagel et al.'s investigation (1980) on price changes for essential and non-essential commodities under the impact of given income.

The findings of overall elasticity of demand in this study lead to a call for examination of other elements than price in the marketing mix. In accordance with previous studies (cf. Foxall, Oliveira-Castro & Schrezenmaier, 2004; Oliveira-Castro, Foxall & Schrezenmaier, 2005; 2008; 2010; Yan et al. 2012), price and both kinds of reinforcement play an essential role in positioning brands in modern markets. In the context of behavioural economics where experiments often have between only two and five subjects, the sample in this study, consisting of over 1,500 participants, definitely helps to boost the validity of the study. Nevertheless, the first and foremost

upgrade concerning the future sample is still to increase the course of collecting buying data. The difficulties stemming from the proportion/ratio problem as discussed in the earlier section remain a big challenge for the individual's analyses because buyers are highly unlikely to buy both big and small brands within a short period of time. The few resulting data points are not sufficient for running regression models. This problem is common in studies making use of the Generalised Matching Law (Baum, 1974). A time period of several years, hence, seems to be needed in order to achieve refined results about big/small brand choice behaviour at the individual level.

6.5 Managerial implications

The three predictors, price, utilitarian, and informational reinforcement have different managerial implications. Firstly, the thesis reveals that price elasticities vary across both product categories and brand groups. The results are in line with the traditional belief in microeconomics that when price reduces quantity bought increases. Besides, as price elasticities are shown to result in the larger R^2, in other words, explain a larger portion of the variance in quantity than both utilitarian and informational reinforcement, pricing strategy remains a viable marketing tactic and the implications of this strategy deserve more attention. Therefore, price still exerts influence on the quantity purchased at least in the short term and thus managers, especially those in charge of small enterprises, have thoroughly to understand the relationship between price and quantity in order to make the right tactical moves regarding price changes and take advantages of the possible impact of a wide range of different price promotions.

Secondly, as Ehrenberg's followers claim that as price reductions as a promotional tool do not much influence the quantity bought of a particular product or brand in the long term, managers need to pay more attention to the other elements of the marketing mix like products and place. Consumers have their own personal taste in products after a long use, and thus they rate the reinforcement of brands/ products based on their consuming history. Companies cannot advertise their products as a mean of high utilitarian or informational benefits without giving any proof. According to this study's findings, consumers who prefer small brands with lower utilitarian and informational benefits are shown to be more sensitive to price changes. On the other hand, big brands that incorporate higher informational reinforcement due to their quality and reputation often have higher prices. Thus, marketers and managers of big companies, after reviewing the status of their products and brands have to be transparent and consistent in their pricing strategy needing to find a balance between the premium price they charge and the benefits they bring to their users.

For utilitarian reinforcement, a secret recipe may not exist anymore, but great care in terms of design and usefulness of products or brands can help companies win over their consumers' hearts. The question here is whether managers should concentrate on improving utilitarian rewards. The functional benefits may be more crucial than non-functional ones for some product categories and brand groups but the addition of these utilitarian benefits may only meet the requirement of certain groups of buyers and, as a result, increase only their quantity and purchasing frequency, not those for all consumers. Therefore, the managers have to investigate their buyers' response to any additional utilitarian benefits through trial and error or by marketing research during the product development process. It is believed that the addition of

product attributes may increase sales when launching but it is must be desired by consumers to give the company a reasonable profit in the long run. Otherwise, adding attributes without the consumers' wanting or needing them can be regarded as a waste of time and resources that can seriously harm the company's prospects in terms of finance and reputation.

Place or distribution, seems to be neglected in marketing practices but according to Sharp (cf. Sharp, 2010; Romaniuk & Sharp, 2016), it can be the most important factor in differentiating big brands from others. He argues that marketers should focus more on physical and mental accessibility. Easy to remember and easy to get is the key to success in the marketplace, an unfair competition, within which giants become bigger and tiny players become smaller. Physical and mental availability can be a source of bias that is believed to generate consumer brand loyalty. While utilitarian benefits such as additional product attributes can be considered as the source of bias in laboratory experiments, branding, as the ultimate form of informational benefits, is said to be a source of bias in natural settings. In general, it could be argued that big brands are big brands for a reason. They have an edge on making their products available physically and mentally. For example, in some countries, Coca-Cola gives convenience stores free stuff like tables, and soft-drink machines if the store's owner consents to use the company's products exclusively. This support is a typical example of improving physical and mental availability. This would mean that for certain products, the more product attributes or the more effective branding is, the more bias consumers have towards certain brands. However, according to proven multi-purchasing behaviour, consumers in these product categories clearly show a weaker bias for small brands, therefore, according

to the “double jeopardy effect”, the bigger brands in the market have far more buyers in the same time period and also have higher brand loyalty. Thus, brand managers of smaller brands should not be too depressed by their company’s lower customer loyalty metrics. They also should not be expected to build customer loyalty to the brand without substantially increasing the brand’s market penetration that, in turn, is under heavy impact of the products or brands’ availability (Sharp, 2010; Romaniuk & Sharp, 2016).

6.6 Limitation and delimitation

6.6.1 Exclusive purchasing

The quantitative approach used for matching analyses in this thesis can only test whether consumers prefer exclusively either a big brand group (“Brand A”) or a small brand group (“Brand B”). From a behaviour analytical perspective, in other words, there is no choice situation when a buyer exclusively chooses one brand. Thus, sole purchasers of a product category (i.e., who only buy a particular brand) and of a brand group (i.e., who only buy either big brands or small brands) cannot be put in matching equations; this can be viewed as an unresolvable limitation of the current study. As a result, there is a significant loss of data points. For example, in the case of baked beans, more than half of the original data has been removed from the matching analyses. Nevertheless, the analyses could still be conducted as an examination of the multi-brand phenomenon that is highly observed in previous studies (see a review in Wells & Foxall, 2013). Besides, in this current study, the investigations of demand elasticities appear to be a great partner of matching analyses in research of consumer

brand choice as they can take all of the data points into their account.

6.6.2 "Brand A" and "Brand B"

"Brand A" and "Brand B" are not actually single brands but a collective entity of brands within a chosen range of market share over the course of the study period. Therefore, an interpretation of "Brand A" or "Brand B" only refers to the fact that buyers have a preference towards big brands or small brands; it is impossible to make an inference about which particular brands generate that preference. For instance, in the case of baked beans, Heinz is the most bought brand in the marketplace during the period of time (52 weeks). The finding shows that consumers tend to maximise their utility by choosing the big brand group. Heinz may be the main reason, but it is impossible, strictly speaking, to conclude that the brand is the cause of that maximisation pattern. This shows the difference between the classification method in this study and that in previous studies in which Heinz, the favourite brand, is more likely to be chosen as a mean of maximisation than the arithmetic average of the remaining brands in the consumers' baked beans repertoire, aka "brand B".

6.6.3 Aggregate versus individual level

The methodology chapter has taken on the issue of advantages and disadvantages of the two levels of analysis: aggregate and individual. The findings of individual data in this study give some food for thought and can be considered as the complement of the use of aggregate data. However, its lack of data points, especially in the case of baked beans where under 50% of the total consumers do not buy both big brand and small brand groups, lead to a mathematical problem for regression

models. As a result, the accumulation of the data points across all four product categories needs to be conducted in order to make the matching analyses doable. This has raised the question of whether the decision to employ an individual analysis was right. The findings of the two levels of matching analyses, strictly considering, are not comparable. Besides, it could be challenged that it would be an unscientific and coarse approach by changing the research method for the sake of the own model fit. There are two main implications of this problem. Firstly, the fact that a considerable amount of matching equations at individual level could not be calculated, and thus data points become scarce suggests that a more detailed and refined analysis may provide better insights. The investigations of demand elasticities, regarding the market share of brands, of individual consumers could provide comparable results with the findings at the aggregate level. Secondly, if a new and better dataset, especially in terms of the longitude of the research, is used in the future, the problem could be resolved when the data points of each individual for each product are sufficient for analysing and result comparing with the aggregate data.

6.7 Contribution

Consumer choice towards different brand groups has been examined via a large sample from a well-known British consumer panel. The major contribution of this thesis, therefore, is to provide an alternative for previous studies that have used behavioural economics analyses in understanding consumer brand choice. The success of the study is said to show the usefulness and relevance of consumer behaviour analysis as well as to provide new suggestions and recommendations for future investigations. Although established through a number of previous studies

(Foxall & James, 2001; 2003; Foxall & Schrezenmaier, 2003; Foxall, Oliveira-Castro & Schrezenmaier, 2004; Oliveira-Castro, Foxall & Schrezenmaier, 2005; 2008; 2010; Yan et al. 2012), investigations of consumer choice using behaviour analytic methods have not been employed widely in marketing practice and academia. Thus, this thesis can be viewed as a mean to prove further the usefulness of behavioural economics methods for elucidating consumer brand choice. It attempts to combine different models and explanatory theories in order to shed more light on the underlying process of purchasing and consuming activities, which is believed to answer such questions as why consumers prefer big brands over small ones, or vice versa or what factors impact those buying behaviours.

Secondly, the results support the findings of Ehrenbergians like double jeopardy effects and multi-brand buying dominance in the marketplace (in other words, the rarity of 100% brand loyalty within any particular product class). They also imply that marketing managers should take advantage of knowing those buying patterns in order to make effective managerial actions that boost the company's penetration level as well as purchasing frequency.

Last but not least, Ehrenberg and his colleagues have strongly claimed that price plays an insignificant role in buying decisions. However, this thesis, in line with previous studies based on consumer behaviour analysis, argues that, according to matching and maximisation results, price still has a remarkable impact on consumption of big/small brand names within a product category. Indeed, price, along with utilitarian and informational reinforcement, is still said to determine the pattern of brand choice. Besides, the influence of non-price factors such as branding in the

form of informational reinforcement is often played down. Ehrenberg's work rejects the two short-term oriented elements in the marketing mix that are price and promotion while supporting product and place that can increase utilitarian and informational benefits in the long term. These kinds of reinforcement, via the work of this thesis, are proven to be traced within quantitative analyses such as matching and elasticity demand models. Sharp (cf. Sharp, 2010; Romaniuk & Sharp, 2016) mentions that the two latter elements of the marketing mix are said to create the physical and mental availability that can help a brand grow.

Appendix

Appendix A: R commands

```
# The original data is SPSS file so there is a need to read it in R

library(foreign)

dat<-read.spss("~/Google Drive/Thesis/Baked Beans/Baked Beans data.sav", to.data.frame=TRUE)

dat<-read.spss("~/Google Drive/Thesis/Biscuits/BiscuitsEditedConsumer_Vicky.sav",
 to.data.frame=TRUE)

dat<-read.spss("~/Google Drive/Thesis/Fruitjuice/FruitJuiceEdited.sav", to.data.frame=TRUE)

dat<-read.spss("~/Google Drive/Thesis/YellowFats/YellowFatsEditedMorethan7.sav",
 to.data.frame=TRUE)

# Removing NAs:

dat<-dat[complete.cases(dat),]

levels(dat$PANELID)

dat$PANELID <- factor(dat$PANELID)

levels(dat$PANELID)

levels(dat$BRAND_NAME)

dat$BRAND_NAME <- factor(dat$BRAND_NAME)

levels(dat$BRAND_NAME)

# Identifying which brands are big and which are small

# The criterion is market share of brands

# Showing the market share

df<-aggregate(dat$TOTALSPENT, list(brname=dat$BRAND_NAME), sum)

df<-as.data.frame(df)

df$br<-cbind(levels(dat$BRAND_NAME))

library(plyr)

dat$mkshare <- plyr::mapvalues(dat$BRAND_NAME, from = df$br, to = df$x)

dat$mkshare<-as.numeric(levels(dat$mkshare))[dat$mkshare]

# Order:

df$Pct<- round(df$x /sum(df$x), digits=4)

ord<-df[order(-df[,2]),]

ord
```

```
# Baked beans:
dat$br<-ifelse(dat$mkshare>444,"big","small")
# Biscuits:
dat$br<-ifelse(dat$mkshare>142,"big","small")
# Fruit juice:
dat$br<-ifelse(dat$mkshare>275,"big","small")
# Yellow fats:
dat$br<-ifelse(dat$mkshare>652,"big","small")
20%: 444, 142, 275, 652
# Normalising the variables (for comparison)
dat$quan<-dat$quantity/100
dat$price<-dat$TOTALSPENT/dat$quan
# Descriptive analysis:
dat1<-dat[dat$br=="big",]
dat1<-dat[dat$br=="small",]
dat1<-dat1[complete.cases(dat1),]
levels(dat1$PANELID)
dat1$PANELID <- factor(dat1$PANELID)
levels(dat1$PANELID)
levels(dat1$BRAND_NAME)
dat1$BRAND_NAME <- factor(dat1$BRAND_NAME)
levels(dat1$BRAND_NAME)
str(dat1)
# Matching analyses:
# Aggregate level:
s<-tapply(dat$TOTALSPENT,list(dat$PANELID,dat$br),sum)
s<-as.data.frame(s)
s$PANELID<-cbind(levels(dat$PANELID))
s<-s[complete.cases(s),]
str(s)
s$spent.ratio<-s$big/s$small
q<-tapply(dat$quan,list(dat$PANELID,dat$br),sum)
q<-as.data.frame(q)
q$PANELID<-cbind(levels(dat$PANELID))
```

```
q<-q[complete.cases(q),]
str(q)
q$quantity.ratio<-q$big/q$small
p<-tapply(dat$price,list(dat$PANELID,dat$br),mean)
p<-as.data.frame(p)
p$PANELID<-cbind(levels(dat$PANELID))
p<-p[complete.cases(p),]
str(p)
p$price.ratio<-p$big/p$small
p$prob.ratio<-(1/p$big)/(1/p$big+1/p$small)
# Individual level:
library(plyr)
dfbb<-ddply(dat,~PANELID,summarise,baked_beans=length(unique(br)))
dfbb<-dfbb[order(-dfbb[,2]),] [1:390,]
dfbb
dfbb<-as.data.frame(dfbb)
dfbq<-ddply(dat,~PANELID,summarise,biscuits=length(unique(br)))
dfbq<-dfbq[order(-dfbq[,2]),] [1:1186,]
dfbq
dfbq<-as.data.frame(dfbq)
dffj<-ddply(dat,~PANELID,summarise,fruit_juice=length(unique(br)))
dffj<-dffj[order(-dffj[,2]),] [1:443,]
dffj
dffj<-as.data.frame(dffj)
dfsp<-ddply(dat,~PANELID,summarise,spreads=length(unique(br)))
dfsp<-dfsp[order(-dfsp[,2]),] [1:779,]
dfsp
dfsp<-as.data.frame(dfsp)
df<-Reduce(function(x, y) merge(x, y, all=TRUE), list(dfbb, dfbq, dffj, dfsp))
df<-as.data.frame(df)
df<-df[complete.cases(df),]
levels(df$PANELID)
df$PANELID <- factor(df$PANELID)
levels(df$PANELID)
```

```
df

both <- subset(dat, PANELID %in% c(8010414, 8010766, 8010803, 8040381, 8041883, 8041913,
  8046253, 8046321, 8046611, 8047878, 8090027, 8090720, 8100320, 8100887, 8101105, 8110664,
  8111050, 8121127, 8142610, 8150363, 8160263, 8161345, 8161734, 8170286, 8172150, 8180223,
  8190185, 8190475, 8190901, 8240804, 8240965, 8251022, 8251398, 8252418, 8252715, 8260017,
  8270610, 8300164, 8300263, 8300652, 8400307, 8410696, 8450791, 8451064, 8461049, 8470140,
  8470386, 8480026, 8480132, 8490605, 8500373, 8510525, 8550392, 8560841, 8561565, 8561978,
  8570239, 8570550, 8580856, 8590640, 8600455, 8610362, 8610935, 8611352, 8640932, 8641120,
  8650160, 8660558, 8671936, 8671967, 8690487, 8700445, 8700780))

levels(both$PANELID)

both$PANELID <- factor(both$PANELID)

levels(both$PANELID)

table(both$PANELID,both$br)

both <- subset(dat, PANELID %in% c(8010766, 8046321, 8046611, 8047878, 8110664, 8160263,
  8180223, 8240965, 8251022, 8252715, 8260017, 8300652, 8450791, 8461049, 8500373, 8561565,
  8561978, 8590640, 8611352, 8641120, 8660558, 8671967, 8690487, 8700780))

levels(both$PANELID)

both$PANELID <- factor(both$PANELID)

levels(both$PANELID)

levels(both$BRAND_NAME)

both$BRAND_NAME <- factor(both$BRAND_NAME)

levels(both$BRAND_NAME)

str(both)

# Description:

dat1<-both[both$br=="big",]

dat1<-both[both$br=="small",]

dat1<-dat1[complete.cases(dat1),]

levels(dat1$PANELID)

dat1$PANELID <- factor(dat1$PANELID)

levels(dat1$PANELID)

levels(dat1$BRAND_NAME)

dat1$BRAND_NAME <- factor(dat1$BRAND_NAME)

levels(dat1$BRAND_NAME)

str(dat1)

# Grouping products

bbb<-both

bbq<-both

bfj<-both
```

```
bsp<-both
grp<-Reduce(function(x, y) merge(x, y, all=TRUE), list(bbb, bbq, bfj,bsp))
dat1<-grp[grp$PANELID=="8010766",]
dat1<-grp[grp$PANELID=="8046321",]
dat1<-grp[grp$PANELID=="8046611",]
dat1<-grp[grp$PANELID=="8047878",]
dat1<-grp[grp$PANELID=="8110664",]
dat1<-grp[grp$PANELID=="8160263",]
dat1<-grp[grp$PANELID=="8180223",]
dat1<-grp[grp$PANELID=="8240965",]
dat1<-grp[grp$PANELID=="8251022",]
dat1<-grp[grp$PANELID=="8252715",]
dat1<-grp[grp$PANELID=="8260017",]
dat1<-grp[grp$PANELID=="8300652",]
dat1<-grp[grp$PANELID=="8450791",]
dat1<-grp[grp$PANELID=="8461049",]
dat1<-grp[grp$PANELID=="8500373",]
dat1<-grp[grp$PANELID=="8561565",]
dat1<-grp[grp$PANELID=="8561978",]
dat1<-grp[grp$PANELID=="8590640",]
dat1<-grp[grp$PANELID=="8611352",]
dat1<-grp[grp$PANELID=="8641120",]
dat1<-grp[grp$PANELID=="8660558",]
dat1<-grp[grp$PANELID=="8671967",]
dat1<-grp[grp$PANELID=="8690487",]
dat1<-grp[grp$PANELID=="8700780",]
s<-tapply(dat1$TOTALSPENT,list(dat1$YYWWDESC,dat1$br),sum)
s<-as.data.frame(s)
s<-s[complete.cases(s),]
str(s)
s$spent.ratio<-s$big/s$small
q<-tapply(dat1$quantity,list(dat1$YYWWDESC,dat1$br),sum)
q<-as.data.frame(q)
q<-q[complete.cases(q),]
```

```
str(q)
q$quantity.ratio<-q$big/q$small
p<-tapply(dat1$PRICE,list(dat1$YYWWDESC,dat1$br),sum)
p<-as.data.frame(p)
p<-p[complete.cases(p),]
str(p)
p$price.ratio<-p$big/p$small
p$prob.ratio<-(1/p$big)/(1/p$big+1/p$small)
# Amount matching
m1=lm(log(s$spent.ratio)~log(q$quantity.ratio))
summary(m1)
plot(log(s$spent.ratio)~log(q$quantity.ratio),main="Amount matching")
abline(m1,col="darkred")
abline(0,1,col="darkblue",lty=2)
# Cost matching
m2=lm(log(q$quantity.ratio)~log(p$price.ratio))
summary(m2)
plot(log(q$quantity.ratio)~log(p$price.ratio),main="Cost matching")
abline(m2,col="darkred")
# Probability matching
m3=lm(log(q$quantity.ratio)~p$prob.ratio)
summary(m3)
plot(log(q$quantity.ratio)~p$prob.ratio,main="Probability matching",xlim=c(0,1))
abline(v=0.5,col="darkred")
# Demand elasticity:
# big brands group:
dat1 <- dat[dat$br=="big",]
dat1<-dat1[dat1$Informational!="0",]
# small brands group:
dat1<- dat[dat$br=="small",]
dat1<-dat1[dat1$Informational!="0",]
# Normalising the variables (for comparison)
dat1$quan<-dat1$quantity/100
dat1$price<-dat1$TOTALSPENT/dat1$quan
```

```
dat1$pack<-paste(dat1$BRAND_NAME,dat1$WEIGHT)
dat1$pack<-as.factor(dat1$pack)
levels(dat1$pack)
dat1$pack <- factor(dat1$pack)
levels(dat1$pack)
# Price elasticity (simple form)
m4=lm(log(dat1$quan)~log(dat1$price))
summary(m4)
# Price elasticity (complex form taking inter- and intra- components into consideration)
Ppb<-tapply(dat1$price,dat1$pack,mean)
df.Ppb<-as.data.frame(Ppb)
df.Ppb$pack<-cbind(levels(dat1$pack))
dat1$Ppb <- plyr::mapvalues(dat1$pack, from = df.Ppb$pack, to = df.Ppb$Ppb)
dat1$Ppb<-as.numeric(levels(dat1$Ppb))[dat1$Ppb]
dat1$Pcpbo.Ppb<-dat1$price/dat1$Ppb
Pcpbo.Ppbc<-tapply(dat1$Pcpbo.Ppb,dat1$PANELID,mean)
df2<-as.data.frame(Pcpbo.Ppbc)
df2$id<-cbind(levels(dat1$PANELID))
dat1$Pcpbo.Ppbc <- plyr::mapvalues(dat1$PANELID, from = df2$id, to = df2$Pcpbo.Ppbc)
dat1$Pcpbo.Ppbc<-as.numeric(levels(dat1$Pcpbo.Ppbc))[dat1$Pcpbo.Ppbc]
# dat1$Pcpbo.Ppbc = IecIabIap
dat1$IecIabIap<-dat1$Pcpbo.Ppbc
# dat1$IacIabIap = IacIabIap
dat1$IacIabIap<-dat1$Pcpbo.Ppb/dat1$Pcpbo.Ppbc
Pb<-tapply(dat1$price,dat1$BRAND_NAME,mean)
df3<-as.data.frame(Pb)
df3$br<-cbind(levels(dat1$BRAND_NAME))
dat1$Pb <- plyr::mapvalues(dat1$BRAND_NAME, from = df3$br, to = df3$Pb)
dat1$Pb<-as.numeric(levels(dat1$Pb))[dat1$Pb]
dat1$Ppb.Pb<-dat1$Ppb/dat1$Pb
Ppb.Pbc<-tapply(dat1$Ppb.Pb,dat1$PANELID,mean)
df4<-as.data.frame(Ppb.Pbc)
df4$id<-cbind(levels(dat1$PANELID))
dat1$Ppb.Pbc <- plyr::mapvalues(dat1$PANELID, from = df4$id, to = df4$Ppb.Pb)
```

```
dat1$Ppb.Pbc<-as.numeric(levels(dat1$Ppb.Pbc))[dat1$Ppb.Pbc]
# dat1$Ppb.Pbc = IecIabIep
dat1$IecIabIep<-dat1$Ppb.Pbc
# dat1$IacIabIep = IacIabIep
dat1$IacIabIep<-dat1$Ppb.Pb/dat1$Ppb.Pbc
Pbc<-tapply(dat1$Pb,dat1$PANELID,mean)
df5<-as.data.frame(Pbc)
df5$id<-cbind(levels(dat1$PANELID))
dat1$Pbc <- plyr::mapvalues(dat1$PANELID, from = df5$id, to = df5$Pbc)
dat1$Pbc<-as.numeric(levels(dat1$Pbc))[dat1$Pbc]
# dat1$Pbc = IecIebPr
dat1$IecIebPr<-dat1$Pbc
# dat1$IacIebPr = IacIebPr
dat1$IacIebPr<-dat1$Pb/dat1$Pbc
Ub<-tapply(dat1$Utilitarian,dat1$BRAND_NAME,mean)
df6<-as.data.frame(Ub)
df6$br<-cbind(levels(dat1$BRAND_NAME))
dat1$Ub <- plyr::mapvalues(dat1$BRAND_NAME, from = df6$br, to = df6$Ub)
dat1$Ub<-as.numeric(levels(dat1$Ub))[dat1$Ub]
Ubc<-tapply(dat1$Ub,dat1$PANELID,mean)
df7<-as.data.frame(Ubc)
df7$id<-cbind(levels(dat1$PANELID))
dat1$Ubc <- plyr::mapvalues(dat1$PANELID, from = df7$id, to = df7$Ubc)
dat1$Ubc<-as.numeric(levels(dat1$Ubc))[dat1$Ubc]
# dat1$Ubc = IecIebUt
dat1$IecIebUt<-dat1$Ubc
# dat1$IacIebUt = IacIebUt
dat1$IacIebUt<-dat1$Ub/dat1$Ubc
Ib<-tapply(dat1$Informational,dat1$BRAND_NAME,mean)
df8<-as.data.frame(Ib)
df8$br<-cbind(levels(dat1$BRAND_NAME))
dat1$Ib <- plyr::mapvalues(dat1$BRAND_NAME, from = df8$br, to = df8$Ib)
dat1$Ib<-as.numeric(levels(dat1$Ib))[dat1$Ib]
```

```
Ibc<-tapply(dat1$Ib,dat1$PANELID,mean)

df9<-as.data.frame(Ibc)

df9$id<-cbind(levels(dat1$PANELID))

dat1$Ibc <- plyr::mapvalues(dat1$PANELID, from = df9$id, to = df9$Ibc)

dat1$Ibc<-as.numeric(levels(dat1$Ibc))[dat1$Ibc]

# dat1$Ibc = IecIebIn

dat1$IecIebIn<-dat1$Ibc

# dat1$IacIebIn = IacIebIn

dat1$IacIebIn<-dat1$Ib/dat1$Ibc

m5<-
 lm(log(dat1$quan)~log(dat1$IacIabIap)+log(dat1$IacIabIep)+log(dat1$IacIebPr)+log(dat1$IacIebUt)
 +log(dat1$IacIebIn)+log(dat1$IecIabIap)+log(dat1$IecIabIep)+log(dat1$IecIebPr)+log(dat1$IecIebUt
 )+log(dat1$IecIebIn))

summary(m5)

###################################

 # Essential value:

# big brands group:

dat1<- dat[dat$br=="big",]

dat1<-dat1[dat1$Informational!="0",]

# small brands group:

dat1 <- dat[dat$br=="small",]

dat1<-dat1[dat1$Informational!="0",]

# Normalising the variables (for comparison)

dat1$quan<-dat1$quantity/100

dat1$price<-dat1$TOTALSPENT/dat1$quan

# Identifying starting points for the non-linear regressions

# K is the difference between Q maximum and Q minimum

K<-log(sort(dat1$quan,decreasing=T)[1])-log(sort(dat1$quan,decreasing=F)[1])

# Alpha is the change in price

alp<-sort(dat1$price,decreasing=F)[2]-sort(dat1$price,decreasing=F)[1]

# Q0 is the quantity at P=0, meaning Q0 seems to be the maximum

Q0<-sort(dat1$quan,decreasing=T)[1]

# The change in Utilitarian and Informational level

uti<-sort(dat1$Utilitarian,decreasing=F)[2]-sort(dat1$Utilitarian,decreasing=F)[1]

inf<-sort(dat1$Informational,decreasing=F)[2]-sort(dat1$Informational,decreasing=F)[1]
```

```
library(minpack.lm)

# Without UR and IR

fm <- nlsLM(log(quantity) ~ log(q0)+k*(exp(-al*q0*price)-1),

data = dat1, start = list(k = K,q0=Q0, al =alp),lower=c(0,0,0),upper=c(Inf,Inf,1), trace=T,control =
  list(maxiter = 500))

# With UR and IR

fm <- nlsLM(log(quantity) ~ log(q0)+k*(exp((-al1*q0*price)+(al2*Utilitarian)+(al3*Informational))-
  1),

data = dat1, start = list(k = K,q0=Q0, al1=alp,
  al2=uti,al3=inf),lower=c(0,0,0,0,0),upper=c(Inf,Inf,1,1,1), trace=T,control = list(maxiter = 500))

summary(fm)

coef(fm)

# Calculating R2

RSS.p<-sum(residuals(fm)^2)

TSS<-sum((na.omit(log(dat$quantity))-mean(na.omit(log(dat$quantity))))^2)

r.squared<-1-(RSS.p/TSS)

r.squared
```

Appendix B: Marketshare information used to define brand groups

Baked beans brname	quantity sold	% volume mktshare	% unit mktshare	% penetration
HEINZ	4069950	43.46%	29.64%	32.41%
TESCO VALUE	1300509	4.84%	9.47%	7.95%
ASDA SMARTPRICE	1087310	4.46%	7.92%	8.17%
TESCO	1040600	6.65%	7.58%	7.62%
J SAINSBURY	858466	5.62%	6.25%	5.86%
ASDA	836815	5.51%	6.09%	5.51%
H P	812645	6.07%	5.92%	3.84%
ALDI	681100	2.75%	4.96%	4.28%
MORRISONS	545280	3.64%	3.97%	4.12%
C & B	480180	6.10%	3.50%	3.85%
MORRISONS BETTABUY	339575	1.27%	2.47%	2.44%
LIDL SUNNY GLADE	252295	1.06%	1.84%	1.91%
NETTO	223700	0.92%	1.63%	1.25%
SOMERFIELD	221400	1.28%	1.61%	1.62%
KWIKSAVE SIMPLY	208830	0.84%	1.52%	1.84%
J SAINSBURY LOW PRICE	203280	0.71%	1.48%	1.42%
HEINZ WEIGHTWATCHERS	169175	1.95%	1.23%	2.03%
CO-OP	152730	1.45%	1.11%	1.87%
KWIKSAVE	65520	0.33%	0.48%	0.25%
CO-OP EVERYDAY	45780	0.22%	0.33%	0.68%
ARGYLL	36400	0.21%	0.27%	0.21%
WAITROSE	25200	0.15%	0.18%	0.18%
ICELAND VALUE	21420	0.11%	0.16%	0.17%
ARGYLL SAFEWAY SAVERS	18630	0.06%	0.14%	0.14%
RIGHT PRICE	9660	0.04%	0.07%	0.08%
PRINCES	8500	0.05%	0.06%	0.04%
M&S ST MICHAEL	3520	0.03%	0.03%	0.04%
LONDIS	2100	0.02%	0.02%	0.02%
WHOLE EARTH ORGANIC	2100	0.02%	0.02%	0.01%
SPAR	1260	0.01%	0.01%	0.01%
WESTLER	1215	0.02%	0.01%	0.02%
GATEWAY GROUPS SOMERF	860	0.01%	0.01%	0.02%
COSTCUTTER	850	0.01%	0.01%	0.01%
BUDGEN	840	0.01%	0.01%	0.01%
NISA HERITAGE	840	0.01%	0.01%	0.01%
BEST IN	800	0.01%	0.01%	0.01%

Biscuit brname	quantity sold	% volume mktshare	% unit mktshare	% penetration
MCVITIES	4003767	14.01%	16.27%	13.23%
TESCO	1503011	4.62%	6.11%	5.63%
ASDA	1257863	3.97%	5.11%	4.83%
FOXS	1113979	5.23%	4.67%	4.72%
KIT KAT	1070232	7.04%	4.49%	4.81%
JACOBS	1044157	5.10%	4.38%	4.89%
TESCO VALUE	1028939	1.93%	4.31%	3.54%
ASDA SMARTPRICE	918580	1.59%	3.85%	3.35%
J SAINSBURY	778521	2.93%	3.26%	3.38%
CADBURY	639677	4.30%	2.68%	3.19%
MORRISONS	636581	1.78%	2.67%	2.53%
RYVITA	510095	2.21%	2.14%	2.97%
LIDL	492519	1.33%	2.06%	1.81%
TWIX	492114	2.53%	2.06%	1.79%
PENGUIN	466822	1.89%	1.96%	1.57%
BURTONS	448461	1.81%	1.88%	1.99%
MARYLAND	288655	1.20%	1.21%	1.36%
CO-OP	281902	1.09%	1.18%	1.27%
ROCKY	272241	1.56%	1.14%	1.29%
WAGON WHEELS	262242	0.95%	1.10%	0.93%
CRAWFORDS	259325	0.83%	1.09%	0.81%
MORRISONS BETTABUY	245835	0.41%	1.03%	0.61%
KP	237659	1.26%	1.00%	0.99%
ELKES	234641	0.62%	0.98%	0.66%
TUNNOCK	218049	1.28%	0.91%	1.23%
M&S	213389	1.68%	0.89%	0.83%
BLUE RIBAND	206024	1.02%	0.86%	1.02%
KWIKSAVE	203125	0.35%	0.85%	0.69%
LYONs	201590	0.56%	0.85%	0.64%
SNACK A JACKS	192131	2.38%	0.81%	2.30%
BREAKAWAY	172878	0.83%	0.72%	0.79%
ECHO	157746	0.90%	0.66%	0.77%
CLUB	156728	0.69%	0.66%	0.58%
RITZ	146455	0.59%	0.61%	0.70%
NETTO	125540	0.20%	0.53%	0.46%
TIME OUT	118466	0.78%	0.50%	0.63%
CLASSIC	115104	0.62%	0.48%	0.48%
J SAINSBURY ECONOMY	108600	0.15%	0.46%	0.26%
BISC &	104844	0.71%	0.44%	0.58%
DRIFTER	82447	0.44%	0.35%	0.42%
HILLS	76650	0.16%	0.32%	0.27%
CHEDDARS	72640	0.36%	0.30%	0.51%
VISCOUNT	70106	0.40%	0.29%	0.38%
WAITROSE	69571	0.27%	0.29%	0.29%
AINSLEY HARRIOTT	67925	0.37%	0.28%	0.35%
KALLO	67061	0.74%	0.28%	0.55%
RIVINGTON	67009	0.27%	0.28%	0.33%
ASKEYS	65785	0.33%	0.28%	0.43%
J SAINSBURY TTD	65059	0.48%	0.27%	0.38%
KINDER	64884	0.73%	0.27%	0.82%
SOMERFIELD	63098	0.21%	0.26%	0.24%
MONTANA	62428	0.31%	0.26%	0.27%
J SAINSBURY BASIC	62035	0.11%	0.26%	0.21%
GO AHEAD	61222	0.49%	0.26%	0.36%
BAHLSEN	59831	0.51%	0.25%	0.41%
CAXTON	58140	0.33%	0.24%	0.50%
GOLD	54556	0.30%	0.23%	0.27%
HOVIS	53935	0.21%	0.23%	0.32%
GATEWAY	53538	0.15%	0.22%	0.22%
TWIGLETS	52585	0.51%	0.22%	0.32%
J SAINSBURY BGTY	46930	0.11%	0.20%	0.18%
ARGYLL SAFEWAY	43605	0.16%	0.18%	0.18%
CARRS	40205	0.28%	0.17%	0.28%
MERBA	38730	0.16%	0.16%	0.19%
SOMMERFIELD MAKE SENSE	38700	0.05%	0.16%	0.10%
YORKIE	35079	0.22%	0.15%	0.19%
QUAKER	34752	0.49%	0.15%	0.44%

PATERSON	34625	0.16%	0.15%	0.10%
TESCO FINEST	33945	0.37%	0.14%	0.22%
H O L	32868	0.09%	0.14%	0.07%
LOTUS	30327	0.12%	0.13%	0.14%
CAFE SOCIETY	29970	0.18%	0.13%	0.13%
CO-OP EVERYDAY	29800	0.08%	0.12%	0.07%
HANS FREITAG	29065	0.11%	0.12%	0.09%
ADAMS	28300	0.10%	0.12%	0.12%
ROYAL EDINBURGH	27020	0.10%	0.11%	0.07%
ASDA GOOD FOR YOU	26363	0.08%	0.11%	0.11%
SHREK 2	26050	0.16%	0.11%	0.14%
ASDA EXTRA SPECIAL	24840	0.20%	0.10%	0.15%
TAXI	22665	0.15%	0.10%	0.15%
CHEESELETS	21455	0.19%	0.09%	0.13%
KELLOGGS	21080	0.26%	0.09%	0.20%
HEINZ	21044	0.18%	0.09%	0.17%
DORIA	19760	0.13%	0.08%	0.10%
RAKUSEN	19450	0.12%	0.08%	0.15%
WEIGHTWATCHERS	19182	0.16%	0.08%	0.14%
DANISH	18055	0.06%	0.08%	0.05%
LEES	17586	0.10%	0.07%	0.09%
HAYWOOD AND PADGETT	17400	0.02%	0.07%	0.04%
ICELAND	17050	0.04%	0.07%	0.04%
NISA	16880	0.05%	0.07%	0.06%
ROLO	16132	0.12%	0.07%	0.10%
GIOTTO	16068	0.05%	0.07%	0.05%
ELLERT	16050	0.12%	0.07%	0.04%
BRINK	15750	0.03%	0.07%	0.04%
NAIRNS	14940	0.11%	0.06%	0.07%
HELLEMA	14900	0.06%	0.06%	0.08%
CAROUSEL	14505	0.12%	0.06%	0.12%
WALKERS	13977	0.14%	0.06%	0.08%
ARNOTTS	13546	0.06%	0.06%	0.06%
TROPHY	13221	0.06%	0.06%	0.10%
J SAINSBURY LOW PRICE	13073	0.02%	0.05%	0.04%
J SAINSBURY PREMIUM	11600	0.07%	0.05%	0.02%
HOUSE OF LANCASTER	11400	0.03%	0.05%	0.01%
DEAN	11170	0.11%	0.05%	0.05%
BORDER	11070	0.10%	0.05%	0.06%
TRIMLYNE	10200	0.02%	0.04%	0.05%
MY FAVOURITE	10000	0.03%	0.04%	0.01%
HURSTWOODS	9900	0.02%	0.04%	0.01%
HIGHLAND	9850	0.04%	0.04%	0.03%
BARGAIN BUYS	9600	0.02%	0.04%	0.01%
FINN	9465	0.05%	0.04%	0.04%
BON BON BUDDIES	9340	0.08%	0.04%	0.08%
RIB N	9300	0.06%	0.04%	0.04%
HOME BLEST	9200	0.03%	0.04%	0.03%
RIVA	9113	0.03%	0.04%	0.04%
HAPPY SHOPPER	8900	0.03%	0.04%	0.04%
QUEENS	8400	0.03%	0.04%	0.02%
SIMMERS	8350	0.03%	0.04%	0.04%
SCOOBY DOO	8345	0.07%	0.03%	0.04%
BISCA	8000	0.03%	0.03%	0.03%
ORGRAN	7980	0.10%	0.03%	0.07%
DS	7800	0.09%	0.03%	0.05%
HORIZON	7750	0.01%	0.03%	0.03%
BBB	7739	0.08%	0.03%	0.07%
REAL FOODS	7400	0.08%	0.03%	0.05%
DUCHY	7250	0.11%	0.03%	0.04%
DIAMOND	7240	0.01%	0.03%	0.01%
MILKY BAR	7170	0.03%	0.03%	0.05%
GLUTEEN	6950	0.05%	0.03%	0.05%
ROKA	6895	0.11%	0.03%	0.07%
TOFFEE CRISP	6811	0.05%	0.03%	0.04%
PADDINGTON	6400	0.03%	0.03%	0.01%
TRUEFREE	6100	0.09%	0.03%	0.05%
BAKERS	6050	0.01%	0.03%	0.02%

PRINCESS	6000	0.02%	0.03%	0.02%
JAMBOS	5980	0.04%	0.03%	0.04%
BRADFORDS	5786	0.02%	0.02%	0.05%
GOTEBORG	5620	0.02%	0.02%	0.02%
OFFICALLY LW FT	5350	0.04%	0.02%	0.04%
MINI CHEDDARS	5336	0.03%	0.02%	0.03%
NABISCO	5228	0.02%	0.02%	0.02%
BOLANDS	4900	0.03%	0.02%	0.03%
ENDULGE	4790	0.16%	0.02%	0.07%
KEEPERS CHOICE	4750	0.02%	0.02%	0.01%
ANDUTRA	4745	0.02%	0.02%	0.02%
TWIXELS	4525	0.03%	0.02%	0.03%
LONDIS	4350	0.02%	0.02%	0.02%
THORNTONS	4275	0.06%	0.02%	0.04%
DUTCH	4255	0.02%	0.02%	0.03%
CORSINI	4200	0.05%	0.02%	0.02%
DE CHAMPAGNE	4135	0.04%	0.02%	0.04%
FARMHOUSE	4100	0.04%	0.02%	0.03%
FUDGES	4100	0.06%	0.02%	0.02%
SPAR	4100	0.01%	0.02%	0.02%
SNAKATA	3794	0.08%	0.02%	0.06%
AMARETTI	3750	0.07%	0.02%	0.02%
COST CUTTER	3650	0.01%	0.02%	0.02%
AINS	3550	0.02%	0.01%	0.02%
BUDGEN	3500	0.01%	0.01%	0.01%
DOVES	3450	0.03%	0.01%	0.02%
NAEINGSINDHOLD	3400	0.01%	0.01%	0.02%
UNIBIC	3250	0.01%	0.01%	0.01%
MACAROONS	3200	0.02%	0.01%	0.02%
TONDOS	3141	0.04%	0.01%	0.06%
JAFFA CAKES	2950	0.01%	0.01%	0.01%
HOBNOBS	2913	0.01%	0.01%	0.01%
GLUTANO	2815	0.05%	0.01%	0.02%
BEST BUY	2750	0.01%	0.01%	0.01%
BISTEFANI	2700	0.02%	0.01%	0.02%
SPREEBACK	2700	0.01%	0.01%	0.01%
BLUE LABEL	2640	0.03%	0.01%	0.03%
PENFOLD	2625	0.01%	0.01%	0.02%
BINGO	2615	0.02%	0.01%	0.02%
MARCANTONIO	2605	0.04%	0.01%	0.06%
BOBBYS	2450	0.02%	0.01%	0.02%
DIETRY SPECIALS	2450	0.03%	0.01%	0.02%
DR KARG	2400	0.03%	0.01%	0.02%
MORRISONS BETTER FOR YOU	2400	0.01%	0.01%	0.01%
GILLE	2333	0.03%	0.01%	0.02%
GRAY DUNN	2250	0.01%	0.01%	0.02%
NESTLE	2250	0.02%	0.01%	0.02%
FA ENGLAND	2244	0.01%	0.01%	0.01%
CAMPBELLS	2200	0.01%	0.01%	0.01%
MACNICOLS	2200	0.01%	0.01%	0.01%
CREATIONS	2000	0.01%	0.01%	0.01%
ACE	1994	0.01%	0.01%	0.01%
ARDEN	1900	0.01%	0.01%	0.00%
BISCOTTO	1900	0.02%	0.01%	0.01%
SIMPLY SCRUMPTIOUS	1900	0.01%	0.01%	0.01%
CRINKLE CRUNCH	1800	0.01%	0.01%	0.01%
DE KROES	1800	0.02%	0.01%	0.02%
ROCHELLE	1750	0.01%	0.01%	0.00%
GREEN & BLACKS	1725	0.02%	0.01%	0.01%
AFTER EIGHT	1700	0.03%	0.01%	0.02%
FOSTERS	1650	0.02%	0.01%	0.01%
WOLF	1640	0.01%	0.01%	0.02%
JACOBITES	1620	0.01%	0.01%	0.01%
THE PLANET SNACK COMPANY	1538	0.01%	0.01%	0.01%
SUNRISE	1520	0.02%	0.01%	0.02%
DANESITA	1518	0.01%	0.01%	0.01%
POP PAN	1400	0.01%	0.01%	0.01%
TRIUNFO	1375	0.01%	0.01%	0.01%

MAMMOET	1305	0.00%	0.01%	0.00%
CAFE KRANZEL	1300	0.01%	0.01%	0.01%
KHARI	1300	0.01%	0.01%	0.01%
BART SIMPSON	1290	0.01%	0.01%	0.01%
GOURMET	1290	0.01%	0.01%	0.01%
GLEN STEWART	1250	0.01%	0.01%	0.01%
REGAL	1200	0.00%	0.01%	0.00%
CLEARSPRING	1152	0.01%	0.00%	0.01%
JEERA	1100	0.01%	0.00%	0.01%
DB CHOC COOKIE	1075	0.01%	0.00%	0.01%
AWT	1000	0.01%	0.00%	0.01%
BISCUIT BARREL	1000	0.01%	0.00%	0.00%
LOACKER	1000	0.01%	0.00%	0.01%
MACFARLANE	1000	0.00%	0.00%	0.01%
TAYLORS	1000	0.01%	0.00%	0.01%
CARBOLITE	965	0.04%	0.00%	0.02%
BUITEMAN	950	0.01%	0.00%	0.01%
DEVON	950	0.00%	0.00%	0.00%
HAWKWOOD	905	0.01%	0.00%	0.01%
ASHBOURNE	900	0.01%	0.00%	0.00%
EXCELSIOR	900	0.00%	0.00%	0.00%
JULES DESTROOPER	900	0.01%	0.00%	0.01%
VAST BANKET	900	0.00%	0.00%	0.01%
GRIESSON	800	0.01%	0.00%	0.01%
GCV	750	0.01%	0.00%	0.01%
AUNTIES WHEELIES	720	0.00%	0.00%	0.00%
BOULEVARD	700	0.01%	0.00%	0.01%
VICENZI	700	0.01%	0.00%	0.00%
PAN CANTUCCINI	650	0.01%	0.00%	0.00%
ORVITA	625	0.00%	0.00%	0.01%
ALICE MCPHERSON	600	0.00%	0.00%	0.00%
ANNAS	600	0.00%	0.00%	0.01%
EUROSHOPPER	600	0.00%	0.00%	0.00%
FORTTS	600	0.01%	0.00%	0.00%
HENRY LAMBERTZ	600	0.01%	0.00%	0.01%
KASHMIR	600	0.00%	0.00%	0.00%
MAGISNAX	600	0.00%	0.00%	0.00%
TRIPLE BARS	600	0.00%	0.00%	0.00%
SUN VALLEY	580	0.01%	0.00%	0.00%
MILLERS	525	0.01%	0.00%	0.00%
BEST IN	500	0.00%	0.00%	0.00%
FLORAL TRADITIONAL	500	0.01%	0.00%	0.00%
LESLEY	500	0.00%	0.00%	0.00%
SPONGEBOB	500	0.01%	0.00%	0.00%
YORKSHIRE BISCUITS	500	0.01%	0.00%	0.00%
MANNER	490	0.00%	0.00%	0.01%
BUTTERFLY	454	0.00%	0.00%	0.00%
TRT	450	0.00%	0.00%	0.00%
FULLERS	440	0.00%	0.00%	0.00%
EASTER BISCUITS	400	0.00%	0.00%	0.00%
LOVELLS	400	0.00%	0.00%	0.00%
QUIACKBURY	400	0.00%	0.00%	0.00%
ROMANY	400	0.00%	0.00%	0.00%
SWISS DELICE	400	0.00%	0.00%	0.01%
HELEY	375	0.00%	0.00%	0.00%
VIEIRA DE CASTRO	375	0.00%	0.00%	0.00%
FAIR TRADE	350	0.00%	0.00%	0.00%
REDOND	350	0.00%	0.00%	0.00%
FAMILY CHOICE	300	0.00%	0.00%	0.00%
GARDEN WAFERS	300	0.00%	0.00%	0.00%
GLUTAFIN	300	0.00%	0.00%	0.00%
MULTI GRAIN	300	0.00%	0.00%	0.00%
PEEK FREANS	300	0.00%	0.00%	0.00%
RIPENSA	300	0.00%	0.00%	0.00%
TOST	300	0.00%	0.00%	0.00%
TRUFFINO	300	0.00%	0.00%	0.00%
WAVERLEY	300	0.00%	0.00%	0.00%
BALO	250	0.00%	0.00%	0.00%

DELSER	250	0.00%	0.00%	0.00%
DUCHESS	250	0.00%	0.00%	0.00%
RIO FIESTA	250	0.00%	0.00%	0.00%
PEPPERIDGE FARM	244	0.00%	0.00%	0.00%
KHATAI	240	0.00%	0.00%	0.00%
BOOTS	200	0.00%	0.00%	0.00%
EARL GREYS	200	0.00%	0.00%	0.00%
FURNISS	200	0.00%	0.00%	0.00%
MICA	200	0.00%	0.00%	0.00%
TRAIDCRAFT	200	0.00%	0.00%	0.00%
BLUE DRAGON	195	0.00%	0.00%	0.00%
BIONA	175	0.00%	0.00%	0.00%
MILKY WAY	175	0.00%	0.00%	0.01%
ORVILLE	156	0.00%	0.00%	0.00%
BAY TREE	150	0.00%	0.00%	0.00%
TODAYS	150	0.00%	0.00%	0.00%
VB ORGANIC	150	0.00%	0.00%	0.00%
VILLAGE BAKERY	150	0.00%	0.00%	0.00%
WATERTHINS	150	0.00%	0.00%	0.00%
NEWBURY	145	0.00%	0.00%	0.00%
RIZZLES	140	0.00%	0.00%	0.00%
ALLINSON	125	0.00%	0.00%	0.00%
FLATBREAD EVERYTHING	125	0.00%	0.00%	0.00%
HAUST	125	0.00%	0.00%	0.00%
ABBEY	120	0.00%	0.00%	0.00%
BOLERO	110	0.00%	0.00%	0.00%
BELIN	100	0.00%	0.00%	0.00%
DELACRE	100	0.00%	0.00%	0.00%
FRANKS COOKIES	100	0.00%	0.00%	0.00%
G.G. SCANDINAVIAN	100	0.00%	0.00%	0.00%
HARLEQUIN	100	0.00%	0.00%	0.00%
LIMA	100	0.00%	0.00%	0.00%
NICE 'N' RICE	100	0.00%	0.00%	0.00%
BONNE MAMAN	90	0.00%	0.00%	0.00%
AMOY	50	0.00%	0.00%	0.00%
CROUSTADES	50	0.00%	0.00%	0.00%
UNCLE BENS	50	0.00%	0.00%	0.00%
T/PINK	14	0.00%	0.00%	0.00%

Fruit juice brname	quantity sold	% volume mktshare	% unit mktshare	% penetration
TESCO	2655080	15.01%	12.61%	12.82%
ASDA	2347000	11.08%	11.15%	11.33%
TESCO VALUE	2191600	7.11%	10.41%	10.55%
J SAINSBURY	1769800	10.00%	8.41%	8.11%
ASDA SMARTPRICE	1667200	4.66%	7.92%	8.30%
TROPICANA	1621750	11.67%	7.70%	6.55%
MORRISONS	1186530	5.68%	5.64%	5.08%
LIDL	1168500	4.07%	5.55%	5.00%
ALDI	991000	4.23%	4.71%	5.57%
DEL MONTE	748000	3.67%	3.55%	3.54%
J SAINSBURY LOW	491000	1.26%	2.33%	2.30%
CO-OP	429000	2.10%	2.04%	2.14%
MORRISONS BETTA	418000	1.33%	1.99%	1.96%
SOMERFIELD	413050	1.82%	1.96%	1.98%
SHLOER	409000	2.91%	1.94%	1.91%
SOMERFIELD SIMP	357000	0.77%	1.70%	1.67%
ASDA BIG SAVER	204000	0.59%	0.97%	0.48%
COPELLA	194500	1.22%	0.92%	0.90%
WAITROSE	174200	0.99%	0.83%	0.82%
M&S ST MICHAEL	169250	1.37%	0.80%	1.04%
SUNPRIDE	119800	0.57%	0.57%	0.59%
J SAINSBURY T T	111000	0.85%	0.53%	0.51%
SOMERFIELD MAKE	104000	0.24%	0.49%	0.49%
CO-OP EVERYDAY	98000	0.27%	0.47%	0.46%
ICELAND	91650	0.53%	0.44%	0.44%
TESCO FINEST	77250	0.59%	0.37%	0.38%
PRINCES	68250	0.33%	0.32%	0.34%
SUNSWEET	62000	0.47%	0.29%	0.29%
CAPE	59000	0.23%	0.28%	0.28%
SAFEWAY	56000	0.21%	0.27%	0.26%
NETTO	52000	0.15%	0.25%	0.24%
APPLETISER	49050	0.44%	0.23%	0.30%
LIBBYS	40410	0.30%	0.19%	0.31%
GROVE FRESH	35000	0.28%	0.17%	0.16%
JUS	34000	0.07%	0.16%	0.16%
CAMPBELLS V-8	31404	0.41%	0.15%	0.29%
KWIK SAVE	27000	0.11%	0.13%	0.13%
FLORIDA'S NATUR	24500	0.12%	0.12%	0.07%
SUNSTREAM	23000	0.08%	0.11%	0.11%
SPAR	22000	0.08%	0.10%	0.10%
JAFFA	20900	0.06%	0.10%	0.13%
SOUTHERN DELIGH	17000	0.08%	0.08%	0.08%
FRUIT PASSION	16000	0.07%	0.08%	0.07%
PJ'S SMOOOTHIE	16000	0.20%	0.08%	0.16%
JUST JUICE	14200	0.06%	0.07%	0.07%
CALYPSO	13200	0.23%	0.06%	0.31%
NISA	13000	0.05%	0.06%	0.05%
WELCHS	13000	0.10%	0.06%	0.06%
J SAINSBURY BAS	12500	0.05%	0.06%	0.07%
PETE & JOHNNYS	10350	0.12%	0.05%	0.07%
SUNRISE	9000	0.03%	0.04%	0.04%
BUDGEN	8600	0.05%	0.04%	0.05%
HAPPY SHOPPER	7000	0.02%	0.03%	0.03%
HUCKLEBERRY FIN	6750	0.16%	0.03%	0.13%
CRYSTAL	6100	0.08%	0.03%	0.07%
ARO	6000	0.06%	0.03%	0.03%
LIFESTYLE	6000	0.01%	0.03%	0.03%
PARADISE	6000	0.02%	0.03%	0.01%
CO-OP FAIRTRADE	5650	0.03%	0.03%	0.04%
BRITVIC	5420	0.07%	0.03%	0.09%
JAF FRESH	5000	0.01%	0.02%	0.02%
STUTE	5000	0.02%	0.02%	0.02%
MINUTE MAID	4000	0.02%	0.02%	0.02%
SUNRAYSIA	4000	0.03%	0.02%	0.02%
EDEN	3000	0.03%	0.01%	0.02%
HERITAGE	3000	0.02%	0.01%	0.01%
SUNMAGIC	2490	0.03%	0.01%	0.02%

KWIKSAVE	2000	0.01%	0.01%	0.01%
SUNJUICE	2000	0.01%	0.01%	0.01%
SCHWEPPES	1800	0.06%	0.01%	0.04%
ASDA GO SIMPLE	1750	0.02%	0.01%	0.03%
BEST IN	1530	0.01%	0.01%	0.01%
SAXON	1500	0.17%	0.01%	0.01%
STELLE	1380	0.01%	0.01%	0.01%
SMOOTHIE	1330	0.02%	0.01%	0.02%
F/NATURE ORGANI	1320	0.02%	0.01%	0.02%
ST IVEL	1200	0.00%	0.01%	0.01%
COSTCUTTER	1000	0.00%	0.00%	0.00%
EXPRESS	1000	0.01%	0.00%	0.00%
JUICE 2 GO	1000	0.00%	0.00%	0.01%
M&S ST MICHAEL	1000	0.01%	0.00%	0.00%
SOUTHERN GOLD	1000	0.00%	0.00%	0.00%
SUNCREST	1000	0.03%	0.00%	0.02%
NEXT	800	0.01%	0.00%	0.02%
FLEMISH CASTLE	750	0.00%	0.00%	0.00%
RABENHORST	750	0.01%	0.00%	0.00%
SUNRICH	750	0.01%	0.00%	0.00%
PURITY	500	0.01%	0.00%	0.00%
FRT N ORG	250	0.01%	0.00%	0.00%
ASSIS	200	0.00%	0.00%	0.00%
KULANA	200	0.01%	0.00%	0.00%

Spreads brname	quantity sold	% volume mktshare	% unit mktshare	% penetration
FLORA	2895250	18.38%	15.37%	14.97%
ST IVEL	1935750	7.34%	10.28%	7.66%
CLOVER	1685500	9.33%	8.95%	6.97%
I CAN'T BELIEVE ITS NOT BUTTER	1121250	4.42%	5.95%	4.55%
STORK	1105500	2.80%	5.87%	5.59%
LURPAK	1104125	10.77%	5.86%	7.53%
TESCO	943000	3.87%	5.01%	4.69%
ASDA	795750	2.44%	4.23%	3.23%
ANCHOR	727600	6.07%	3.86%	5.02%
MORRISONS	719000	2.85%	3.82%	3.70%
J SAINSBURY	696905	3.14%	3.70%	3.94%
TESCO VALUE	663250	2.93%	3.52%	4.22%
COUNTRY LIFE	508250	4.28%	2.70%	4.05%
ASDA SMART PRICE	494250	2.32%	2.62%	3.08%
ALDI	412250	1.89%	2.19%	2.68%
OLIVIO	362500	2.31%	1.92%	2.46%
VITALITE	289500	1.21%	1.54%	1.36%
WILLOW	220000	1.25%	1.17%	1.77%
BERTOLLI	217000	1.27%	1.15%	0.68%
HOLLYBUSH	176250	0.99%	0.94%	1.16%
CO-OP	165000	0.68%	0.88%	0.95%
UTTERLY BUTTERLY	159000	0.73%	0.84%	0.62%
LIDL	152072	0.49%	0.81%	0.86%
KERRYGOLD	150500	1.32%	0.80%	1.27%
PURESOYA	148000	0.59%	0.79%	0.88%
KWIKSAVE SIMPLY	103250	0.49%	0.55%	0.75%
FRESH FIELDS	101500	0.25%	0.54%	0.35%
BENECOL	84500	1.73%	0.45%	0.54%
GOLDEN CHURN	76500	0.25%	0.41%	0.27%
KWIK SAVE SIMPLY	58750	0.19%	0.31%	0.24%
SOMERFIELD	57500	0.27%	0.31%	0.30%
BERIO	48000	0.34%	0.25%	0.31%
PURE	44000	0.28%	0.23%	0.28%
PRESIDENT	36000	0.37%	0.19%	0.36%
WAITROSE	32250	0.24%	0.17%	0.25%
DAIRYGATE	29750	0.20%	0.16%	0.26%
TESCO BAKING	28000	0.08%	0.15%	0.17%
ARGENTO	27500	0.14%	0.15%	0.12%
ASDA BEST FOR BAKING	24500	0.06%	0.13%	0.17%
VELVET GOLD	24500	0.03%	0.13%	0.12%
SAFEWAY	24250	0.09%	0.13%	0.09%
KWIK SAVE	22000	0.13%	0.12%	0.18%
YORKSHIRE	20000	0.17%	0.11%	0.18%
YEO VALLEY	17500	0.18%	0.09%	0.17%
ICELAND	13250	0.09%	0.07%	0.08%
J SAINSBURY LOW PRICE	13250	0.02%	0.07%	0.05%
SUMMER COUNTY	12000	0.03%	0.06%	0.02%
M&S ST MICHAEL	9750	0.08%	0.05%	0.10%
TESCO FINEST	7875	0.08%	0.04%	0.10%
NISA	5750	0.04%	0.03%	0.03%
WYKE FARMHOUSE	5750	0.04%	0.03%	0.05%
KERRY	5620	0.12%	0.03%	0.14%
ROWAN GLEN	4750	0.03%	0.03%	0.03%
PURA	4500	0.02%	0.02%	0.03%
GOLD CUP	4000	0.01%	0.02%	0.03%
HEINZ	3500	0.02%	0.02%	0.04%
ROWSONS	3000	0.01%	0.02%	0.01%
MARYLAND	2500	0.03%	0.01%	0.03%
ST HELENS	2500	0.04%	0.01%	0.03%
DRAKEMIRE	2250	0.02%	0.01%	0.02%
TOMOR	2000	0.01%	0.01%	0.02%
DROMONA	1750	0.01%	0.01%	0.01%
CO-OP EVERYDAY	1500	0.00%	0.01%	0.01%
DELAMERE	1500	0.02%	0.01%	0.01%
SLIMMERS	1500	0.00%	0.01%	0.01%
WHEELBARROW	1500	0.02%	0.01%	0.02%
HAPPY SHOPPER	1250	0.00%	0.01%	0.01%

SPAR	1250	0.01%	0.01%	0.01%
CARAPELLI	1000	0.00%	0.01%	0.00%
DUCHY	1000	0.02%	0.01%	0.01%
GOLD TOP	1000	0.01%	0.01%	0.01%
HORLICKS	1000	0.01%	0.01%	0.01%
L/FARM	1000	0.01%	0.01%	0.01%
DAIRY CREST	810	0.02%	0.00%	0.02%
NORPAK	750	0.01%	0.00%	0.01%
RACHELS	750	0.01%	0.00%	0.01%
BUDGEN	500	0.00%	0.00%	0.00%
COUNTRY GOLD	500	0.00%	0.00%	0.00%
DANE CHURN	500	0.00%	0.00%	0.01%
FARMFOODS	500	0.00%	0.00%	0.00%
KERRYMAID	500	0.00%	0.00%	0.00%
NETTO	500	0.00%	0.00%	0.00%
BEST WAY	250	0.00%	0.00%	0.00%
LIFESTYLE	250	0.00%	0.00%	0.00%
VILLAGE CROSS	250	0.00%	0.00%	0.00%
LATT MONT	125	0.00%	0.00%	0.00%

Bibliography

Abeyasakara, S., Lawson-McDowall, J., Wilson, I.M., (2000). *Converting ranks to scores for an ad-hoc procedure to identify methods of communication available to farmers.* [Online: Available at: http:// www. reading.ac.uk]

Albanese, P. J. (1988). The formation and change of fertility preferences: a case study of the generational change in the size of the Italian family in the United States. *Journal of Behavioral Economics*, *17*(1), 35-55.

Alhadeff, D. A. (1982). *Microeconomics and human behavior: Toward a new synthesis of economics and psychology*. University of California Press.

Allison, J. (1983). *Behavioural economics*. New York, Praeger.

Allison, J. (1986). Economic interpretations of animal experiments. *Economic psychology: Intersections in theory and application*, 219-245.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. *Action control*, 11-39.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour.*

Anderson, E., & Simester, D. (2003). Mind your pricing cues. *Harvard Business Review*, *81*(9), 96-103.

Andreasen, A. R. (1965). Attitudes and Consumer Behavior: A Decision Model in New Research in Marketing. Institute of Business and Economic Research. *University of California, Berkeley*, 1-61.

Banks, M. L., Roma, P. G., Folk, J. E., Rice, K. C., & Negus, S. S. (2011). Effects of the delta-opioid agonist SNC80 on the abuse liability of methadone in rhesus monkeys: a behavioral economic analysis. *Psychopharmacology*, *216*(3), 431-439.

Barnes, D., & Holmes, Y. (1991). Radical behaviorism, stimulus equivalence, and human cognition. *The Psychological Record*, *41*(1), 19-31.

Bartholomew, D. J. (1984). Discussion: The Dirichlet: A comprehensive model of buying behaviour. *The Journal of the Royal Statistical Society Series A (General)*, *147*(5), 643-4.

Bass, F. M. (1995). Empirical generalizations and marketing science: A personal view. *Marketing Science*, *14*(3_supplement), G6-G19.

Battalio, R. C., Kagel, J. H., Winkler, R. C., Fisher, E. B., Basmann, R. L., & Krasner, L. (1973). A test of consumer demand theory using observations of individual consumer purchases. *Economic Inquiry*, *11*(4), 411-428.

Baum, W. M. (1974). On two types of deviation from the matching law: Bias and undermatching. *Journal of the experimental analysis of behavior*, *22*(1), 231-242.

Baum, W. M. (1979). Matching, undermatching, and overmatching in studies of choice. *Journal of the Experimental analysis of Behavior*, *32*(2), 269-281.

Baum, W. M., & Nevin, J. A. (1981). Maximization theory: Some empirical problems. *Behavioral and Brain Sciences*, *4*(3), 389-390.

Baum, W. M., & Rachlin, H. C. (1969). Choice as time allocation. *Journal of the experimental analysis of behavior*, *12*(6), 861-874.

Begg, D., Fischer, S. & Dornbusch, R. (1997). *Economics*, 5th Edition. London: McGraw-Hill Book Company Europe.

Bell, J. (2014). *Doing Your Research Project: A guide for first-time researchers*. McGraw-Hill Education (UK).

Belk, R. W. (2007). *Handbook of qualitative research methods in marketing*. Edward Elgar Publishing.

Benton, T., & Craib, I. (2001). Critical realism and the social sciences. *Philosophy of science: The foundations of philosophical thought*, 119-139.

Bernstein, D. J., & Ebbesen, E. B. (1978). Reinforcement and substitution in humans: A multiple response analysis. *Journal of the Experimental Analysis of Behavior*, *30*(3), 243-253.

Berry, L. L., & Kunkel, J. H. (1970). In pursuit of consumer theory. *Decision Sciences*, *1*(1-2), 25-39.

Bhaskar, R. (2010). *Reclaiming reality: A critical introduction to contemporary philosophy*. Taylor & Francis.

Bhaskar, R. (2013). *A realist theory of science*. Routledge.

Bickel, W. K., Green, L., & Vuchinich, R. E. (1995). Behavioral economics. *Journal of the experimental analysis of behavior*, *64*(3), 257-262.

Bidwell, L. C., MacKillop, J., Murphy, J. G., Tidey, J. W., & Colby, S. M. (2012). Latent factor structure of a behavioral economic cigarette demand curve in adolescent smokers. *Addictive behaviors*, *37*(11), 1257-1263.

Bitner, M. J. (1992). Servicescapes: The impact of physical surroundings on customers and employees. *The Journal of Marketing*, 57-71.

Blaikie, N. (1993). *Approaches to social enquiry.* Cambridge, Polity Press.

Blattberg, R. C., & Wisniewski, K. J. (1989). Price-induced patterns of competition. *Marketing science*, 8(4), 291-309.

Bloom, D. (1984). Discussion: The Dirichlet: A comprehensive model of buying behaviour. *The Journal of the Royal Statistical Society Series A (General)*, 147(5), 647.

Bordley, R. F. (1983). A central principle of science: Optimization. *Systems Research and Behavioral Science*, *28*(1), 53-64.

Brownstein, A. J., & Pliskoff, S. S. (1968). Some effects of relative reinforcement rate and changeover delay in response-independent concurrent schedules of reinforcement. *Journal of the Experimental Analysis of Behavior*, *11*(6), 683-688.

Bryman, A. (2012). *Social research methods*. Oxford university press.

Bryman, A. & Bell, E. (2011). *Business Research Methods 3e*. Oxford university press.

Bui Huynh, N. & Foxall, G.R. (2016). Consumer store choice: a matching analysis. In G.R. Foxall (ed.), *The Routledge Companion to Consumer Behavior Analysis*. London and New York: Routledge, 96-120.

Burrell, G. & Morgan, G. (1979). *Sociological paradigms and organisational analysis.* London, Heinemann Educational Books.

Burns, A. C., & Bush, R. F. (2006). Marketing research. *Globalization*, *1*(7).

Castro, B., & Weingarten, K. (1970). Toward experimental economics. *Journal of Political Economy*, *78*(3), 598-607.

Charlton, P., & Ehrenberg, A. S. (1976). An experiment in brand choice. *Journal of Marketing Research*, 152-160.

Christensen, C. J., Kohut, S. J., Handler, S., Silberberg, A., & Riley, A. L. (2009). Demand for food and cocaine in Fischer and Lewis rats. *Behavioral Neuroscience*, *123*(1), 165.

Christensen, C. J., Silberberg, A., Hursh, S. R., Huntsberry, M. E., & Riley, A. L. (2008). Essential value of cocaine and food in rats: tests of the exponential model of demand. *Psychopharmacology*, *198*(2), 221-229.

Christensen, C. J., Silberberg, A., Hursh, S. R., Roma, P. G., & Riley, A. L. (2008). Demand for cocaine and food over time. *Pharmacology Biochemistry and Behavior*, *91*(2), 209-216.

Churchill, G. A. (1999). *Marketing research: methodological foundations.* Fort Worth, Texas, The Dryden Press.

Churchill, G. A. J. & Iacobucci, D. (2002). A paradigm for developing better measures for split-half realiability coefficients. *Journal of Marketing Research,* 16, 64-73.

Churchill, G. A., & Iacobucci, D. (2006). *Marketing research: methodological foundations*. New York: Dryden Press.

Collier, G.H., Hirsch, E. & Hamlin, P.H. (1972). The ecological determinants of reinforcement in the rat, *Physiology and Behavior*, 9, 705-716.

Conger, R., & Killeen, P. (1974). Use of concurrent operants in small group research: A demonstration. *Pacific Sociological Review*, *17*(4), 399-416.

Creswell, J. W., Clark, V. L. P., Gutmann, M. L. & Hanson, W. E. 2003. Advanced mixed methods research designs. In: Tashakkori, A. & Teddie, C. (eds.) *Handbook of mixed methods in social and behavioural research.* Thousand Oaks, California: SAGE Publications.

Crouch, S., & Housden, M. (2003). *Marketing research for managers*, [online] Oxford.

Curry, B., Foxall, G. R., & Sigurdsson, V. (2010). On the tautology of the matching law in consumer behavior analysis. *Behavioural processes*, *84*(1), 390-399.

Currim, I. S., & Schneider, L. G. (1991). A taxonomy of consumer purchase strategies in a promotion intensive environment. *Marketing Science*, *10*(2), 91-110.

Davison, M., & Jenkins, P. E. (1985). Stimulus discriminability, contingency discriminability, and schedule performance. *Learning & behavior*, *13*(1), 77-84.

Davison, M., & McCarthy, D. (2016). *The matching law: A research review*. Routledge.

Dawson, S., Bloch, P. H., & Ridgway, N. M. (1990). Shopping motives, emotional states, and retail outcomes. *Journal of retailing*, *66*(4), 408.

De Chernatony, L. & McDonald, M. (2003). *Creating Powerful Brands.* Butterworth-Heinernann.

De Villiers, P. (1977). Choice in concurrent schedules and a quantitative formulation of the law of effect. *Handbook of operant behavior*, 233-287.

De Villiers, P.A. & Herrnstein, R.J. (1976). Toward a law of response strength, *Psychological Bulletin.* 83, 1131-1153.

Denzin, N., K. & Lincoln, Y. S. (1994). *Handbook of qualitative research.* Thousand Oaks, California, SAGE Publications.

Denzin, N. K. & Lincoln, Y. S. (1998). *Collecting and interpreting qualitative materials.* London, SAGE Publications.

Dickson, P. R., & Sawyer, A. G. (1990). The price knowledge and search of supermarket shoppers. *The Journal of Marketing*, 42-53.

Dinsmoor, J.A. (1995). In the beginning..., Todd, J. T., & Morris, E. K. (1995). *Modern perspectives on BF Skinner and contemporary behaviorism*. Greenwood Press/Greenwood Publishing Group. Westport, CT: Greenwood Press, 7-24.

Donovan, R.J. & Rossiter, J.R. (1982). Store atmosphere: an environmental psychology approach, *Journal of Retailing*, *58*(1), 34-57.

Easterby-Smith, M., Golden-Biddle, K. & Locke, K. (2008). Working with pluralism: determining quality in qualitative research. *Organizational Research Methods,* 11,419-429.

Ehrenberg, A. S. C. (1972). *Repeat-buying: theory and applications*. North-Holland Pub. Co.

Ehrenberg, A. S. (1986). Pricing and brand differentiation. *Singapore Marketing Review*, *1*, 5-15.

Ehrenberg, A.S.C. (1988). *Repeat Buying: Facts, Theory and Applications*, (2nd Eds.), New York: Oxford University Press/London: Griffin.

Ehrenberg, A. S. C. (1991). New brands and the existing market, *Journal of the Market Research Society, 33* (4), 285-299.

Ehrenberg, A. S. C. (1993). Theory or well-based results: which comes first?, In: G. Laurent, G. Lilien & P. Pras (Eds.), *Research traditions in marketing*, 79-108.

Ehrenberg, A. S.C. & England, L. R. (1990). Generalising a pricing effect, *The Journal of Industrial Economics, 39*, 47-68.

Ehrenberg, A. S. C. & Goodhardt, G. J. (1977). *Essays on Understanding Buyer Behavior.* New York: J. Walter Thompson and Market Research Corporation of America.

Ehrenberg, A. S. C. & Goodhardt, G. J. (2002). Double jeopardy revisited, again, *Marketing Research, 14*(1), 40-42.

Ehrenberg, A. S.C., Goodhardt, G. J. & Barwise, P. (1990). Double jeopardy revisited, *Journal of Marketing, 54*, 82-91.

Ehrenberg, A. S.C., Hammond, K. & Goodhardt, G. J. (1994). The after-effects of price-related consumer promotions", *Journal of Advertising Research, July/August*, 11-21.

Ehrenberg, A. S. C. & Scriven, J. (1999). Brand loyalty, In P. E. Earl & S. Kemp (Eds.) *The Elgar Companion to Consumer Research and Economic Psychology.* Cheltenham, Gloucestershire: Edward Elgar, 53-63.

Ehrenberg, A. S. C. & Uncles, M. (1999). Understanding Dirichlet-Type Markets, *The R&D Initiative Research Report.*

Elster, J. (1989). *Solomonic judgements: limitations of rationality*. Cambridge: Cambridge University Press.

Engel, J.F., Kollat, D.T. & Blackwell, R.D. (1968). *Consumer behavior*. New York: Holt, Rinehart and Winston.

Elsmore, T. F., Fletcher, G. V., Conrad, D. G., & Sodetz, F. J. (1980). Reduction of heroin intake in baboons by an economic constraint. *Pharmacology Biochemistry and Behavior, 13*, 729–731.

Eriksson, P. & Kovalainen, A. (2008). *Qualitative methods in business research.* London, SAGE Publication.

Fagerstrøm, A. (2010). The motivating effect of antecedent stimuli on the web shop: A conjoint analysis of the impact of antecedent stimuli at the point of online purchase. *Journal of organizational behavior management* 30(2), 199-220.

Fantino, E.J. (1981). Is maximisation theory general, and is it refutable? *The Behavioural and Brain Sciences, 4*, 390-393.

Fantino, E. & Preston, R.A. (1988). Choice and foraging: The effects of accessibility on acceptability, *Journal of the Experimental Analysis of Behaviour, 50*, 395-403.

Ferster, C. B. & Skinner, B. F. (1957). Schedules of reinforcement.

Fishbum, P.C. (1987). Utility theory and decision theory, In: J. Eatwell, M. Milgate P. Newman (eds) The New Palgrave: *Addiction M of economics* (Vol 4. Q to Z), London and Basing stoke: Macmillan Press Ltd., 779-783.

Fisher, W.W. & Mazur, J.E. (1997). Basic and applied research on choice responding, *Journal of Applied Behavior Analysis, 30* (3), 387-410.

Fisher, E.B., Winkler, R.C., Krasner, L., Kagel, J., Battalio. R.C. & Basmann, R.L. 1978). Economic principles in behavior therapy: Complex interdependencies in token economies, *Behavior Therapy, 9*, 391-403.

Foster, T. M., Sumpter, C. E., Temple, W., Flevill, A., & Poling, A. (2009). Demand equations for qualitatively different foods under fixed-ratio schedules: A comparison of three data conversions. *Journal of the Experimental Analysis of Behavior, 92*, 305–326.

Foxall, G.R. (1987). Radical Behaviourism and Consumer Research, *International Journal of Research in Marketing, 4*, 111-129.

Foxall, G. R. (1990). *Consumer Psychology in Behavioral Perspective.* London and New York: Routledge.

Foxall, G. R. (1992). The Behavioral Perspective Model of purchase and consumption: from consumer theory to marketing practice, *Journal of the Academy of Marketing Science, 20,* 189-198.

Foxall, G. R. (1996). *Consumers in Context: The BPM Research Program.* London and New York: International Thomson.

Foxall, G. R. (1997). *Marketing Psychology: The Paradigm in the Wings.* London: Macmillan.

Foxall, G. R. (1998). Radical behaviorist interpretation: Generating and evaluating an account of consumer behavior, *The Behavior Analyst, 21*, 321-354.

Foxall, G. R. (1999). The substitutability of brands, *Managerial and Decision Economics, 20,* 241-57.

Foxall, G. R. (Ed.) (2002). *Consumer Behavior Analysis: Critical Perspectives.* London and New York: Routledge.

Foxall, G. R. (2004). *Context and Cognition: Interpreting complex behavior*. Reno, NV: Context Press.

Foxall, G. R. (2005). *Understanding Consumer Choice.* London and New York: Palgave Macmillan.

Foxall, G. R. (2010). *Interpreting Consumer Choice: The Behavioral Perspective Model.* New York: Routledge.

Foxall, G. R. (2017). *Advanced Introduction to Consumer Behavior Analysis.* Cheltenham: Edward Elgar.

Foxall, G.R., Goldsmith, R.E. & Brown S. (1998). *Consumer Psychology for Marketing,* 2nd Edition, London: International Thomson Business Press.

Foxall, G. R. & Greenley, G. E. (1998). The affective structure of consumer situations, *Environment and Behavior, 30*, 781-798.

Foxall, G. R. & Greenley, G. E. (1999). Consumers' emotional responses to service enviromnents, *Journal of Business Research, 46,* 149-58.

Foxall, G.R. & Greenley, G.E. (2000). Predicting and explaining responses to consumer environments: An empirical test and theoretical extension of the bchavioural perspective model, *Service Industries Journal, 20*, 39-63.

Foxall, G. R. & James, V. K. (2001). The behavioral analysis of consumer brand choice: a preliminary analysis, *European Journal of Behavior Analysis, 2*, 209-220.

Foxall, G. R. & James, V. K. (2003). The behavioral ecology of brand choice: how and what do consumers maximize?, *Psychology and Marketing, 20,* 811-836.

Foxall, G. R., & Schrezenmaier, T. C. (2003). The behavioral economics of consumer brand choice: Establishing a methodology. *Journal of Economic Psychology, 24*(5), 675-695.

Foxall, G. R., Oliveira-Castro, J. M., & Schrezenmaier, T. C. (2004). The behavioral economics of consumer brand choice: Patterns of reinforcement and utility maximization. *Behavioural Processes, 66*, 235–260.

Foxall, G. R., Yan, J., Oliveira-Castro, J. M., & Wells, V. K. (2013). Brand-related and situational influences on demand elasticity. *Journal of Business Research, 66*(1), 73-81.

Foxall, G. R. & Yani-de-Soriano, M. M. (2005). Situational influences on consumers' attitudes and behavior, *Journal of Business Research, 58*(4), 518-525.

Fuqua, R.W. (1984). Comments on the applied relevance of the matching law, *Journal of Applied BehaviorAnalysis, 17*(3), 381-386.

Gabor, A. & Granger, C.W. J. (1961). On the price consciousness of consumers, *Applied Statistics, 10*(3), 170-188.

Gephart, R. P. (2004). Qualitative research and the Academy of Management Journal. *Academy of Management Journal* 47(4), 454-462.

Goodhardt, G.J., Ehrenberg, A. S.C.& Chatfield, C. (1984). The Dirichlet: A comprehensive model of buying behaviour, *Journal of the Royal Statistical Society Series (A General),147*, 621-643.

Green, L. & Freed, D. E. (1993). The substitutability of reinforcers, *Journal of the Experimental Analysis of Behavior, 60*, 141-158.

Green, L., Kagel, J.H. & Battalio, R.C. (1982). Ratio schedules of reinforcement and their relationship to economic theories of labor supply, In: M.L. Commons, R.J. Herrnstein & H. Rachlin (Eds), *Quantitative Analyses of Behavior. Vol 11. matching and maximizing accounts*. Cambridge, MA: Ballinger, 375-429.

Green, L., Rachlin, H. & Hanson, J. (1983). Matching and maximizing with concurrent ratio-interval schedules, *Journal of the Experimental Analysis of Behavior, 40*, 217-24.

Guba, E. G. & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *In:* Denzin, N. K. & Lincoln, Y. S. (eds.) *Handbook of qualitative research.* London: SAGE Publications.

Guba, E. G. & Lincoln, Y. S. (1998). Competing paradigms in qualitative research. *In:* Denzin, N. K. & Lincoln, Y. S. (eds.) *The landscape of qualitative research: theories and issues.* Thousand Oaks, CA, London: SAGE Publications.

Denzin, N. K., & Lincoln, Y. S. (2008). *The landscape of qualitative research* (Vol. 1). Sage.

Halcomb, E., & Hickman, L. (2015). Mixed methods research. *Nursing Standard*, *29*(32), 41-47.

Hantula, D. A., DiClemente, D. F., & Rajala, A. K. (2001). Outside the box: The analysis of consumer behavior. *Organizational change*, 203-223.

Hatch, M. J. & Cunliffe, A. (2006). *Organization theory,* Oxford, Oxford University Press.

Hayes, L. J. & Chase, P. N. (1991). *Dialogues on verbal behavior: The First International Institute on Verbal Relations*. Context Press.

Herrnstein, R.J. (1961). Relative and absolute strength of response as a function of frequency of reinforcement, *Journal of the Experimental Analysis of Behavior, 4*, 267-272.

Herrnstein, R.J. (1970). On the law of effect, *Journal of the Experimental Analysis of Behavior, 13*, 243-266.

Herrnstein, R.J. (1974). Formal properties of the matching law, *Journal of the Experimental Analysis of Behaviour, 21*(1), 159-164.

Herrnstein, R.J. (1982). Melioration as behavioral dynamism. In: M. L. Commons, R.J. Herrnstein & H. Rachlin (Eds), *Quantitative-Analyses of Behavior. Vol 11, matching and maximizing accounts.* Cambridge, MA: Ballinger, 433-458.

Herrnstein, R.J. (1988). A behavioral alternative to utility maximization. In: Maital, S. (ed.), *Evolution and its influence.* London: Oxford University Press, 35-61.

Herrnstein, R.J. (1990a). Rational choice theory: Necessary but not sufficient, *American Psychologist, 45*, 356-367.

Herrnstein, R.J. (1990b). Behavior, reinforcement and utility, *Psychological Science, 4,* 217-224.

Herrnstein, R. J. (1997). *The Matching Law: Papers in Psychology and Economics.* (edited by Howard Rachlin and David I. Laibson). Cambridge, MA: Harvard University Press.

Herrnstein, R.J. & Heyman, G.M. (1979). Is matching compatible with reinforcement maximization on concurrent variable interval, variable ratio?, *Journal of the Experimental Analysis of Behaviour, 31*, 209-223.

Herrnstein, R.J. & Loveland, D.H. (1974). Hunger and contrast in a multiple schedule, *Journal of the Experimental Analysis of Behaviour, 21*(3), 511-517.

Herrnstein, R.J. & Loveland, D.H. (1975). Maximizing and matching on concurrent ratio schedules, *Journal of the Experimental Analysis of Behavior, 24,* 107-116.

Herrnstein, R.J. & Prelec, D. (1991). Melioration: A theory of distributed choice, *Journal of Economic Perspectives, 5*, 137-156.

Herrnstein, R. J. & Vaughan, W. (1980). Melioration and behavioral allocation, In J. E. R. Staddon (Ed.). *Limits to Action: The Allocation of Individual Behavior.* New York: Academic Press, 143-176.

Hill, E. & OSullivan, T. (1999). *Marketing,* 2d Edition. Harlow: Addison Longman.

Hodos, W., & Kalman, G. (1963). Effects of increment size and reinforcer volume on progressive ratio performance. *Journal of the experimental analysis of behavior*, *6*(3), 387-392.

Hodos, W. (1961). Progressive ratio as a measure of reward strength. *Science*, *134* (3483), 943-944.

Hoepfl, M. C. (1997). *Choosing qualitative research: a primer for technology education researchers.* [Online: Available at: http:// scholar.lib.vt.edu/ejoumals/JTE/v9nl/hoe pfl.html]

Holbrook, M. B. (1995). *Consumer research: Introspective essays on the study of consumption*. Sage Publications Thousand Oaks, CA.

Hollard, V. & Davison, M.C. (1971). Preference for qualitatively different reinforcers, *Journal of the Experimental Analysis of Behaviour, 16*(3), 375-380.

Home, P.J. & Lowe, C.F. (1993). Determinants of human performance on concurrent schedules, *Journal of the Experimental Analysis of Behavior, 59*, 29-60.

Houston, A.I. & McFarland, D.J. (1980). Behavioral resilience and its relation to demand functions, *In:* Staddon, J.E.R. (Ed.). *Limits to Action: The Allocation of Individual Behavior*. New York: Academic Free Press, 177-204.

Howard, J.A. & Sheth, J.N. (1969). *The theory of buyer behavior*. New York: Wiley.

Hoyer, W.D., 1984. An examination of consumer decision making for a common repeat purchase product. *Journal of consumer research*, *11*(3), 822-829.

Hudson, L. A. & Ozanne, J. L. (1998). Alternative ways of seeking knowledge in consumer research. *Journal of Consumer Research,* 14, 508-521.

Hughes, J. A. & Sharrock, W. (1997). *The philosophy of social research.* London, Longman.

Hui, M.K., Dube, L. & Chebat, J.C. (1997). The impact of music on consumer reactions to waiting for services, *Journal of Retailing, 73*(1), 87-104.

Hursh, S.R. (1978). The economics of daily consumption controlling food-and water-reinforced responding, *Journal of the Experimental Analysis of Behavior, 29*, 475-491.

Hursh, S.R. (1980). Economic concepts for the analysis of behavior, *Journal of the Experimental Analysis of Behavior, 34*, 219-238.

Hursh, S.R. (1984). Behavioral economics, *Journal of the Experimental Analysis of Behavior, 42*, 435-452.

Hursh, S. R. (1991). Behavioral economics of drug self-administration and drug-abuse policy. *Journal of the Experimental Analysis of Behavior, 56*, 377-393.

Hursh, S. R., & Silberberg, A. (2008). Economic demand and essential value. *Psychological Review, 115*, 186-198.

Hursh, S.R. & Roma, P.G., (2013). Behavioral economics and empirical public policy. *Journal of the experimental analysis of behavior, 99*(1), 98-124.

Hursh, S. R., & Roma, P. G. (2016). Behavioral economics and the analysis of consumption and choice. *Managerial and Decision Economics*, *37*(4-5), 224-238.

Hursh, S.R. (1993). Behavioral economics of drug self-administration: an introduction, *Drug and Alcohol Dependence, 33*, 165-172.

Hursh, S.R. & Bauman, R. A. (1987). The behavioral analysis of demand, In: Green, L. & Kagel, J. H. (Eds), *Advances in Behavioral Economics*, Volume 1. Norwood, NJ: Ablex. 117-165.

Hursh, S. R., & Winger, G. (1995). Normalized demand for drugs and other reinforcers. *Journal of the experimental analysis of behavior*, *64*(3), 373-384.

Hussey, J. & Hussey, R. (1997). *Business research: a practical guide for undergraduate and postgraduate students.* Basingstoke, Palgrave.

Jacobs, E. A., & Bickel, W. K. (1999). Modelling drug consumption in the clinic using simulation procedures: Demand for heroin and cigarettes in opioid-dependent outpatients. *Experimental and Clinical Psychopharmacology, 7*, 412-426.

Jacoby, J. (1976). Consumer psychology: An octennium, *Annual Review of Psychology, 27*, 331-358.

Jacoby, J. (1977). The emerging behavioral process technology in consumer decision making research. *Advances in consumer research* 4(1).

Jacoby, J., Johar, G.V. & Morrin, M. (1998). Consumer behaviour: A quadrennium, *Annual Review of psychology, 49*, 319-344.

Jary, M. & Wileman, A. (1998). Managing retail brands, In: S.Hart & J. Murphy, *Brands: The new wealth creators*, Basingstoke: Palgave Macmillan.

Jeuland, A. (1984). Discussion: The Dirichlet: A comprehensive model of buying behaviour, *The Journal of the Royal Statistical Society Series A (General), 147*(5), 649-650.

Jobber, D. (2004). *Principles and Practice of Marketing,* 4th Edition, London: McGraw-Hill.

Johnson, P. & Duberley, J. (2000). *Understanding management research: An introduction to epistemology*. Sage

Kagel, J. H. (1987). Economics according to the rats (and pigeons too): What have we learned and what can we hope to learn?, In: Roth, A. E. (Ed.) *Laboratory Experimentation in Economic: Six Points of View*, Cambridge: Cambridge University Press, 155-192.

Kagel, J. H., Battalio, R. C. & Green, L. (1995). *Economic Choice Theory: An Experimental Analysis of Animal Behavior.* Cambridge: Cambridge University Press.

Kagel, J. H., Battalio, R. C., Green, L. & Rachlin, H. (1980). Consumer demand theory applied to choice behavior of rats, In: J. E. R. Staddon (Ed.), *Limits to Action: The Allocation of Individual Behavior*. New York: Academic Press, 237-267.

Kagel, J. H., Battalio, R. C., Rachlin, H., Green, L. (1981). Demand curves for animal consumers, *Quarterly Journal of Economics, 96*(1), 1-16.

Kagel, J.H., Battalio, R.C., Rachlin, H., Green, L., Basmann, R.L. & Klemm, W.R. (1975). Experimental studies of consumer demand behavior using laboratory animals, *Economic Inquiry, 8*, 22-38.

Kagel, J.H., Battalio, R.C. & Walker, J. (1979). Volunteer Artifacts in Experiments in Economics: Specification of the problem and some initial data from a small scale field experiment, In: V.L. Smith (Ed.), *Research in Experimental Economics*, Vol. 1, Greenwich, Connecticut: J.A.I. Press.

Kagel, J.H. & Winkler, R.C. (1972). Behavioral economics: Areas of cooperative research between economics and applied behavioral analysis, *Journal of Applied Behavior, Analysis, 5*(3), 335-342.

Kapferer, J.N. (2001). (Re) Inventing the brand, London: Kogan Page. Keith, R.J. (1960). The marketing revolution, *Journal of Marketing, 24* (January), 35-38.

Kenesei, Z. & Todd, S. (2003). The use of price in the purchase decision, *Journal of Empirical Generalisations in Marketing Science, 8*, 1-21.

Keng, K. A. & Ehrenberg, A. S.C. (1984). Patterns of store choice, *Journal of Marketing Research, 21*, 399-409.

Killeen, P.R. (1972). The Matching Law, *Journal of the Experimental Analysis of Behavior, 17*, 489-495.

Killeen, P. R. (1995). Economics, ecologics, and mechanics—The dynamics of responding under conditions of varying motivation. *Journal of the Experimental Analysis of Behavior, 64*, 405-431.

Kohli, Ajay K. and Bernard J. Jaworski (1990). Market Orientation: The Construct, Research Propositions, and Management Implications, *Journal of Marketing, 54*(2), 1-18.

Kolakowski, L. (1993). An overall view of positivism. *Social research: Philosophy, politics and practice*, 1-8.

Kotler, P., Armstrong, G., Saunders, J. & Wong, V. (2001). *Principles of Marketing*, 3rd European Edition, Harlow: Prentice Hall Europe.

Kraft, J.R. & Baum, W.M. (2001). Group choice: The ideal free distribution of human social behaviour, *Journal of the Experimental Analysis of Behaviour, 76*(1), 21-42.

Krauss, S. E. (2005). Research paradigms and meaning making: A primer. *The qualitative report*, *10*(4), 758-770.

Krishnamurti, L. & Raj, S.P. (1988). A model of brand choice and purchase quantity price sensitivities, *Marketing Science, 7,* 1-20.

Kroll, T., & Neri, M. (2009). Designs for mixed methods research. *Mixed methods research for nursing and the health sciences*, 31-49.

Kuhn, T. S. (2012). *The structure of scientific revolutions*. University of Chicago press.

Kunkel, J.H. (1963). Psychological factors in the analysis of economic development, *Journal of Social Issues, 19*(1), 68-87.

Lander, D.G. & Irwin, R.J., 1968. Multiple Schedules: Effects of the Distribution of Reinforcements between Components on the Distribution of Responses between Components. *Journal of the Experimental Analysis of Behavior*, *11*(5), 517-524.

Lattin, J.M. & Bucklin R.E. (1989). Reference effects of price and promotion on brand choice behavior, *Journal of Marketing Research, 26*(3), 299-310.

Lea, S. E. G. (1978). The psychology and economics of demand, *Psychological Bulletin, 85,* 441-466.

Lea, S. E. G. (1981). Animal experiments in economic psychology, *Journal of Economic Psychology, 1*, 245-271.

Lea, S.E.G. & Roper, T.J. (1977). Demand for food on fixed-ratio schedules as a fraction of the quality of concurrently available reinforcement, *Journal of the Experimental Analysis of Behaviour, 27*(2), 371-380.

Lea, S.E.G., Tarpy, R.M. & Webley, P. (1987). *The Individual in the Economy: A Survey of Economic Psychology*, Cambridge: Cambridge University Press.

Levine, M.W. (2001). *Fundamentals of sensation and perception*, P edition, New York: Oxford University Press.

Leszczyc, P.T.P., Sinha, A. and Timmermans, H.J., 2000. Consumer store choice dynamics: an analysis of the competitive market structure for grocery stores. *Journal of Retailing, 76*(3), 323-345.

Levy, S.J. (1959). Symbols for sale, *Harvard Business Review,37*, 117-124.

Levy, M., Grcwal, D., Kopalle, P.K. & Hess, J.D. (2004). Emerging trends in retail pricing practice: implications for research, *Journal of Retailing, 80*, xiii-xxi.

Lewin, S.B. (1996). Economics and Psychology: Lessons for our own day from the early Twentieth Century, *Journal of Economic Literature, 34*, 1293-1323.

Logue, A. W. (2002). The living legacy of the Harvard Pigeon Lab: Quantitative analysis in the wide world, *Journal of the Experimental Analysis of Behavior, 77*, 357-366.

Lowe, C.F. (1983). Radical behaviorism and human psychology, In: G.C.L. Davey (Ed.), *Animal models of human behavior*, Chichester: Wiley, 71-93.

Madden, G. W., Bickel, W. K. & Jacobs, E. A. (2000). Three predictions of the economic concept of unit price in a choice context, *Journal of the Experimental Analysis of Behavior, 73*, 45-64.

Mason, J. (2006). Mixing methods in a qualitatively driven way. *Qualitative Research* 6(1), 9-25.

Mazur, J.E. (1991). Choice, In: I.H. Iversen & K.A. Lattel (eds), *Experimental Analysis Of Behaviour - Part One*, Amsterdam: Elsevier Science Publishers.

McAlister, L. (1979). Choosing multiple items from aproduct class, *Journal of Consumer Research, 9*(3), 213-224.

McDowell, J.J. (1988). Matching theory in natural human environments, *The Behavior Analyst, 11*(2), 95-109.

McPhee, William N. (1963). *Formal Theories of Mass Behavior*, New York: Free Press.

Mehrabian, A. & Russell, J.A. (1974). *An approach to environmental psychology*, Cambridge, MA: MIT Press.

Miller, H.L., Heiner, R.A. & Manning S.W. (1987). Experimental approaches to the Matching/Maximizing Controversy, In: L. Green and J.H. Kagel (eds), *Advances in Behavioral Economics Volume I*. Norwood, N.J: Ablex Publishing Corporation, 253-287.

Milliman, R.E. (1982). Using background music to affect the behaviour of supermarket shoppers, *Journal of Marketing, 46*(3), 86-91.

Morgan, G. & Smircich, L. (1980). The case for qualitative research. *Academy of management review* 5(4), 491-500.

Murphy, J. (1998). What is branding?, In: S. Hart & J. Murphy, *Brands: The new wealth creators*, Basing stoke: Palgrave Macmillan.

Myers, D.L. & Myers, L.E. (1977). Undermatching: A reappraisal of performance on concurrent variable-interval schedules of reinforcement, *Journal of the Experimental Analysis of Behavior, 25*, 203-214.

Myerson, J. & Hale, S. (1984). Practical implications of the matching law, *Journal of Applied Behavior Analysis, 17*(3), 367-380.

Nevin, J.A. (1982). Some persistent issues in the study of matching and maximizing, In: M.L. Commons, R.J. Herrnstein, H.C. Rachlin, *Quantitative analyses of behaviour Vol 11*, Cambridge, Massachusetts: Ballinger Publishing Company.

Nevin, J. A. (1992). An integrative model for the study of behavioral momentum. *Journal of the experimental analysis of behavior*, *57*(3), 301-316.

Nevin, J. A., & Grace, R. C. (2000). Behavioral momentum: Empirical, theoretical, and metaphorical issues. *Behavioral and Brain Sciences*, *23*(1), 117-125.

Nevin, J. A., Grace, R. C., Holland, S., & McLean, A. P. (2001). Variable-ratio versus variable-interval schedules: Response rate, resistance to change, and preference. *Journal of the Experimental Analysis of Behavior*, *76*(1), 43-74.

Nicosia, F.M. (1966). *Consumer decision processes*, Englewood Cliffs, NJ: Prentice Hall.

Nord, W.R. & Peter, P. (1980). A behavior modification perspective on marketing, *Journal of Marketing, 44*, 36-47.

Norusis, M.J. (2002). *SPSS11.0 guide to data analysis*, Upper Saddle River, N.J.: Prentice Hall.

Oliveira-Castro, J. M., Foxall, G. R., & James, V. K. (2008). Individual differences in price responsiveness within and across food brands. *Service Industries Journal, 28,* 733–753.

Oliveira-Castro, J. M., Foxall, G. R., James, V. K., Pohl, R. H. B. F., Dias, M. B. & Chang, S. W. (2008). Consumer-based brand equity and brand performance. *Service Industries Journal, 28*, 445–461.

Oliveira-Castro, J. M., Foxall, G. R., & Schrezenmaier, T. C. (2005). Patterns of consumer response to retail price differentials. *Service Industries Journal, 25*, 309–335.

Oliveira-Castro, J. M., Foxall, G. R., & Schrezenmaier, T. C. (2006). Consumer brand choice: Individual and group analyses of demand elasticity. *Journal of the Experimental Analysis of Behavior, 85*, 147–166.

Oliveira-Castro, J. M., Foxall, G. R., Yan, J., & Wells, V. K. (2011). A behavioral-economic analysis of the essential value of brands. *Behavioural processes, 87*(1), 106-114.

OShaughnessy, J. (1992). *Explaining buyer behavior: Central concepts and philosophy of science issues*, New York: Oxford University Press.

OShaughnessy, J. & OShaughnessy, N.J. (2002). *The marketing power of emotion,* New York: Oxford University Press.

Penrose, E. (1959). *The Theory of the Growth of the Firm*. Oxford: Blackwell.

Peter, J.P. & Nord, W.R. (1982). A clarification and extension of operant conditioning principles in marketing, *Journal of Marketing, 46,* 102-107.

Phillips, F. (1984). Discussion: The Dirichlet: A comprehensive model of buying behaviour, *The Journal of the Royal Statistical Society Series A (General), 147*(5), 650.

Pierce, W.D. & Epling, W.F. (1983). Choice, matching and human behavior: A review of the literature, *The Behavior Analyst, 6(*1), 57-76.

Popkowski-Leszczyc, P.T.L., Sinha, A. & Timmermans, H.J.P. (2000). Consumer store choice dynamics: An analysis of the competitive market structure for grocery stores, *Journal of Retailing, 76*(3), 323-345.

Powell, R. W. (1969). The effect of reinforcement magnitude upon responding under fixed-ratio schedules. *Journal of the Experimental Analysis of Behavior*, *12*(4), 605-608.

Prelec, D. (1982). Matching, maximizing, and the hyperbolic reinforcement feedback function, *Psychological Review, 89*, 189-230.

Rachlin, H.C. (1971). On the tautology of the matching law, *Journal of the Experimental Analysis of Behavior, 15,* 249-251.

Rachlin, H.C. (1980). Economics and behavioral psychology. In: J.E.R. Staddon (Ed), *Limits to Action: the allocation of individual-behaviour.* New York: Academic Press, 205-236.

Rachlin, H. (1981). Absolute and relative consumption space. In *Nebraska symposium on motivation*. University of Nebraska Press.

Rachlin, H.C. (1982). Economics of the matching law, In: Commons, M. L., Herrnstein, R. J. & Rachlin, H. (eds), *Quantitative Analysis of Behavior. Volume 11: Matching and Maximizing Accounts*, Cambridge, MA: Ballinger. 347-374.

Rachlin, H.C. (1987). Animal choice and human choice, In: L. Green& J. H. Kagel (Eds.), *Advances in Behavioral Economics,* Vol. 1. Norwood, NJ: Ablex. 48-64.

Rachlin, H.C. (1989). *Judgement, Decision and Choice: A Cognitive/Behavioural Synthesis*, New York: WH Freeman and Company.

Rachlin, H.C. (1995). Self-control: beyond commitment, *Behavioural and Brain Sciences, 18,* 109-159.

Rachlin, H.C. (2000). *The science of self-control*. Cambridge, MA: Harvard University Press.

Rachlin, H.C., Battalio, B., Kagel, J. & Green, L. (1981). Maximization theory in behavioral psychology, *The Behavioral and Brain Sciences, 4*, 371-417.

Rachlin, H.C. & Green, L. (1972). Commitment, choice, and self-control, *Journal of the Experimental Analysis of Behavior, 17,* 15-22.

Rachlin, H.C., Green, L., Kagel, J.H. & Battalio R.C. (1976). Economic demand theory and psychological studies of choice, In: G.H. Bower (Ed.), *The psychology of learning and motivation,* Vol. 10, New York: Academic Press.

Rachlin, H.C., Kagel, J.H. & Battalio, R.C. (1980). Substitutability in time allocation, *Psychological Review, 87*(4), 355-374.

Ragin, C. (1994). *Constructing social research: the unity and diversity of method.* Thousand Oaks, California, Pine Forge Press.

Rao, A.R. & Monroe, K.B. (1989). The effect of price, brand name and store name on buyer perceptions of product quality: An integrative review, *Journal of Marketing Research, 26*, 351-357.

Reichheld, F. F. & Sasser, W. Earl Jr. (1990). Zero defections: Quality comes to services, *Harvard Business Review,* September - October, 105-111.

Riley, F. D. O., Ehrenberg, A. S., Castleberry, S. B., & Barwise, T. P. (1997). The variability of attitudinal repeat-rates. *International journal of Research in Marketing*, *14*(5), 437-450.

Romaniuk, J. and Sharp, B., 2016. *How Brands Grow Part 2: Including Emerging Markets, Services, Durables, New and Luxury Brands*. Oxford University Press.

Romero, S., Foxall, G., Schrezenmaier, T., Oliveira-Castro, J., & James, V. (2006). Deviations from matching in consumer choice. *European Journal of Behavior Analysis*, *7*(1), 15-39.

Rothschild, M.L. & Gaidis, W.C. (1981). Behavioral Learning Theory: Its relevance to Marketing and Promotions, *Journal of Marketing, 45*(Spring), 70-78.

Sauders, M., Lewis, P. & Thornhill, A. (2003). *Research methods for business students.* England, Prentice Hall.

Sayer, A. (2000). *Realism and social science*. Sage.

Schrader, S.M. & Green, L. (1990). The economics of leisure in psychological studies of choice, In: L. Greenand J. H. Kagel (eds), *Advances in Behavioral Economics Volume 2*., Norwood, N.J: Ablex Publishing Corporation, 226-252.

Schroeder, S.R. & Holland, J.G. (1969). Reinforcement of eye movement with concurrent schedules, *Journal of the Experimental Analysis of Behavior, 12,* 897-903.

Schwartz, B. (1984). *Psychology of learning and behaviour* (2nd ed.), New York: W.W. Norton.

Schwartz, B., & Lacey, H. (1988). What applied studies of human operant conditioning tell us about humans and about operant conditioning, In G. Davey & C. Cullen (Eds), *Human Operant Conditioning and Behaviour Modification*, Chicester: John Wiley & Sons Ltd., 27-42.

Schwartz, B. & Reisberg, D. (1991). *Learning and Memo*. New York: W.W. Norton Co.

Scriven, J. & Ehrenberg, A. S. C. (2003). How Consumers Choose Prices over Time, *Marketing Learning, 13*, 46.

Sen, A. (1987). *On ethics and economics,* Oxford: Basil Blackwell.

Sharot, T. (1984). Discussion: The Dirichlet: A comprehensive model of buying behaviour, *The Journal of the Royal Statistical Society Series A (General), 147*(5), 646-647.

Sharp, B., 2010. *How brands grow: What marketers don't know*. South Melbourne: Oxford University Press.

Sheth, J.N., Sisodia, R.S. & Sharma, A. (2000). The antecedents and consequences of customer-centric marketing, *Journal of the Academy of Marketing Science, 28*(1), 55-66.

Shimp, C.P. (1966). Probabilistically reinforced choice behaviour in pigeons, *Journal of the Experimental Analysis of Behavior, 9*, 433-455.

Shimp, C.P. (1975). Perspectives on the behavioral unit: Choice behavior in animals, In: W.K. Estes (Ed.), *Handbook of learning and cognitive processes: Conditioning and behavior theory* (Vol. 2), Hillsdale, New Jersey: Lawrence Erlbaurn Publishers, 225-268.

Sigurdsson, V. (2008). *Relative sales and matching analysis of consumers' brand choices in open settings*. Cardiff University (United Kingdom).

Silberberg, A., Hamilton, B., Ziriax, J.M. & Casey, J. (1978). The structure of choice, *Journal of Experimental Psychology: Animal Behavior Processes, 4*, 368-398.

Silver, M.S. (1997). *Business Statistics,* London: McGraw-Hill.

Smith, D. (2004). The uses and abuses of positivism. In: *What Matters in Probation*. Willan, Cullompton, 34-52.

Simon, H.A. (1955). A behavioral model of rational choice, *Quarterly Journal of Economics, 59*, 99-118.

Simon, H.A. (1987). Behavioural economics In: J.Eatwell, M. Milgate and P. Newman (eds) *The New Palfuave: A dictionary of economics* (Vol 1,A to D), London and Basingstoke: Macmillan Press Ltd, 221-225.

Skinner, B.F. (1938). *The Behavior of Organisms,* New York: Century.

Skinner, B.F. (1947). Experimental psychology, In: W. Dennis (Ed.), *Current trends in psychology*, Pittsburgh: University of Pittsburgh, 16-49.

Skinner, B.F. (1950). Are theories of learning necessary?, *Psychological Review, 57*, 193-216.

Skinner, B.F. (1953). *Science and Human Behavior*, New York: The Free Press.

Skinner, B.F. (1974). *About Behaviorism*, New York: Knopf.

Sørensen, D. B., Ladewig, J., Ersbøll, A. K., & Matthews, L. (2004). Using the cross point of demand functions to assess animal priorities. *Animal Behaviour*, *68*(4), 949-955.

Soriano, M. Y. & Foxall, G. R. (2002). Emotion and environment: a test of the behavioural perspective model in a Latin American context, *Journal of Consumer Behaviour, 2*, 138-154.

Sparks, L. (1993). The rise and fall of mass marketing? Food retailing in Great Britain since 1960, 4 in: *The rise and fall of mass marketing*, Tedlow, R.S. and Jones, G. (eds.). London: Routledge.

Summers, T.A. & Hebert, P.R. (2001). Shedding some light on store atmospherics: influence of illumination on consumer behaviour, *Journal of Business Research, 54*(2), 145-150.

Thaler, R. (1987). The psychology of choice and the assumptions of economics In: A.E.Roth (eds), *Laboratory Experimentation in Economics*, Cambridge: Cambridge University Press, 99-130.

Thorndike, E.L. (1911). *Animal Intelligence*, New York: Macmillan.

Timberlake, W. (1982). The Emperors clothes: assumptions of the matching theory, In: M.L. Commons, R.J. Herrnstein, H.C. Rachlin, *Quantitative analyses of behaviour* Vol II, Cambridge, Massachusetts: Ballinger Publishing Company.

Tregarthen, T. (1996). *Economics,* NewYork: Worth Publishers.

Troye, S.V. (1985). Situationalist theory and consumer behaviour, In: J.N. Sheth (Ed.), *Research in Consumer Behavior: A Research Annual.* Volume I Greenwich, Connecticut: JAI Press, 285-321.

Uncles, M. & Ehrenberg, A. S.C. (1990). The Buying of Packaged Goodsat US Retail Chains, *Journal of Retailing, 66,* 278-293.

Uncles, M., Ehrenberg, A. S. C. & Hammond, K. (1995). Patterns of buyer behavior: Regularities, models, and extensions, *Marketing Science, 14,* G71-G78.

Urbany, J.E., Dickson, P.R. & Sawyer, A.G. (2000). Insights into cross-and within- store price search: retailer estimates vs. consumer self reports, *Journal of Retailing, 76* (Summer), 243-254.

Valentine, E.R. (1982). *Conceptual issues in psychology,* London: Routledge.

Van Houwelingen, J.H. & Van Raaij, W.F. (1989). The effect of goal-setting and daily electronic feedback on in-home energy use, *Journal of Consumer Research, 17*, 346-361.

Vanhuele, M. & Dreze, X. (2002). Measuring the price knowledge shoppers bring to the store, *Journal of Marketing, 66*(4), 72-85).

Vaughan, W. & Herrnstein, R. J. (1987). Stability, melioration and natural selection, In: L. Green & J. H. Kagel (Eds.), *Advances in Behavioral Economics.* Vol. 1. Norwood, NJ: Ablex. 185-215.

Voce, A. (2004). Introduction to research paradigms. *Retrieved March*, *18*, 2010.

Watkins, T. (1986). The Economics of the Brand. London: McGraw-Hill.

Watson, J.B. (1913). Psychology as the behaviorist views it, *Psychological Review, 20*(2), 158-177.

Watson, J.B. (1917). The effect of delayed feeding upon learning, *Psychobiology, 1*, 51-59.

Wells, V.K. & Foxall, G.R., (2013). Matching, demand, maximization, and consumer choice. *The Psychological Record*, *63*(2), 239.

Wearden, J. H. (1988). Some neglected problems in the analysis of human operant behavior, In: G. C. L. Davey and C. Cullen (eds.) *Human Operant Conditioning and Behavior Modification.* Chichester: Wiley. 197-224.

Wicker, A.W. (1969). Attitude versus actions: the relationship of verbal and overt behavioral responses to attitude objects, *Social Issues, 25,* 41-78.

Winkler, R.C. (1971). The relevance of economic theory and technology to token reinforcement systems, *Behaviour Research and Therapy, 9*, 81-88.

Winkler, R. C. (1980). Behavioral economics, token economies, and applied behavior analysis. In: Staddon, J. E. R. (ed.) *Limits to Action: The Allocation of Individual Behavior*. New York: Academic Press. 269-297.

Winkler, R.C. & Burkhard, B. (1990). A Systems Approach to Behavior Modification, Chapter II. In: *Advances in Behavioral Economics Volume II,* Green, L. and Kagel, J.H. (eds.). Norwood: Ablex Publishing Corporation.

Yan, J., Foxall, G. R., & Doyle, J. R. (2012). Patterns of reinforcement and the essential value of brands: II. evaluation of a model of consumer choice. *The Psychological Record, 62*(3), 377.

Zettle, R.D. & Hayes, S.C. (1982). Rule-governed behavior: A potential theoretical framework for cognitive-behavioral therapy In: P.C. Kendall (eds), *Advances in Cognitive-Behavioral Research and Therapy* (Vol 1). New York and London: Academic Press, 73-118.