Socioeconomic and demographic factors influencing the choice of brand. Assessing consumers' reactions to price promotions of national brands vs. private labels in the Spanish food sector

Binary logit and multinominal logit approach

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Declaration

I hereby affirm that the present thesis with the title "Socioeconomic and demographic factors influencing the choice of brand. Assessing consumers' reactions to price promotions of national brands vs. private labels in the Spanish food sector" was prepared by myself alone and did not involve the use of any impermissible help or of any other tools than the ones indicated. All parts of the text – including tables, maps, figures, etc. – which were taken over verbatim or analogously from other published or unpublished works have been identified accordingly. The thesis has been submitted in the same form to the Universitat Politècnica de Catalunya (UPC) and to the Rheinische Friedrich-Wilhelms-Universität Bonn, the two examining institutions for my Master AFEPA Program and has not been published either in part or in its entirety.

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Abstract

After the economic and financial crisis of 2008, consumers in Spain became more price sensitive and started to prefer more often the retailers' own brands in the supermarkets. This has increased the share of private label sales in the country to 41.2% for 2012 (Summary et al. 2012). In those cases companies offering national brands usually respond by various kinds of promotions among which are price reductions. Meanwhile, private labels have the opportunity to grow and develop and to cover new niches with quality goods, healthier food choices, sustainable packaging etc. The purpose of the present study is to estimate which socioeconomic and demographic factors influence the consumers' choice of brand. Moreover, the brand loyalty of private label shoppers in case of price promotions of national brands is examined. The data for the analysis is a supermarket scan data provided from a single retailer for 80 stores in different regions of Spain. The products chosen for the analysis are semi-skimmed milk and cereals sold by the retailer's chain in two regions– Madrid and Barcelona. For the first objective of the study a binary logit model is applied indicating age, gender, region, price, shopping day and package as significant variables that impact the choice of brand- national or private. For the second objective – estimating consumers' behavior in case of price promotions, the multinominal logit model is used demonstrating that consumers in Spain are not loyal to private labels and usually switch their brand choice in case of price promotion. Recommendations are provided for policy measures at European, national and firm level, which intend to stimulate fair competition, transparency and predictability of the prices, sustainable market relationships, government support for healthier food choices, boost of regional production and more Research&Development and innovation in the food sector.

Key words: consumer behavior, brand choice, private label, price promotion, scan data, binary logit, multinominal logit, food policy.

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Abbreviations

AIDS- Almost Ideal Demand System model

ASEAN- Spanish Food Safety and Nutrition Agency

BOGOF- Buy one get one free

CAP – Common Agricultural Policy

COM- Common Market Association

EC – European Commission

EJRC- European Joint Research Center

EU- European Union

FAO- Food and Agriculture Organization of the United Nations

GMO- Genetically Modified Organism

IGC- International Grain Council

IRI- Information Resources Incorporated

NCA- National Competition Authority

OECD- Organization for Economic Co-operation and Development

PP- Private Brand

PRA- Production of Agrarian Rama

PRV- Production of Plant Rama

USDA- United States Department of Agriculture

WHO- World Health Organization

WTO- World Trade Organization

Dedication

First of all, I would like to dedicate this Master thesis under the name "Socioeconomic and demographic factors influencing the choice of brand. Assessing consumers' reactions to price promotions of national brands vs. private labels in the Spanish food sector" to my mother who successfully beat the cancer during the last year and I hope she won the battle forever. Second, I would like to acknowledge and the rest of my family for all their support during this very emotional, hard-working and intensive two years of my life. I would also like to thank Prof. José M. Gil and Dr. Montserrat Costa for their patience and support during the process of writing my Master thesis. Last, but not least, I would like to dedicate my work to the wonderful people that I have met during my Master studies from all over the world, each of them giving me an important lesson not only for food policy analysis, but also for life. Special thanks to Ruochen Wu for a former graduate from the AFEPA program for his friendly support and advices.

Chapter 1-Introduction

1.1 Background -Marketing, Market power and competition

Marketing is a complex mechanism for influencing consumer behavior (Hasting et al. 2003). The marketing mix, well-known as the 4P, includes product, price, promotion and placement. All those techniques are used to attract the potential buyers and increase the profits of the companies. In the business sector, competition stimulates the development of new products, new technologies or a wider set of goods at a decreased price. We distinguish between perfect and imperfect competition (the latter presented by a monopoly, duopoly or oligopoly). In some microeconomic textbooks the agricultural sector is still considered as a perfectly competitive market, where all the participants are infinite offering homogeneous product, no barriers of entry, perfect information, well defined property rights exist etc., but in reality this is not the case. Especially when one focuses on the food retailers, where often mergers, acquisitions and joint ventures occur and usually lead to the formation of major players exercising significant market power and economic inefficiencies.

Using price promotion as a marketing strategy affects the competitiveness of the retailers in the food sector. This is one of the reasons why market power and competition policy in food supply chains are important issues on the policy agenda all around the world (Swinnen & Vandeplas 2010). To prevent the exercising of excessive influence of a single company at national, regional or global level, many international organizations have long experience promoting "fair competition". Taking for example the OECD- they organize a high level meeting, once or twice per year, where along with the issues of sustainability, health and transparency in the food supply chain, competition is also an essential part of the dialogue (OECD, 2014). Another international organization, which strives for "a fair competition and less distorted agricultural sector" is the World Trade Organization. The first crucial step to achieve that was made with the first multilateral agreement dedicated to the sector in the Uruguay Round (WTO, 2014). The Food and Agriculture Organization (FAO) also focuses on competition, which in most global product/markets is intense (FAO, 2014). At the European stage, the

creation of a single market is one of the main objectives of the European Union's competition policy. The Directorate General for Competition of the European Commission, which strictly observes and penalizes the unfair practices in the food supply chain like cartels, contractual imbalances, abuse of dominance and monopolization etc. (Commission 2009). Under EU law, these practices are banned and victims are entitled to compensation. Two important documents are supporting the Union's strong efforts in this direction – the Green paper, adopted in 2005, which identified the main obstacles to the efficiently working system of bringing damages claims for infringement and proposed measures to compensate victims of unfair competition; and the White paper, published in 2008, which suggested specific policy measures so that all victims of EU antitrust infringements could be fully compensated for the harm they had suffered (EC, 2014). But even all those methods are still not enough preventing unfair market situations.

In fact, the number of international mergers and acquisitions has been increasing significantly during the last decade. Many European food chains have spread their business in the US and the opposite. As a result, food retailing is becoming increasingly multinational with three food retailers Wal-Mart, Carrefour, and Royal Ahold now appearing in the world's top-100 multinational corporations (Nations 2003). The vertical relationships in the food market should also not be underestimated (Sexton et al. 2007) and have been further examined by Spencer & Jones (1992), Ishikawa & Spencer (1999), and Sheldon et al.(2001).

The present study discusses the topics of fair competition, transparency in the food supply chain, price formation and price promotion and consumer purchasing behavior and choice of brand.

Both consumers and farmers seem to be facing a concentrated structure in their exchange process. However, while consumers seem to benefit from strong competition, farm organizations often claim that concentrated retailers hurt their business (Swinnen & Vandeplas 2010). This usually creates pressure between consumers, food producers, retailers and local governments. Concrete examples could be found in the media all over Europe and the rest of the world –for example, in Belgium where in 2009 the farm unions blocked large food chain stores demonstrating against low farm prices, protests against Wall- Mart in Mexico in 2006 because of paying low wages to the workers while dumping the prices and distorting local small business etc.

However, looking deeper in the literature, one can conclude that the benefits for the consumers from retailer concentration are not always empirically proven. And while the studies Hall (1979), Lamm (1981) and by Cotterill (Cotterill 1986, 1999; Cotterill & Harper, 1995) find that there is a positive correlation between food chains concentration and decreasing food prices. According to Hasting et al.(2003), the entry of multinational retailers may positively affect consumers' prices, though this is not necessarily the case for all products (e.g., Schwentesius & Gómez). Meanwhile, many other authors are rather skeptic to that theory - Newmark (1990), Binkley & Connor (1998) and calculate a negative or insignificant correlation.

The uncertainty about the relationship between retail concentration and the food prices raises the question about the level of price transparency in the food sector. Food prices and inflation are crucial topics in regions where we observe food scarcity and insecurity, but in Europe people spend relatively little on food (on average 14% according to Lloyd (2013)). Nevertheless, the European Commission has taken serious measures for providing transparent environment in the food sector by launching a three year EU funded project, the Transparency of Food Pricing (concluded in December 2013) for investigating food and commodity price issues. In the Strategic research agenda on Transparency in the food chain, it is stated clear that the farms are the basis for all food production and have to serve simultaneously to different food chains which usually focus on specified groups of production, e.g. meat, vegetables, or cereals. Consequently, the farms have to respond to various requirements for information and integration into transparency schemes is a pre-condition for reaching transparency in food (Prof. Dr. Schiefer G. & Dr. Deiters 2009). Afterwards, the processing and retailing come and both have interest to provide complete information of food safety and quality and contribute for preserving the environment, assuring good business ethics and achieving of social responsibility.

However, cases of price dumping, price discrimination, unfair contracts and confusing promotions are not met occasionally in the food sector and they are disturbing not only for the business, but for the consumers as well. The contracts in the food sector have extreme importance, because the respective incomes of the supplier and the buyer depend on their opportunity costs and their bargaining power. This could be very problematic in developing countries, where one of the agents could not have other opportunities and in that way he/ she could jeopardize the profits and continuation of the business.

The extended market power, low level of transparency in the food supply chain, problematic contracts and unfair competition conditions only pave the path to inefficiencies in the food sector and stimulate price volatility. In Spain, the problem has worsened after the financial and economic crisis in 2008, which increased significantly the level of unemployment (according to Eurostat data- 19.9% in 2010, 21.4% in 2011, 24.8% in 2012, and 26.1% in 2013) and made consumers more price sensitive. This provoked the expansion of the retailers' private brand labels offering good quality products at cheaper prices. The share of sales of the retailers' own brands in Spain reached 41.2% in 2011 and contributed for the more stable market positions of the retailers and the unbalanced bargain relations between retailers and producers.

1.2 Problem statement

The growing use of private labels in recent years has affected significantly the landscape of retail competition, with major retailers no longer being confined to their traditional role as purchasers and distributors of branded goods (Ezrachi & Bernitz 2009). On the one hand, competition among retailers has the result that discounts obtained from producers, as well as efficiency gains, are passed on the consumers (Bunte 2011). On the other hand, the bargaining relations between retailers and suppliers are often uneven and fair competition is distorted by excessive market power. Furthermore, the problems of "copycats" free rider behavior of the private labels questions the efficiency of innovation. Copycat brands try to free ride on the positive associations that consumer has with a leader brand by having a similar trade-dress. Via their similarity in trade-dress, copycats try to access information that consumers have stored in memory about another brand and transfer it to them (Horen & Pieters 2012). However, during the last years private brands target new niches and work on the development of high quality and premium labels at affordable prices in order to attract a broad range of loyal clients. The national brands respond with various kinds of promotions including price promotion. The effects of price promotion on the consumers' choice of brand are still not well examined.

This motivates the following questions:

First, are there any socio-economic and demographic factors having significant influence on the consumers' choice of brand?
Second, how consumers react to price promotions in Spain and do they differentiate between the reduced prices of national, well-known goods and the retailers own brands?
Are consumers loyal to private brands?

For answering those questions a binary logit model will be applied, which will have as dependent variable two possible outcomes – purchasing of private or a national brand of the same product, while using as explanatory variables various socioeconomic and demographic factors in order to estimate which are them are really significant and have an impact on the choice of brand. Then, a multiominal logit model will be included in the analysis, demonstrating the influence of price promotion on the choice between national and private labels. The data for the analysis is a scanner data for four months (from 1st July to 31st November) comprising many stores of a single retail chain in Spain. The data is kindly provided to the Universitat Politècnica de Catalunya by the retailer.

The contribution of the present study will be twofold. First, a deeper focus on the choice of brand in Spain will be presented, shaping not only the factors having an impact on the consumer's decisions, but also predicting their future reactions in case of price promotions. Second, the paper is intended to provide a scientific base for taking strategies at national level for improving the market economy, fair competition and defending consumer's rights, but also at a firm level – for both retailers and producers to work more efficiently in a predictive business environment.

1.3 Objectives of the study

The paper aims to achieve several objectives:

- To identify socioeconomic and demographic factors having an influence on the choice of brand in Spain

- To obtain binary logit and multinominal logit estimates, which demonstrate under which significant circumstances consumers take their purchasing decisions in the supermarket
- To predict consumer behavior in the case of price promotion and in case of other external factors of the surrounding environment

1.4 Research hypothesis

This research is based on the three hypothesis:

1) Consumers are taking their purchasing decisions in a competitive environment;
2) Private and national brands have equal chances to be bought by the consumers, but private brands experience price promotion more often;
3) Consumers are not loyal to private brands despite their lower prices;

1.5 Limitations

Some of the limitations of the present study are related to period of the data (only four months), which might be classified as a short-term period. Also it presents the purchases effectuated in the supermarket chain of a single retailer. A perspective of another retail chain might further confirm the results or give new ideas for the analysis. The limitations of the empirical model, omitted variables etc. are further discussed in Chapter 6.

Chapter 2 - Theory and methodology

2.1 Literature review on theory

Price formation and Price promotion

Theoretically the major part of the price comes from the processing and distribution and it is decided upon a competitive process. However, in reality the price is very often influenced by the stronger side in the bargaining process. According to the European Joint Research Center (EJRC, 2014):

Consumer price t = Producer price t + Margin t

Margin = Processing + Marketing + Distribution

The margin is related to the price transmission, the more intermediates (producers, slaughterers, wholesalers, processors, retailers) there are in the supply chain, the more expensive the final product would be for the consumer. At the moment the European Union is responding to those challenges by generating coordinated data gathering in all the member states and adopting of some documents (Commission Staff Working Document –COM (2009)1450, 28 Oct 2009, providing an extensive statistical analysis and the Announcement of measures and intentions -COM(2009) 591,28 Oct 2009) in order to assure transparency and fair pricing practices. However, if there is no fair competition and even excessive market power of some participants in the market, then the final price wouldn't be efficient neither for the business, nor for the consumers. Furthermore, one of the most wide spread marketing tools for competing in the food sector – the price promotion, could not be profitable for the retailers and be a false signal and misleading information for clients. This normally should be avoided, but what exactly happens in reality?

The price promotion is part of the sales promotion and it is one of the seven aspects of the promotional mix. The latter includes advertising, personal selling, sales promotion, public relations and direct marketing. Corporate image and sponsorship are often added as the sixth and the seventh elements (Mangold & Faulds 2009). The difference between the marketing mix, or the 4P –price, place, promotion and placement and the promotional mix is hidden in the fact that the first is used to create value to a new product, and the other represents coordination of

activities to reach the client and interact with him or her. We observe various types of price promotions. Depending on the target – they could be consumer targeted or retailers targeted (also called trade promotions). According to (Chandon et al. 2000) price promotions could also be monetary promotions, which include price reductions, coupons, and rebates, and non-monetary promotions, among which are free gifts and premiums, BOGOF (buy one get one free), contests, sweepstakes, and bonus pack.

Also depending on the main effects of price promotions on category demand, we differentiate between short, medium, and long run price promotions (Nijs et al. 2001). Regarding the short-term effect, many authors claim that the increased sales volume with the price promotion is due to brand-switching (Sunil Gupta 1988; Totten & Block 1987), meanwhile others attribute the short-run success of this marketing strategy to the category-expansion effect of price promotions (Chintagunta 1993; Van Heerde 1999 ; Vilcassim & Chintagunta 1995; Vilcassim & Chintagunta 1992). The medium-run effect explores the impact of the strategy in different shorter periods (Blattberg 1990). For the long-run effect, there is still little research made in that area. However, there are some authors expressing contradicting opinions on the actual effects of price promotion in a long term -if they are positive, negative or rather neutral (Dodson et al. 1978; Jedidi et al. 1999 ; Jedidi et al. 1999; Shoemaker & Shoaf 1977; Strang 1975, Dekimpe & Hanssens 1999; Neslin & Shoemaker 1989 ; Totten & Block 1987 etc.)

Blattberg and other researchers have summarized some conclusions supported by empirical evidence regarding price promotions (Blattberg et al. 1995). Some of them include : temporary retail price reductions substantially increase sales (documented by Blattberg et al., 1987), higher market share brands are less elastic (Russell & Bolton 1988 , Vilcassim & Chintagunta 1995), the frequency of deals changes the consumer's reference price (Bucklin & Lattin 1991), the greater the frequency of deals, the lower the height of deal spike (Raju et al. 1990), cross-promotional effects are asymmetric, and promoting higher quality brands impacts weaker brands disproportionally (Kahneman & Tversky 1979) etc.. The article (Blattberg et al. 1995) is very interestingly structured choosing some of those conclusions, which the authors find particularly important for the business and analyze them in detail.

In fact, price promotions could be very influential for the all the participants on the food market including the final consumer. For that reason, the food supply chain and food prices have been under scrutiny in almost every country during the last years. High political attention has

been attributed to that topic at the European Union level as well. However, due to many factors, including increasing global population, the global economic and financial crisis in 2008, the demand for food and feed crops for the production of biofuels, correlation between agricultural commodity prices and oil prices, climatic changes, financial speculation etc.(FAO, 2011), the food prices are among the most volatile prices in world markets. For that reason, consumers are often very sensitive even to small changes in prices. In order to further analyze that matter, a distinction is made between national products and retailers' own brands.

Private vs. national labels

Retailer's brand or own brands, as they are known in the industry, have become major competitors to national brands during the last decades. The Private labels manufacturing association's website defines them as: "all merchandise sold under a retailer's brand. That brand can be the retailer's own name or a name created exclusively by that retailer." (PLMA, 2014). The private brand products have been developed at all levels of value for the food and non-food products and respond to consumers preferences and needs. Retailers chose a winning merchandising strategy, placing their own products next to well-known brands and often suggesting lower price for same quality goods. The success of the retailer's brands and their leadership among the stores' products motivates them to continue an intensive product development and helps them to control the stock – based on a wide range of factors including consumer requests and market trends (Lewis 2006). According to Information Resources data cited in Brandweek (1992) and the Wall Street Journal (1992), in 1991 private label brand shares of grocery-store sales were highest for milk (64%), frozen plain vegetables (47%), sugar (42%), butter (40%), cottage cheese (39%), frozen orange juice (31%), pies and cakes (29%), and paper cups and plates (29%), and lowest for cigarettes (1.7%), frozen chicken (3.6%), cold cereal (4.6%), frozen desserts (5.4%), carbonated beverages (6.7%), chips and snacks (7.2%), coffee (7.9%), and cookies (8.6%) (Batra 2000). Furthermore, researches effectuated a bit later in time, confirm the same tendency- store brands continue to be presented in almost every home (PLMA, 2011). Also a study among 27 000 people revealed most of the consumers prefer retailer's own brands because of the economic conditions, but 91% of them will also continue to purchase same products even after the crisis (Nielsen 2011). Actually, this is due to the fact that for many years own brands were estimated as a cheaper alternatives to manufacturer brands (Kumar &

Steenkamp 2007). However, retailer's strategies evolved and higher quality and premium own brand products are now well positioned on the market and contribute to the retailer's image, to create consumers' profiles and attract new clients (Benito et al., 2014). Meanwhile, the retailers are often criticized by some manufacturers of being their competitors -playing the role of buyers and producers of the goods at the same time. Same manufacturers claim that this could distort the fair competition and damage the consumers. The retailers may also use private labels to pressure manufacturers to compete more vigorously on price in order to win back share lost to the private label (Garretson et al. 2002). However, those allegations have never been recognized for a real threat by the European Commission.

Nevertheless, it has already been proven that private brands bring many advantages. Since 2000s 'upmarket' private label ranges for certain niche markets have been created by placing emphasis on the flavors of the goods, or the quality of the land where the goods were produced etc. For example, Leclerc group has introduced a range called 'Nos régions ont du talent', Carrefour has introduced a 'Reflets de France' range; and Casino has a 'Destinations Saveurs' brand, which correspond to the UK equivalents 'Tesco finest' or Sainsbury's 'Taste the difference' (Bergès et al. 2013). Furthermore, while creating their own brands, retailers contribute for the innovation (through fast responding to the changing consumers' needs and preferences), promote healthy and organic eating, support small and medium enterprises and decrease regional unemployment. Carrefour, for example, develops its own brand "Quality lines" in 1992, which represents a wide range of high value products including cheese, meat, vegetables etc. (EuroCommerce, 2014). The main goal and the product range to respond to the high preferences of the consumers and all the quality standards for freshness, food safety, taste and environmental protection. Another similar case is Kaufland, the company which in 2008 implemented an extended voluntary nutrition labelling scheme for all of its own brand ranges in order to better inform its customers for the calorie and nutrient content of products on the packaging. The product ranges K-classic, K-Bio, K-Classic WellYou, provide additional package information and contribute for the healthy and balanced menu of the clients. Mercadona, a well-known Spanish retailer, is supporting small and medium size enterprises, which are the company's main suppliers (among which are Martinez Loriente for meat, Senoble for yogurt etc.). As a matter of fact there are plenty of manufacturers who produce simultaneously for the retailers private brand ranges and for their own products (EuroCommerce, 2010).

Among the others benefits for the consumers from the retailer's own brands, are also many in-store and point-of-sale promotions, visibility in terms of packaging, size, color, shape and availability.

However, retailers are well aware that offering wider choice of products sometimes confuses the consumers and make their shopping experience more complicated and time consuming (Lewis, 2006). Furthermore, the so called "copycats" free rider behavior of the private labels sometimes distorts fair competition and influences negatively the innovation.

Consumer behavior

As it has been proven, the private labels have some advantages and shortcoming, which certainly influence the consumer buying behavior.

The American Marketing Association defines consumer behavior as "the dynamic interaction of affect and cognition, behavior, and the environment by which human beings conduct the exchange aspects of their lives" (Peter & Olson 2009).There are various economic, social, cultural and psychological factors, which impact the consumer behavior and the decision making process of buying and using products. The reactions of the clients to the companies' marketing strategies strongly affect the business profits and the future economic performance of the big retailers. For that reason, developing the marketing 4P- product, price, promotion and placement, plays a crucial role in the agri-food sector. Furthermore, customers often feel some external environmental impacts, which could alter their buying choices. The latter include comments from other consumers, advertisements, price information, packaging, product appearance, blogs, and many others (Peter & Olson 2009). Consequently, consumer behavior is complicated and dynamic; it changes, develops and evolves over time, while being exposed to different exchanges and interactions.

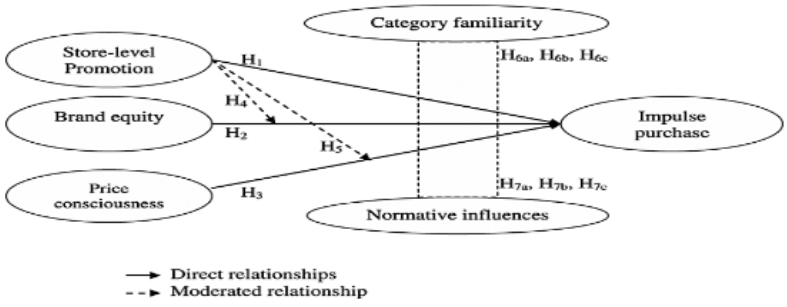
Many research groups are interested at the consumer behavior – among them are political parties, non-profit organizations, marketing agencies etc. Focusing on the food retail sector, the marketing specialists are continuously trying to conquer and impact the potential clients' affect, cognition and behavior. However, once consumers are in the store, they can redeem manufacturers' coupons, take advantage of a store's advertised specials, search for shelf or display discounts, or buy private label brands (Garretson et al. 2002). In fact, the majority

respond mostly to promotions and the possibilities to benefit from the underpriced retailers' private brands.

We observe different market stimuli influencing the consumers' buying behavior. Among them are: the package of the product, the placement on the retailers' shelves etc. Interestingly, the social status also exercises a significant impact on the willingness of the consumer to purchase a given good (Shukla 2010). However, promotions in the stores are still one of the major incentives for the clients. There are four major types of promotion - advertising, sales promotions, personal selling, and publicity. They all form the promotional mix. The most common form is advertising. Advertising is a mean of communication with the users of a product or service. Advertisements are messages paid for by those who send them and are intended to inform or influence people who receive them, as defined by the Advertising Association of the UK (Advertising association, 2014). Meanwhile, many scientific studies prove a positive empirical relationship between intensive advertising and increased sales. Sales promotion imposes direct inducements for the consumer to buy the product, the personal selling involves a direct personal interaction, and the publicity is every paid form of communication about the marker's company, products, or brands. All these strategies are used to influence consumers' behavior, to inform, transform affective responses and to remind (Garretson et al. 2002).

Price promotion is a basic part of the sales promotion strategy and the topic of the current study. Shukla (2010) has examined the complementary factors that interact with price promotions and contribute for the final purchase of the product. As it could be observed from Figure 1, brand equity, price consciousness, cognition of the brand and normative factors interact with price promotion and between them and shape the final impulse purchase.

Figure 2.1 Price promotions and purchase



Source: Shukla (2013)

Other authors focus on additional moderating variables, which include consumer characteristics (e.g., age, gender, education, income, loyalty, product knowledge, need for cognition, and affect state), brand characteristics (e.g., promotion history and brand equity), product category characteristics (e.g., commonness of promotion), and manufacturer characteristics e.g., promotion patterns of each company (Yi & Yoo 2011).

Earlier we have discussed the general effects on price promotions on sales. In addition to that, numerous studies estimate distinguish between short and long-term effects from price promotions on the consumer behavior as well. Most of the authors agree that in the short-term period, price promotions influence positively the consumers' buying behavior (Doob & et al 1969, Dodson et al. 1978, Schindler 1992). However, in the long-term, there are varying opinions on the type of effect of the price promotion on the consumers. Some of the empirical models confirm a not negative impact (Davis et al. 1992, Neslin & Shoemaker 1989), but the majority is firmly behind the position of a negative long-term influence of the price promotions (Doob & et al 1969, Dodson et al. 1978, Guadagni & Little 1983, Kahn & Louie 1990). The latter reveals the possibility of switching behavior of the consumer in the long-run (Blattberg 1990, Sunil Gupta 1988, Dodson et al. 1978) or stockpiling (Bucklin & Gupta 1992), bundling (Foubert et al., 2007), and consumption or quantity increase (Ailawadi & Neslin 1998) in the short-run period. But could there be also a chance that the client is hesitating between price promotions of national goods and retailers' own brands? Some experimental economic methods have proved an advantage over private label goods in terms of perceived quality (Richardson et al. 1994, Kumar & Steenkamp 2007). However, choosing the promotional national brand or the private brand of the retailers, consumers most often seek for a cheaper option for their products. The purpose of this study is to further analyze which other factors could be influencing for the consumer to choose one of the options over the other.

2.2 Literature review on methodology

By looking carefully at the literature for price promotions, one could observe two main problems being discussed – the retailers' profitability from price promotions and the estimation

of the consumers' demand systems in the case of reduced product prices. In the present paper we summarize the literature on both issues and explain why they are not the chosen topic for our analysis. Afterwards, the logit model is introduced and previous cases using that method are presented in order to assess consumers' reactions to price promotions of national brands vs. private labels in the Spanish food sector.

From the one side, it could be extremely interesting and very challenging to estimate the retailers' profitability from both price promotions of national goods and of their own brand products. As it has been mentioned above, retailers are often accused for imposing lower buying prices to producers and having a negative influence on the fair competition by entering in cartels, causing monopolies etc. To estimate the gross margin of the retailers from price promotions, one should take into account the wholesale price of the product, the retail price, and all allowances, discounts and market incentives (Mathews 1994). The problem comes from the fact that the supply chain is often long and complicated and that information is hardly available for the researchers. Moreover, comparing the profitability of price promotions of national brands vs. retailers' own brands, the first would be favored, because promotions of national brands are more often encountered (Steenkamp et al. 2010). However, there are various independent from each other studies trying to find the most appropriate method for estimating retailers' profitability from price promotions. And while, there are authors using meta-analysis for making empirical generalizations about the net impact from price promotions (Nijs et al. 2001), others are focusing on the profitability of the different promotions and trying to propose strategies to increase their benefits (Ailawadi et al. 2006). The results from Ailawadi's work empirically confirms that what makes the promotions really profitable relates to the promotional margins, the purchase of other products in the store, advertisement efforts etc. In addition to those factors, one could add the acceleration of product category purchases, the brand loyalty redeemers, and repeat purchase effects, which were proven to be significant by a computer model simulating the effect of coupon promotions on sales and calculating the net profitability from Neslin & Shoemaker (1983) . However, focusing again on the differences between the profitability of national and private label brands, some authors choose the unit-root techniques (more specifically VAR models for different products including yogurt, soups, catsup and detergent) and find curious outcomes- for example that private-label price promotions appear to be powerful enough to either increase

consumption or to attract previous non-buyers to the category who subsequently become national-brand buyers (Dekimpe & Hanssens 1999). Consequently, time period is extremely important for estimating the profitability of the price promotion. In the case of the current paper, the authors dispose with only short-term data. For that reason, many of the above mentioned methods would not be applicable and the initial intention of the authors to estimate retailers' profitability would not be practical with the current set of data. However, a possible analysis of the scanner data would provide an answer to the question: How consumers react to price promotions and do they differentiate between the reduced prices of national, well-known goods and the retailers own brands? Furthermore, by strictly following the consumers' decisions, patterns of behavior could be established toward the two types of products.

From the other side, the topic of the consumer behavior has been attracting the interest of many researchers during the last decades. Various methods have been proposed to analyze consumers' demand, but the estimation of the demand function could be often a challenge. The first obstacle is to provide the appropriate data for the analysis. Many authors have used panel or time-series data gathered from consumers' surveys and experiments. Lately, scanner-data from supermarkets has also been borrowed to researchers for academic analysis. With that they were trying to estimate how changes in prices influence the quantity bought by the consumers, and how the external factors related to variation of the prices of substitute or complementary products, consumers' incomes, preferences and expectations could again impact the purchased quantity. There are many popular models to estimate demand: the Generalized Leontief cost function, translog, Rotterdam and Almost Ideal Demand System models etc. An example of the traditional approach to demand analysis is the system of double logarithmic demand functions employed in the pioneering studies of consumer demand by Henri Schultz, Richard Stone and Herman Wold, where the utility function is linear logarithmic (Christensen et al. 1975). Christensen et al. offer an alternative to that by focusing on a direct translog utility function, which is the transcendental function of the logarithms of the quantities consumed. The Generalized Leontief cost function, known also as the Diewert function, offers a way to derive a system of demand equations from the production function through the Shephard duality theorem (Diewert, 1971). However, some of the most common methods to estimate the demand function working with scanner data are the Almost Ideal Demand System (AIDS) method and the Rotterdam method. Even though both are linear models, they have their differences and their

advantages and disadvantages as well. The Rotterdam model has been developed by Barten (1964) and Theil (1965) and has been already used in many researches for demand system estimations and not only. The model is flexible enough allowing extensive applications, for example Capps and Nayga utilized the model for separability tests in appropriate groupings of disaggregated meat products in a demand systems framework (Nayga Jr. & Capps Jr. 1994). The AIDS model was proposed by Deaton and Muellbauer and combines many of the characteristics of the Rotterdam and translog models, but it also has its clear advantages, which according to the authors are the following: it gives an arbitrary first-order approximation to any demand system; satisfies the axioms of choice exactly; aggregates perfectly over consumers without invoking parallel linear Engel curves; has a functional form which is consistent with known household-budget data; it is simple to estimate, largely avoiding the need for non-linear estimation; and it can be used to test the restrictions of homogeneity and symmetry through linear restrictions on fixed parameters (Deaton & Muellbauer 1980). An appropriate example of a case in the agri-food sector where the AIDS model was successfully applied could be the study of Jones (2003), who analyzed consumer behavior or consumption patterns in supermarkets of people living in geographically distinct areas and with different level of incomes.

In fact, various studies have been trying to compare the Rotterdam and AIDS models and explore their strengths and weaknesses. Among them is the work of Barnett & Seck (2008) (2007), which determines the performances of the methods in terms of their ability to recover the true elasticities of demand by using Monte Carlo techniques. The results show that at the levels of low and moderately high substitution elasticities among the goods, both the Rotterdam and the fully nonlinear AIDS model present similar results, but for products with very high elasticity of substitution the nonlinear AIDS model is showing more robust results. However, the data for the current analysis is short-term and not so detailed in terms of consumers' characteristics-including income, education, profession etc., which motivated further research for choosing more appropriate method for the analysis and assessing consumers' behavior.

Another way to explain consumers; buying behavior is through a meta-analysis. In statistics, the meta-analysis refers to methods that focus on contrasting and combining results from different studies, in the hope of identifying patterns among study results, sources of disagreement among those results, or other interesting relationships that may come to light in the context of multiple studies (Greenland 1995). It is effectuated through several steps including:

formulation of a research problem, search in the literature, selection of studies, decide on the variables, which could be comparable or combined among the various studies and model selection. Some of the authors were utilizing the meta-analysis in order to get more specific results for price elasticities and overcome bias -in the case of alcoholic beverages in the work of (Nelson 2014). Others were specifically trying to estimate the impact of advertisements on sales using a form of meta-analysis called "replication analysis" (Assmus et al. 1984) etc. This model is extremely time-consuming and challenging since the variables chosen in the literature may not respond to the real data the authors are disposing with.

In the literature various additional methods and econometric models could be found to better estimate possible impact of promotions on consumer behavior or to quantitatively measure that impact. Among them are the linear model for own and cross price effects estimations and own and cross price elasticities (Brooker 1994), double log model to (in order to analyze the demand for maple syrup, Iskow (1994), to estimate price, income and promotion elasticities), utility models trying to define the implications of three major classes of preference of distribution on the expected patterns of competition (Blattberg 1990) etc.

However, for the objective of the current analysis given the available data set, a multinominal logit model could be a more appropriate version of method to compare the consumer behavior towards price promotions of national brands and the retailers own brands. Numerous studies confirm the possible application the multinominal logit model working with a panel scanner data for that purpose.

2.3 Method selection and previous cases

The logit model is a well-known model dealing with panel data and it is an essential tool kit for studying discrete choices. Wooldridge (2009) describes the logit as a model for binary response, where the response probability is the logit function evaluated at a linear function of the explanatory variables. According to Cameron & Trivadi (2005) the model is used for a dependent variable that indicates in which one of mutually exclusive categories the outcome of interest falls. Often there is no natural ordering of the categories.

$yi = 1$ with probability p

0 with probability $(1-p)$

The conditional probability given by:

$pi \equiv Pr[yi = 1|x] = F(xi\beta)$

The simple binary logit model (where the dependent variable could take values of 0 and 1) is the base for the multinominal logit model and the nested logit model (Hensher & Greene 2006). The latter allows the error terms of pairs or groups of alternatives to be correlated (Wen & Koppelman 2001). It is advantageous to use when there is a clear nested structure, but this is not always the case. The multinominal logit model uses only variables that describe the characteristics of the individuals and not of the alternatives.

Therefore, applying the binary logit model (where the dependent variable might take two possible outcomes) will allow to observe which are the socioeconomic and demographic factors having an influence of the choice of brand – national or private, and to realize the first objective of this research. A similar study was already effectuated by Akbay & Tiryaki (2008), who revealed, which factors impact consumer behavior for buying various types of milk.

Meanwhile, there are many cases in the literature where the multinominal logit model is chosen to study consumer choices. The authors of the current paper estimate that the multinominal logit will allow to determine how price promotion influences of the choice of brand (the main objective of the study) and to test the research hypothesis if people stay loyal to private brands in case of price promotions of national labels or not.

For example, Guadagni & Little (1983) used that choice model for estimating the short-term share of purchases by brand-size while taking into account data for 100 households over the 32-week calibration period and a subsequent 20-week forecast period. The methodology was the multinomial logit, with calibration and testing done on scanner panel data for regular ground coffee. The results predicted high statistical significance for the explanatory variables of brand loyalty, size loyalty, presence/absence of store promotion, regular shelf price and promotional price cut. Some years later, the same authors Guadagni & Little (1998) effectuated another study in this field, again choosing the coffee as the main product. The data they have disposed with was again supermarket scanner data for coffee for 74-week period from (14 September 1978 to 12 February 1980), containing information on the item bought, the date, the price paid, and the

household buying. From the whole data set, the authors have picked randomly 200 households, making more than 5 coffee purchases in the given period. This time they have constructed nested logit model with the variable representing the consumers' choices y*k(n)*, from the one side, taking values of 1 if the consumer *i* chooses alternative *k* on the *n*-th choice occasion (namely to buy now) and 0 if otherwise (to buy later). From the other side, the independent variables include price and promotion, and customer characteristics, such as brand and size loyalty. The model is not much different from the previous one they have already built, but it became a base for many other researches in this field. However, in their study Bucklin et al. (1998) develop another version of the multinominal logit model where the binary dependent variable takes values of 0 and 1 if the consumer decides to buy the product or not. In addition to that, the authors estimate the incidence (whether to buy) by nested logit, and quantity (how much to buy) by poisson regression. This time the chosen product was yoghurt.

Sunil Gupta (1988) also chose the multinominal logit model for his study for the consumer behavior. He was working with scanner supermarket data for coffee for two years period (1980-1982) for more than 2000 households. Except the long-term information that it contained, the data was also very detailed revealing the complete purchase history of each household (e.g. household identification, brand name, date and hour of purchase, store where it was bought etc.). Furthermore, the cases of brand promotion and discounts for all the coffee brands in all the retailer's supermarkets were also indicated in the dataset. Taking into account the extreme size of the data, the author eliminated the very light users (purchasing less than 10 times in two years) and from them picked randomly around 100 observations for his analysis. In that way from pooled data, he was already disposing with a panel one – a necessary condition to run the logit. For the brand choice model, Gupta has used the following variables: brand specific constant (dummy, taking values of 0 or 1), regular brand price (cents), promotional price cut (in cents), feature-or-display and feature-and-display (again dummies). Following the example of Guadagni & Little (1983), the author also included brand and size loyalty, which were exponentially weighted averages of past purchases. In addition to that, brand choice, interpurchase time model and purchase quantity model were also formulated. The results confirmed the conclusions already made by Guadagni and Little (2010), saying that the brand size and loyalty have the strongest impact on the consumers' purchasing behavior. Among the other factors influencing the buying behavior are feature and display, however price and

promotion could not be so important if the client didn't actually have the intention to buy the given product. An elasticity analysis was performed to assess the relative impact of sales promotion on consumers' brand choice, interpurchase time, and purchase quantity decisions, which indicates that 84% of the sales increase from promotion was due to brand switching. However within the time some other authors have also observed the brand choice, purchase time and purchase quantity decisions (Blattberg & Jeuland 1981, Frank et al. 1965, Shoemaker & Shoaf n.d., etc.). All their works had their specifics. For example, Blattberg, Eppen and Liebeman began their work with an explanation why is it beneficial for both manufacturers and retailers to offer price promotions and concluded that some of the benefits may overlap (Blattberg et al. 1981). Their idea was to analyze the interaction between the consumer (demand) and the retailer (supply) and to determine the magnitude and frequency of deals and the quantity sold on the deal through the well-known empirical methods and under the assumptions that from the one side, the consumers are trying to minimize their costs and from the other, the retailers to maximize their profits. Both parties are looking for the optimal deal price. According to the conclusions stockpiling and brand switching are some of the major causes for increased sales. Nevertheless, in other works, for example that of Frank et al. (1965) the retailers' side has been not taken into account and the consumers holding cost of the inventory were not estimated. They have used distributed lag models instead to measure the effects of past purchasing on a brand's sales and market share. Ailawadi & Neslin (1998) were also among the researchers constructing a model to analyze purchase incidence, brand choice, and purchase quantity decisions for a household. The data was again a scanner panel data, from which households making at least one shopping trip every two weeks were chosen. The authors built a binomial logit model to estimate purchase incidence for two products- yoghurt (perishable one) and ketchup (a non-perishable one). In order to quantify the effect of promotion on total category demand, the authors simulated purchases for 100 of the households over a one-year horizon using the promotional environment defined by the data and the parameter estimates based on the continuous usage rate function. The importance of the flexible usage rate phenomenon was also demonstrated by quantifying the effect of promotion on consumption through Monte Carlo simulation. The results showed that for yogurt, where usage rate was highly flexible, substantial percentage of the short term promotion sales bump was attributed to increased category consumption (Ailawadi & Neslin 1998). Regarding the brand choice Neslin and Ailawadi chose the following variables: set

of brand sizes available in the store, price per ounce of the chosen brand, dummy if the brand was featured or displayed and finally loyalty to the brand.

The category incidence and the brand choice were again analyzed with a nested and a multinomonal logit model by (Tellis & Zufryden 1995) . Again following the example of (Guadagni & Little 1983) the multinominal logit model was having for the independent variables: brand loyalty, price, discount, feature and display. However, discount is something new added in the model. The product for the analysis was saltine crackers due to the high occurrence of promotions for those goods. Again brand loyalty experienced the strongest significance comparing to price and promotion. What is particular in the work of Tellis & Zufryden (1995) is that it presents optimization model that allows the retailers to pick up a wining discount strategy in their stores.

Looking back at the work of Bucklin & Gupta (1992), some years later, the author constructed again a logit model to measure the marketing impact on two consumer behavior variables- weather to buy the product category or not and which brand of the category to select. What is particular in his work is the segmentation in preference, brand choice, price and promotion sensitivity and response. The author used scanner panel data on liquid laundry detergent for the analysis. The model allowed a better understanding of the different types of consumers' behavior.

Bucklin & Lattin (1991) took advantage of the detail found in their data to build a new model of category competition among retailers. The model permits a third level of logit nesting: the household's choice of store. Furthermore, they divided the decision behavior in two groups - planned and opportunistic, depending on the level of information that the consumers possessed about price promotions before entering the store.

Some other authors -Roy et al. (1996) studied the consumer choice behavior towards catsup purchases and proposed a framework to distinguish three separate effects: habit persistence of a household, purchase feedback within a household, and heterogeneity of preference.

Another important factor, namely the marketing effects on brand choice, has been also studied by numerous authors. Among them is Lilien (1974) who also imposed differentiation between "premium" and "standard" class brands, but also between private and national labels and the role of the price promotion in the consumer choice. In his work Lilien tried to develop a normative model of individual consumer behavior following a certain set of postulates or

assumptions and explored that model's properties. Blattberg & Jeuland (1981) produced a macromodel of the estimate the sales-advertising relationship for a single product by taking into account two important factors: reach of the advertisements and rate of decay of their effectiveness over time. Meanwhile another researcher Keon (1980) developed his own stochastic brand choice model- the Bargain Value Model. By using consumer panel data, the model predicts an individual household's probability of purchasing various brands as a function of one of the marketing mix factors- namely the prevailing price.

Multiominal logit model for milk and cereals

The chosen products for the current analysis are milk and cereals. From nutritional point of view, milk in an important component of the human diet, a major source for calcium, vitamins and minerals. Some biochemical studies confirm that milk helps to prevent dental caries, heart disease and stroke (Bus & Worsley 2003, Massey 2001). Especially low-fat milk is an ideal for people who prefer to stay fit and to have a balanced menu. For those and many other reasons, milk is almost always presented in the shopping bag of the consumers. Particular attention has also been attributed to the milk in the researches where the multinomial logit model was used. An appropriate example could be the already mentioned work of Akbay & Tiryaki (2008), where binominal logit and multinominal logit models were used to analyze households' fluid milk consumption decisions as a function of socioeconomic and demographic factors. The objective of the binominal model was to estimate if the above mentioned factors influence the consumers' behavior to buy or not to buy the product. The multinominal logit model was used to clarify if the socioeconomic and demographic characteristics are associated with the consumers' preferences for three types of milk: unpacked, pasteurized and sterilized. The data was collected through a survey conducted by State Statistical Institution of Turkey and designed to be nationally representative of the Turkish households. The results suggest that the socioeconomic and demographic factors have an important role in fluid milk consumption. Furthermore, the fluid milk alternative chosen by most sample households is unpacked fluid milk.

In the work if Tian & Cotterill (2005) three different models have been compared, including the logit model, and the conclusion was that they show similar results. The

multionminal logit model is used to compare the demand for three brands, one of which is private. The data for the analysis was provided from the Information Resources Incorporated (IRI). It was a four-week-period data for 58 periods from March 1996 to July 2000 on gallons sold of milk, units sold, dollar sales, and prices for the three brands for skimmed and low-fat milk in Boston. Among the variables taken into account for the model are: prices, sales volume, market share, per capita income, units per gallon. Remarquably, those variables are not so commonly used in the previously enumerated studies.

An interesting alternative for cereals is the combination of the nest and multinominal models in a nested multinominal logit model under the generalized least squares theory in the work of (Bechtel & Gordon n.d.), where the market share of the products again plays one of the major roles in the analysis. The product attracts the attention of the authors, as it could also be an important ingredient for a balanced menu and could be considered as a complementary good for the milk. Moreover, cereals are part of the culture of the Spanish people, being often an integral part of their breakfast

2.3 Contribution of this study

The present study applies a choice model which doesn't focus on the preference between substitute goods, or between various types of the same products, but rather on the choice of brand. In the days where, unfair market conditions often exist and consumers are forced to choose the cheapest option due to the difficult economic situation- the topics of the retailers' private labels' increased market influence and the price promotions of the national brands become an important part of the policy agenda. Meanwhile, people start to get more and more cautious about the quality of the food they are buying, the labelling, welfare of animals, fair trade etc. In this complicated situation, the authors of this research would like to provide answer to the question- which factors influence the consumers to choose a private or a national brand? Also if the consumer is a frequent purchaser of a private brand, would he change his/her buying habits in case of price promotion on the national one? This will partially respond to the query if the retailers' own brands are already well developed and satisfy all the consumers' needs so they start to become loyal to them. Furthermore, it is intended to be a credible scientific base for

policy analysis decisions at a national level for improving the market economy, fair competition and defending consumer's rights, but also at a firm level – for both retailers and producers to work more efficiently in a predictive business environment.

Chapter 3 - Context and data description

3.1 Context of the study

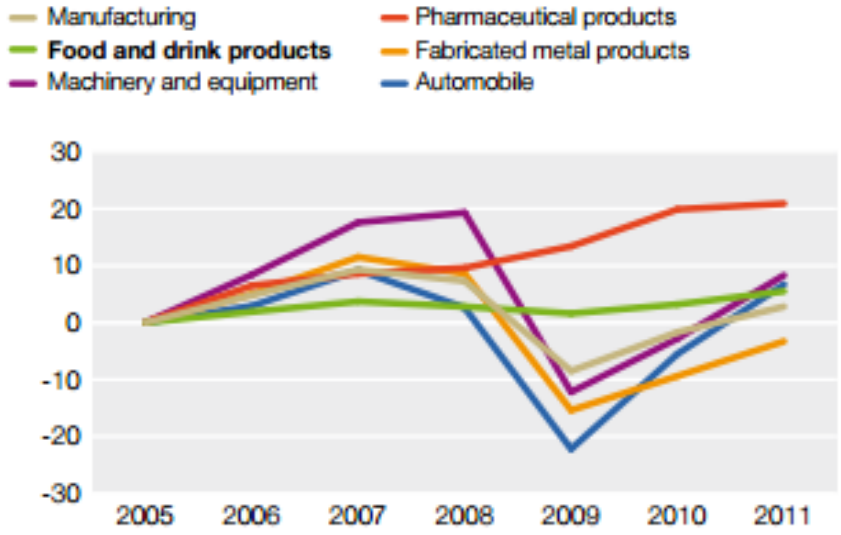
The food sector in Europe and Spain

On the one hand, at the European level the Single market and the Common agricultural policy (CAP) have played significant role in the food production and trade during the last decades. The beginning of the CAP was set in 1962 with the objectives to provide affordable food for EU citizens and a fair standard of living for farmers (European Commission 2012). Later on until 1984, farms became so productive, generating excessive "food mountains", which urged for reforms, some of which imposed quotas to the production of milk and a ceiling on EU expenditure to farmers. The year 1992, famous with the so called MacSharry reforms, was characterized by reduced levels of support by 29% for cereals and 15% for beef, "set-aside payments", direct payments for farmers encouraging them to be more environmentally-friendly etc. In 1999, the Agenda 2000 divided the CAP into two pillars –production support and rural development. Nowadays, new incentives have been launched for strengthening the competitiveness of the agricultural sector, promoting innovation, combat climate change and support jobs and growth in rural areas (European Commission 2012). All this reflected into the European food market and transformed the food and drink industry into the largest manufacturing sector in terms of turnover - €917bn for the EU-27 and 14% employment of the total manufacturing sector (EC, 2014). It contributes with 1.9% to the EU gross value added for 2010. Despite the economic downturn observed after 2008, the production of food and beverages increased with 2,6% comparing to the decline of 4,2% experienced in other industries (Food Drink Europe, 2014).

According to the European Commission (Commission 2009), the food supply chain, agriculture, agri-food industry and distribution sectors, represent more than 5% of the European added value and 7% of the employment. In addition to that, the agricultural and food industry represents 1400 billion euro per year, which is an amount higher than any other manufacturing sector. The agri-food supply chain strives to deliver high-quality products with respect to the strict standards at an affordable price.

The size of the European common market offers many opportunities for the companies to grow and increase their productivity, to conquer larger niches, develop new products and invest in innovation. However, all the actions on the market should be aligned to the preservation of the environment and ensure fair access and chances to all the market participants. The development of the European manufacturing before and after the economic and financial crisis of 2008 is presented on Figure 3.1. The figure, provided by the Food and Drink Europe, a permanent secretariat in Brussels cooperating with the European Institutions on questions related to food and drinks in the EU, from which we can conclude that the Food and drink sector is the only sector generating stable production results during the last years

Figure 3.1 Production in the manufacturing industry, 2005- 2011 (% change since 2005)



Source: Eurostat (STS); Food Drink Europe calculations

On the other hand, the Spanish food industry ranks fifth in sales value after Germany, France, Italy and the United Kingdom. The sector is represented by companies operating at regional, national and international level.

In Spain, the food and beverage industry is the first industrial branch, according to the latest Survey of the Ministry of agriculture, food and environment from December 31, 2012, representing 20.5% of net product sales, 18.4 % of employed persons, 14.9 % of investments in tangible assets and 15.1 % of value added in Spain. The detailed number of employed persons,

net products sales, investments in properties and equipment and purchase of row commodities are presented in Table 3.1. From the table it could be concluded that only the number of employed persons and the investments are slightly decreasing with -1,.% and -5.9% for the period 2011/2011, which is a normal result for the still recovering from the crisis Spanish economy. The industries following the food and beverages sector by total net sales in 2012 are the metals and fabricated metal products (12.1%) and motor vehicles and transport equipment (11 , 9%).

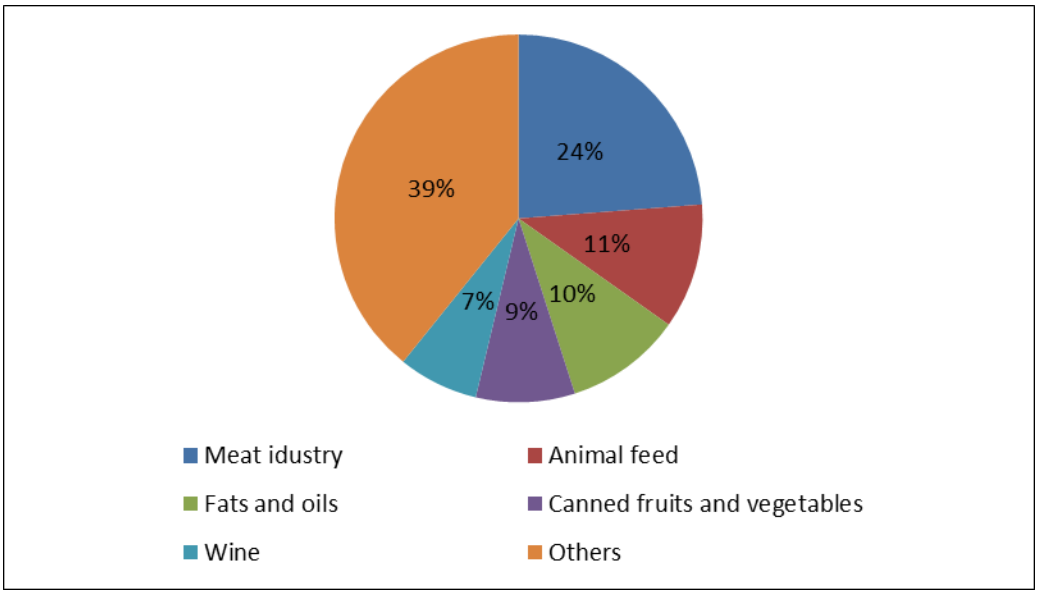
Table 3.1 Figures of main factors of food industry, data from December 2012

	year	2011	year	2012	Changes%	2011/2012
	Total Industry	Food Industry	Total Industry	Food Industry	Total Industry	Food Industry
Employed persons	2049195	358338	1922272	352823	-6.2	-1.5
Net product sales	45083029	88673143	438907147	90168963	-2.6	1.7
Investment in properties and equipment	180359994	3059145	19346128	2879490	-7.3	-5.9
Row commodities purchase	255602558	51976965	250811015	54309310	-1.9	4.5

Source: Ministry of agriculture, food and environment, Spain

In 2012, net product sales for the Food and Beverage Industry in Spain amounted to € 90,168.963 million, representing an increase of 1.7 % on the € 88,673.1 million in 2011.

Figure 3.2 Share of the total food and beverages production in 2012 for Spain



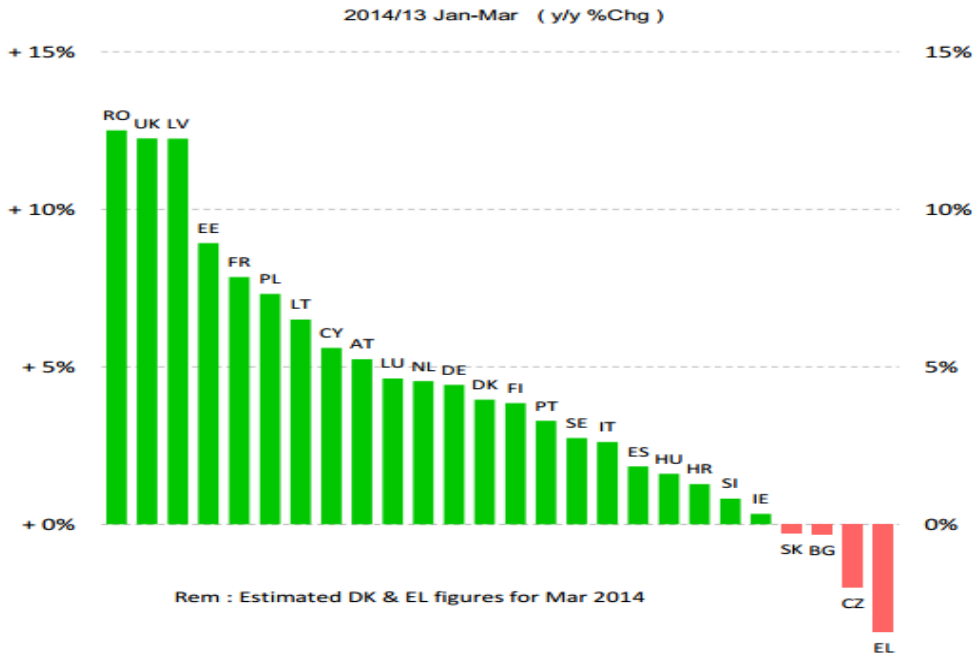
Source: Ministry of agriculture, food and environment, Spain

As it is presented on Figure 3.2, from the total net sales in the Food industry for 2012, € 19,499.2 million (21.6 %) belong to the Meat Industries, occupying the 1st place, followed by Animal Feed (10%), fats and oils (9.3%) and Industries milk (9.2%). The sectors of Canned Fruits and Vegetables and Wine, reached 7155.4 and 5771.7€ million, respectively, representing 7.9% and 6.4 % of net product sales Food Industry (data is provided by the Ministry of agriculture, food and environment in Spain).

The two products chosen for the current analysis are milk and cereals. Milk in an important daily ingredient for most of the diets of the Spanish consumers and one of the most purchased products in supermarkets as it is proven in the preliminary data analysis.

Total EU27 milk production is estimated around 152 million tons per year (EC, 2011). The main producers of the Community are Germany, France, the United Kingdom, the Netherlands, Italy and Poland which altogether account for more than 70% of the EU production (EC, 2014). As it could be seen from Figure 3.3 presenting data for a later period 2013/2014, there is a significant divergence between the leaders in milk production and in milk collection in Europe. An explanation for this could the Single Market and the free trade flows between the Member States and the changes in the leaders positions from 2011 until 2014.

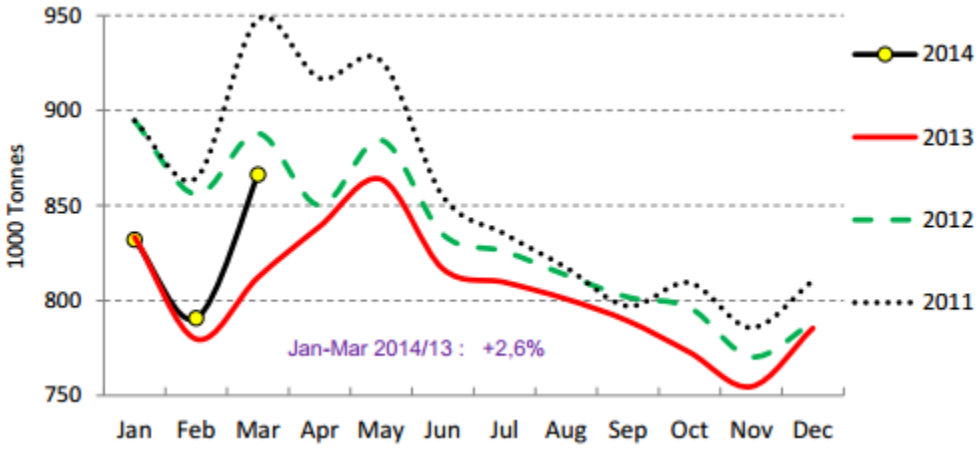
Figure 3.3 Cow's milk collected in Europe



Source: Eurostat, Newcronos

In addition, Figure 3.4 again presenting data from Eurostat and Newcronos, provides a detailed information on the changes in quantities of cow's milk collection during the last years in Spain.

Figure 3.4 Changes in quantities of cow's milk collection

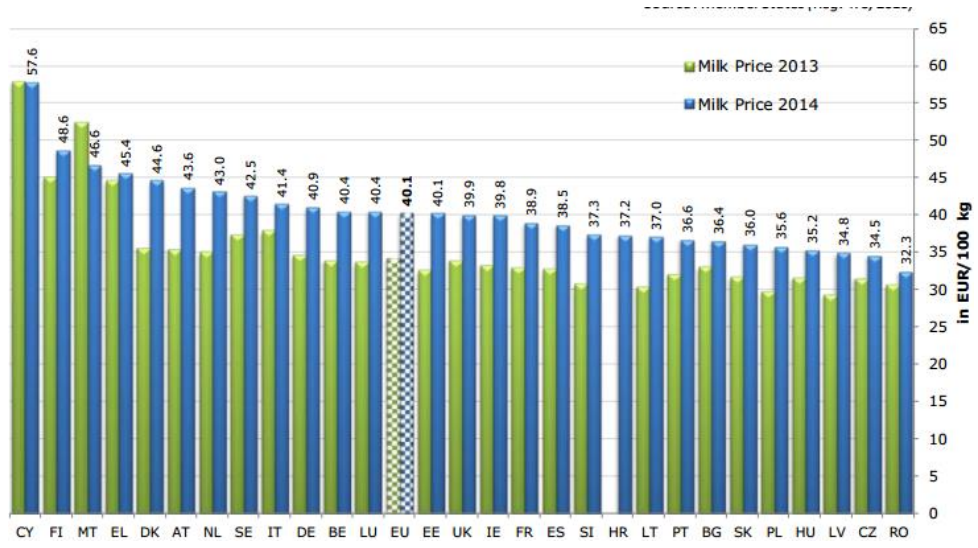


Source: Cow's milk collected in Spain, Eurostat, Newcronos

Although varying, the numbers of Figure 3.4 are still significant and confirm that the diary sector represents an important part of the Spanish agricultural production. Milk also has an important economic, social and environmental role for the development of the country. Based on data of the Spanish Ministry of Environment, Rural, and Marine Affairs (MARM official website, 2014), Spain is the only country in the EU experiencing milk deficit due to imposed quota to the production. It is estimated that the annual demand for consumption reaches around 9 million tons, but the local production is restrained only to 6 million tons, which is the reason for the deficit.

However, according to the US Department of Agriculture data farm gate prices in Spain have been consistently below the EU average (USDA, 2011). This is confirmed by the recent regional and national statistics considering price changes in milk in the European Union, which are presented in Figure 3.5.

Figure 3.5 Milk prices compare 2013-2014



Source: EC 2014, Member states

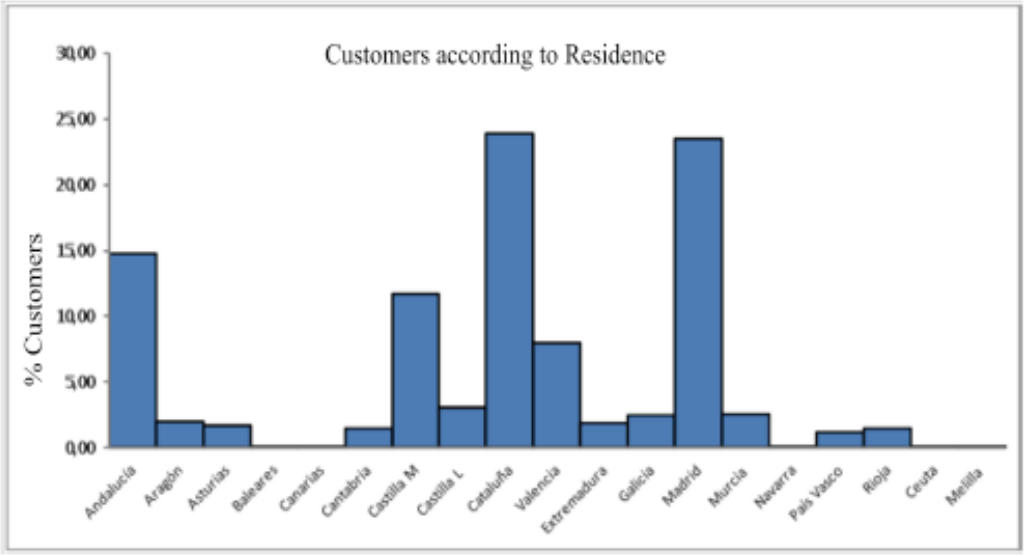
The number of milk producers in Spain reaches around 19 232. Despite that impressive number, there are only 414 producers certified to directly sell the ready to consume product (EC,

2014). Producers usually differentiate between four main types of milk – whole fat milk, semi-skimmed, skimmed and enriched milk. Usually in Europe, every country sets its own criteria for the level fat in the different product, but they all vary around the ranges 3-4% for the whole milk, 1,7-1,8% for the semi-skimmed milk and 0,1-0,5% for the skim milk

The Spanish supermarkets offer a wide choice of varieties of milk products. Except of the above mentioned ones, the consumers could find in the stores also organic types of milk, evaporated, condensed, powdered, baby milk and soy milk etc. For the current analysis only one type of milk was chosen and this is the semi-skimmed milk in bricks and in bottles. The authors of this paper would like to slightly focus the attention into consumers' healthier food choices and make a suggestion of the influence of price promotion on the purchase incidence of national and private brands among the recommended dietary goods in the supermarkets.

Since around 50% of the purchases from our data set are effectuated on the territory of Madrid and Barcelona, those cities were chosen for representative in the present analysis (Figure 3.6).

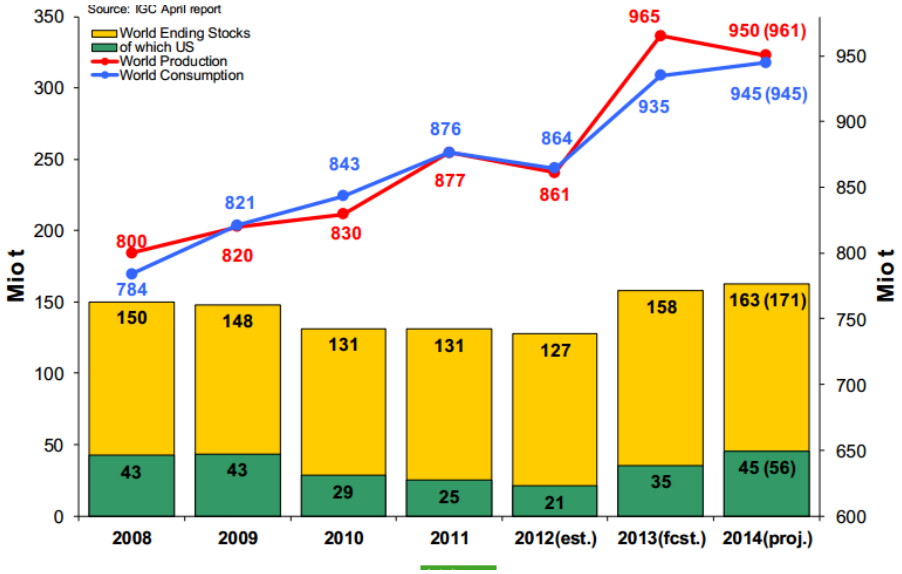
Figure 3.6 Share of sales in the different regions of Spain



Source: adapted from Cataño, 2013

Regarding the second product chosen for the analysis- cereals, at the European level, the cereals policies have been strongly influenced by price volatility with an increasing long-term trends, the biofuels production and the climate change. Additional factors are the growth in the global food demand and the decline in food crop productivity (EC, 2011). However, nowadays the European Union is still one of the world's largest cereals producers and net exporters. In terms of quantity and area, wheat is by far the most popular cereal grown in the EU, making up nearly half the total. Of the remaining 50%, about one-third is maize and one-third barley. Other cereals grown in smaller quantities include triticale, rye, oats and spelt (EC, 2014). The payment system is fully decoupled and flexible to the market changes and the cereals production is part of the Single Common Market Organization (CMO) since 2008. With the advancement of the EU-US free trade negotiations, the questions of the GMO crop productions have been even more intensively discussed during the last years. In Spain most of the breakfast cereals are made mostly from maize. The development of the world's maize production from 2008 to 2014 could be followed in Figure 3.7 and reaches 965 million tons for 2013:

Figure 3.7 World's maize production 2006-2014



Source: EC, International Grains Council (IGC)

Nevertheless, Spain has its log traditions in the production of various crops. Wheat and barley are generally grown in the dry areas. Rice is a typical culture in the irrigated areas of the Levante, in Andalusia, and at the mouth of the Rio Ebro. Spanish farmers also grow rye, oats, and sorghum. However, the cultivation of corn and barley was particularly encouraged by the government in order to reduce imports of animal feed grains. Spain also became one of the world's largest importers of soybeans, and it developed a modern oilseed-crushing industry of such high productivity that surplus soybean oil became one of Spain's most important agricultural export commodities. In the arid areas of Spain, crops like kidney beans and beans, lentils, chick peas are predominated in the wetter regions (USDA, 1998).

The production of cereals (excluding rice) reached the value of 3,216 million euros in 2009 and represented 8.6% of the PRA (Production of Agrarian Rama) and 14% of the PRV (Production Plant Rama) in Spain. The annual expenditure of the first pillar of the CAP in the sector has been, since the implementation of the Single Payment Scheme in 2006 and until 2009, of 438 455 000 euros (372.67 area payments to cereals, 42,025 supplement to wheat hard and 23,760 specific quality premium for durum wheat). In 2010, the above amounts are integrated into the single payment scheme and direct support to cereals disappears through community support the first pillar (MARM, 2014).

The area planted with cereals (except rice), shows a clear downward trend in Spain during the last years. Specifically, from 2002 to 2011 the grain area has been reduced with 12%, from 6.6 million hectares in 2002 to 5.8 million hectares in 2011. The average yield of the last five years has improved to 3.4 t / ha , compared to the last decade was 3.2 t / ha.

With a total area of 340 000 hectares, Spain occupies the sixth place on the list of maize-producing countries of the EU. This is one of the reasons why except for export, corn and corn products and broadly presented in the daily meals of the Spanish people.

The typical breakfast in Spain, for example, is usually the smallest meal of the day. It contains café con leche (coffee with milk), a strong espresso coffee, hot milk and cupcake or churros. Children often prefer hot or cold chocolate milk, however cereals have become a very common food for young and adults. On the Spanish market, we observe various types of cereals – including muesli, oats, corn flakes, and different types of cereals. The latter include crunchy, fiber enriched, with fruits, chocolate, dietary ones etc. Since milk and cornflakes are

complementary food and contribute for the balanced and healthy diet, plus they are produced locally, the authors have chosen those two goods for the current analysis.

3.2 Data sources and description

The data for the current analysis is provided by a single retailer, comprising 80 stores in some of the biggest cities in Spain. The stores have different size and are arranged in three groups- Small, Classic and Maxi. The "small" and "classic" types comprise stores range between 200 and 700m2 in size and are positioned as close as possible to customers. Type "maxi" stores are up to 1000m2 and are usually located on the outskirts of urban center. This differentiation is needed in order to compare the consumer behavior in the various types of supermarkets.

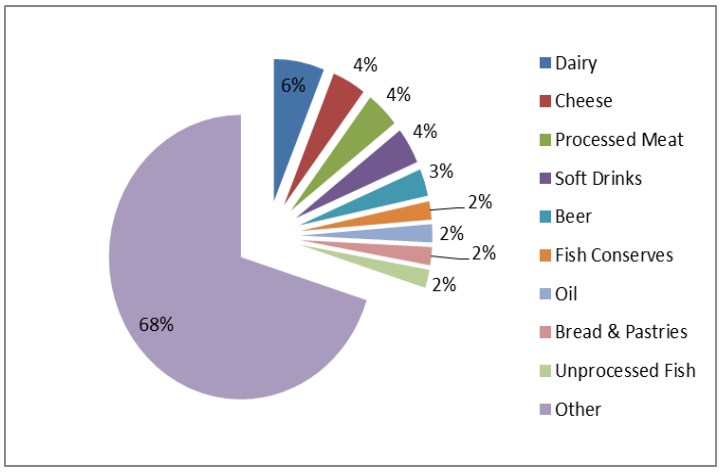
The data is detailed and very complete allowing to observe cases of discounts and price promotions, their occurrence and frequency and the interest of the consumers, expressed by the purchasing decision. The data also contains information on the code of the product, quantity purchased, way of payment, characteristics of the consumers including age and gender, data, hour and place of buying etc. The type of data is scanner data over a five month period (from the July 1, 2011 to November 31, 2011). The work with scanner data has its specifics, but it is becoming broadly used by the researchers during the last years due to its clear advantages and convenience. According to Tin et al. (2007) , supermarket sales data potentially addresses this gap between providing detailed, timely, and inexpensive monitoring data for informing policies and anticipating trends, which corresponds to the idea of the paper to compare consumers´ short-term reactions to price promotions of national brands and retailers own products. It is important to mention that scanner data is also a practical source for providing information on individual buying behavior in order to analyze population diary habits and develop efficient marketing strategies, governmental policies and decisions.

The majority of the stores in the database are located in Catalonia, Madrid, Andalusia, and Valencia. On average the clients were aged between 40 and 65 years and dominant among them were the women.

In total, 24,759 various products of 191 different food and non-food categories were offered for the period of observation and in total, 21,067,165 purchases were made, corresponding to a total revenue of 30,739,012€. Significant part of those purchases (20%) was

realized in the stores of “small” and “classic” type or the so called proximity supermarkets (Cataño 2013).

Figure 3.8 Share of sales by product



Source: adapted from Cataño, 2013

As it can be concluded from Figure 3.8 and confirmed by the Ministry of environment and rural and marine affairs in Spain, the dairy products occupy an important place among the food expenditures of the Spanish consumers, followed by soft drinks, alcoholic drinks (mostly beer and wine), meat, fish conserves, olive oil etc.

The buying purchases are most frequent during on Friday and Saturday, when around 40% of the purchases are made. The average amount of purchase is higher on July and November, when it amounts on average between € 12.62 и € 12.70 and usually includes around 7 products.

3.3 Data preparation and preliminary analysis

Milk

For the first product for the analysis – milk, initially the data for the purchases of semi-skimmed milk in Barcelona and Madrid contained 44 858 observations from 17 stores. After removing observations with missing information for gender and age, there were 31 110 left. The

observations contained information for the name of the product, code, and type of package – bottle or brick, card number of the consumer, age, gender, day of purchase, price, promotion, if there is any, and its amounts. The type of the store- small, medium or maxi was also indicated and the region of the purchase as well. Since, the data was pooled type and very large to threat, the authors of the paper decided to remove all the consumers who purchased only once for the 4 months period because they are not representative for the study. In that way, the number of the observations was reduced to 28 881. Next, systematic sampling was utilized. The goal was to arrange the study population according to some ordering scheme (in our case the numbers of the cards from the smallest to the largest) and then to select elements at regular intervals through that ordered list (in our case every 20^{th} observation, which represented around 15% of the data) in order to remove the repeating card numbers and transform the pooled data into a panel. This was needed for the analysis with a multinominal logit model and was confirmed by most of the studies in the literature review (for example in the case of (Guadagni & Little 2008). The final number of the data equals to 1373 observations for the binary logit and 1174 for the multinomial logit model..

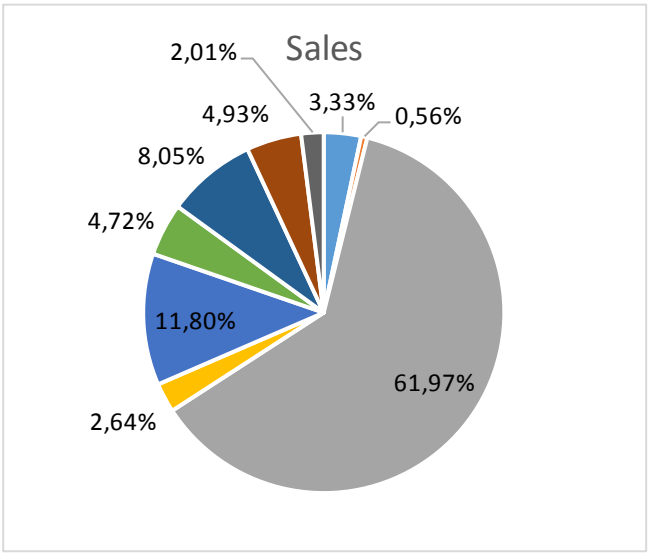
Product types

In total, 9 brands of semi-skimmed milk are presented in the 17 stores. All the stores belong to the same supermarket chain, represented on three continents.

In fact, only 2 of the semi-skimmed milk brands in the supermarkets are private – Leche semidestinada Bri PP (PP indicates the retailers' private label) and Leche semidestinada Botel PP depending on their package- brick or bottle. The national brands include ATO, Celta and Lauki in brick, and the types Pascual and La asturiana offered in bottles and bricks.

From the data, it could be concluded, that the consumers in the regions of Barcelona and Madrid are particularly attached to the semi-skimmed milk in brick with the retailers' private brand - PP, which represents around 61,97% of the purchases. Afterwards, come the national brands again in brick La asturiana with 11,8%, Lauki with 8,05%, Celta with 4, 93%, La asturiana in bottle with 4,72%, Pascual with 3,33%, ATO with 2,01%, PP bottle with 2,64% and finally Pascual bottle with 0,56% of the purchases (Figure 3.9).

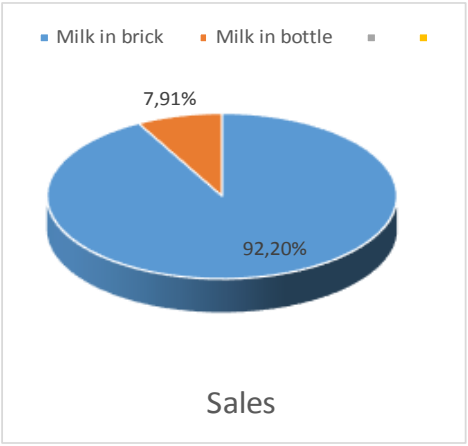
Figure 3.9 Share of sales of semi-skimmed milk by product



Source: own calculations

The difference in the sales of the private brand PP in brick and in bottle is impressive, but the tendency is confirmed by the overall analysis of the data, where among all the brands 92.09% of the purchases of milk are made of milk in bricks and the rest 7.91% in bottles (Figure 3.10). This could be a result from the cheaper prices of the products offered in bricks, or to be related to the increasing environmental concern at the European and national level, which stimulates consumers to opt for environmentally-friendly package of the milk in bricks than to choose plastic bottles.

Figure 3.10 Share of sales of semi-skimmed milk by package



Source: own calculations

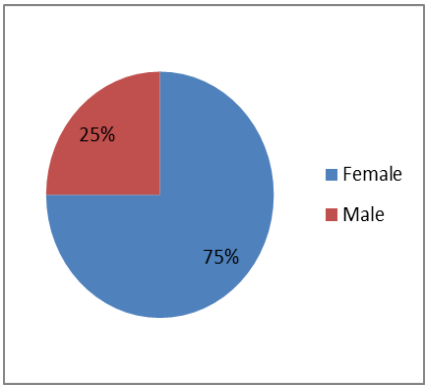
Despite the fact, that national brands are usually considered to be preferred from the consumers due to the convenience to be broadly spread and easily found and the expensive national advertisement campaigns they are paying for, which influence significantly the buying behavior, the data proves that in the total sales the dominance of the private brands is still valid with 64.61% of the sales comparing to 35.39% of the national ones. This certifies once again the increasing importance of private labels during the last decades, related to the improved quality that they offer, the affordable prices, the marketing and merchandising efforts by the retailers.

In fact, for long years, the retailer has developed a wide range private label products and secured positions of quality and low prices for them. In addition, the strategy of the company is to locate its stores in the close neighborhoods, which makes it convenient for the people to follow the routine for the daily needed products and be frequent purchasers of the same low-cost and quality brands.

Gender, Age and Shopping days

Regarding the gender role in the food buying process, the analysis for milk products confirms the conclusions from the general data analysis that females prevail by 75% comparing to males with 25% (Figure 3.11). The average age of the clients varies between 25 and 49 years. Around 11% of the consumers are between 14 and 24, 47% between 25 and 49, and 42% are 50 and above.

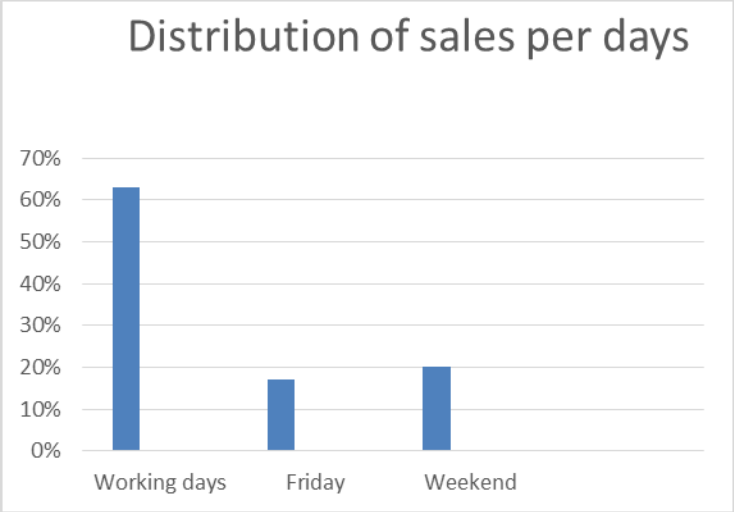
Figure 3.11 Share of sales of semi-skimmed milk by gender



Source: own calculations

Also 17% of the consumers in the period of the data gathering prefer to make their purchases on Friday (or 7 785 observations), 20% on Saturday and 63% during the working days. The tendency of the strongest presence in the stores on Friday comparing to the other days, which was deduced in the general data analysis is still valid here (Figure 3.12).

Figure 3.12 Share of sales of semi-skimmed milk by day of the week



Source: own calculations

Prices, Promotions Discounts

The prices of semi-skimmed milk for the different brands and packages vary between 0.44 euro per liter and 1.11 euro per liter. The average price is around 0.61 euro per liter. Typically the prices for bottled milk are more expensive, and the purchases of milk in bricks prevail. However, what particularly attracts the attention in the current study is the price promotion. In fact, very few price promotions were offered for the private brand semi-skimmed milk product – around 14% of the total number of promotions. Meanwhile, the national brands have been exposed to more often (86%) and higher discounts. This confirms the literature review position on that topic that promotions are usually offered for national brand products. The most purchased semi-skimmed milk of private brand in brick has been offered very rarely on promotion in around 16% of the cases. Most often promotions were made for the product from the national brand La austuriana in brick. According to the retailers' official website the average duration of the promotions varies between 7 to 10 days and in most cases these are price promotions. The maximum discount from the data for semi-skimmed milk equals to 0.30 euro.

Stores and Region

The city of Madrid is presented by 10 stores, where 67% of the sales are effectuated and Barcelona from 7 and forms 33% of the sales. Most of the purchases- 61% are effectuated in proximity stores of small size, 17% in the "classic" or medium type and 21% is the "maxi" sized supermarkets, located in the outskirts of the town. In all the types of stores dominate the private brand purchases, with almost double in the small and medium types, and with 40% the "maxi" stores.

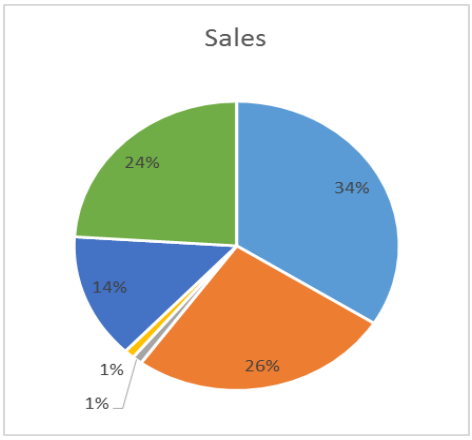
Cereals

For the second product for the analysis – cereals, in order to make the comparison with milk possible, the chosen regions were again the cities of Barcelona and Madrid. The complete number of observations contained 10 762 sales. From them 381 were removed due to missing gender information. Then all the purchases of one product bought by one card for the period of 4 months were removed and systematic sampling was implied again in order to receive a panel data. Since, the initial number of observations was considerably less in comparison with milk, every 10^{th} observation was chosen for the systematic sampling (for the milk was every 20^{th}). Finally, a panel data of 308 observations were created.

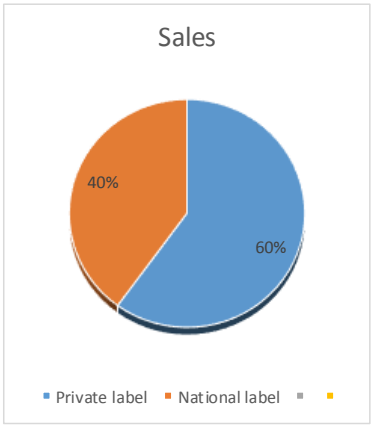
Products

In total six similar types of maize cereals were included. They are all dietary and targeted for adults. Only two of the brands – Cereal cornflakes PP and Cereal Special form PP are private. The other brands are the most wide spread internationally and having the largest market share in Spain brands- Nestle and Kellogg. The products of Nestle include – Cereal Golden Graham and Cereal Fitness Nestle; and the Kellogg's products include – Cereal Cornflakes Kello and Cereal Special Kello. In this case the difference in the sales of the private and national brand is not so obvious, but the private label purchases again prevail with 60%, comparing with 40% sales of the national brands. The most often purchased product is Cereal cornflakes PP with 34% market share, followed by Cereal Special form PP with 26%, Cereal Special Kello with 24%, Ceral cornflakes Kello with 14%, and the two final ones- Cereal Golden Grahan Nestle and Cereal Fitness Nestle with an insignificant market share of one percent (Figures 3.13 and 3.14).

Figure 3.13 and 3.14 Share of sales for cereals by product type and type of brand



Source: own calculations



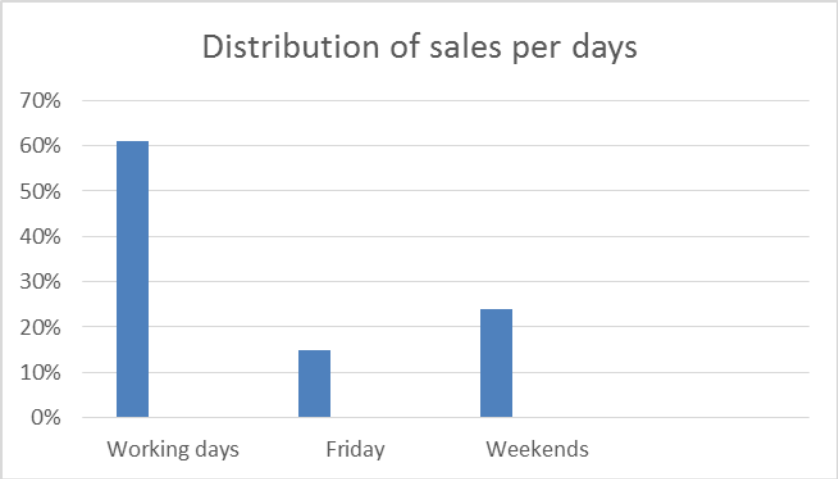
Price, Discount and Promotion

The prices for the six types of cereals vary between 1.05 euro (in case of promotion) and 3.72 per package of 500 grams. The prices for the private brands are cheaper than the national ones, but they also experience price promotions more often than the national labels (60% of the cases of promotion are for private brands). This makes a clear difference regarding the milk, where it is the opposite. The maximum discount reaches 1.34 euro for the most expensive types of brand, but the average is around 0.70 euro.

Gender, Age and Shopping days

The majority of the purchases were made by females (70%) and a smaller number by males (30%). The distribution between the age groups follows the trends of the general data analysis and the case for milk. The largest share of purchases is effectuated by people between 25 and 49 years old – 70%, smaller by people above 50 – 20% and the smallest by people between 14 and 24- 10%. Most of the sales are realized again on Friday – 15%, during the weekend – 24% and on the working days around 61% (Figure 3.13).

Figure 3.13 Share of sales for cereals by day of the week



Source: own calculations

Stores and Region

Regarding the localization of the purchases, 70% of the sales are realized on the territory of Madird and 30% in Barcelona. The trends in the market share of the different brands stay the same in both cities like general and milk data analyses. People continue to prefer the small proximity stores in their neighborhoods, where 58% of the sales were effectuated. However, the percentage of the "maxi" stores in the outskirts of the towns has increased to 27% in comparison with the milk, where it was only 21% (Figure 3.11).

Brand loyalty

Regarding brand preferences, another variable was generated- brand loyalty, which takes values in the model of 1 f the customer repeated the purchase of the same brand after he first tried it and 0 if he/she switched to another one. For the case of milk 84% of the consumers repeat their purchases after buying a private label. However, this number doesn't consider the cases when a national brand was offered on a promotion. For the case of cereals, 63% of the private brand shoppers repeat their choices after the first time.

In conclusion, it could be summarized that the two chosen products for analysis and comparison- milk and cereals experience similar trends in terms of the market shares of private and national brands, consumers' characteristics and socio-economic factors. Most of the people repeat their purchases after once having bought the private label for milk and cereals, but the private brands of cereals are more often offered at reduced prices (60% of the cases for cereals versus 16% for milk). The goal of this study is to prove how all this influences the price promotions and how the reduced prices change the clients' buying behavior.

Chapter 4 - Theory and model

4.1 Discrete choice models

The discrete choice models can be classified into binominal choice models (also called dichotomous) where the dependent variable takes two possible alternatives or multinominal (polytomous), where it can take more than two. In addition, there are various more specific types of discrete models including: Binary Logit, Binary Probit, Multinomial Logit, Conditional Logit, Multinomial Probit, Nested Logit, Generalized Extreme Value Models, Mixed Logit, and Exploded Logit. They all should respond to the following important criteria: the dependent variable should take more than one alternative. In addition, all the alternatives should be exhaustive, mutually exclusive and finite numbers. The dependent variable may also have ordered or unordered structure.

Binary outcomes are simple to model and estimation is usually made by maximum likelihood. The most common ones are the logit and the probit for which the dependent variable may take alternatives of 0 and 1 with different probabilities.

$$y = \begin{cases} 1 & \text{with probability } p, \\ 0 & \text{with probability } 1 - p. \end{cases}$$

The probability with which one of the alternatives could be chosen differs for the logit and probit. For the logit model the probability could be expressed with:

$$p_i = \Pr[y_i = 1|x_i] = \frac{\exp(\beta_1 + \beta_2 x_i)}{1 + \exp(\beta_1 + \beta_2 x_i)},$$

Where $0 < p_i < 1.$ and the marginal effect takes the form:

$$\frac{dp_i}{dx_i} = \frac{\exp(\beta_1 + \beta_2 x_i)}{(1 + \exp(\beta_1 + \beta_2 x_i))^2}\beta_2.$$

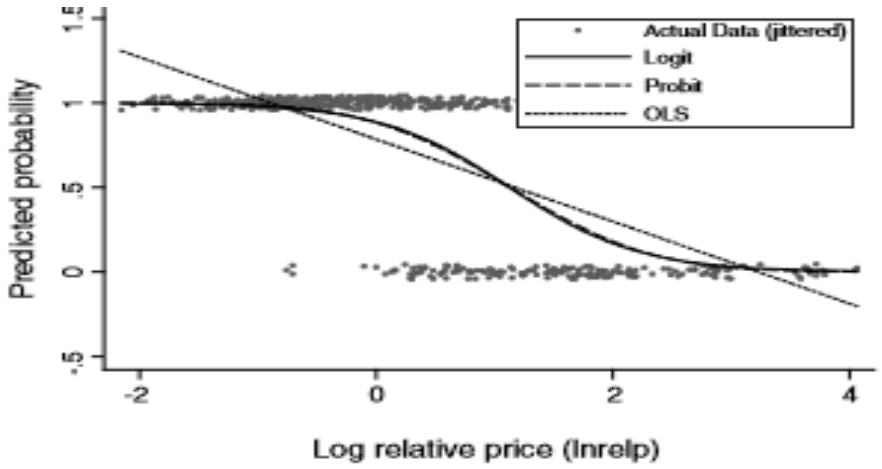
And for the probit:

$$p_i = \Pr[y_i = 1|x_i] = \Phi(\beta_1 + \beta_2 x_i),$$

Where the probability also takes values from 0 to 1 and the marginal effect could be expressed with: $\phi(\mathbf{x}'\beta)\beta_j$.

The difference in the probabilities of the logit and probit models could be easily observed from the Figure 4.1:

Figure 4.1 Probabilities of logit and probit models



Source: A. Colin Cameron and Pravin K. Trivedi 2005

In is important to be mentioned that the marginal effects are very important for the binary models, since the significance of the different variables could not only be concluded from their signs in the regression. Also apart from the probability, it is also useful to extract the utility in the binary models because it gives a precise meaning of the probability, distinguishes alternative model specifications ad provides theoretical basis for calculations of changes in the consumers' surplus in cases of changes in the attributes of the alternatives.

4.2 The multinominal logit

The multinominal logit model could take several possible outcomes, which are usually mutually exclusive. The model is commonly used when choice of a possible transport should be made (by car, by bike, by plane) or for a choice of other discrete alternatives. The interest in discrete choice modeling, as in most econometric modeling, lies in being able to predict the

decision making behavior of a group of individuals. A further application of the model is to determine the relative influence of different attributes of alternatives and characteristics of decision makers when they make choice decisions (Koppelman & Bhat 2006).

The estimation is again made by the Maximum likelihood approach. The procedure for maximum likelihood estimation involves two important steps: developing a joint probability density function of the observed sample, called the likelihood function, and estimating parameter values which maximize the likelihood function (Koppelman & Bhat 2006). The likelihood is a function of the parameters with the observations indicating the data generation process.

The probability of choosing one of the alternatives could be expressed with:

$$\Pr(i) = \frac{\exp(V_i)}{\sum_{j=1}^{J} \exp(V_j)}$$

Where Pr(i) is the probability of the decision-maker choosing alternative i and

Vjis the systematic component of the utility of alternative j

The calculation of the utility for each alternative is the sum of deterministic and random components. (Cameron & Trivadi 2005).

$$\text{If } U(X_i, S_t) \geq U(X_j, S_t)\ \forall j \quad \Rightarrow i \succ j\ \forall j \in C$$

Where U (.) is the mathematical utility function

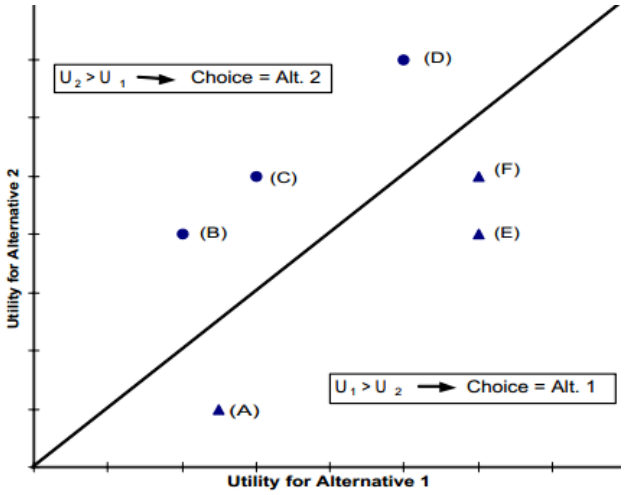
Xi and Xj are vectors of attributes describing alternatives i and j, respectively

St is a vector of characteristics describing individual t, that influence

his/her preferences among alternatives.

Normally, the alternative with the highest utility will be chosen.

Figure 4.2 Utilities in the multinominal logit



Source: Illustration of deterministic choice, Koppelman & Bhat 2006

Except the multinominal logit model, commonly used are the conditional and mixed logit models. In a conditional logit model, a choice among alternatives is treated as a function of the characteristics of the alternatives, and the mixed logit is sometimes referred to a model in which the multinominal logit and the conditional logit models are special cases (So & Kuhfeld n.d.).

4.3 Identification and estimation

The aim of the current study is to estimate the impact of some consumers' characteristics and the local environment on the buying behavior. More precisely the relationship between the choices of a national or private brand will be used as a function of some socioeconomic and demographic factors through a binary model. The role of price promotions will also be analyzed. Since in that case the dependent variable will have more than two possible outcomes (the various

types of milk and cereals), the multinominal logit model will be the most suitable model according to the literature review. Two separate binary and multinominal logit models will be utilized for the two types of consumer goods (milk and cereals) and then a comparison will be made.

For the binary model, the example of Akbay & Tiryaki (2008) are used as an example, trying to define some socioeconomic and demographic factors having an influence on the consumers' buying behavior. The contribution of the current study will be the focus not on the different types of the same good, but on the various brands - national and private. In the models of Akbay & Tiryaki (2008) and Hatirli et al. (2004) the brand choice is not considered, but the different types of milk – packed, pasteurized and sterilized or processed, unprocessed and combined are taken into account. Finally, unlike the already mentioned authors, the no consumption of milk is not part of the analysis. For the second objective of the study, a multinominal logit model will be applied for demonstrating the impact that price promotions are having on the choice of brands. The binary estimated regression will include the following variables:

$$Ypred = a0 + a1age + a2age2 + a3gender + a4dayoftheweek + a5region\ (+a6package\ in\ the\ case\ of\ milk)$$

Where the dependent variable takes values of 1 of the purchased good is private and 0 if it is national brand. Among the independent variables age, age-squared (due to the increasing rate of buying at early age and its decreasing rate after retirement), gender, region (Madrid or Barcelona), day of the week (working days taking values of 0, Friday, taking value of 1 or weekend, taking value of 2), package (bottle of brick for the case of milk). In the studies of (Akbay & Tiryaki 2008) and al. and Hatirli et al. (2004) , the authors use independent variables revealing the socio-economic impact of the local environment like education, gender, age, maternal status, household size, household income level etc. In the present analysis, many of those factors could not be included due to missing information. Fixed effects will be added instead to cover the missing variables since they are time invariant.

For the multinominal logit model the estimated regression will have the following form:

$$Ypred = \alpha 0 + x1promotion + x2discount + x3brandloyalty + x4sizeofstore + x5price$$

Where the dependent variable is considering unordered possible responses. The latter include nine options for milk:

Y1- Lechesemidestinata Pascual brick

Y2- Lechesemidestinata Pacual bottle

Y3- Lechesemidestinata PP brick

Y4- Lechesemidestinata PP bottle

Y5- Lechesemidestinata La asturiana brick

Y6- Lechesemidestinata La asturiana bottle

Y7- Lechesemidestinata Lauki brick

Y8- Lechesemidestinata Celta brick

Y9- Lechesemidestinata ATO brick

In the case of the multinominal logit model, the consumers are divided in three age groups (from 14-24, taking value of 0; 25-49, taking value of 1; above 50, taking value of 2 in te model). The size of store includes small (taking value of 1 in the model), classic (value of 2) and maxi type of store, (value of 3), as it has already been mentioned in the descriptive analysis. Promotion is taking value of one in case of presence of promotion, and zero

otherwise. The same estimated regression is again used for the case of cereals. The possible buying options for cereals include:

Y1- Cereal cornflakes PP

Y2- Cereal Special form PP

Y3- Cereal Golden Graham Nestle

Y4- Cereal Fitness Nestle

Y5- Cereal Cornflakes Kellog

Y6- Cereal special Kellog

All of the cereal possible outcomes have similar package and weight, are targeted for adults and suppose healthier diet choice. The model is based on the example of Guadagni et al. (2010). In their study the authors apply a multinominal logit model, including the independent variables- brand loyalty, size loyalty, presence/absence of price promotion, price and discount, and are trying to predict the share of purchases. In the current study the goal will be to estimate the effect on price promotion and the other explanatory variables on the choice of brand- national or private.

The probability of choosing one of the possible responses is:

$$p(c_i|C) = \frac{\exp(U(c_i))}{\sum_{j=1}^{m} \exp(U(c_j))} = \frac{\exp(\mathbf{x}_i\boldsymbol{\beta})}{\sum_{j=1}^{m} \exp(\mathbf{x}_j\boldsymbol{\beta})},$$

where x*i*is vector of alternative attributes

β is vector of unknown parameters

U(c*i*) is the utility for alternative c*i*

The probability that an individual will choose one of the alternatives from a choice set c*i* is the exponential of the utilities of the alternative divided by the sum of all the exponential utilities (Kuhfeld 2002). The sum of all the probabilities equals to 1 and all the marginal effects sum to zero. As it was already indicated for non-linear functions, the marginal effects play important role when estimating the significance of the coefficients in the model. They also give better indications and represent changes in the dependent variable for given changes in a particular regressor whereas holding the other regressors at their sample means (Akbay & Tiryaki 2008). The marginall effects could be obtained from the formula:

$$\frac{\partial P_{ji}}{\partial x_{ji}} = P_{ji}\left(\beta_j - \sum_{j=1}^{J} P_{ki}\beta_k\right) \quad \text{for} \quad j = 0, 1, 2 \ldots, J,$$

Both models-the binary and the multinominal logit are estimated through the maximum-likelihood approach. The software used for the analysis is STATA/SE 12.0.

Chapter 5 - Results

5.1 Econometric model estimates

The first objective of the study is to estimate which of the socioeconomic and demographic factors influence significantly on the consumers' buying decision between national and private label goods. For that purpose a binominal logit model is used with the dependent variable taking values of one and zero if it is a private or a national brand. The independent variables include age, gender, day of the week and region. An additional independent variable age-squared is considered since at early age people would become more and more active buyers, but after reaching a certain age their shopping tours will start to decrease. For the case of milk one additional variable is included- package type (brick or bottle). In the descriptive analysis it has been proven that the goods in bricks are more often purchased in the store, which might be related to the lower price. In order to prove this package and price are also considered. All the following tables are own calculations.

Table 5.1 Log likelihood estimation, binary logit model for milk

```
Iteration 0:   log likelihood = -898.69649
Iteration 1:   log likelihood =  -856.7189
Iteration 2:   log likelihood = -856.55449
Iteration 3:   log likelihood = -856.55446

Logistic regression                             Number of obs   =       1373
                                                LR chi2(7)      =      84.28
                                                Prob > chi2     =     0.0000
Log likelihood = -856.55446                     Pseudo R2       =     0.0469
```

From the results of the log likelihood estimation of the binary logit (Table 5.1), we can conclude that we have 1373 observations for milk (or no observations with missing data. LR) The chi2(7) shows that we have 7 degrees of freedom and its value of the Prob> chi2=0.000 tells us that the models fits significantly than an empty model. In the linear regression the R-squared is a measure of the goodness-of-fit since it is not only dependent from the number of observations. In the logistic regression, the maximum-likelihood method is used for the calculation of the estimates and the R-squared is not anymore an adequate indicator for the

goodness-of-fit. Instead, there is a Pseudo R-squared, which takes similar values from 0 to 1, with higher values indicating better model fit, but it could not be interpreted in the same way. In our case the Pseudo R-squared is 0.0469.

Table 5.2 Binary logit model results for milk

brandtype	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age1	.3462957	.3206465	1.08	0.280	-.2821598	.9747512
age2	-.1445548	.1323865	-1.09	0.275	-.4040275	.1149179
1.male	.269078	.1355324	1.99	0.047	.0034393	.5347167
1.madrid	-.6495139	.1304819	-4.98	0.000	-.9052538	-.393774
dayoftheweek						
1	.2199477	.1624654	1.35	0.176	-.0984786	.538374
2	-.0583256	.1479349	-0.39	0.693	-.3482727	.2316215
1.brick	1.453093	.2179425	6.67	0.000	1.025934	1.880253
_cons	-.5419259	.2867357	-1.89	0.059	-1.103917	.0200657

Also, in the binary logit models the significance of the explanatory variables could not only be explained by looking at the coefficients. In fact, the marginal effect should be taken into account. However, the sign and the size of the coefficients are important and particularly their sign coincides with the sign of the marginal effect. In the case of milk, the variables package, region and gender have the lowest p-values of 0.000, 0.000 and 0.047 respectively, which suggests that they might be significant and coefficients of 1.4530, -0.6495 and 0.2690 (Table 5.2). This means that in every case where the store is located in Madrid, the consumers tend to be less willing to buy the private brand of milk with the log odds of choosing it equals -0.6495. If they are males the log odd of buying private brands increases with 0.2690. If consumers buy the milk in brick, the log odd to choose a private brand increases with 1.4540 Age, age-squared and the rest of the explanatory variables have higher p-values, which suggests that they might be insignificant (but this will be proven with the marginal effects). However, it is interesting to see that age has a positive sign, but with age-squared it is already negative. Regarding, the days of the week going for a shopping tour on Friday versus going during the working days increases the

log odds of buying a private brand by 0.2199. Meanwhile, shopping during the weekend versus shopping during the working days, decreases the log odd of buying a private label of milk by 0.0583. The real significance of the explanatory variables could be estimated by calculating the marginal effects for each of them. Before doing that a more solid understanding of the logit model is needed through an estimation of the probabilities of choosing the private brand (Bruin, J. 2006). For that reason, we calculate the predicted probability of buying the private or national label of semi-skimmed milk in the store.

Next, we calculate the marginal effects (Table 5.3). The results confirm that the three significant variables are brick (at 10% level of significance), Madrid (again at 10%) and male (at 0,1%). Consequently, for every product bought in brick the probability of choosing the private brand increases by 0.34 percentage points, for every purchase of semi-skimmed milk in Madrid, the probability of buying private label decreases by 0.14 percentage points and for every additional case of male shopping for semi-skimmed milk, the probability of choosing private brand increases by 0.06 percentage points.

Table 5.3 Marginal effects for the binary logit for milk

```
Average marginal effects                        Number of obs   =       1373
Model VCE    : OIM

Expression   : Pr(brandtype), predict()
dy/dx w.r.t. : age1 age2 1.male 1.madrid 1.dayoftheweek 2.dayoftheweek 1.brick
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
age1	.0750367	.069374	1.08	0.279	-.0609339	.2110073
age2	-.0313227	.0286418	-1.09	0.274	-.0874597	.0248143
1.male	.0573063	.0282341	2.03	0.042	.0019685	.112644
1.madrid	-.1373563	.0262016	-5.24	0.000	-.1887106	-.0860021
dayoftheweek						
1	.0465941	.0337149	1.38	0.167	-.0194858	.112674
2	-.0128364	.032679	-0.39	0.694	-.0768861	.0512133
1.brick	.3397105	.046761	7.26	0.000	.2480607	.4313603

In the logitstic regression, the odd ratios are also calculated and are sometimes interpreted instead of the coefficients.

Since it has already been mentioned that in the example of Akbay & Tiryaki (2008)some more time-invariant explanatory variables are included (like education, maternal status, household size and income level), which are missing in the current dataset. For dealing the bias that might occur a fixed effect is added to the logistic regression. Before that, two models for the goodness-of-fit are applied to how well the initial model fits the data. The Hosmar and Lemeshow's goodness-of-fit test (Table 5.4) is grouping the data ordering on the predicted probabilities and then is forming 10 nearly equal-sized groups (Stata manual).

Table 5.4 The Hosmar and Lemeshow's goodness-of-fit model

```
      number of observations =      1373
            number of groups =        10
  Hosmer-Lemeshow chi2(8) =         4.45
              Prob > chi2 =         0.8142
```

Logistic model for brandtype, goodness-of-fit test

(Table collapsed on quantiles of estimated probabilities)

Group	Prob	Obs_1	Exp_1	Obs_0	Exp_0	Total
1	0.5650	70	66.6	97	100.4	167
2	0.5929	130	136.1	101	94.9	231
3	0.5999	29	28.8	19	19.2	48
4	0.6138	108	101.9	58	64.1	166
5	0.6447	58	60.7	37	34.3	95
6	0.6645	88	91.1	50	46.9	138
7	0.7132	91	89.4	39	40.6	130
8	0.7361	111	113.6	44	41.4	155
9	0.7749	82	84.3	30	27.7	112
10	0.8323	109	103.6	22	27.4	131

The Pearson x-squared test (Table 5.5) is a test of the observed against the expected number of responses using cells defined by covariate patterns (in our case their number is not

close to the number of observations, which makes it suitable to use the model for the goodness-of-fit).

Table 5.5 The Pearson x-squared

```
Logistic model for brandtype, goodness-of-fit test

       number of observations =      1373
 number of covariate patterns =        61
             Pearson chi2(53) =     53.22
                  Prob > chi2 =    0.4656
```

Both models fail to reject the hypothesis that our model fits the data well, while the fixed effect model needs to be improved (see Table 5.6 having empty values). Therefore, we could assume that the initial model has credible results for the data we dispose even though some time-invariant variables are left excluded.

Table 5.6 Binary logit model for milk with fixed effects

```
note: multiple positive outcomes within groups encountered.

Iteration 0:   log likelihood = -847.18778
Iteration 1:   log likelihood = -847.18757
Iteration 2:   log likelihood = -847.18757

Conditional fixed-effects logistic regression   Number of obs      =      1373
Group variable: dayoftheweek                    Number of groups   =         3

                                                Obs per group: min =       236
                                                               avg =     457.7
                                                               max =       864

                                                LR chi2(5)         =     81.20
Log likelihood  = -847.18757                    Prob > chi2        =    0.0000
```

brandtype	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age1	.345296	.3203074	1.08	0.281	-.282495	.9730869
age2	-.1441003	.1322439	-1.09	0.276	-.4032937	.1150931
1.male	.2684951	.1353883	1.98	0.047	.003139	.5338512
1.madrid	-.6481332	.1303445	-4.97	0.000	-.9036037	-.3926627
dayoftheweek						
1	.2199477	.	.	.	.	.
2	-.0583256	.	.	.	.	.
1.brick	1.449424	.2176635	6.66	0.000	1.022811	1.876037

For the case of cereals we have 308 observations, in the binary logut model we have seven degrees of freedom (Table 5.7). The p-value is again 0.0000 and the Pseudo R-squared this time has a higher value of 0.7173. The cereals have similar package, for that reason it is not included as an explanatory variable. Nevertheles, another variable is considered- price, which is also part of the economic factors and varies significantly between the six possible outcomes of the model. There are less observations of cereals in the model (to remind 15% of all the observations were randomly chosen for milk and 20% cereals to form a panel dataset and all the households purchasing only once in the period of 4-months were also dropped from the sample, since they were not considered representative; the difference in the percentages -15% and 20%, is explained with the exceeding number of initial milk observations).

Table 5.7 Binary logit model for cereals

```
Iteration 0:   log likelihood = -207.20623
Iteration 1:   log likelihood = -62.093334
Iteration 2:   log likelihood = -58.670728
Iteration 3:   log likelihood = -58.581845
Iteration 4:   log likelihood = -58.581579
Iteration 5:   log likelihood = -58.581579

Logistic regression                             Number of obs   =        308
                                                LR chi2(7)      =     297.25
                                                Prob > chi2     =     0.0000
Log likelihood = -58.581579                     Pseudo R2       =     0.7173
```

typeofbrand	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age1	.0569365	.0480479	1.18	0.236	-.0372357	.1511086
age2	-.0008234	.0005028	-1.64	0.102	-.0018089	.0001621
1.male	-1.619148	.5406951	-2.99	0.003	-2.678891	-.5594048
1.madrid	-.6191659	.5025395	-1.23	0.218	-1.604125	.3657935
dayoftheweek						
1	.6520387	.7061757	0.92	0.356	-.7320402	2.036118
2	-1.082764	.5887158	-1.84	0.066	-2.236626	.0710973
price	-8.551305	1.392143	-6.14	0.000	-11.27986	-5.822754
_cons	17.86132	2.960848	6.03	0.000	12.05817	23.66448

This time, we will focus directly on the marginal effects (Table 5.8), which show again strong significance or male. This time with every additional case of a male buying semi-skimmed in the store, the probability of choosing private label decreases with 0.11 percentage points. Price is also very significant, with a p-value of 0.0000, which means with every increase of the price with 0.10 euro, the probability of choosing the private brand, decreases with 0.6 percentage points. In this model, the age-squared already has significant p-value at 0.1% and with every additional year, the possibility of choosing the private brand decreases with 0.0005 percentage points. Age squared and day of the week could also be considered significant with p-values 0.092 and 0.065 respectively (for shopping on the weekends). For the days of the week, this means that every time when the consumers visits the shop on the weekends versus on the working day, decreases the log odds of buying milk by 0.070 percentage points.

Table 5.8 Marginal effects of the binary logit for cereals

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
age1	.0034287	.0028511	1.20	0.229	-.0021594	.0090167
age2	-.0000496	.0000294	-1.69	0.092	-.0001072	8.05e-06
1.male	-.1058181	.0333372	-3.17	0.002	-.1711577	-.0404784
1.madrid	-.037062	.0293547	-1.26	0.207	-.0945962	.0204723
dayoftheweek						
1	.0378879	.0393898	0.96	0.336	-.0393146	.1150904
2	-.0706662	.0383357	-1.84	0.065	-.1458028	.0044703
price	-.5149518	.0371326	-13.87	0.000	-.5877303	-.4421733

Note: dy/dx for factor levels is the discrete change from the base level.

The models for the goodness-of-fit still confirm (Tables 5.9, 5.10) that our binary logit fits the data well, but the results form adding fixed-effects are still unsatisfactory and cause non-convergence of the maximum likelihood. Therefore, even without the missing time-invariant variables, we can accept that our model is still showing reliable results with the data we analyze.

Table 5.9 The Hosmar and Lemeshow's goodness-of-fit model

```
      number of observations =       308
            number of groups =        10
    Hosmer-Lemeshow chi2(8) =         7.08
                Prob > chi2 =         0.5282
```

(Table collapsed on quantiles of estimated probabilities)

Group	Prob	Obs_1	Exp_1	Obs_0	Exp_0	Total
1	0.0001	0	0.0	31	31.0	31
2	0.0007	0	0.0	31	31.0	31
3	0.1619	0	2.1	31	28.9	31
4	0.5312	14	11.7	17	19.3	31
5	0.8220	24	21.8	6	8.2	30
6	0.9110	26	27.1	5	3.9	31
7	0.9980	29	30.4	2	0.6	31
8	0.9994	31	31.0	0	0.0	31
9	0.9998	31	31.0	0	0.0	31
10	1.0000	30	30.0	0	0.0	30

Table 5.9 The Hosmar and Lemeshow's goodness-of-fit

```
Logistic model for typeofbrand, goodness-of-fit test

      number of observations =       308
number of covariate patterns =       285
          Pearson chi2(277) =       257.06
                Prob > chi2 =         0.7995
```

For the second objective of the study, namely to assess the impact of price promotion on the consumers' buying behavior, a multinominal logit model will be applied. In the case of dairy products, the various types of semi-skimmed milk in brick and bottle are set as the dependent variable. The number of the possible outcomes is reduced from 9 to 6, because the software had difficulties to run the model. The three products offered only in bricks were removed from the sample- Semi-skimmed milk ATO, CELTA, LAUKI. The independent variables focus on, type of the store (small, classic or maxi), price, promotion, discount and brand loyalty of the clients. There is no natural ordering of the possible responses of the dependent variable. The base

outcome is preliminary defined to be the most purchased national brand - Y5-Lechesemidestinata La asturiana brick. Running the model with the price loyalty as explanatory variable, there was again the non-convergence problem of the maximum likelihood. To finally achieve a maximum price was dropped out of the model (the model with price for milk and cereals could be found in Appendix A)

For the case of milk, the number of observations is already 1174. Therefore, the final model considers the six possible outcomes:

Y1- Leche semidestinata Pascual brick

Y2- Leche semidestinata Pacual bottle

Y3- Leche semidestinata PP brick

Y4- Leche semidestinata PP bottle

Y5- Leches emidestinata La asturiana brick

Y6- Leche semidestinata La asturiana bottle

The results reveal Prob<chi 2 equals to 0.0000, which is the probability of obtaining the chi-square statistic (666.34) if there is in fact no effect of the predictor variables. The outcome, chosen for the base outcome is Y5- Leche semidestinata La asturiana brick, and it is in fact is the most purchased national brand product. The coefficients show how, for example, for each case of having a discount of the Leche semidestinata Pascual brick (outcome 1), the multinomial log-odds for outcome 1 relative to base outcome 5 (Lechesemidestinata La asturiana brick) would be expected to increase by 12.40 units, while holding all other variables in the model are held constant. Regarding the p-value of the model, for example, for Leche semidestinata Pascual brick relative to Lechesemidestinata PP brick, the test statistic for the predictor dsicount is 0003. If setting our alpha level to 0.05, we would reject the null hypothesis and conclude that for buying Leche semidestinata Pascual brick relative to buying Leche semidestinata PP bbrik Leche semidestinata La asturiana brick, the regression coefficient for promotion is found to be statistically different from zero, while all the other variables are held constant (The results from the multinominal logit model for the case of milk and cereals could be found in Appendix B).

However, the significance of the explanatory variables still should be confirmed by the marginal effects estimation.

In the average marginal effects table for the first outcome, we observe that in case of price promotion of Leche semidestinata Pascual brick the probability of choosing it over Y5- Leche semidestinata La asturiana brick increases by 0.20 percentage points (Table 5.10). The p-values for the size of the store are also significant at the alpha level set of 0.1 and 0.000, leads to

the conclusion that the probability of choosing Leche semidestinata Pascual brick on Friday over the working days increases by 0.02 probability points, and the probability buying it on the weekend relative to the working days increases by 0.03 percentage points.

Table 5.10 Average marginal effects Outcome 1

```
Average marginal effects                        Number of obs   =       1174
Model VCE    : OIM

Expression   : Pr(code==1), predict(outcome(1) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	.1976158	.0351163	5.63	0.000	.1287892	.2664425
discount	.8769949	123.5147	0.01	0.994	-241.2074	242.9614
store						
2	.0228965	.0139298	1.64	0.100	-.0044054	.0501984
3	.0363544	.0099385	3.66	0.000	.0168753	.0558336
1.loyalty	-.0071498	.010299	-0.69	0.488	-.0273354	.0130358

The marginal effects for the second outcome (Y2- Leche semidestinata Pacual bottle) reveal that price promotion is still significant if the alpha level is set at 0.1 and the possibility of buying the product with price promotion over the base outcome Leche semidestinata La asturiana brick increases by 0.03 percentage points (Table 5.11). Loyalty is also significant at alpha 0.1, showing decreasing possibility of choosing outcome 2 over the base oucome by 0.03 percentage points.

Table 5.11 Average marginal effects Outcome 2

```
Expression   : Pr(code==2), predict(outcome(2) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	.0344704	.0196456	1.75	0.079	-.0040343	.0729751
discount	-3.575865	699.4683	-0.01	0.996	-1374.508	1367.357
store						
2	-.0052254	.002486	-2.10	0.036	-.0100979	-.0003528
3	.0077109	.0064462	1.20	0.232	-.0049235	.0203453
1.loyalty	-.0138802	.006879	-2.02	0.044	-.0273629	-.0003975

The third outcome (Y3- Lechesemidestinata PP brick), has significant results for promotion at alpha level 0.001, revealing that the possibility of choosing of the most purchased private label over the most purchased national one, in case of promotion of the first decreases by 0.83 percentage points (Table 5.12). The same is valid for outcome Y4- Leche semidestinata PP bottle (Table 5.13), where promotion is still highly significant at alpha level 0.001, but decreasing the probability of choosing the product over the base outcome by 0.03 percentage points.

Table 5.12 Average marginal effects Outcome (3)

```
Average marginal effects                        Number of obs    =       1174
Model VCE    : OIM

Expression   : Pr(code==3), predict(outcome(3) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	-.8254612	.0118396	-69.72	0.000	-.8486663	-.802256
discount	15.71758	1388.887	0.01	0.991	-2706.451	2737.886
store						
2	.0254989	25.43912	0.00	0.999	-49.83426	49.88526
3	-.0262092	.027658	-0.95	0.343	-.0804179	.0279995
1.loyalty	.1601375	8.554894	0.02	0.985	-16.60715	16.92742

Table 5.13 Average marginal effects Outcome 4

```
Average marginal effects                        Number of obs    =       1174
Model VCE     : OIM

Expression    : Pr(code==4), predict(outcome(4) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	-.0326894	.0053877	-6.07	0.000	-.0432491	-.0221298
discount	-18.25757	1698.614	-0.01	0.991	-3347.48	3310.965
store						
2	-.0103575	.010808	-0.96	0.338	-.0315408	.0108257
3	.0115545	.0136795	0.84	0.398	-.0152567	.0383657
1.loyalty	-.0408958	.2399878	-0.17	0.865	-.5112632	.4294717

The average margnal effects for the sixth outcome Y6- Leche semidestinata La asturiana bottle, show highly significant results for promotion (at alpha 0.001) and a positive possibility of preffring the product over the base otcome by 0.17 percentage points. Brand loyalty is also significant at alpha 0.1, but decrasig the probability of choosing the product over Y5- Leches emidestinata La asturiana brick by 0.52 percentage points (Table 5.14).

Table 5.14 Average marginal effects Outcome 6

```
Average marginal effects                        Number of obs    =       1174
Model VCE     : OIM

Expression    : Pr(code==6), predict(outcome(6) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	.1717661	.0401587	4.28	0.000	.0930564	.2504758
discount	1.824653	170.3283	0.01	0.991	-332.0126	335.6619
store						
2	.0033189	1.59347	0.00	0.998	-3.119825	3.126463
3	.0166814	.0178121	0.94	0.349	-.0182297	.0515926
1.loyalty	-.0524076	.0231115	-2.27	0.023	-.0977053	-.0071098

Regarding the case of cereals, we have six possible outcomes:

Y1- Cereal cornflakes PP

Y2- Cereal Special form PP

Y3- Cereal Golden Graham Nestle

Y4- Cereal Fitness Nestle

Y5- Cereal Cornflakes Kellog

Y6- Cereal special Kellog

This time the base outcome has been chosen to be the most purchased private brand Y1- Cereal cornflakes PP. The explanatory variables include promotion, discount, size of the store and brand loyalty.

We have 308 observations again with no missing values. Prob<ci2=0.0001, which is the probability of obtaining the chi-square statistic (62.29) if there is in fact no effect of the predictor variables. The Pseudo-R2 is 0.0722.

The main focus here again will be on the marginal effects for each outcome. Since the first outcome (Y1- Cereal cornflakes PP) is the base outcome, the results for the marginal effect for the second (Y2- Cereal Special form PP) estimate to significant variable, or with other words no explanatory variables has an impact on the product choice (Table 5.15).

Table 5.15 Average marginal effects Outcome 2

```
Average marginal effects                        Number of obs    =        308
Model VCE    : OIM

Expression   : Pr(code==2), predict(outcome(2) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	.2784528	41.19381	0.01	0.995	-80.45994	81.01684
discount	.5534742	28.73708	0.02	0.985	-55.77017	56.87711
store						
2	.0390301	3.451487	0.01	0.991	-6.72576	6.803821
3	.0255619	8.372826	0.00	0.998	-16.38488	16.436
1.loyalty	.0977476	3.686686	0.03	0.979	-7.128024	7.32352

From the marginal effects table of the third outcome (Y3- Cereal Golden Graham Nestle), we can conclude that the probability of choosing Y3- Cereal Golden Graham Nestle over Y1- Cereal cornflakes PP in case of promotion of Y3 decreases with 0.01 percentage points.

Table 5.16 Average marginal effects Outcome 3

```
Average marginal effects                        Number of obs    =        308
Model VCE    : OIM

Expression   : Pr(code==3), predict(outcome(3) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	-.0100105	.0056638	-1.77	0.077	-.0211113	.0010904
discount	-1.652309	89.8399	-0.02	0.985	-177.7353	174.4307
store						
2	.035992	.0249449	1.44	0.149	-.0128991	.084883
3	.0132268	.0132371	1.00	0.318	-.0127175	.0391711
1.loyalty	.0038548	.0110024	0.35	0.726	-.0177094	.0254191

From the marginal effects table for the fourth outcome (Y4- Cereal Fitness Nestle), we see that price if not relevant anymore (5.17). However, it is strongly significant in the fifth

marginal effects table, where it is indicating that in case of promotion of the product Cereal Cornflakes Kellogs' the probability of choosing it over Cereal Fitness Nestle decreases with 0.16 percentage points (Table 5.18).

Table 5.17 Average marginal effects Outcome 4

```
Average marginal effects                        Number of obs    =        308
Model VCE     : OIM

Expression    : Pr(code==4), predict(outcome(4) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	.0106956	74.26187	0.00	1.000	-145.5399	145.5613
discount	-.5408843	37.42831	-0.01	0.988	-73.89903	72.81726
store						
2	-8.57e-11	1.68e-06	-0.00	1.000	-3.28e-06	3.28e-06
3	.0185746	13.75217	0.00	0.999	-26.93518	26.97233
1.loyalty	.0082475	5.50087	0.00	0.999	-10.77326	10.78975

Table 5.18 Average marginal effects Outcome 5

```
Average marginal effects                        Number of obs    =        308
Model VCE     : OIM

Expression    : Pr(code==5), predict(outcome(5) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	-.1531269	.0212559	-7.20	0.000	-.1947877	-.1114662
discount	.4957889	11.61777	0.04	0.966	-22.27462	23.2662
store						
2	-.0233985	.0521022	-0.45	0.653	-.125517	.07872
3	.001025	.0461379	0.02	0.982	-.0894037	.0914537
1.loyalty	-.0305649	.0398691	-0.77	0.443	-.108707	.0475772

For the sixth outcome, Cereal special Kellogs', promotion is again significant decreasing the probability of choosing the product over Cereal Fitness Nestle with 0.27 percentage points (Table 5.18).

Table 5.18 Average marginal effects Outcome 6

```
Average marginal effects                        Number of obs    =        308
Model VCE    : OIM

Expression   : Pr(code==6), predict(outcome(6) )
dy/dx w.r.t. : 1.promotion discount 2.store 3.store 1.loyalty
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1.promotion	-.2704254	.0258603	-10.46	0.000	-.3211106	-.2197402
discount	.7800162	17.82879	0.04	0.965	-34.16378	35.72381
store						
2	-.0882516	4.472785	-0.02	0.984	-8.854748	8.678245
3	-.0945066	4.472655	-0.02	0.983	-8.86075	8.671737
1.loyalty	-.0452983	4.473909	-0.01	0.992	-8.813998	8.723401

5.2 Summary of the results

To a certain extent the results from the logit model confirm the results of Akbay & Tiryaki (2008), proving the significant influence of gender, region, age, package, day of the week and price on the consumers' buying choices. For the different cases of milk and cereals males have contradictory – positive and negative preferences to the private brand, which could due to the different size of the data and the slightly differing models. However, in the region of Madrid people prefer national brands, which is not the case for Barcelona. The increased price is decreasing the possibility of choosing a national brands, and people consequently prefer the cheapest option of the milk offered in bricks.

Regarding the multinominal logit, the base outcomes for the two products -milk and cereals have been chosen different for purpose. In the first case for milk, the base outcome was set to be the most purchased national brand. The results reveled positive effect of price promotion on the consumers' behavior for all the products, except for the two private brands – semi skimmed milk PP in brick and in bottle. Next, if running the same multinominal logit model for cereals, while setting the base outcome to be the most purchased private brand, the promotions, when significant, have negative results on the purchasing behavior, decreasing the probability of choosing the promoted product. This leads to the conclusion, that price promotion is influencing significantly the buying behavior of the consumers, increasing the chance for them to switch to national brands. Brand loyalty and size of the store could in some cases also alter the consumers brand choice as it has already been concluded by Guadagni et al. (2010).

Chapter 6 - Discussion

6.1 Review of the important findings

During the last years private brands target new niches and work on the development of high quality and premium labels at affordable prices in order to attract a broad range of loyal clients. The national brands respond with various kinds of promotions including price promotion. The effects of price promotion on the retailers' profitability and the consumers' welfare are still not well examined. Most of the authors agree that in the short-term period, price promotions influence positively the consumers' buying behavior behavior (Doob & et al 1969, Dodson et al. 1978, Schindler 1992) , but in the long-term there are various opinions – some claim a not negative impact (Davis et al. 1992, Neslin & Shoemaker 1989) or a firm position for a negative one (Doob & et al 1969, Dodson et al. 1978, Guadagni & Little 1983, Kahn & Louie 1990) etc. Regarding the price promotion effects on profitability Ailawadi et al. (2006) calculate lower net profit impact from the promotional margin after analyzing data of by CVS, a leading U.S. drug retailer for 2003. This finding is supported by Srinivasan et al. (2004) who demonstrate positive impact on manufacturer revenues through vector autoregressive models from price promotions, but mixed effects on the retailer's profitability again due to the decreased margins.

In the current study the authors dispose with short-term data for four months provided by a single retailer in Spain. Spain is one of the countries in the European Union with the highest share of private brands in the total purchase value- 41,2% (Summary et al. 2012), with an increasing rate of 1% for 2010, and 1,2% for 2011 (Summary et al. 2012). The country has been strongly affected by the financial and economic crisis in 2008, which paved the way for cheaper, but quality private brands to grow and develop – with Eroski, Carrefour and El Cortes Ingles launching their premium brands, Caprabo with its Nature brand offering high standard and fresh fish, meat, fruits and vegetables.

This leads to the main hypothesis of the study:

1) Consumers are taking their purchasing decisions in a competitive environment;
2) Private and national brands have equal chances to be bought by the consumers, but private brands experience price promotion more often;

3) Consumers are not loyal to private brands despite their lower prices;

The purpose of the present work is: first to respond the question which are the socioeconomic and demographic factors having an influence on the choice of brand in Spain. And second, to estimate how consumers react to price promotions in Spain and do they prefer buying national well-known brands at reduced prices or they still opt for the retailers' own brands.

The results from the descriptive analysis of the data indicate that private brands are more preferred to the national ones (with 64.6% for the semi-skimmed milk and 60% for the cereals). The share of price promotions for national labels of the perishable good –milk is 86%, which is not the case for the nonperishable one- cereals, where 60% of the promotions are offered for the private label. In the case if milk and cereals, purchasers of private brands repeat their choices after the first time.

Two models were used for the empirical analysis. It appears that the results from the binary logit model confirm the results from Akbay & Tiryaki (2008) who estimated gender and region as significant socio-economic and demographic factors, having an impact on the choice of brand. However, in the current study age-squared was found significant only for cereals. Meanwhile, other economic factors - package (for milk) and price (for cereals), shopping days were considered and both turned to have a high significant influence on the brand choice. The multinominal logit model results demonstrated that even though private brands are more often purchased, in case of price promotion, consumers prefer to buy national brands. Brand loyalty and size of the store could also alter the consumers' choice of brands. This is with accordance to the work of (Guadagni et al. 2010) used as an example, where brand loyalty and store size were found significant. The contribution of this study is that price promotion was also found significant, leading to the conclusion that Spanish consumers easily switch to private brand in case of price promotion even if they were frequent shoppers of private brand before. Furthermore, the results of the present multinominal logit models support the IRI Special report's findings on "Retail Private Label Brands in Europe Current and Emerging Trends" (Summary et al. 2012), which conclude that private label shoppers in Spain are not brand loyal, in 2011, 52% of them changed to another brand, and 1 in 4 were considering buying national brands once the economy improves.

Therefore, the hypothesis have been partially confirmed. The consumers in the current study benefit from a broad range of national and private labels in the different types of stores from the retail chain. They are usually choosing the cheaper alternative, which is the private brand. For that reason, price promotions have been offered more often for national brands of the perishable good milk, and more rarely for national brands of the nonperishable one-cereals. This could be due to the fact that there are very few national labels for cereals in Spain – Nestle and Kellogg, which profit from big market share, target customers with strong preferences for balanced diet and healthy food, who are loyal to them despite the high prices. From the analysis, it appears that consumers are not loyal to private brands even if they purchase them more often, and quickly switch to national brands in case of price promotions. Apart from the price, the other socioeconomic factors, which might alter consumers' brand choice are gender, region, shopping days and package.

6.2. Limitations of the study

In every research there are usually some limitations, which are worth mentioning for further research in the field. In the current analysis, there have been some obstacles related to the data, method, not included variables, which might be significant etc.

The dataset

The supermarket scanner data for the study was provided by a single retailer comprising many stores in different regions in Spain. The dataset is very detailed providing information for all the purchases made during that time, the exact time of buying, quantity, price, promotion and discount, age of the consumers, region of the store, size of the store etc. Nevertheless, there was no information provided regarding the characteristics of the clients- their household size, income education, profession etc. All those factors have been included in other studies trying to estimate the socioeconomic and demographic factors influencing the consumers' behavior (Akbay & Tiryaki 2008). Meanwhile the period of the data is four months- from July to October 2011, which could be classified as short-term period. A longer one could allow deeper research in the consumers' buying habits (for example Neslin et al. (1998) disposed with a panel data for a year, which they have used to estimate the purchase incidence for two products- yoghurt and ketchup)

or to have not only clients' perspective, but also the retailers' one, permitting to estimate theiprofitability from various types of price promotions (Jedidi et al., 1998 using eight years of panel data to assess the effects of changes in advertising and promotion policies on sales and profits).

The products

The products chosen for the current analysis are milk and cereals. Both of them are considered to be a healthier choice in the consumers' daily diets, complementary goods and part of their weekly purchases. Since both products are packaged, the most suitable model according to the literature to estimate the impact of promotion on the brand choice would be the multinominal logit. However, there are many other goods, which have been used in similar analysis, which also show significant results and form an important part of the consumers' shopping basket- like yoghurt, soups, detergent (Dekimpe & Hanssens 1999), ground coffee (Bucklin et al. 1998) etc.

The region

As it has been already mentioned in the paper, the two biggest cities of Spain have been chosen for the present analysis, since they represent around 50% of the purchases for the four month period. However, another perspective, showing the brand choice in smaller towns, could probably contribute to understand the differences in the consumers' buying behavior at the different levels of income. An effort has been made to overcome this issue by including store size with the hypothesis that people with different incomes prefer to buy their products in smaller and closer supermarkets in the center, classical type spread all over the city or bigger ones located in the outskirts of the towns.

The model

After carefully considering the options of choosing a demand model (being probably the most wide-spread for scanner panel data dealing with promotions), to estimate elasticity (which corresponds to the demand response of the brand and measures the sensitivity of the brand's demand to price changes of other brands) or to focus on a meta-analysis (although being a very time-consuming method and carrying the risk that our data might not fit the results, it is a highly appreciated and reliable method for choice behavior), the binary and the multinominal logit

seemed the most appropriate methods to achieve the goals set. However, it would have been better to work on two models and compare the results. To overcome that shortcoming two products have been analyzed (a perishable and a nonperishable one) and a comparison between them has been made in order to confirm the credibility of the results.

The variables included

There has been a number of variables included in the binary and multinominal logit, among which are different age, consumers divided in age groups, gender, day of the week, type of package, size of the store, region, promotion, discount etc. Nevertheless, in the models of (Akbay & Tiryaki 2008) and (Guadagni et al. 2010),used as example models and base for the current analysis, some other variables were considered and some of them estimated significant – brand loyalty (the results in the work of (Mela et al. (1997) prove that consumers in the no loyal segment are more price and promotion sensitive than the consumers in the loyal segment, which could have also been interesting to analyze in the present study), size of the brand (also taken into account in the work of (Ailawadi & Neslin 1998) etc. Other variables found significant by various authors, might also have an influence on the brand choice – like classification of the brands to standard and premium labels (Lilien 1974), brand switching and stockpiling (Bucklin & Gupta, 1992) etc.

The advertising and promotion effects

Promotion is not always related to price, but also to advertising, merchandising and display, which could be another factor to increase sales. In the dataset of the study no access to the stores' weekly newspaper was assigned (though it was specifically required from the retailer) for the four months period in order to estimate the duration of the promotions. There was also missing information for the media advertising, display quality (feature and display have been already included in the analysis of Gupta, 1998) etc. According to (Kaul & Wittink 1995) there are three important generalizations about advertising, which affect both researchers and managers: (1) an increase in price advertising leads to higher price sensitivity among consumers, (2) the use of price advertising leads to lower prices, and (3) an increase in nonprice advertising leads to lower price sensitivity among consumers. Meanwhile, Blateberg et al. (1981) demonstrate the sales-advertising relationship for a single product by examining the reach of advertisements and rate of decay of their effectiveness over time.

6.3. Future considerations

Price promotion is a significant factor that usually influences consumers to opt for national labels is case of reduced prices. If there is a large number of loyal consumers to the national brands, they are not willing to make price promotions too often. However, the increasing value share of the purchases of the private brands (42% of the value of all the products in Spain, 49,2% in the UK 16,1% in Italy, 18,5% in the US according to the IRI Group Special Report) is the result from improved quality, premium standard products, broader assortment ranges, leverage of the control of shelf space, advertising campaigns, reasonable prices etc. This is a serious threat for the national brands, especially in the cases of an environment of distorted fair competition. As it has already been stated in the paper, it is not firmly concluded if price promotion has a positive or negative long-term effect for the retailer and the consumer. Our suggestion is that consumers should benefit from a wide range of products on the market and price promotion will impact their brand choice if they are not too loyal to a certain label. Nevertheless, there are many other socioeconomic and demographic factors, which might also alter their choice of brand. What really matters at the end, is that the consumers are satisfied from the product they get ad pay a fair price for it. In fact, despite the growth of the private label, shoppers still buy a repertoire of branded and private label goods at a mix of price points in most categories (Summary et al. 2012). Consequently, we would suggest some measures to be taken at European, national and firm level to guarantee good business environment, equal rights to all market participants (including producers of national and private labels) and safety for the consumers.

At the European level, policies taking into consideration the cultural and economic differences of the Member States, providing an equal chance for them to trade and to compete on the Single Market are needed. The result from unfair market practices, including late payments, unilateral changes in contracts etc., may cause market inefficiencies, usually leading to price volatility. To deal with that issue the National Competition Authorities ("NCAs") and the European Commission (EC) are closely monitoring the structure and functioning of the markets. They cooperate through the European Competition Network ("ECN"), which has undertaken more than 180 antitrust investigations, close to 1300 merger control proceedings and more than 100 market monitoring actions within the period 2004-2011 (Trends 2011). Efficient steps have

already been made in the direction of informative labelling (the EC has taken a number of decisions recently to stop the development of national and regional origin labelling schemes), food traceability and predictability (EC publishes a European food prices monitoring tool, which puts together data collected by Eurostat and National Statistical Institutes about the consumer price levels of comparable food products across Member States and price developments in Member States at each step of the chain – agricultural commodity, producer and consumer food prices – for a selection of specific products), food safety and security (EC is engaged in on-going food safety standards harmonization to further boost cross-border trade in food products in the Community), animal welfare etc. (Commission, 2009.). However, boost of the EU agricultural and food competitiveness on the global markets together with stimulation of sustainable market relationships are also needed.

At a national level, Spain as a Member State of the EU, has harmonized its legislation with the European regulations regarding agricultural, food and environmental policies. However, when EU-wide legislation is incomplete or absent, Spanish laws apply. The responsible institutions dealing with food issues are: the Ministry of Health and Social Welfare, which controls all food imports for human consumption; the Ministry of Environment and Rural and Marine Affairs controlling all imports of animal feed/ingredients and live animals, food Safety is assured by the Spanish Food Safety and Nutrition Agency (AESAN) within the Ministry of Health, and food intended for human consumption must meet the general food safety requirements of EU law (Thursland et al. 2009). Our suggestions will be to carefully implement the EC's competition rules (overcome the concentration of production in few companies having the largest market share for milk, which decreases the buying prices of the producers), to leave no possibility for corruption at local and national level, to stimulate regional production for both – private and national brands, to assure that price promotion will not only reflect on the margins of the producers. Furthermore, focus on healthy and balanced diets for children and adults should be further stimulated by the government. According to the World Health Organization (WHO) data, in 2008, 62% of the adult population (>= 20 years old) is overweight and 26.6% is obese. The prevalence of obesity for men and women is 18.0% and 16.0%, respectively. Regarding adolescences (aged between 10-19 years old), 35% of the boys and 24% of the girls are having problems with weight, and for children (0-9 years old) 44.5% are overweight and 18.3% are obese (WTO & Office 2008). There are numerous incentives including salt reduction,

stimulation of fruit intake, labelling and consumer awareness campaigns, which should be further developed and become a national priority.

At the firm level, companies should strive to develop both niches of private and national labels which would create more possibilities for them to develop, to invest in Research and Development and to reach high probability. Work with regional producers of primary and rough products is recommended to develop local economy and preserve the environment.

Chapter 7 - Conclusion

The objective of the paper is to observe and analyze which factors have an influence of the brand consumers' behavior towards price promotions in the small, middle-sized or big local supermarkets in the regions of Barcelona and Madrid in Spain. The models chosen are the binary and multinominal logits. The author disposes with a scanner data for a period of 4 months, kindly provided to the UPC from a Spanish retailer chain. The products chosen for the analysis are semi-skimmed milk and cereals. These complementary products are bought often by the Spanish consumers and could assure more accurate results in the study. Furthermore, these are products suggesting balanced menu and a healthier diet. The production and trade of semi-skimmed milk and cereals are strongly influenced from the European Common Agricultural Policy during the years. The biggest advantage of the two goods is the fact that almost every supermarket in Spain has created its own brand of those two products. The results from the binary logit model indicates that gender, region, package, shopping days and price are the socio-economic factors influencing the consumers' choice of brand. Even though the private brand shoppers of milk and cereals, usually repeat their purchases, the multinominal logit model demonstrates that they easily switch to private brand in case of price promotion of the latter. Consequently, Spanish consumers prefer the retailers' own brands, because of their cheap price and good quality, but are not loyal to them.

The results might be a scientific base for policy analysis in the field of agriculture, food, fair competition and trade legislative proposals at European and national level.

Bibliography

Ailawadi, K. & Neslin, S., 1998. The effect of promotion on consumption: Buying more and consuming it faster. *Journal of Marketing Research*, 35(3), pp.390–398. Available at: http://www.jstor.org/stable/3152036\nhttp://www.jstor.org/stable/10.2307/3152036.

Ailawadi, K.L. et al., 2006. Promotion Profitability for a Retailer: The Role of Promotion, Brand, Category, and Store Characteristics. *Journal of Marketing Research*, 43(4), pp.518–535.

Akbay, C. & Tiryaki, G.Y., 2008. Unpacked and packed fluid milk consumption patterns and preferences in Turkey. *Agricultural Economics*, 38(1), pp.9–20.

Assmus, G., Farley, J.U. & Lehmann, D.R., 1984. How Advertising Affects Sales: Meta-Analysis of Econometric Results. *Journal of Marketing*, 21(1), pp.65–74.

Barnett, W.A. & Seck, O., 2008. Rotterdam model versus almost ideal demand system: Will the best specification please stand up? *Journal of Applied Econometrics*, 23(6), pp.795–824.

Barten, A.P., Consumer demand functions under conditions of almost additive preferences . *Econometrica*, (32(1/2):1{38).

Batra, R., 2000. Consumer-Level Factors Moderating The Success. , 76(2), pp.175–191.

Bechtel & Gordon, Share-Ratio Estimation of the Nested Multinomial Logit Model . *Journal of Marketing Research*, 27(ProQuest pg. 232), p.232.

Berg??s, F., Hassan, D. & Monier-Dilhan, S., 2013. Are consumers more loyal to national brands than to private labels? *Bulletin of Economic Research*, 65(SUPPL1).

Binkley, J.K. & Connor, J.M., 1998. Grocery market pricing and the new competitive environment. *Journal of Retailing*, 74(2), pp.273–294.

Blattberg, R.. & N.S., 1990. *). Sales promotion: Concepts, methods, and strategies (1st ed.)*, New Jersey.: Prentice Hall, .

Blattberg, R.C., Briesch, R. & Fox, E.J., 1995. How Promotions Work. *Marketing Science*, 14(3 Supplement), pp.G122–G132.

Blattberg, R.C., Eppen, G.D. & Lieberman, J., 1981. A THEORETICAL AND EMPIRICAL EVALUATION OF PRICE DEALS FOR CONSUMER NONDURABLES. *Journal of Marketing*, 45(1), pp.116–129. Available at:

http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=4999419&site=ehost-live&scope=site.

Blattberg, R.C. & Jeuland, A.P., 1981. A Micromodeling Approach to Investigate the Advertising-Sales Relationship. *Management Science*, 27(9), pp.988–1005.

Brooker, E., 1994. The impact of advertissing on consumer demand for beef.

Bucklin, R., Gupta, S. & Siddarth, S., 1998. Determining segmentation in sales response across consumer purchase behaviors. *Journal of Marketing Research*, XXXV(May), pp.189–197. Available at: http://www.jstor.org/stable/10.2307/3151847.

Bucklin, R.E. & Gupta, S., 1992. Brand Choice, Purchase Incidence, and Segmentation: An Integrated Modeling Approach. *Journal of Marketing Research*, 29(2), pp.201–215.

Bucklin, R.E. & Lattin, J.M., 1991. A Two-State Model of Purchase Incidence and Brand Choice. *Marketing Science*, 10(1), pp.24–39.

Bunte, F., 2011. *The impact of private labels on the competitiveness of the European food supply chain* , The Hague. Available at: http://ec.europa.eu/enterprise/sectors/food/files/study_privlab04042011_en.pdf.

Bus, A.E.M. & Worsley, A., 2003. Consumers' health perceptions of three types of milk: A survey in Australia. *Appetite*, 40(2), pp.93–100.

Cameron, A. & Trivadi, P., 2005. *MICROECONOMETRICS: Methods and Applications* , New York: Cambridge University Press.

Chandon, P., Wansink, B. & Laurent, G., 2000. A Benefit Congruency Framework of Sales Promotion Effectiveness. *Journal of Marketing*, 64(4), pp.65–81.

Chintagunta, P.K., 1993. Investigating Purchase Incidence, Brand Choice and Purchase Quantity Decisions of Households. *Marketing Science*, 12(2), pp.184–208.

Christensen, L.R., Jorgenson, D.W. & Lau, L.J., 1975. Transcendental Logarithmic Utility Functions. *The American Economic Review*, 65(3), pp.367–383.

Commission, E., 2009. Communication (2009) 591. A better functioning food supply chain in Europe. *European Union*.

Davis, S., Inman, J.J. & McAslister, L., 1992. Promotion Has a Negative Effect on Brand Evaluations: Or Does It? Additional Disconfirming Evidence. *Journal of Marketing Research*, 29(1), pp.143–148.

Deaton, A. & Muellbauer, J., 1980. An almost ideal demand system. *American Economic Review*, 70(3), pp.312–326. Available at: www.jstor.org/stable/1805222\nhttp://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=4503194&site=ehost-live&scope=site.

Dekimpe, M.G. & Hanssens, D.M., 1999. Sustained Spending and Persistent Response: A New Look at Long-Term Marketing Profitability. *Journal of Marketing Research*, 36(4), pp.397–412. Available at: http://www.jstor.org/stable/3151996.

Dodson, J., Tybout, A. & Sternthal, B., 1978. Impact of deals and deal retraction on brand switching. *Journal of marketing research*, XV(February), pp.72–81. Available at: http://www.jstor.org/stable/10.2307/3150402.

Doob, A.N. & et al, 1969. Effect of initial selling price on subsequent sales. *Journal of Personality and Social Psychology*, 11(4), pp.345–350.

European Commission, 2012. The Common Agricultural Policy A partnership between Europe and Farmers . *Publications Office of the European Union*.

Ezrachi, A. & Bernitz, U., 2009. *Private Labels, Brands and Competition Policy: The Changing Landscape of Retail Competition*, Oxford University Press. Available at: http://econpapers.repec.org/bookchap/oxpobooks/9780199559374.htm.

Frank, R.E., Massy, W.F. & Morrison, D.G., 1965. Bias in multiple discriminant analysis. *Journal of Marketing Research*, II(August), pp.250–258. Available at: http://www.jstor.org/stable/3150183.

Garretson, J.A., Fisher, D. & Burton, S., 2002. Antecedents of private label attitude and national brand promotion attitude: Similarities and differences. *Journal of Retailing*, 78(2), pp.91–99.

Greenland, S., 1995. Dose-response and trend analysis in epidemiology: alternatives to categorical analysis. *Epidemiology (Cambridge, Mass.)*, 6(4), pp.356–365.

Guadagni, P.M. et al., 2010. A Logit Model of Brand Choice Calibrated on Scanner Data Stable URL : http://www.jstor.org/stable/184043 A LOGIT MODEL OF BRAND CHOICE CALIBRATED ON SCANNER DATA *. , 2(3), pp.203–238.

Guadagni, P.M. & Little, J.D.C., 1983. A Logit Model of Brand Choice Calibrated on Scanner Data. *Marketing Science*, 2(3), pp.203–238.

Guadagni, P.M. & Little, J.D.C., 2008. Commentary--A Logit Model of Brand Choice Calibrated on Scanner Data: A 25th Anniversary Perspective. *Marketing Science*, 27(1), pp.26–28.

Guadagni, P.M. & Little, J.D.C., 1998. When and what to buy: A nested logit model of coffee purchase. *Journal of Forecasting*, 17(3-4), pp.303–326. Available at: http://www.scopus.com/inward/record.url?eid=2-s2.0-0001064341&partnerID=40&md5=b1a98d83fa077a09f82871129d25936c.

Hall, L.. S.A.. C.J., 1979. Beef wholesale-retail mar- keting margins and concentration . *Econometrica 46*, 195-300.

Hasting, G., Stead, M. & McDermott, L., 2003. Review of research on the effects of food promotion to children. *McKinsey & Co.*, (Food retail sector cases), p.68.

Hatirli, S.A., Ozkan, B. & Aktas, A.R., 2004. Factors affecting fluid milk purchasing sources in Turkey. *Food Quality and Preference*, 15(6), pp.509–515.

Van Heerde, H.J., 1999. Models for Sales Promotion Effects Based on Store-Level Scanner Data.

Hensher, D.A. & Greene, W.H., 2006. The Mixed Logit Model : The State of Practice and Warnings for the Unwary. *Transportation*, 2002, pp.1–49. Available at: http://www.springerlink.com/index/V58681058723V360.pdf.

Horen, F. van & Pieters, R., 2012. When High-Similarity Copycats Lose and Moderate-Similarity Copycats Gain: The Impact of Comparative Evaluation. *Journal of Marketing Research*, 49(1), pp.83–91.

Ishikawa, J. & Spencer, B.J., 1999. Rent-shifting export subsidies with an imported intermediate product. *Journal of International Economics*, 48(2), pp.199–232.

Jedidi, K., Mela, C.F. & Gupta, S., 1999. Managing Advertising and Promotion for Long-Run Profitability. *Marketing Science*, 18(1), pp.1–22.

Jones, E., 2003. Analyses of Consumers' Dietary Behavior: An Application of the AIDS Model to Supermarket Scanner Data. *Agribusiness*, 19(2), pp.203–221. Available at: http://search.proquest.com/docview/56151800?accountid=13042\nhttp://oxfordsfx.hosted.exlibrisgroup.com/oxford?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ:econlitshell&atitle=Analyses+of+Consumers'+Dietary+Behavior:+An+Application+of+the+AIDS+Model+to+Supermarket+Scanner+Data&title=Agribusiness&issn=07424477&date=2003-04-

01&volume=19&issue=2&spage=203&au=Jones,+Eugene&isbn=&jtitle=Agribusiness&bti tle=&rft_id=info:eric/.

Kahn, B.E. & Louie, T.A., 1990. Effects of retraction of price promotions on brand choice behavior for variety-seeking and last-purchase-loyal consumers. *Journal of Marketing Research*, XXV(August), pp.279–89.

Kahneman, D. & Tversky, A., 1979. Kahneman & Tversky (1979) - Prospect Theory - An Analysis Of Decision Under Risk.pdf. *Econometrica*, 47(2), pp.263–292. Available at: http://www.jstor.org/stable/1914185.

Kaul, A. & Wittink, D.R., 1995. Empirical Generalizations About the Impact of Advertising on Price Sensitivity and Price. *Marketing Science*, 14(3 Supplement), pp.G151–G160.

Keon, J.W., 1980. The Bargain Value Model and a Comparison of Managerial Implications with the Linear Learning Model. *Management Science*, 26(11), pp.1117–1130.

Koppelman, F.S. & Bhat, C., 2006. A Self Instructing Course in Mode Choice Modeling : Multinomial and Nested Logit Models by with technical support from Table of Contents. *Elements*, 28(3), pp.501–12.

Kuhfeld, W., 2002. Multinomial Logit, Discrete Choice Modeling An Introduction to Designing Choice Experiments, and Collecting, Processing, and Analyzing Choice Data with SAS . *Analyzing Choice Data with SAS*.

Kumar, N. & Steenkamp, J.E.M., 2007. *Private Label Strategy: How to Meet the Store Brand Challenge*, Harvard Business School Press. Available at: http://www.amazon.com/dp/1422101673.

Lamm, R.M., 1981. Prices and concentration in the food retailing industry . *J. Ind. Econ.* , 30(1), pp.67–78.

Lilien, G.L., 1974. A Modified Linear Learning Model of Buyer Behavior. *Management Science*, 20(7), pp.1027–1036.

Lloyd, T.. M.S.. M.W. and Z.E., 2013. European Retail Food Price Inflation. *EuroChoices*, (12: 37–44. doi: 10.1111/1746-692X.12030).

Mangold, W.G. & Faulds, D.J., 2009. Social media: The new hybrid element of the promotion mix. *Business Horizons*, 52(4), pp.357–365.

Massey, L.K., 2001. Dairy food consumption, blood pressure and stroke. *The Journal of nutrition*, 131(7), pp.1875–1878.

Mathews, R., 1994. The ABCs of private label profitability. *Progressive Grocer, supl. Brand Power*, (12).

Mela, C.F., Gupta, S. & Lehmann, D.R., 1997. The long-term impact of promotion and advertising on consumer brand choice. *Journal of Marketing Research*, 34(2), pp.248–261.

Nations, U., 2003. United Nations Conference on Trade and Development.

Nayga Jr., R.M. & Capps Jr., O., 1994. Tests of Weak Separability in Disaggregated Meat

Nelson, J.P., 2014. Estimating the price elasticity of beer: Meta-analysis of data with heterogeneity, dependence, and publication bias. *Journal of Health Economics*, 33(1), pp.180–187.

Neslin, S.A. & Shoemaker, R.W., 1983. A Model for Evaluating the Profitability of Coupon Promotions. *Marketing Science*, 2(4), pp.361–388.

Neslin, S.A. & Shoemaker, R.W., 1989. An Alternative Explanation For Lower Repeat Rates After Promotion Purchases. *Journal of Marketing Research*, 26(2), pp.205–213.

Newmark, C.M., 1990. A new test of the price-concentration relationship in grocery retailing . *Econ. Lett.*, 369–373(33).

Nielsen, 2011. Shopping & Saving Strategies Around the World A Nielsen Report October 2011. *October*, (October).

Nijs, V.R. et al., 2001. The Category-Demand Effects of Price Promotions. *Marketing Science*, 20(1), pp.1–22.

Organization, W.H. & Office, R., 2008. Spain. , (1), pp.3–7.

Peter, J.P. & Olson, J.C., 2009. *Consumer Behavior & Marketing Strategy*, McGraw-Hill Irwin.

Prof. Dr. Schiefer G. & Dr. Deiters, J., 2009. Strategic Research Agenda on Transparency in the Food Chain. *University of Bonn*, (978-3-941766-09-9).

Raju, J.S., Srinivasan, V. & Lal, R., 1990. The Effects of Brand Loyalty on Competitive Price Promotional Strategies. *Management Science*, 36(3), pp.276–304.

Richardson, P.S., Dick, A.S. & Jain, A.K., 1994. Extrinsic and Intrinsic Cue Effects on Perceptions of Store Brand Quality. *Journal of Marketing*, 58(4), pp.28–36. Available at: http://www.jstor.org/stable/1251914.

Roy, R., Chintagunta, P.K. & Haldar, S., 1996. A Framework for Investigating Habits, "The Hand of the Past," and Heterogeneity in Dynamic Brand Choice. *Marketing Science*, 15(3), pp.280–299.

Russell, G.J. & Bolton, R.N., 1988. Implications of Market Structure for Elasticity STructure. *Journal of Marketing Research*, 25(3), pp.229–241.

Schindler, R.M., 1992. A coupon is more than a low price: Evidence from a shopping-simulation study. *Psychology & Marketing*, 431–451(9).

Schwentesius, R. & Gómez, M.Á., 2002. Supermarkets in Mexico: Impacts on Horticulture Systems. *Development Policy Review*, 20(4), pp.487–502. Available at: http://onlinelibrary.wiley.com/doi/10.1111/1467-7679.00185/abstract.

Sexton, R.J. et al., 2007. Agricultural trade liberalization and economic development: The role of downstream market power. *Agricultural Economics*, 36(2), pp.253–270.

Sheldon, I., Pick, D. & McCorriston, S., 2001. Export subsidies and profit-shifting in vertical markets. *Journal of Agricultural and Resource Economics*, 26(1), pp.125–141. Available at: http://ageconsearch.umn.edu/handle/123456789/4107.

Shoemaker, R. & Shoaf, F., Repeat Rates of Deal Purchases. *Journal of Advertising Research*, 4-53(17 (2)).

Shukla, P., 2010. Status consumption in cross-national context: Socio-psychological, brand and situational antecedents. *International Marketing Review*, 27(1), pp.108–129.

So, Y. & Kuhfeld, W.F., Multinomial Logit Models. , pp.1227–1234.

Spencer, B.J. & Jones, R.W., 1992. Trade and protection in vertically related markets. *Journal of International Economics*, 32(1-2), pp.31–55.

Srinivasan, S. et al., 2004. Do Promotions Benefit Manufacturers, Retailers, or Both? *Management Science*, 50(5), pp.617–629.

Steenkamp, J.-B.E.., Van Heerde, H.J. & Geyskens, I., 2010. What Makes Consumers Willing to Pay a Price Premium for National Brands over Private Labels? *Journal of Marketing Research*, 47(6), pp.1011–1024.

Strang, R.A., 1975. The Relationship Between Advertising and Promotion in Brand Strategy . *Cambridge: Marketing Science Institute*.

Summary, E., Label, P. & Brands, N., 2012. Private Label in Europe 2012. , (October), pp.1–30.

Sunil Gupta, 1988. Impact of Sales Promotions on When, What, and How Much to Buy. *Journal of Marketing Research*, 25(4), pp.342–355.

Swinnen, J.F.M. & Vandeplas, A., 2010. Market power and rents in global supply chains. *Agricultural Economics*, 41, pp.109–120. Available at: <Go to ISI>://WOS:000285124700011.

Tellis, G.J. & Zufryden, F.S., 1995. Tackling the Retailer Decision Maze: Which Brands to Discount, How Much, When and Why? *Marketing Science*, 14(3), pp.271–299.

Theil, H., 1965. The information approach to demand analysis. *Econometrica: Journal of the Econometric Society*, 33(1), pp.67–87. Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:The+Information+Approach+to+Demand+Analysis#0.

Thursland, M.E. et al., 2009. Spain Food and Agricultural Import Regulations and Standards - Narrative FAIRS Country Report.

Tian, L. & Cotterill, R.W., 2005. Constrained Price, Address, or Logit Brand Demand Models: An Econometric Comparison in the Boston Fluid Milk Market. *Agribusiness*, 21(2), pp.149–166. Available at: http://search.proquest.com/docview/56402776?accountid=13042\nhttp://oxfordsfx.hosted.exlibrisgroup.com/oxford?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ:econlitshell&atitle=Constrained+Price,+Address,+or+Logit+Brand+Demand+Models:+An+Econometric+Comparison+in+the+Boston+Fluid+Milk+Market&title=Agribusiness&issn=07424477&date=2005-04-01&volume=21&issue=2&spage=149&au=Tian,+Li;Cotterill,+Ronald+W&isbn=&jtitle=Agribusiness&btitle=&rft_id=info:eric/.

Tin, S.T., Mhurchu, C.N. & Bullen, C., 2007. Supermarket sales data: feasibility and applicability in population food and nutrition monitoring. *Nutrition reviews*, 65(1), pp.20–30.

Totten, J. & Block, M., 1987. Analyzing Sales Promotion: Test and Cases, Chicago. *Chicago Commerce Communications*.

Trends, E., 2011. Retail Private Label Brands in Europe Current and Emerging Trends. , (December), pp.1–21.

Vilcassim, N.J. & Chintagunta, P.K., 1995. Investigating retailer product category pricing from household scanner panel data. *Journal of Retailing*, 71(2), pp.103–128.

Wen, C.H. & Koppelman, F.S., 2001. The generalized nested logit model. *Transportation Research Part B: Methodological*, 35(7), pp.627–641.

Wooldridge, J., 2009. *Introductory Econometrics: A Modern Approach*, 5th ed., Michigan State University.

Yi, Y. & Yoo, J., 2011. The long-term effects of sales promotions on brand attitude across monetary and non-monetary promotions. *Psychology and Marketing*, 28(9), pp.879–896.

USDA. Country Studies/Area Handbook Series sponsored by the U.S. Department of the Army between 1986 and 1998. [Online] Available from: http://countrystudies.us/ http://countrystudies.us/ [Accessed: 3th June 2014].

EC. Agriculture and Rural Development [Online] Available from: http://ec.europa.eu/agriculture/milk/index_en.htm [Accessed: 10th July 2014].

EC. Actions for damages, key documents [Online] Available from: http://ec.europa.eu/competition/antitrust/actionsdamages/documents.html [Accessed: 10th July 2014].

EJRC. [Online] Available from: https://ec.europa.eu/jrc/ [Accessed: 10th July 2014].

Eurostat. [Online] Available from: http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home [Accessed: 10th July 2014].

FAO. Global agricultural marketing management [Online] Available from: http://www.fao.org/docrep/w5973e/w5973e00.HTM [Accessed: 7th May 2014].

FoodDrinkEurope. [Online] Available from: http://www.fooddrinkeurope.eu/ [Accessed: 10th July 2014].

MARM. Spanish Ministry of Environment, Rural, and Marine Affairs. [Online] Available from: http://epanet.ew.eea.europa.eu/european_epas/countries/es/ministry-environment-and-rural-affairs . [Accessed: 8th June 2014].

OECD. The OECD Food Chain Network [Online] Available from: http://www.oecd.org/site/agrfcn/ [Accessed: 3th June 2014].

UK Advertising association [Online] Available from: http://www.adassoc.org.uk/ [Accessed: 11th April 2014].

WTO. UNDERSTANDING THE WTO: THE AGREEMENTS [Online] Available from: http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm3_e.htm . [Accessed: 8th mAY 2014].

Appendix A - Multinominal logit model for milk and cereals

```
. mlogit code i.promotion discount store i.loyalty price, iter(10),

Iteration 0:   log likelihood = -1094.3336
Iteration 1:   log likelihood = -728.18128
Iteration 2:   log likelihood = -459.79892
Iteration 3:   log likelihood =  -321.0875
Iteration 4:   log likelihood = -200.44698
Iteration 5:   log likelihood = -81.059905
Iteration 6:   log likelihood = -53.409209
Iteration 7:   log likelihood = -29.574951
Iteration 8:   log likelihood = -26.480376
Iteration 9:   log likelihood = -25.789619
Iteration 10:  log likelihood = -25.608937
convergence not achieved

Multinomial logistic regression                 Number of obs   =       1176
                                                LR chi2(25)     =    2137.45
                                                Prob > chi2     =     0.0000
Log likelihood = -25.608937                     Pseudo R2       =     0.9766
```

code	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1						
1.promotion	-38.6009	384.6459	-0.10	0.920	-792.4931	715.2913
discount	1163.541	1800.415	0.65	0.518	-2365.209	4692.29
store	-1.456044	30.55556	-0.05	0.962	-61.34383	58.43174
1.loyalty	1.676587	45.27782	0.04	0.970	-87.0663	90.41948
priceperliter	806.2841	475.2115	1.70	0.090	-125.1133	1737.682
_cons	-643.9581	348.9123	-1.85	0.065	-1327.814	39.89751
2						
1.promotion	-42.61431	386.0997	-0.11	0.912	-799.3558	714.1272
discount	1061.15	6841.843	0.16	0.877	-12348.62	14470.92
store	-3.072683	32.3228	-0.10	0.924	-66.4242	60.27884
1.loyalty	-2.317653	49.6291	-0.05	0.963	-99.58891	94.9536
priceperliter	947.1443	547.8103	1.73	0.084	-126.5441	2020.833
_cons	-769.2032	447.6146	-1.72	0.086	-1646.512	108.1053
3	(base outcome)					

4						
1.promotion	-52.15786	2159.237	-0.02	0.981	-4284.185	4179.869
discount	-387.7371	4614.289	-0.08	0.933	-9431.577	8656.103
store	-.8568217	17.21019	-0.05	0.960	-34.58817	32.87452
1.loyalty	-.2154146	22.889	-0.01	0.992	-45.07704	44.64621
priceperliter	201.0411	270.1103	0.74	0.457	-328.3653	730.4476
_cons	-117.9561	153.3768	-0.77	0.442	-418.569	182.6568
5						
1.promotion	-46.03892	384.0888	-0.12	0.905	-798.8391	706.7613
discount	726.323	1762.393	0.41	0.680	-2727.903	4180.549
store	-2.045307	28.87805	-0.07	0.944	-58.64525	54.55464
1.loyalty	2.08768	41.47446	0.05	0.960	-79.20076	83.37612
priceperliter	332.0078	373.338	0.89	0.374	-399.7212	1063.737
_cons	-214.2125	241.0207	-0.89	0.374	-686.6045	258.1794
6						
1.promotion	-46.25331	384.4344	-0.12	0.904	-799.7309	707.2243
discount	1018.524	1800.116	0.57	0.572	-2509.639	4546.686
store	-2.151792	30.55245	-0.07	0.944	-62.03348	57.7299
1.loyalty	1.571646	45.26789	0.03	0.972	-87.1518	90.29509
priceperliter	644.9722	473.8712	1.36	0.173	-283.7984	1573.743
_cons	-486.1688	347.0602	-1.40	0.161	-1166.394	194.0567

Warning: convergence not achieved

```
. mlogit code i.promotion discount i.store i.loyalty price, iter(10)

Iteration 0:   log likelihood = -431.47959
Iteration 1:   log likelihood = -265.89973
Iteration 2:   log likelihood = -123.66451
Iteration 3:   log likelihood = -111.62956
Iteration 4:   log likelihood = -58.339492
Iteration 5:   log likelihood = -53.019265
Iteration 6:   log likelihood = -46.370787
Iteration 7:   log likelihood = -17.467383
Iteration 8:   log likelihood = -2.0199713
Iteration 9:   log likelihood = -.54521287
Iteration 10:  log likelihood = -.00198653
convergence not achieved

Multinomial logistic regression                 Number of obs   =        308
                                                LR chi2(30)     =     862.96
                                                Prob > chi2     =     0.0000
Log likelihood = -.00198653                     Pseudo R2       =     1.0000
```

code	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1	(base outcome)					
2						
1.promotion	-.7896884	1472.269	-0.00	1.000	-2886.385	2884.805
discount	45.70039	3797.588	0.01	0.990	-7397.434	7488.835
store						
2	.3108526	856.5992	0.00	1.000	-1678.593	1679.214
3	.790533	833.8777	0.00	0.999	-1633.58	1635.161
1.loyalty	-.1558271	725.0664	-0.00	1.000	-1421.26	1420.948
price	46.35874	1196.896	0.04	0.969	-2299.515	2392.232
_cons	-71.85001	1641.053	-0.04	0.965	-3288.256	3144.556
3						
1.promotion	121.1521	1809.285	0.07	0.947	-3424.982	3667.286
discount	397.2819	4146.706	0.10	0.924	-7730.112	8524.676
store						
2	122.0611	95804.55	0.00	0.999	-187651.4	187895.5
3	111.5386	95804.48	0.00	0.999	-187661.8	187884.9
1.loyalty	3.323906	921.4576	0.00	0.997	-1802.7	1809.348
price	386.1355	1704.946	0.23	0.821	-2955.497	3727.768
_cons	-987.0298	95871.2	-0.01	0.992	-188891.1	186917.1
4						
1.promotion	43.38002	11306	0.00	0.997	-22115.98	22202.74
discount	309.9029	4277.359	0.07	0.942	-8073.567	8693.373
store						
2	99.97615	108188.9	0.00	0.999	-211946.3	212146.2
3	114.3615	95804.43	0.00	0.999	-187658.9	187887.6
1.loyalty	11.12146	4457.12	0.00	0.998	-8724.673	8746.916
price	316.5571	1491.857	0.21	0.832	-2607.429	3240.544
_cons	-783.4597	95938.23	-0.01	0.993	-188818.9	187252

5						
1.promotion	-7.28861	5191.329	-0.00	0.999	-10182.11	10167.53
discount	157.703	3888.265	0.04	0.968	-7463.156	7778.562
store						
2	1.042369	882.1666	0.00	0.999	-1727.972	1730.057
3	.9142059	855.4831	0.00	0.999	-1675.802	1677.63
1.loyalty	-.3264715	742.6685	-0.00	1.000	-1455.93	1455.277
price	157.0909	1381.242	0.11	0.909	-2550.094	2864.276
_cons	-301.0984	2182.147	-0.14	0.890	-4578.028	3975.831
6						
1.promotion	60.94353	1844.737	0.03	0.974	-3554.674	3676.561
discount	357.5551	4067.354	0.09	0.930	-7614.313	8329.423
store						
2	121.9135	95804.26	0.00	0.999	-187651	187894.8
3	111.7996	95804.19	0.00	0.999	-187661	187884.6
1.loyalty	3.265139	912.2366	0.00	0.997	-1784.686	1791.216
price	346.4517	1542.511	0.22	0.822	-2676.814	3369.718
_cons	-852.7338	95845.53	-0.01	0.993	-188706.5	187001

Warning: convergence not achieved

Appendix B-Multinominal logit model for milk and cereals (price not included)

```
. mlogit code i.promotion discount i.store i.loyalty, baseoutcome(5)

Iteration 0:   log likelihood = -1094.3336
Iteration 1:   log likelihood = -1073.1975
Iteration 2:   log likelihood = -1060.3913
Iteration 3:   log likelihood = -959.81442
Iteration 4:   log likelihood =  -818.5031
Iteration 5:   log likelihood = -772.77408
Iteration 6:   log likelihood = -763.87101
Iteration 7:   log likelihood = -761.73534
Iteration 8:   log likelihood = -761.28321
Iteration 9:   log likelihood = -761.18975
Iteration 10:  log likelihood = -761.17052
Iteration 11:  log likelihood = -761.16585
Iteration 12:  log likelihood = -761.16481
Iteration 13:  log likelihood = -761.16457
Iteration 14:  log likelihood = -761.16453

Multinomial logistic regression                 Number of obs   =       1176
                                                LR chi2(25)     =     666.34
                                                Prob > chi2     =     0.0000
Log likelihood = -761.16453                     Pseudo R2       =     0.3044
```

code	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1						
1.promotion	16.21772	495.8032	0.03	0.974	-955.5387	987.9741
discount	12.40245	4.213416	2.94	0.003	4.14431	20.6606
store						
2	1.179394	.6242968	1.89	0.059	-.0442048	2.402994
3	1.935457	.4768647	4.06	0.000	1.00082	2.870095
1.loyalty	-.6265946	.5128686	-1.22	0.222	-1.631799	.3786094
_cons	-17.69227	495.8033	-0.04	0.972	-989.4489	954.0644
2						
1.promotion	1.866036	.8889095	2.10	0.036	.1238056	3.608267
discount	-626.0423	108167.8	-0.01	0.995	-212631	211378.9
store						
2	-14.7713	2563.909	-0.01	0.995	-5039.941	5010.399
3	1.544767	.8033982	1.92	0.055	-.0298649	3.119398
1.loyalty	-2.051814	.869763	-2.36	0.018	-3.756518	-.3471095
_cons	-2.917975	.9050938	-3.22	0.001	-4.691926	-1.144024
3						
1.promotion	-26.20279	20673.71	-0.00	0.999	-40545.92	40493.52
discount	1.411457	4.435572	0.32	0.750	-7.282104	10.10502
store						
2	.259203	.2806579	0.92	0.356	-.2908765	.8092824
3	.0555457	.2598476	0.21	0.831	-.4537463	.5648377
1.loyalty	.8224849	.2474568	3.32	0.001	.3374785	1.307491
_cons	1.356573	.2443257	5.55	0.000	.8777029	1.835442
4						
1.promotion	-25.42813	80475.56	-0.00	1.000	-157754.6	157703.8
discount	-672.8479	55965.78	-0.01	0.990	-110363.8	109018.1
store						
2	-.2501758	.6144963	-0.41	0.684	-1.454566	.9542149
3	.4687586	.4639047	1.01	0.312	-.440478	1.377995
1.loyalty	-.5267638	.4242747	-1.24	0.214	-1.358327	.3047993
_cons	-.3394113	.395825	-0.86	0.391	-1.115214	.4363914
5	(base outcome)					

6						
1.promotion	.1110643	.3156712	0.35	0.725	-.5076399	.7297684
discount	3.649922	4.134447	0.88	0.377	-4.453445	11.75329
store						
2	.3201446	.4124706	0.78	0.438	-.4882829	1.128572
3	.6473271	.3451958	1.88	0.061	-.0292442	1.323898
1.loyalty	-.4778971	.33165	-1.44	0.150	-1.127919	.1721249
_cons	-.8756033	.3309209	-2.65	0.008	-1.524196	-.2270102

```
.
. mlogit code i.promotion discount i.store i.loyalty

Iteration 0:   log likelihood = -431.47959
Iteration 1:   log likelihood = -413.80141
Iteration 2:   log likelihood = -401.93243
Iteration 3:   log likelihood = -400.83993
Iteration 4:   log likelihood = -400.48518
Iteration 5:   log likelihood = -400.37808
Iteration 6:   log likelihood = -400.34748
Iteration 7:   log likelihood = -400.33899
Iteration 8:   log likelihood =  -400.3371
Iteration 9:   log likelihood = -400.33669
Iteration 10:  log likelihood =  -400.3366
Iteration 11:  log likelihood = -400.33658

Multinomial logistic regression                 Number of obs   =        308
                                                LR chi2(25)     =      62.29
                                                Prob > chi2     =     0.0001
Log likelihood = -400.33658                     Pseudo R2       =     0.0722
```

1	(base outcome)					
2						
1.promotion	.4021671	.4990439	0.81	0.420	-.5759408	1.380275
discount	1.025671	1.120473	0.92	0.360	-1.170416	3.221757
store						
2	.0491172	.4157146	0.12	0.906	-.7656683	.8639028
3	.0049214	.3522969	0.01	0.989	-.6855679	.6954106
1.loyalty	.5017329	.3123001	1.61	0.108	-.1103641	1.11383
_cons	-.6891094	.2954372	-2.33	0.020	-1.268156	-.1100632
3						
1.promotion	-15.35061	6687.403	-0.00	0.998	-13122.42	13091.72
discount	-176.5071	9600.915	-0.02	0.985	-18993.95	18640.94
store						
2	18.34139	3997.176	0.00	0.996	-7815.98	7852.663
3	17.33985	3997.176	0.00	0.997	-7816.982	7851.661
1.loyalty	.533863	1.273265	0.42	0.675	-1.96169	3.029416
_cons	-20.75486	3997.176	-0.01	0.996	-7855.076	7813.567
4						
1.promotion	1.427797	6333.72	0.00	1.000	-12412.44	12415.29
discount	-175.4523	11968.85	-0.01	0.988	-23633.96	23283.06
store						
2	-.6401403	13331.01	-0.00	1.000	-26128.95	26127.67
3	18.33666	5298.317	0.00	0.997	-10366.17	10402.85
1.loyalty	16.83342	3682.589	0.00	0.996	-7200.909	7234.576
_cons	-37.4542	6790.19	-0.01	0.996	-13345.98	13271.07
5						
1.promotion	-18.76833	4030.237	-0.00	0.996	-7917.888	7880.351
discount	3.437533	1.126191	3.05	0.002	1.23024	5.644827
store						
2	-.3401438	.5392105	-0.63	0.528	-1.396977	.7166894
3	-.1471696	.4300297	-0.34	0.732	-.9900123	.6956731
1.loyalty	-.1607983	.3739797	-0.43	0.667	-.8937851	.5721884
_cons	-.8325271	.3331297	-2.50	0.012	-1.485449	-.1796048

6						
1.promotion	-18.75974	3031.833	-0.01	0.995	-5961.043	5923.524
discount	3.324955	1.055426	3.15	0.002	1.256359	5.393551
store						
2	-.5264466	.450194	-1.17	0.242	-1.408811	.3559174
3	-.5512143	.3779642	-1.46	0.145	-1.29201	.1895818
1.loyalty	-.1291857	.3153773	-0.41	0.682	-.7473138	.4889425
_cons	-.1415201	.2755892	-0.51	0.608	-.681665	.3986249