Sergio Brasini, Marzia Freo, Giorgio Tassinari

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Abstract

This paper examines whether sales promotions effectiveness depends upon the consumer's brand loyalty and her buying behaviour and whether consumer's behavioural characteristics in term of purchase frequency and level affect the response to promotional activities and moderate the effect of brand loyalty during the consumer choice process. Different specifications for the utility function, exploiting information on selling price, promotional activities such as displays usage, ad features in the store, 3x2 and discount, and differently brand loyalty measures have been estimated into a discrete choice framework, that is into the rational brand choice paradigm, paying attention to their effects on individuals' probabilities to choose the specific brand during each purchase occasion. The application is run on a ACNielsen dataset of Italian households consumer panel, observed to buy at least two yoghurt packages during a year, matched to store panel data with respect to quantities, prices and promotions.

1. Introduction

A key role in the purchasing process is played by the consumer's brand loyalty. In fact, brand loyalty is the main target which the marketing policy of the firm is driven at, in particular by means of short-term and tactical activities. To this purpose, the interaction between brand loyalty and promotional activities is considered extremely interesting too. Focusing on this aspect, the paper tries to answer both to what extent the sales promotions effectiveness depends upon the consumer's brand loyalty and upon her buying behaviour, and to what extent the consumer's behavioural characteristics (purchase frequency and purchase level) affect the response to promotional activities and moderate the effect of brand loyalty during the consumer choice process. The specific interest is posed on analysis of consumer behaviour with respect to a fast moving consumer good purchases, as yoghurt, for two major reasons: we do not have to take into account stockpiling, due to the specific product perishableness, and contemporaneously it is a market continuously evolving. The general discrete choice setting of the random utility model, which assumes that each individual chooses the alternative providing the greatest utility among others, is adopted with an application on a ACNielsen dataset of Italian households consumer panel, observed to buy at least two yoghurt packages during a year, matched to data on quantities, prices and promotions.

The present work is organised as follows. In Sections 2 the question of brand loyalty measurement is afforded; then the empirical findings on sales promotions effects reviewed. The data are described in Section 4 and the empirical results are reported in the two following sections. Concluding remarks are given in Section 7.

2. Brand loyalty: theoretical and operational definitions

In spite of the results of a number of empirical studies which show that brand loyalty has a significant role in the choice process among several alternatives, researches have not yet proposed a univocal methodology to measure it. For this reason, from theoretical and operational points of view brand loyalty can acquire different connotations.

It is important to distinguish between theoretical definitions of brand loyalty (i.e. abstract descriptions of the phenomenon) and operational or

functional definitions (i.e. measurement methods). Concerning the former class, we refer to the proposal of Jacoby and Chestnut (1978), who define brand loyalty as 1) preferential and 2) behavioural response 3) exhibited in the course of time by a subject who 4) chooses one or more alternative brands among a given set. Moreover, such loyalty 5) depends upon psychological processes since the brands are chosen through an internal criterion which derives from the confidence in such brands.

Loyalty measures can be divided into four groups by means of two dimensions: behavioural vs. brand attitude and brand vs. individual-oriented.

Behavioural and brand attitude measures respectively emphasise the purchasing process and the learning process; brand-oriented measures consider loyalty as a brand attribute while individual-oriented measures consider loyalty as one of the consumer's general characteristics.

The firsts define brand loyalty in terms of the actual observed purchases within a certain time period, hence paying closer attention to the first three requirements of the previous definition. An interesting advantage is that they are based on actual purchases which can be linked to the performance and to the life of the firm; moreover, they directly depend on the consumer's behaviour in a certain time period and, thus, are easier to calculate than attitude data. The drawback is that they cannot distinguish between brand loyalty and repurchases; therefore they could be biased. Moreover, even if behavioural information provide accurate descriptions of past behaviour, they do not guaranty prediction of future behaviour (see Day *et al.*, 1997). Specifically, behavioural measures might be affected by the short-term variations caused for example by the availability of the consumer's favourite brand.

Conversely, brand attitude measures can distinguish between a real brand loyalty and repurchases, since they are based upon the ascertainment of stable preferences or upon the consumer's purchase intention, hence emphasising the cognitive dimension of loyalty (fourth and fifth requirements of the theoretical definition).

Brand attitude measures make it easier to select the appropriate decision unit (third requirement); finally they permit to understand the reasons of the consumer's choice behaviour, which are less sensitive to short-term changes. However, brand attitude measures can hardly provide

an accurate description of the empirical behaviour, since the buyer's behaviour is driven by a number of factors besides brand loyalty.

Concerning the second dimension, loyalty may be though as the outcome of a psychological process about the attributes of the brand (see the fifth requirement); hence it could be considered either one of the distinctive properties of a brand or one of the characteristics of the consumers (see Hafstrom *et al.*, 1992).

Within this framework, we can classify brand loyalty measures as brand-oriented or individual-oriented respectively. Brand-oriented measures consider brand loyalty within a well-specified product category; individual-oriented measures consider loyalty as one of the consumer's general characteristics.

Crossing the above mentioned dimensions, four categories can be defined (Table 1).

Brand-oriented attitude measures (e.g. the percentage of consumers who want to purchase brand A).
Individual -oriented attitude measures (e.g. the level of agreement or disagreement with the statement "I like to be loyal to the most well-known brands "; see Jacoby, 1971; Raju, 1980).
Brand-oriented behavioural measures (e.g. the percentage of buyers that, having already purchased brand A, repurchase it; see Guadagni and Little, 1983; Colombo and Morrison, 1989; Krishnamurthy *et al*., 1992).
Individual-oriented behavioural measures (e.g. a consumer is brand-loyal if he/she buys brand A belonging to a specific product category in more than half of the purchasing episodes; see Cunnigham, 1956).

In order to understand the influence of brand loyalty on purchasing behaviour and how the effectiveness of marketing tools depends upon such a variable we can refer to studies of several researchers. As an example, on the basis of single source data extracted from a panel of families Tellis (1988) concludes that brand loyalty (followed by promotional variables) is the strongest determinant of purchase choices.

Table 1. A taxonomy of measures of brand loyalty

	Brand-attitude measures	*Behavioural measures*
Brand-oriented	A1. measures of purchasing intentions/preferences A2. measures of involvement	C1. measures based on aggregate data C1a. measures based on aggregate transition matrices C1b. measures based on market shares C2. measures based on individual data
Individual-oriented	B1. attitudinal measures: identification of the reasons underlying loyalty	D1. measures of the purchasing proportion D2. measures of dynamic purchases

Since consumers take advantage of promotions only if the promoted brand belongs to their consideration set, in the short-term price reductions have a minor role in conditioning a choice, while in the medium and in the long-term promotional activities can modify the individuals' consumption behaviours and habits.

By relying on a long-term analysis of consumption behaviours, Mela *et al*. (1997) conclude that promotional activities based on price reduction increase the individual's sensitiveness to price and therefore the number of customers who are loyal to promotions.

What is important, however, is that the intensity of such effects is related to the subject's brand loyalty level; in fact, promotional activities not price-oriented lower the sensitivity of loyal consumers to price itself while increase the sensitivity of no-loyal consumers. This result can be explained by the fact that brand loyal subjects develop stable consumption patterns in the course of time and therefore only a notable incentive, e.g. a large price reduction, can justify a change in their choices.

It is worth noting that promotions might not benefit all firms. In this framework Boulding *et al*. (1994) analyses the three major cases:

- the leading brands whose price is higher than the average market price might be benefited by strategies aiming to emphasise the tangible attributes which differentiate such brands from their competitors, and not by promotional campaigns, since price, quality

and brand image of leading brands are strictly interrelated. Therefore, a promotional initiative might be seen as a decline of the quality of the brand;

- if the price of the product is lower than the average market price, promotions can make the brand more appealing for customers who are price-aware;
- brands whose price is approximately equal to the average market price are not influenced by promotional policies.

3. The effectiveness of promotions: a synopsis of the literature

Gupta (1988) studies the impact of promotions on brand choices, time of purchase and average purchase level in each purchasing occasion. His computations show that more than 84% of sales increases caused by promotional activities (i.e. discount on price) can be ascribed to new and occasional customers, willing to choose a different brand; 14% of sales increases can be explained by means of a reduction of the average time interval between two purchases of the same product while the remaining 2% depends on the stockpiling process. However, Gupta points out that the influence of promotions on these three phenomena depends on the characteristics of the product considered and on the number of customers who are loyal to promotions.

The lower the perishability of a product, the higher the propensity of its customers to change their consumption patterns and buying behaviours. Consequently the effectiveness of promotional activities will also be higher (see Ailawadi and Neslin, 1998). Moreover, the greater the number of promotion-loyal customers (who are price-sensitive and no brand-loyal), the higher the probability that sales increases are temporary; hence the long-term effect of the promotional activity will be lower. However, it must be stressed that potential customers could be loyal to their consideration set, and therefore they could divide promotions into two groups: promotions related to brands that they have purchased before and promotions related to brands which they have never purchased. Such customers might be willing to take advantage of promotions of the first group.

Other authors, see e.g. Dodson *et al*. (1978), Guadagni and Little (1983), Neslin and Shoemaker (1989), examine how promotions affect the customer's perception of the quality of the product, consequently

determining the repurchasing rate by counting the number of customers who are not willing to choose a different brand in future purchasing occasions. Their conclusion is that promotional initiatives can attract no-loyal customers who, however, are likely to buy a different brand when promoted in the future. Therefore, after a promotional campaign the repurchasing rate will be lower even if loyal customers have not changed their consumption habits as well as their perception of the quality of the product.

The work of Assuncao and Meyer (1993) is important since it shows that the purchase level depends on the customers' expected time between two promotions which involve brands belonging to their consideration set. In fact, the more frequent the promotional initiatives, the lower the impact on the purchase level at each purchasing occasion. Moreover, if such initiatives are perceived as usual, consumers will not be motivated to accelerate their purchasing behaviour. Hence, the maximum result will be obtained with relatively infrequent promotions.

In the presence of many alternatives, most of the customers develop their own habits by regularly purchasing one or more brands. As a result, brand loyalty consolidates gradually in the course of time. An exclusive loyalty will hardly be detected, since customers generally choose among several brands belonging to a stable purchasing basket, where some brands can be prevailing (Barnard and Ehrenberg, 1997). The brand loyalty level might depend on the consumption level of a given product category as well: frequent customers know relatively better the various brand supplies and show a higher loyalty than infrequent buyers. Obviously, on the one hand, loyalty depends on the considered product category, since loyalty to frequently used products is not influenced by socio-economic variables and by the customer's personality; on the other hand, the older the customer, the higher the loyalty level. Surveys on the customers' motivation have also shown that the impact of price policies on brand loyalty is scarce, while advertising and promotional campaigns are extremely important in order to increase the purchase level and the purchase frequency.

4. The reference dataset

Our analysis has been performed on a yoghurt dataset provided by ACNielsen, a leading market research company expert at statistical surveys and market analysis. Yoghurt is nowadays a popular food for adults and children of all ages and inclinations. In fact, there is probably a yoghurt flavour to please every taste. Consumers demand variety and yoghurt producers have concocted enough new flavours and textures to satisfy the daily yoghurt eater's diverse palate. Yoghurt was previously considered by many processors to be a mature market; however, just the opposite is true. With the average retail food outlet stocking many dozens of different yoghurt items, actually there are more styles, flavours and sizes than ever before. This increased variety assures the primary shopper that it will be possible to buy yoghurt for every member of the household. In most cases this means a different kind of yoghurt for each member of the household. Prior to the increased variety in the yoghurt category, the primary shopper was most likely purchasing yoghurt for some, not all members of the household. Now everyone eats yoghurt, from babies to grandparents. There is another reason why the yoghurt category is receiving a great attention by marketers. They want everyone that is eating yoghurt to eat more. While a first strategy for growth came from variety, a second one came from occasion-based consumption: today there are yoghurts for breakfast, lunch or dessert.

The data refer to the Italian yoghurt market. Specifically eight brands with national distribution are considered: Ala, Alleluya, Danone, Granarolo, Mio, Parmalat, Vitasnella, Yomo; others brands, characterised by the sales chain's label, are grouped together as "private labels". The cumulative market share of the considered brands during the analysed period is 68.5%. Due to the differences in yoghurt tastes and packaging sizes, restrictions on these two attributes have been placed; all data refer to 2x125 gr. packages, while unflavoured yoghurt has not been considered. The analysed group consists of all the families belonging to the ACNielsen consumer panel not affected by rotation procedure who have bought yoghurt at least twice during the 52 weeks of observation period (between the 27th week of 1997 and the 26th of 1998). The number of households is 74, observed to buy during the 52 weeks 2381 yoghurt packages in 839 occasions; the average number of yoghurt purchases of each family is 32.2 packages per year and 2.8 per occasion; the average

time between two consecutive buying occasions is 4.6 weeks while between two consecutive consuming occasions is 1.6 week. Promotional activities are considered in the dataset; they are recorded on a weekly basis in all the 139 shops where the households belonging to the consumer panel made their purchases. These shops are uniformly distributed all over the country. In table 2 a synthetic description of the dataset is provided.

Table 2. Characteristics of the dataset

Brand	Market share (%)	Average price (in lira)	Availability in the shop (%)
Ala	3.6	1422.939	42.1
Alleluya	1.9	2695.381	87.4
Danone	10.2	2261.700	98.6
Granarolo	3.9	1579.054	33.3
Private labels	4.7	1373.971	81.8
Mio	7.6	2462.844	100.0
Parmalat	12.7	1947.551	89.6
Vitasnella	7.9	2199.102	99.9
Yomo	16.0	2440.897	100.0
Others	31.5	-	-

As expected, the brands with the lowest average price belong to the private labels (1373.971); on the other hand, Alleluya (2695.381) has the highest price, followed by Mio (2462.844) and by Yomo (2440.897). These three brands are available almost in every shop. Granarolo (33.3%) is the less available brand and it also has a quite low market share (3.9%). To sum up, Yomo is the leading brand since it holds the highest market share (16.0%); moreover, its managers have been able to apply a marketing-mix policy which guarantees an excellent quality/price ratio and the maximum degree of availability in the market. However, it must be noticed that, despite their low price, private labels are characterised by less availability (81.8%) and low market share (4.7%). This fact seems to suggest that the yoghurt category has low price elasticity and a strong pattern of brand preferences. Therefore, we expect brand loyalty to play

an important role in the choice process and at the same time the impact of new promotional activities not to be particularly noticeable.

5. The model

In the analysis different specifications for the utility function into the multinomial logit model are considered. In order to obtain the model with the greatest ability to describe the process of choosing among different brands, each specification embodies a different definition of brand loyalty.

In the first estimated utility function, the variable loyalty of each family is expressed as the ratio between the purchase level of a given brand in each purchasing occasion and the total purchase level of the product category by the family over the entire time period (BL1). Despite its greatest simplicity, it is easy to understand its limited accuracy, mainly because brand loyalty is not influenced by past purchases.

An improvement can be obtained with the second utility function, where the variable loyalty has the same denominator as the previous one, but for each family its numerator is given by the cumulated purchase level of a given brand up to the current time period (BL2). In this case, the loyalty to a given brand depends on the customer's past purchasing decisions as well.

The third measure of brand loyalty has been proposed by Krishnamurthi *et al*. (1992) as the ratio between the family's total purchase level of a given brand during the entire time period and the family's total purchase level of the whole category (BL3). Therefore, in this case within a given time interval each family has a constant loyalty level.

The last operational restatement of brand loyalty has been developed by Guadagni and Little (1983) by perequating a dichotomic variable which considers the last purchased brand (BL4). The measure of loyalty of the *n*-th household to the *i*-th brand at *t*-th purchasing occasion, BL_{int}, is given by the following formula:

$$BL_{int} = \lambda BL_{in(t-1)} + (1 - \lambda)L_{in(t-1)}$$

where $L_{in(t-1)}$ is a *dummy* variable which is equal to '1' if the *i*-th brand is chosen by the *n*-th household in the (*t*-1)-th purchasing occasion and '0'

otherwise. The smoothing parameter has been posed equal to a sensitive value suggested by a review of the literature (e.g. Fader *et al.*, 1992) and thus $\lambda = 0.75$ has been used. Brand loyalty measures are schematically presented in table 3.

Table 3. Operational measures of brand loyalty

BL1 := Purchase level of brand *i* by household *n* at observation *t* / Total purchase level of the product
category by household *n* during the whole time period
BL2 := Cumulated purchase level of brand *i* by household *n* up to time *t* / Total purchase level of the
product category by household *n* during the whole time period
BL3 := Total purchase level of brand *i* by household *n* during the whole time period / Total purchase
level of the product category by household *n* during the whole time period
BL4 := $\mathrm{BL}_{int} = \lambda \mathrm{BL}_{in(t-1)} + (1-\lambda)\mathrm{L}_{in(t-1)}$

Following the general formulation for the logit model, the utility linear-in-parameters function, U_{jn}, for the household *n* associated to the choice *j* for *j*=1,..,*J* is:

$$U_{jn} = \beta'_j \mathbf{x}_{jn} + \varepsilon_{jn},$$

where β_j is the parameters vector of alternative *j* reflecting the impact of changes of the explanatory variables $\mathbf{x}_{jn}$ extended to include both attributes of brands and characteristics of consumers. So far, the probability that household *n* choices the alternative *i* becomes:

$$P_n(i) = Pr\left(U_{in} \geq U_{jn}, \forall\, j \in C_n\right)$$
$$= Pr\left(\beta_i' \mathbf{x}_{in} + \varepsilon_{in} \geq \beta_j' \mathbf{x}_{jn} + \varepsilon_{jn}, \forall\, j \in C_n\right)$$
$$= Pr\left(\beta_i' \mathbf{x}_{in} + \varepsilon_{in} \geq \max_{j \in C_n}\left(\beta_j' \mathbf{x}_{jn} + \varepsilon_{jn}\right)\right)$$
$$= \frac{exp\left(\beta_i' \mathbf{x}_{in}\right)}{\sum\limits_{j \in C_n} exp\left(\beta_j' \mathbf{x}_{jn}\right)},$$

where C_n is the alternatives set available to household n.

In order to assess whether the utility functions which incorporate selling price, promotions and brand loyalty common effects (excluded the intercept) can significantly describe the brand choice process we examine the estimates of the parameters of the models for the different measures of brand loyalty previous reported (see table 4, panel A and B).

Table 4. Estimates of specifications with different brand loyalty measures

PANEL A	BL1			BL2		
Variable	Value	Std err	t-test	Value	Std err	t-test
CONST.-Ala	-1.437	0.594	-2.418	-2.300	0.331	-6.940
CONST.-Alleluya	-0.873	0.246	-3.554	-0.683	0.207	-3.292
CONST.-Danone	-0.600	0.196	-3.066	-0.033	0.119	-0.273
CONST.-Granarolo	-0.747	0.443	-1.688	-1.600	0.269	-5.952
CONST.-Private labels	-0.739	0.530	-1.395	-1.664	0.306	-5.429
CONST.-Mio	-0.590	0.183	-3.219	-0.453	0.128	-3.538
CONST.-Parmalat	-2.087	0.403	-5.177	-1.372	0.200	-6.867
CONST.-Vitasnella	-0.999	0.242	-4.121	-0.452	0.130	-3.487
CONST.-Yomo	0.000	-		0.000	-	
PRICE	-0.001	0.000	-1.736	-0.002	0.000	-7.599
3x2	0.239	0.267	0.896	0.543	0.142	3.824
DISPLAY	-0.616	0.238	-2.593	0.178	0.124	1.437
FEATURE	-0.229	0.306	-0.749	0.748	0.169	4.432
DISCOUNT	-0.228	0.167	-1.363	0.347	0.093	3.717
BRAND LOYALTY	119.716	3.930	30.462	8.768	0.215	40.723
Number of estimated parameters:			14			14
Null log-likelihood:			-4711.380			-4711.380
Final log-likelihood:			-799.738			-2076.740
Likelihood ratio test:			7823.290			5269.290
Rho-square:			0.830			0.559

PANEL B		BL3			BL4 (λ=0.75)	
Variable	Value	Std err	t-test	Value	Std err	t-test
CONST.-Ala	-1.784	0.378	-4.724	-1.903	0.308	-6.172
CONST.-Alleluya	-0.400	0.218	-1.835	-0.475	0.181	-2.628
CONST.-Danone	-0.031	0.126	-0.249	0.059	0.111	0.531
CONST.-Granarolo	-1.154	0.287	-4.018	-1.063	0.241	-4.417
CONST.-Private labels	-1.438	0.338	-4.255	-1.506	0.286	-5.258
CONST.-Mio	-0.445	0.154	-2.882	-0.390	0.115	-3.374
CONST.-Parmalat	-0.847	0.215	-3.943	-1.164	0.184	-6.341
CONST.-Vitasnella	-0.202	0.144	-1.404	-0.222	0.124	-1.793
CONST.-Yomo	0.000	-		0.000	-	
PRICE	-0.001	0.000	-5.384	-0.002	0.000	-7.346
3x2	0.629	0.149	4.217	0.768	0.129	5.959
DISPLAY	0.310	0.127	2.451	0.155	0.114	1.359
FEATURE	0.460	0.168	2.742	0.623	0.155	4.019
DISCOUNT	0.334	0.105	3.163	0.584	0.088	6.605
BRAND LOYALTY	5.199	0.113	45.875	4.753	0.106	45.038
Number of estimated parameters:			14			14
Null log-likelihood:			-4711.380			-4711.380
Final log-likelihood:			-1793.080			-2388.160
Likelihood ratio test:			5836.600			4646.430
Rho-square:			0.619			0.493

The first important issue to be examined is the determination of the operational formulation of brand loyalty which ensures the most satisfactory results. In this framework we have adopted a combined criterion:

- significance of the results and correspondence of the signs of coefficients to their theoretical expectations;
- goodness of fit.

By jointly using both criteria it arises that the operational definition of Krishnamurty *et al*. (BL3) leads to the most satisfactory formulation. We can now start evaluating the general model based on this brand loyalty formulation. Concerning the global model fit, positive results are obtained: the goodness of fit index (equal to 0.619) shows a satisfactory level of adaptation. As far as the variables are considered separately, all coefficients are significant. As expected, price rises discourage purchases while brand loyalty and promotional activities positively affect purchasing decisions. Gupta's conclusions, i.e. purchasing habits (brand loyalty in our framework) the most relevant variables and marketing activities (promotions in our framework) relevant but less significant, are confirmed.

Table 5. Estimates of specifications with specific-brand (BL-B) and specificbrand and promotions effects (BL-BP)

BL-B	Value	Std err	t-test	BL-BP	Value	Std err	t-test
Ala	-2.748	0.463	-5.936	Ala	-4.014	0.642	-6.249
Alleluya	-0.926	0.288	-3.213	Alleluia	-1.142	0.288	-3.962
Danone	-0.225	0.216	-1.039	Danone	-0.447	0.223	-2.004
Granarolo	-1.500	0.361	-4.157	Granarolo	-2.504	0.416	-6.017
Private labels	-1.630	0.381	-4.273	Private labels	-2.114	0.411	-5.145
Mio	-1.184	0.260	-4.557	Mio	-1.368	0.262	-5.215
Parmalat	-1.597	0.293	-5.452	Parmalat	-1.939	0.305	-6.354
Vitasnella	-0.728	0.226	-3.216	Vitasnella	-1.135	0.245	-4.638
Yomo	0.000	-		Yomo	0.000	-	
PRICE	-0.001	0.000	-5.314	PRICE	-0.002	0.000	-5.342
3x2	0.608	0.145	4.183	3x2			
				Danone	0.707	0.287	2.469
				Parmalat	2.210	0.463	4.772
				Vitasnella	0.880	0.359	2.451
				Yomo	0.836	0.194	4.320
DISPLAY	0.275	0.124	2.212	DISPLAY			
				Granarolo	1.418	0.290	4.889
				Private labels	0.852	0.300	2.841
FEATURE	0.404	0.165	2.446	FEATURE			
				Danone	1.026	0.369	2.778
DISCOUNT	0.345	0.105	3.296	DISCOUNT			
			3.296	Ala	2.264	0.525	4.315
				Granarolo	0.972	0.302	3.225
				Private labels	0.807	0.224	3.611
				Vitasnella	0.979	0.263	3.726
BRAND LOYALTY				BRAND LOYALTY			
Ala	7.780	0.952	8.169	Ala	8.861	1.089	8.135
Alleluia	6.072	0.879	6.904	Alleluya	6.341	0.904	7.014
Danone	4.582	0.334	13.706	Danone	4.793	0.345	13.908
Granarolo	5.122	0.613	8.352	Granarolo	5.614	0.647	8.678
Private	4.625	0.292	15.861	Private labels	4.855	0.307	15.813
Mio	6.365	0.470	13.549	Mio	6.431	0.478	13.463
Parmalat	6.831	0.630	10.844	Parmalat	6.929	0.639	10.841
Vitasnella	5.567	0.357	15.594	Vitasnella	5.600	0.362	15.488
Yomo	4.249	0.350	12.139	Yomo	4.036	0.350	11.521
Number of estimated			22				29
Null log-likelihood:			-4711.380				-4711.380
Final log-likelihood:			-1772.140				-1731.220
Likelihood ratio test:			5878.480				5960.330
Rho-square:			0.624				0.633
LR H_0: BL3 vs. BL-B			41.880	LR H_0: BL-B vs. BL-BP			81.840
p-value(χ_8^2)			0.000	p-value(χ_7^2)			0.000

The interpretation of the results of the model estimation must take account of the characteristics of the product considered (yoghurt in our framework). The limited effect of price promotions (3x2 and discount) might depend on the reduced possibilities of accumulating perishable products just as yoghurt. Tellis has also noticed the prominence of brand loyalty in the determination of buying behaviours, followed by promotion-related variables and product prices. In fact, subjects who are loyal to a given brand share stable purchasing habits and only a sufficiently strong reason – such as a relevant discount on price – can persuade consumers to change their choices.

To further investigate the interaction between brand loyalty and promotional activities effects on choice probability, different specifications for the utility functions have been estimated. Former the brand loyalty coefficients equality restriction among brands, then the promotional activities coefficients ones have been relaxed (see table 5, models BL-B and BL-BP). The hypothesis of equal coefficient on brand loyalty is rejected with a LR = 41.9, and the more general unrestricted promotional coefficients specification overcomes the restricted one with a LR = 81.8. It has been already noticed that, in the present case as well as in the literature, brand loyalty affects greater on choice probabilities than promotions. What is more significant here is that brand specific promotion effects increase with respect to the brand general estimated one. Coherent findings can be drawn examining (Table 6) marginal rates of substitution between each promotion activity and brand loyalty, computed as approximations by means of taking the derivative with respect to binary variables such as if they were continuous. These ratios of the coefficients on the same utility function turn out to be useful since provide information on the trade-off between the two corresponding variables. Passing from the common coefficients to the brand and promotions specific model, all the brand loyalty-promotions trade-offs strongly increase. For example, the brand loyalty-discount substitution effect, which is 6.4 in the first common model (BL3), is multiplied by three-four times in the specific effects model (BL-BP), ranging from 17.0 of Private labels to 25.6 of Ala. This happens since each brand levers on a different marketing-mix, using more frequently some promotional activities and omitting others, with the consequence that their effect is globally underestimated.

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Table 6. Marginal rates of substitution respect to brand loyalty

Marginal rate of substitution (%) of each variable respect to	BL3 common BL	BL-B mean BL	BL-BP specific BL
3x2	12.1	10.7	
Danone			14.8
Parmalat			37.6
Vitasnella			15.8
Yomo			21.1
DISPLAY	6.0	4.8	
Granarolo			25.2
Private labels			17.4
FEATURE	8.9	7.1	
Danone			21.4
DISCOUNT	6.4	6.1	
Ala			25.6
Granarolo			17.3
Private labels			17.0
Vitasnella			17.6

6. Segment analysis

So far, the heterogeneity of the data sample has not been yet considered; actually, the consumers' brand loyalty and their sensitivity to price policies and promotional activities might change according to the characteristics of the individual. In this section we aim to test whether a relation exists between these variables and some characteristics of the buying process. By relying on the available data the following characteristics have been considered:

- purchase volume;
- purchase frequency;
- brand loyalty.

In order to perform this sort of analysis it is necessary to adopt a special approach to segmentation. Particularly, the initial sample has been divided according to the presence of the considered characteristics (it is obvious that surveys of this kind might suffer from the limited number of households in the groups obtained).

Segmentation is a strategic marketing activity and it formally corresponds to the detection of sub-populations within the original

population. Consumers are divided into different subgroups. This is extremely important for companies, since the analysis of the behaviour of specific groups and of their sensitivity to independent variables helps to tailor products and marketing strategies to the differences within the marketing target. Analyses concerning specific segments will be carried out by considering the brand loyalty and promotions coefficients restricted model with BL3.

6.1 Brand choice and purchase level
We begin the segmentation process by distinguishing households who purchase large quantities of yoghurt from households who purchase smaller quantities. Such groups can be respectively denoted as heavy buyers and light buyers. Compared to other product categories, yoghurt fits extremely well for this analysis: due to its perishableness, storage is limited, hence allowing to detect heavy buyers by looking at the purchase levels without taking the purchase frequencies into account. Hence, a variable measuring the total number of packages purchased by each of the families within the considered time period has been defined. Subsequently the dataset has been divided by referring to the 75th percentile. To consider the relevance of heavy buyers segment for marketing, it should be noted that the heavy buyer quarter of households purchases about the 60% of yoghurt packages. Table 7 displays the results regarding heavy buyers and light buyers respectively.

The LR test shows that the segmentation significantly increases the phenomenon description. The results obtained for the heavy buyers segment indicate that parameters signs are the same as in the general model. Among sales promotions, 3x2 is significant for both groups, while the display seems to be effective only to heavy buyers, acting as a cognitive-promotion. Concerning light buyers, they appear less expert consumers (selling price is not more significant) and, being not aware of the product price, are attracted more by discount and feature. Summarising, heavy and light buyers present very different behaviours with respect both to selling price and promotions. The brand loyalty coefficient does not change in a relevant manner in the groups; to this purpose has to be minded that in logit specification the marginal effects are not composed only by parameters but depend, in a non linear pattern, also on the value of explanatory variables; regarding the brand loyalty, it

assumes different values in the two groups, higher for heavy buyers with the consequence that its mean marginal effect is greater for them. The same applies for the next two segmentations.

Table 7. Results for heavy – light buyers

	Light buyers			Heavy buyers		
	Value	Std err	t-test	Value	Std err	t-test
CONST.-Ala	-0.235	0.519	-0.453	-4.340	0.626	-6.938
CONST.-Alleluya	-1.004	0.354	-2.833	0.248	0.267	0.926
CONST.-Danone	0.253	0.195	1.297	-0.370	0.171	-2.165
CONST.-Granarolo	-0.041	0.397	-0.103	-2.948	0.444	-6.633
CONST.-Priv. labels	-0.148	0.527	-0.282	-3.238	0.482	-6.724
CONST.-Mio	-0.435	0.258	-1.684	-0.741	0.200	-3.705
CONST.-Parmalat	-0.283	0.329	-0.861	-1.596	0.296	-5.398
CONST.-Vitasnella	0.296	0.216	1.370	-0.817	0.203	-4.025
CONST.-Yomo	0.000	-		0.000	-	
PRICE	0.000	0.000	-0.939	-0.003	0.000	-7.593
3x2	0.771	0.234	3.295	0.498	0.200	2.483
DISPLAY	0.016	0.192	0.082	0.677	0.171	3.951
FEATURE	0.755	0.244	3.093	0.050	0.240	0.207
DISCOUNT	0.620	0.153	4.060	0.089	0.149	0.597
BRAND LOYALTY	5.211	0.167	31.170	5.475	0.173	31.625
Number of households:			55			19
Number of observations:			962			1419
Number of estimated parameters:			14			14
Null log-likelihood:			-1931.01			-2780.37
Final log-likelihood:			-735.39			-1029.06
Likelihood ratio test:			2391.24			3502.62
Rho-square:			0.619			0.630
LR H_0: general vs. heavy-light buyers			57.254			
p-value(χ^2_{14})			0.000			

6.2 Brand choice and purchase frequency
    The buying behaviour might depend on the time period between two consecutive purchases as well. Therefore, it can be of some interest to

divide the sample into two groups, i.e. by distinguishing consumers who frequently purchase a given product from consumers who wait longer between two purchase occasions (the divide between the two segments is the 75th percentile of the distribution of the customers in terms of number of purchase occasions within the time period analysed).

Frequent buyers purchase yoghurt 0.7 time a week, that is about three times every two weeks; infrequent once every 2.6 weeks, that is once every about 18 days. Estimation results for the two segments are given in table 8.

As far as promotional activities are concerned, a difference between the two groups is observed: frequent buyers react with lesser extent to all promotional initiatives than infrequent buyers who react extremely well and more strongly than the first group to promotional policies as the values of the parameters show. This result can be explained in terms of the high brand loyalty of frequent buyers. In fact, the LR test shows with greater extent than before a significant behavioural segmentation. Also in this case we believe that it is preferable to start the analysis with the inspection of the informal tests on the coefficient estimation. The most effective promotion is 3x2 again, more for infrequent than for frequent buyers. The last ones are also sensitive to price rises and feature promotions. Infrequent buyers are insensitive to selling price and feature but affected by display and strongly by discount. It must be stressed that frequent consumers are less sensitive to price promotions; their purchasing process is generally habitual and less attracted by illusory effects.

Table 8. Results for frequent – infrequent buyers

	Infrequent buyers			Frequent buyers		
	Value	Std err	t-test	Value	Std err	t-test
CONST.-Ala	0.044	0.545	0.081	-3.912	0.591	-6.615
CONST.-Alleluya	-0.625	0.366	-1.706	-0.082	0.265	-0.308
CONST.-Danone	0.478	0.200	2.394	-0.356	0.169	-2.109
CONST.-Granarolo	-0.108	0.462	-0.235	-2.098	0.383	-5.480
CONST.-Priv. labels	0.076	0.533	0.142	-2.864	0.469	-6.109
CONST.-Mio	-0.407	0.286	-1.422	-0.700	0.190	-3.685
CONST.-Parmalat	0.339	0.312	1.088	-2.131	0.337	-6.314
CONST.-Vitasnella	0.724	0.227	3.190	-0.829	0.195	-4.258
CONST.-Yomo	0.000	-		0.000	-	
PRICE	0.000	0.000	-0.853	-0.003	0.000	-6.753
3x2	0.920	0.214	4.301	0.573	0.215	2.664
DISPLAY	0.627	0.195	3.215	0.013	0.176	0.073
FEATURE	0.377	0.238	1.583	0.557	0.240	2.320
DISCOUNT	1.004	0.165	6.080	-0.090	0.144	-0.625
BRAND LOYALTY	5.558	0.184	30.142	5.252	0.166	31.600
Number of households:			56			18
Number of observations:			1097			1284
Number of estimated parameters:			14			14
Null log-likelihood:			-2171.69			-2539.69
Final log-likelihood:			-707.23			-1029.41
Likelihood ratio test:			2928.92			3020.56
Rho-square:			0.674			0.595
LR H_0: general vs. frequent-infrequent			112.878			
p-value(χ^2_{14})			0.000			

6.3 Brand choice and loyalty

In order to obtain a deeper investigation of the interaction between brand loyalty and promotional activities, the sample has further been divided *a priori* into high brand loyalty consumers (more than 75% of their purchases regard a single brand) and consumers with a lower brand loyalty. Table 9 reports the results of the estimation of the logit model for the two segments.

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This segmentation is significant too, also if the less significant among three proposed segmentations. The price coefficients are negative in both the segments. For low brand loyalty customers all sales promotions have about the same positive effect on choices while results are partially contradictory for high brand loyalty customers; as expected, their choice probabilities are augmented by 3x2 promotions but diminished by display promotions. The goodness of fit indexes for the two groups are quite different; very near the unity for high loyalty customers and remarkably lower for low loyalty customers, indicating that proposed variables better explain the behaviour of the second group than the first.

Table 9. Results for high – low brand loyalty customers

	Low brand loyalty customers			High brand loyalty customers		
	Value	Std err	t-test	Value	Std err	t-test
CONST.-Ala	-1.393	0.424	-3.286	-3.477	0.906	-3.836
CONST.-Alleluya	-0.220	0.240	-0.919	-1.025	0.580	-1.766
CONST.-Danone	0.061	0.138	0.439	-0.496	0.374	-1.327
CONST.-Granarolo	-0.791	0.313	-2.528	-3.531	0.840	-4.202
CONST.-Priv. labels	-0.973	0.376	-2.589	-3.384	0.840	-4.030
CONST.-Mio	-0.238	0.192	-1.239	-0.783	0.353	-2.219
CONST.-Parmalat	-0.634	0.239	-2.650	-1.598	0.544	-2.936
CONST.-Vitasnella	-0.160	0.162	-0.984	-0.258	0.365	-0.708
CONST.-Yomo	0.000	-		0.000	-	
PRICE	-0.001	0.000	-3.896	-0.003	0.001	-4.245
3x2	0.436	0.159	2.741	1.958	0.376	5.213
DISPLAY	0.403	0.133	3.039	-0.954	0.436	-2.190
FEATURE	0.438	0.180	2.427	0.581	0.430	1.351
DISCOUNT	0.424	0.114	3.707	-0.106	0.272	-0.388
BRAND LOYALTY	5.425	0.176	30.769	5.468	0.218	25.040
Number of households:			41			33
Number of observations:			1292			1089
Number of estimated parameters:			14			14
Null log-likelihood:			-2591.190			-2120.190
Final log-likelihood:			-1443.650			-328.602
Likelihood ratio test:			2295.090			3583.170
Rho-square:			0.443			0.845
LR H_0: general vs. low –high loyalty cust.			41.656			
p-value(χ^2_{14})			0.000			

7. Concluding remarks

We have noticed that many marketing-mix variables have a great impact on the purchasing process and on the choice among brands. Each firm should also pays attention to the loyalty that each individual and family shows towards different brands, to the purchase level and the interval of time between two successive purchase occasions.

The higher the brand loyalty, the more heterogeneous the effectiveness of promotional policies. Households with low consumption level or low purchase frequency are less sensitive to selling price and more to price-promotions (3x2 and discount); with regard to communication-promotions, light buyers are affected by feature, while infrequent ones by display. On the other side a crucial role is played by selling price for heavy and frequent buyers; moreover both the last groups show a cross behaviour to light and infrequent with respect to communication-promotions: heavy buyers are affected by display, while frequent ones by feature.

Firms should also take into consideration that in the short-term discounts and promotions have a very limited influence on brand choices. Only in the long run promotional initiatives can change the consumers' behaviour and purchasing habits.

Finally, the characteristics of a firm are also relevant as regards the long-term effect of promotional initiatives aimed at making customers price-conscious. In particular, frequent and significant price reductions are of no benefit to the leading brands since price reductions can enlarge the sensitivity to such a factor and therefore these brands, whose price is generally higher than average market one, might lose their characteristics of uniqueness which justify their higher price. On the other hand, suitable strategies should emphasise the tangible and intangible attributes which differentiate a brand from competing brands.

Therefore, promotional activities are of some benefit to firms which offer their product at a lower price than the average market price, since they make their product more attractive for price-conscious consumers.

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