BRAND LOYALTY AND HETEROGENEITY IN THE SPANISH MARKET OF NON-FINE LAUNDRY DETERGENTS

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Summary

This paper proposes the estimation of consumer choice models to measure brand-loyalty in the Spanish market of non-fine laundry detergents. The aim of this research is to specify brand choice, allowing differences in the brand- loyalty measures across brands in the Spanish context. We propose one alternative way to specify brand loyalty using as our main framework the Guadagni and Little (1983) loyalty variable. We try to analyse how different forms of heterogeneity help to explain consumers' decisions. The different specifications are estimated on ACNielsen Spanish household scanner panel data on non-fine laundry detergent category over a two-year period and more than 1,000 households. Loyalty (state dependence), marketing-mix, socio-demographics and shopping behavior variables are included in the models. The first discrete-choice model formulation is the multinomial logit. The two sources of differences among individuals' behaviour are observed heterogeneity (socio-demographic variables as size of the family, social class or an indicator of working wife) and unobserved heterogeneity (differences in tastes or preferences). The individuals differ in these variables and they take different decisions according to them. However, even for individuals with the same characteristics, we continue observing different purchase behaviour due to differences which are not observed by researchers and are only known by the individuals themselves. One of the advantages of using scanner data (i.e., panel data in our case) is the possibility to control for unobserved heterogeneity, because observed heterogeneity can be controlled for even in the case of cross-section data. In terms of the results, we obtain similar findings in the response of loyalty to those reported in previous research in the US and other high income country markets and, hence, we infer that the brand-loyalty behavior of Spanish consumers is similar. The specification allowing differences across brands contributes to improving the choice-model results, and allows a better understanding of the brand-loyalty process, such as the double jeopardy brand-loyalty effect. As expected, improving the specifications by introducing additional heterogeneity terms, also contribute to improve the explanatory power of the models.

Keywords: brand loyalty; discrete choice; non-fine laundry detergent; Spain

1. Introduction

The importance of brand loyalty has been recognized in the marketing literature for at least three decades (Howard and Sheth, 1969). Aaker (1991) has discussed the role of loyalty in the brand equity process and has specifically noted that brand loyalty leads to certain marketing advantages, such as reduced marketing costs, more new customers, and greater trade leverage. Chaudhuri and Holbrook (2001) examine how loyalty influences such outcome-related aspects of brand equity as market share and relative price. In addition, Dick and Basu (1994) suggest other loyalty-related marketing advantages, such as the reduction of search motivation, favorable word of mouth, and greater resistance among loyal customers to competitive strategies.

Two divergent streams of research characterize the literature on the operational loyalty concept: (a) the stochastic approach, which is purely behavioral, and (b) the deterministic approach that considers loyalty as an attitude. Behavioral measures stress the importance of actual purchase behavior for detecting brand loyalty, but neglect the underlying cognitive process. In contrast, attitudinal measures emphasize the importance of the cognitive processes, but ignore actual behavior. Reconciling the two approaches, Jacoby and Kyner (1973) propose to integrate the two notions within the same conceptual definition. According to them, brand loyalty is the *biased behavioral response, expressed over time, by some decision-making units, with respect to one or more alternative brands out of a set of such brands, and is a function of psychological (decision-making evaluative) processes*. This definition clearly identifies loyalty as a behavior. If the behavioral aspect of loyalty seems clear, and loyalty is the repeated purchasing of the same brands, the attitudinal component remains relatively vague.

Mellens, Dekimpe and Sttenkamp (1996; p. 523) point out that discrete-choice models offer vast opportunities for behavioral brand-loyalty research, as they are behavioral measures at the individual level. This implies that choice dynamics are incorporated, and explanatory variables describing brands and consumers can be added so that both the individual-related components and the brand-related components of brand loyalty can be implemented. The relative influence of brand loyalty on brand choice, compared

to other variables, can then be studied. Guadagni and Little (1983) made the first effort to incorporate brand loyalty in a discrete-choice model. Researchers have accommodated brand loyalty, also called state dependence, in discrete-choice models by including either a lagged-purchase variable (Jones and Landwehr, 1988; Lattin and Bucklin, 1989), or a variable constructed from lagged purchases, as an explanatory variable in the model (Erdem, 1996; Guadagni and Little, 1983; Krishnamurthi and Raj, 1988; Lattin and Bucklin, 1989; Ortmeyer, Lattin and Montgomery, 1991; Allenby and Rossi, 1991 and Keane 1997).

Howard and Sheth (1969) proposed that in frequently purchased product categories, especially low-priced categories, households may routinize their brand purchases by using the same brand repeatedly over time. This means that the currently chosen brand has a higher probability of being chosen in the future than other brands. This is a case of positive state dependence, or inertia. Brand inertia is a totally routinized behavior or a behavior based on situation factors, such as brand accessibility and high switching costs, with a low relative attitude towards the brand, and cannot be considered as loyalty in the long run, and where high repeat patronage is characterized by non-attitudinal influences on behavior (Dick and Basu, 1994). In contrast, households may satiate themselves with previously chosen brands and switch brands in a quest for variety (McAslister, 1982; Kahn, Kalwani and Morrison, 1986; Kim, Allenby and Rossi, 2002). In such a scenario, the currently chosen brand has a lower probability of being chosen in the future than other brands. This is a case of negative state dependence. The general finding in this literature is that loyalty or state dependence is positive in low-priced, frequently purchased product categories. This finding is consistent with Howard's and Sheth's (1969) theory of routinized behavior.

More research is necessary about brand loyalty because conceptual and empirical gaps remain in the marketing literature. On the other hand, despite the increasing internationalization of firms, and increasing market integration, most of the studies on brand loyalty confine themselves to the US market (with some notable exceptions such as (Cavero and Cebollada, 1997; Erdem, Zhao and Valenzuela, 2003). Deshpande and Webster (1989) have already pointed out the lack of comparative country studies. Comparative studies are important as differences between nations' characters and cultures, as well as political and economic differences, can affect the way firms and

consumers respond to markets (Porter, 1990). Few studies provide empirical evidence that research on domestic markets can be generalized to international markets. This is in spite of the fact that lack of replication and extension research restricts the development of a cumulative body of knowledge in the business disciplines (Hubbart et al., 1998). The present research aims at filling these gaps by evaluating whether the brand-choice models developed and applied to the US market and in other high income country markets perform in the Spanish context.

The definition of loyalty proposed by Jacoby and Kyner 1973 suggests that they mean brand loyalty. Day (1969) suggests that once attitudinal criteria are imposed, loyalty becomes a brand-specific concept and not a general concept describing the overall behavior pattern for the product class. Empirical findings (Kahn, Kalwani and Morrison, 1986) have shown that loyalty differs across product classes and across brands within product classes. Assael (1998) points out that brand loyalty is product-specific. Consumers will be loyal to brands in one category and will have little loyalty to brands in other categories. Sloot, Verhoef and Franses (2002) go further, showing that the effect of brand type is moderated by product type. However, Guadagni and Little (1983; p. 212) hypothesized that brand loyalty is the same attribute across all the brands in a category. Since then, researchers include one loyalty variable in brand-choice models that captures overall loyalty. This measure represents the category "loyalty effect" and does not take into account the specific-brand loyalty effect. This is very restrictive, contradicting one of the few "law-like" generalizations in marketing, that is, the double jeopardy theory (Ehrenberg, Goodhardt and Barwise, 1990; p.90): brands with greater market shares exhibit greater purchasing loyalty.

In the framework of this research, loyalty is measured directly as repeat purchasing behavior. However, the re-purchase of the same brand can be considered in two different ways; it is either:

- reflective loyalty, which is a result of brand commitment or a favorable attitude towards the brand, or
- purchase inertia, that is to say, repeat purchasing of the same brand without a real motive for the choice made (Odin, Odin and Valette-Florence, 2001).

To model loyalty as specific across brands can improve the choice model results and allow better understanding of the brand loyalty process, for example, the double jeopardy effect. We propose alternative way to model brand loyalty using as our framework the Guadagni and Little (1983) loyalty variable. Moreover, we relax the homogeneity in brand loyalty by estimating latent discrete choice models allowing for differences in the loyalty variables not only across brands but across segments. We estimate the model using ACNielsen Spanish household scanner panel data on non-fine laundry detergent category. The variables included are: loyalty variables, marketing-mix variables, socio-demographics, and a shopping behavior variable. We begin with the formulation of a multinomial logit model and we then move on to the estimation of latent multinomial logit models.

The rest of the paper is organized in four sections. In section 2 we review brand loyalty in the discrete-choice model literature. We set up the proposed empirical model using the specification model described in the literature in Section 3. After describing the data sources, we propose the model estimation in Section 4. The results and tests to discriminate among models are in Section 5 and in Section 6 we discuss the findings and our conclusions.

2. Brand loyalty in discrete choice models. Literature review

Despite many advances in marketing models, the model developed by Guadagni and Little (1983; hereafter, G&L) serves as a benchmark. The key variable that allows the model to accurately fit the data is the loyalty variable, which is an exponential smoothing of past purchases (i.e., we are in the context of behavioral loyalty or a stochastic approach). The loyalty variable confounds two effects: state dependence (sometimes called purchase feedback) and household heterogeneity. Heterogeneity refers to differences across households in brand preference or market responses, and purchase-event feedback refers to the impact of past purchases on current preferences. Although it is really difficult to separate the effects of state dependence and individual heterogeneity, we will try to separate these two effects in the empirical part of the model. Different versions of the G&L loyalty variable have emerged (Krishnamurthi and Raj, 1988; Lattin and Bucklin 1989, Ortmeyer, Lattin and Montgomery, 1991). The Krishnamurthi and Raj (1988) model of brand choice and purchase quantity models the

choice decision very similarly to that of G&L. They used a logarithm of price instead of actual price, although it is actually a minor change. Their final variable in the choice model is one that reflects possible dependence in the purchase behavior of the household. They defined a single common variable: brand purchase share history. The brand purchase share history variable (Krishnamurthi and Raj 1988) and the preference variable (Lattin and Bucklin 1989) are operational definitions of brand loyalty (Jacoby and Chestnut, 1978), as is the variable concerned with the proportion of purchases devoted to a given brand, proposed by Cunningham (1956). In his market-share concept, loyalty is defined in terms of the percentage of total purchases devoted to the single most frequently purchased brand.

3. Proposed empirical model

The aim of this research is to specify brand choice, allowing differences in the brand-loyalty measures across brands in the Spanish context. We propose one alternative way to specify brand loyalty using as our main framework the Guadagni and Little (1983) loyalty variable. We try to analyse how different forms of heterogeneity help to explain consumers' decisions. The first discrete-choice model formulation is the multinomial logit. The two sources of differences among individuals' behaviour are observed heterogeneity (socio-demographic variables as size of the family, social class or an indicator of working wife) and unobserved heterogeneity (differences in tastes or preferences). The individuals differ in these variables and they take different decisions according to them. However, even for individuals with the same characteristics, we continue observing different purchase behaviour due to differences which are not observed by researchers and are only known by the individuals themselves. One of the advantages of using scanner data (i.e., panel data in our case) is the possibility to control for unobserved heterogeneity, because observed heterogeneity can be controlled for even in the case of cross-section data.

As variables that can influence the choice brand behavior of a household, we take into account the following variable groups (the variable definitions are reported in the appendix):

- marketing-mix variables;
- household-specific socio-demographic variables;

- category-specific shopping variables;
- loyalty variables (state dependence); and
- lagged promotion variables

In this study, we test whether brand loyalty is constant across brands in the choice models in a way such that the number of loyalty variables to be specified depends on the number of alternatives (or brands). One loyalty variable is defined for each alternative (brand) and is specified to have brand-specific coefficients. We impose a restriction in these last specification that brand *j* loyalty can only influence the probability of choosing brand *j*.

In the case of latent discrete choice models, we make two kind of exercises. First, we estimate the specificacion allowing for preference heterogeneity. This means that we relax the equality of the specific constants in each of the estimated segments. Second, we allow for response heterogeneity. While we have several response variables as quoted before, we are interested in testing how heterogeneity affects the estimates of loyalty variables in each brand.

4. Data and estimation method

We estimate our models using scanner panel data supplied by ACNielsen Spain, on household purchases of brands in non-fine laundry detergents. The Spanish data set included a representative sample of households across the country, rather than households in specific cities. Their purchase activities are recorded from January 1999 to December 2000. We have 1,557 households accounting for 33,246 purchases of 78 brands. Average expenditure on non-fine detergent was 57.30 €. The seven largest brands hold 70 percent share of the market.

In estimating a brand-choice model with household data, a subset of the alternatives in the category is typically selected for analysis because the existence of few observations for some brands can generate estimation problems. This situation occurs in our data set. Gupta, Chintagunta, Kaul and Wittink (1996) propose that the household purchase data for this subset can be selected in one of two ways: household selection (use all category purchases of those households that only purchase from among the brands in the subset)

or purchase selection (use all purchases of the selected brands). Purchase selection implies that the purchase records for a given household may be incomplete. As a result, models employing household loyalty variables will have reduced validity. Our case results show that the coefficients of specific constant terms tend to increase, while less is explained by these estimations. On the other hand, household selection implies a reduction of consumer diversity, and smaller market share brands will be under-represented in the results.

We decided to work with the entire data set, applying two aggregation tactics to simplify the model alternatives. As our first tactic, we selected a representative brand subset and aggregated brands with smaller market shares into a residual category called "other brands" (Erdem and Keane, 1996). Our second tactic, given the fact that marketing-mix policies for store brands are very similar, was to consider all generic brands as one alternative called "store brands" (Kamakura and Russell, 1989). In the Appendix, we provide the descriptive statistics and the socio-demographic statistics. We used the first year period to initialize some of the proposed loyalty variables. The second year was used to estimate and to predict. Households without information during the initialization period were singled out for the analysis.

Following the suggestion of Lattin (1987), we fixed the smoothing constant to build the G&L loyalty variable at a value of 0.7. First, we must perform sensitivity analysis to be sure that the qualitative resutls are unaffected by this parameter. Second, the smoothing constant can be estimated at the same time with the rest of the parameters of the model, although we leave this exercise for future work.

Since the categories are unordered, we propose to estimate multinomial and latent multinomial logit models whose estimation is done by maximum likelihood. We note that the multinomial logit model was also used in previous brand-loyalty studies (Guadagni and Little, 1983; Gupta, 1988; Kamakura and Russell, 1993), while latent multinomial logit models are employed by (Kamakura and Russell, 1989). In a multinomial logit model, *k-1* (*k* being the number of alternatives) equations are estimated, because the parameters of the *k* alternatives are not identified, so we express the model in utility differences.

5. Results

The model selection and the estimation results are reported in Tables 1 and 2. Before discussing these results, we select the best performance model in statistical terms, concerning some hypotheses about heterogeneity.

Model Selection

To compare the performance of the model without heterogeneity and controlling unobserved heterogeneity (preference heterogeneity; preference heterogeneity and response heterogeneity in loyalty) we use the Bayesian Information Criterion (BIC). $BIC = - LogL + (1/2)Klog(N)$, where $LogL$ is the value of the log-likelihood function for both models, K is the number of parameters estimated, and N is the sample size. We prefer those models with smaller values of log-likelihood and higher values of *BIC*. The values of the *LogL* and *BIC* for each specification are reported in Table 1. The sample size in the estimating sample (N) is *14686*.

Those models with heterogeneous loyalty fit better when relaxing the existence of a unique segment (homogeneous case) of consumers and estimate models with several segments up to three.

Instead of estimating models with preference heterogeneity and additional number of segments, we move on to the estimation of multinomial logit models with preference heterogeneity and response heterogeneity in loyalty both between brands and segments. Because after the four latent segment the BIC is decreasing we choose the model with preference and response heterogeneity (in loyalty) with tree-latent class.

Estimation results

The estimation results chosen model are reported in Table 2. The price coefficients can be interpreted as quasi price-elasticities. The negative sign implies a substitution effect among the brands (Krishnamurthi and Raj, 1988).

The influence of promotion is significant and has a negative sign. Promotion reduces the purchase probability in the subsequent choice observation (Guadagni and Little, 1983).The reason could be that there are few promotions in this category, or that households have a negative perception of these promotions. Maybe they consider promoted brands are of lower quality than non-promoted brands.

In this category, the socio-demographic variable of social class is significant with negative sign. This variable can be considered a proxy for income. We can surmise that high and medium social class households have other ways to wash their clothes (Krishnamurthi and Raj, 1988; Gupta and Chintagunta, 1994; Seetharaman, Ainslie and Chintagunta, 1999). The shopping behavior variable has a positive coefficient; households with above-average expenditures are more likely to purchase (Seetharaman, Ainslie and Chintagunta, 1999).

All the brand-loyalty coefficients are significant with positive sign; brand loyalty increases the probability of the brand the band being chosen. All loyalty effects but the one corresponding to Ariel are statistically different by segments, by brands and they are also statistically different to the loyalty effects found in the standard multinomial logit model by brand.

6. Discussion and conclusions

We have tried in this paper to answer two questions: i) whether typical brand-choice specifications apply to Spanish consumers, since we have enough empirical evidence about their application to other countries like US; ii) whether preference heterogeneity is enough to explain differences in the behavior at different segments of consumers in the market or we also need response heterogeneity in the discrete brand-choice loyalty models.

In regard to the answer to the first question, our results are very similar to other results found along the literature as those of Guadagni and Little (1983) or Kamamura and Russell (1989). We also find that our model fit is comparable to previous results. We should say, however, that all loyalty variable perform well and point towards the existence of state dependence or inertia in the behavior of Spanish consumers

concerning the purchase of non-fine laundry detergent. This merely confirms the fact observed in some previous papers that in frequently purchased and low priced products consumers rutinize their behavior.

In regard to the answer to the second question, our results show that preference heterogeneity is not enough to explain differences in the behavior at different segments of consumers in the market, we also need response heterogeneity in the discrete brand-choice loyalty models.

Our homogeneous models, in terms of preference heterogeneity, have shown that the consumers of non-fine laundry detergents in Spain are grouped in more segments that those defined according to the number of brands in which we aggregate our categorical variable. In fact, the estimates of the magnitude of the segments in a latent multinomial logit model with eight segments groups the consumers in a way such that they almost coincide with the market share of each brand. But, we should notice that the specification admits more than eight segments in the market.

In summary, our study offers preliminary evidence about the generalizability of the previous results of empirical research using discrete-choice models. The results for the Spanish market are similar to the findings reported in previous research applied to the US and other high income country markets. In addition, the empirical results show that the degree of brand loyalty differs across brand, across segments within a brand and across category. The proposed model in this research enables us to distinguish the level of brand loyalty for each brand considered. From a managerial point of view, the estimation of a brand-specific loyalty variable is a useful tool for brand managers, i.e., this model enables comparisons of brand-loyalty levels vis-à-vis competitor brands. Finally, we find signs of unobservable household heterogeneity (Keane, 1997; Ailawadi, Gedenk and Heslin, 1999; Andrews, Ainslie and Currim, 2002).

Table 1. Model selection

Segments (S)	Log-likelihood	# parameters	BIC
Model: Preference heterogeneity			
1 (MNL)	-27,814	18	27,851
2 (MNL, latent 2)	-15,015	26	15,065
3 (MNL, latent 3)	-14,840	34	14,910
4 (MNL, latent 4)	-14,735	42	14,822
5 (MNL, latent 5)	-14,655	50	14,758
6 (MNL, latent 6)	-14,626	58	14,747
7 (MNL, latent 7)	-14,588	66	14,725
8 (MNL, latent 8)	-14,541	74	14,694
Model: Preference and response heterogeneity (in loyalty)			
1 (MNL)	-15,379	24	15,429
2 (MNL, latent 2)	-14,912	39	14,993
3 (MNL, latent 3)	-14,738	54	14,850
4 (MNL, latent 4)	-14,664	69	14,516
5 (MNL, latent 5)	-13,598	84	13,772

Table 2. Estimation results for non-fine laundry. Preference and response heterogeneity (in loyalty), tree-latent class.

	S=1, no heterogeneity		Segment 1	Segment 2	Segment 3
Worker	0.09 (0.07) 1.35	0.2 (0.10) 2.95***			
Size	-0.04 (0.03) -1.28	0.02 (0.05) 0.03			
Social Class	-0.15 (0.09) -1.75*	-0.52 (0.12) -4.24***			
Big purchase	0.25 (0.07) 1.35	0.21 (0.10) 2.02**			
Promo1	-1.69 (0.10) -17.48***	-1.58 (0.12) -13.55***			
Promo2	-0.39 (0.09) -4.43***	-0.41 (0.10) -4.03***			
Log(price)	-0.70 (0.08) -8.43***	-0.89 (0.06) -14.78***			
Loye1	5.60 (0.13) 42.39***		5.70 (0.19) 29.45***	5.14 (0.20) 25.81***	5.54 (0.07) 81.59***
Loye 3	7.07 (0.29) 24.46***		8.32 (1.01) 8.25***	6.73 (0.46) 14.56***	6.56 (0.09) 75.69***
Loye 4	6.26 (0.23) 27.61***		5.86 (0.37) 15.82***	6.50 (0.34) 18.93***	7.67 (0.34) 22.28***
Loye 5	0.58 (0.17) 3.44***		4.59 (0.21) 21.92***	6.28 (0.37) 17.05***	4.23 (0.24) 17.66***
Loye 6	5.77 (0.21) 27.56***		5.54 (0.29) 19.33***	5.41 (0.31) 17.49***	6.77 (0.44) 15.51***
Loye 7	5.82 (0.17) 1.24		4.48 (0.23) 19.47***	6.02 (0.22) 27.32***	9.20 (0.46) 19.92***
Loye 8	4.36 (0.09) 49.06***		3.60 (0.14) 24.83***	4.75 (0.20) 23.80***	5.15 (0.21) 24.57***
Segments size			0.41125738	0.40455552	0.18418710

Notes:

1. Table entries are value coefficient, standard error beneath in parentheses and t-statistic (* p<0.10, **p<0.05 y ***p<0.01).
2. Colon (brand 2) is the reference brand.
3. Additional variables: specific constant by segment and quarterly dummies.

References

Aaker, David A. 1991. *Managing Brand Equity: Capitalizing on the Value of a Brand Name.* New York: The Free Press.

Ailawadi, Kusum L., Karen Gedenk and Scott. A. Neslin. 1999. "Heterogeneity and Purchase Event Feedback in Choice Models: An empirical Analysis with Implications for Model Building." *International Journal of Research in Marketing* 16:177-198.

Allenby, Greg M. and Peter E. Rossi. 1991. "Quality Perceptions and Asymmetric Switching Between Brands." *Marketing Science* 10 (3):185-204.

Andrews, Rick L. Andrew Ainslie and Imran S. Currim. 2002. "An Empirical Comparison of Logit Choice Models with Discrete Versus Continuous Representations of Heterogeneity." *Journal of Marketing Research* 39 (November): 479-488.

Assael, Henry. *Consumer Behavior and Marketing Action.* 6rd ed. Cincinnati: South-Western (1998)

Ben-Akiva, Moshe and Steven R. Lerman. 1985. *Discrete Choice Analysis: Theory and Application to Travel Demand*. Cambridge. MA: MIT Press.

Cavero, Sandra and Javier Cebollada. 1997 "Las Estrategias de Captación y Retención de Clientes y la Lealtad. Un Análisis de Segmentación." *Revista Española de Investigación de Marketing* ESIC 1: 55-71.

Chaudhuri, Arjun. and Morris B. Holbrook. 2001. "The chain of Effects from Brand Trust and Brand Affect to Brand Performance: The Role of Brand Loyalty." *Journal of Marketing* 65 (April): 81-93.

Cunningham, Ross M. 1956 "Brand Loyalty-What, Where, How Much?" *Harvard Business Review* 34, (January-February): 116-128.

Day, George S. 1969. "A Two-Dimensional Concept of Brand Loyalty" *Journal of Advertising Research* 9 (September): 29-35.

Deshpande, R. and Webster, F. 1989. "Organizational Culture and Marketing:Defining the research Agenda." *Journal of Marketing* 43 (January).:3-15.

Dick, Alan S. and Kunal Basu. 1994. "Customer Loyalty: Toward an Integrated Conceptual Framework". *Journal of the Academy of Marketing Science* 22 (2): 99-113.

Ehrenberg, Andrew S.C, Gerald J Goodhardt and T. Patrick Barwise. 1990. “Double Jeopardy Revisited.” *Journal of Marketing* 45 (July): 82-91.

Erdem, Tülin. 1996. “A Dynamic Analysis of Market Structure Using Panel Data.” Marketing Science 15 (4): 359-78.

_____.and Michael P. Keane. 1996. “Decision-making Under Uncertainty: Capturing Dynamic Brand Choice Processes in turbulent Consumer Goods Markets.” Marketing Science 15 (1): 1-20.

_____. Ying Zhao and Ana Valenzuela. 2003. “Performance of Store Brands: A Cross-Country Analysis of Consumer Store Brand Preferences, Perceptions, and Risk”. *Journal of Marketing Research (in press).*

Guadagni, Peter M. and John D. Little. 1983. “A Logit Model of Brand Choice Calibrated on Scanner Data.” Marketing Science 2 (3): 203-238.

Gupta, Sunil. 1988 "Impact of Sales Promotions on When, What and How Much to Buy." *Journal of Marketing Research* 25 (November): 342-55.

Gupta, Sachin and Pradeep K. Chintagunta. 1994. “On Using Demographic Variables to Determine Segment Membership in Logit Mixture Models.” *Journal of Marketing Research* 31 (February): 128-136.

_____.Pradeep Chintagunta, Anil Kaul and Dick R Wittink. 1996 “Do Household Scanner Data Provide Representative Inferences from Brand Choices: A Comparison with Store Data.” *Journal of Marketing Research* 33, (November), 383-398.

Howard, John. A. and Jagdish N. Sheth. 1969. *The Theory of Buyer Behavior.* New York: John Wiley & Sons.

Hubbard, R., Vetter, D. and Little, E. 1998. “Replication in Strategic Management: Scientific Testing for Validity, Generalizability and Usefulness.” *Strategic Management Journal* 19 (3): 243-254.

Jacoby, Jacob and Robert W. Chestnut. 1978. *Brand loyalty: Measurement and Management.* New York: John Wiley & Sons.

_____. and David. B. Kyner. 1973. "Brand Loyalty vs Repeat Purchasing Behavior." *Journal of Marketing Research* 10 (February):1-9.

Jones, Morgan J. and Jane T. Landwehr. 1988. “Removing Heterogeneity Bias from Logit Model Estimation.” *Marketing Science* 7 (Winter): 41-59.

Kahn, Barbara E. Manohar U. Kalwani and Donald G. Morrison. 1986. “Measuring Variety-Seeking and Reinforcement Behaviors Using Panel Data.” *Journal of Marketing Research* 23 (May): 89-100.

Kamakura, Wagner A. and Gary J. Russell. 1989. “A Probabilistic Choice Model for Market Segmentation and Elasticity Structure” *Journal of Marketing Research* 26 (November): 379-390.

_____. and Gary J. Russell. 1993. "Measuring Brand Value with Scanner Data." *International Journal of Research in Marketing* 10 (1): 9-22.

Keane, Michael P. 1997. “Modeling Heterogeneity and State Dependence in Consumer Choice Behavior.” *Journal of Business and Economic Statistics* 15 (3): 310-27.

Kim, Jaehwan, Greg M. Allenby and Peter E. Rossi. 2002. “Modeling Consumer Demand for Variety.” *Marketing Science* 21 (Summer): 229-250.

Krishnamurthi, Lakshman and S. P. Raj. 1988 “A Model of Brand Choice and Purchase Quantity Price Sensitivities ” *Marketing Science* 7 (Winter): 1-20.

Lattin, James M. 1987. “A Model of Balanced Choice Behavior.” *Marketing Science* 6 (Winter): 48-65.

_____. and Randolph E. Bucklin. 1989 “Reference Effects of Price and Promotion on Brand Choice Behavior.” *Journal of Marketing Research* 26 (August): 299-310.

McAlister, L. 1982. “A Dynamic Attribute Satiation Model for Choices Made Across Time”, *Journal of Consumer Research* 9 (September): 141-50.

Mellens M., M. G. Dekimpe and J.-B.E.M. Steenkamp. 1996. "A Review of Brand-loyalty Measures in Marketing." *Tijdschrift Voor Economie in Management* 41 (4): 507-533.

Odin, Yorick, Nathalie Odin and Pierre Valette-Florence. 2001. “Conceptual and Operational Aspects of Brand Loyalty. An Empirical Investigation” *Journal of Business Research* 53, 75-84.

Ortmeyer, Gwen, James M. Lattin and David B. Montgomery. 1991. “Individual Differences in Response to Consumer Promotions.” *International Journal of Research in Marketing* 8: 169-186.

Porter, Michael. 1990. *The Competitive Advantage of Nations*. New York: The Free Press.

Seetharaman, P.B. Andrew Ainslie and Pradeep K. Chintagunta. 1999. “Investigating Household State Dependence Effects Across Categories.” *Journal of Marketing Research* 36, (November): 488-500.

Sloot, Laurens, Peter C. Verhoef and Philip Hans Franses. 2002. "The Impact of Brand and Category Characteristics on Consumer Stock-Out reactions." *Working Paper, Erasmus Research Institute of Management.* Report Series Research in Management

APPENDIX

Variables

The variables included in the analysis are grouped in the following five categories:

(1) Marketing-mix variables:

"Logpr" natural logarithm of price/weight. Weight is equal to one kilogram and price is sales price.

(2) Socio-demographic variables:

"Size" is a count variable that represents the size of the household, where value 5 identifies households with five or more members.
"Social class" is a dummy variable, where 0 represents low-medium class household and 1 value represents medium, medium-high and high class.
"Worker" is a dummy variable, where 1 identifies households with working housewife.

(3) Shopping behavior variable:

"*Bigpurchase*" is a dummy variable; value 1 is taken if the household category expenditure during the analyzed period would be higher than the average expenditure across all households, and 0 otherwise. The average expenditure in non-fine detergent 57.30 €.

(4) Loyalty variables:

Guadagni and Little (1983; p. 216) modeled observing past behavior as: "$Loye^{h}_{it}$"= λ $Loye^{h}_{it-1}$ + (1-λ) I^{h}_{it}, where $Loye^{h}_{it}$ measures brand loyalty for brand i for t-th purchase of consumer h. I^{h}_{it} is a dummy variable taking value 1 if customer h bought brand i at purchase occasion t-1, and 0 otherwise. Therefore, loyalty is taken to be the exponentially weighted average of past purchases of the brand, treated as 0–1 variables.

To start up brand loyalty, they set $Loye^{h}_{i1=}$ λ if the brand of alternative i was the first purchase in the data history of consumer h, otherwise (1-λ)/(number of brands – 1), thus insuring that the sum of loyalties across brands always equals 1 for a customer.

(5) Promotional lagged

"Promo1$^{h}_{it}$" is a dummy variable that detects the relative impact of previous purchase on promotion. The variable takes value 1 if consumer h's previous purchase was a promotional purchase of i brand, and 0 otherwise.
"Promo2$^{h}_{it}$" takes value 1 if customer h's second previous purchase was a promotional purchase of i brand, and 0 otherwise.

A.1. Descriptive statistics

Non-fine detergent category									
Brand	Ariel (1)	Colon (2)	Dixan (3)	Elena (4)	SB (5)	Skip (6)	Wipp (7)	O.B (8)	Total
Purchases occasions	4,652	2,980	2,239	1,946	6,418	2,095	3,308	9,608	33,246
Market share	0.19	0.09	0.07	0.05	0.12	0.07	0.11	0.30	1
Promotional purchases percentage (%)	26.61	40.64	42.16	40.65	0.72	40.19	32.16	19.66	24.14
Price/weight (€)	2.37	1.76	1.78	1.44	1	1.82	1.95	1.60	
Average	2.06	1.75	1.74	1.33	0.90	1.77	1.89	1.53	
Median									
Socio-demographic variables									
	Mean	SD							
Worker	0.32	--							
Social-class	0.83	--							
Size	3.71	0.96							
Big purchase	0.40	--							