Four essays on modeling brand choice and brand loyalty

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Introduction

Research focus

Numerous studies and publications in marketing research are dedicated to the concept of brand loyalty [Colombo and Morrison, 1989, Bhattacharya, 1997, Dekimpe et al., 1997, Chaudhuri and Holbrook, 2001]. This great interest in the empirical investigation of brand loyalty is mainly based upon its strong managerial relevance. It has been shown that brand manufacturers with a large loyal customer base have a competitive advantage [Aaker, 1991, Mellens et al., 1996] in that those customers exhibit a greater resistance against competitive actions [Dick and Basu, 1994], have a higher willingness-to-pay [Chaudhuri and Holbrook, 2001], and a lower price sensitivity with regard to the purchase incidence, but a higher sensitivity with regard to the purchase quantity decision [Krishnamurthi and Raj, 1991]. Therefore, many consumer packaged goods companies are considering brand building and improving brand loyalty as sound business policy [Yim and Kannan, 1999].

Research on single-category brand loyalty has been focused on dividing the market into groups of loyals and switchers. In the context of customer segmentation approaches to studying behavioral brand loyalty, several modeling approaches can be differentiated. Whereas Grover and Srinivasan [1987] and Colombo and Morrison [1989] estimate a zero-order brand choice and use observed brand shares as segmentation basis, McCarthy et al. [1992] and Yim and Kannan [1999] choose a first-order Markov modeling approach. With the multinomial logit formulation [Guadagni and Little, 1983] the classical approach for brand choice modeling is used by Grover and Srinivasan [1992]

and Dillon and Gupta [1996]. They estimate the impact of marketing mix variables on brand choice and segment customers on the basis of observed brand shares [Grover and Srinivasan, 1992] or intrinsic preference and response to the marketing mix [Dillon and Gupta, 1996].

However, the vast majority of studies on brand loyalty are limited to a single-category perspective. And this is despite the fact that there is an enormous amount of literature [Dichtl, 1974, Böcker, 1974, Böcker and Merkle, 1975, Böcker, 1975, Schnedlitz and Kleinberg, 1994, Russell and Kamakura, 1997, Ainslie and Rossi, 1998, Hruschka et al., 1999, Manchanda et al., 1999, Seetharaman et al., 1999, Russell and Petersen, 2000, Chib et al., 2002, Singh et al., 2005, Hansen et al., 2006, Song and Chintagunta, 2006, 2007, Niraj et al., 2008] on the cross-category relationships in consumers' decision-making using multi-category market basket models (see Russell et al. [1997], Russell et al. [1999], Seetharaman et al. [2005] and Boztuǧ and Silberhorn [2006] for a review and synthesis). The recognition of cross-category dependencies implies that consumers' purchase decisions are not independent across categories. A brand manufacturer's category-specific marketing activities are assumed to also have an impact on other products of the brand in other categories. Manufacturers' utilization of cross-category promotions and retailers' shelf-space allocation decisions across product categories within a store evidence this reality [Niraj et al., 2008]. The existing literature on multi-category models mainly focuses on the relations between purchase incidence decisions in several product categories [Chintagunta and Haldar, 1998, Manchanda et al., 1999, Russell and Petersen, 2000, Chib et al., 2002, Chung and Rao, 2003, Jedidi et al., 2003], or on cross-category related brand choice decisions [Ainslie and Rossi, 1998, Erdem, 1998, Erdem and Winer, 1999, Seetharaman et al., 1999, Erdem and Sun, 2002, Iyengar et al., 2003]. There is a lack of research, though, in the investigation of brand loyalty from a multi-category perspective.

Moreover, empirical studies on brand loyalty emphasize the systematic features and regularities of choice behavior in quantitative models. But this

approach is limited to modeling the impact of manifest observable variables on brand choice. The integration of latent descriptors [Walker, 2001, Ben-Akiva et al., 2002b] would allow a deeper and more realistic understanding of the formation of brand loyalty. Such approaches could incorporate several elements of cognitive processes that have been identified as important to the choice process.

This thesis is composed of four essays that pick up the delineated limitations of brand loyalty research. The essays 1 and 4 contribute to the research on brand choice modeling in that they frame this topic from the methodological side and investigate methodological extensions of the classical multinomial choice modeling approach. The essays 2 and 3 contribute to the research on brand loyalty in that they extend the focus of investigation on a multi-category perspective and on psychological determinants in terms of a deeper understanding of the individuals' choice process.

The multinomial logit model, which was mentioned above in the context of customers' loyalty segmentation, is by far the most widely used choice model. It is derived under some restrictive assumptions. The property of proportional substitution across alternatives or independence from irrelevant alternatives (IIA) respectively can be seen either as a restriction imposed by the model or as the outcome of a properly specified model that captures all sources of correlation over alternatives, so that only white noise remains [Train, 2003]. But in many cases it is not possible to capture all sources of correlation explicitly. The unobserved utility components are correlated and IIA does not hold. In these cases, a more general model than standard logit is needed. The most widely used member of such generalized extreme value (GEV) models is called nested logit. The **first essay** points attention to two different specifications of the nested logit model. It is shown in a simulation study that, dependent on the software package used for estimation, the estimation results differ and the consistency with the underlying random utility theory is not given.

Cross-category relations are utilized when transferring an established brand name, and thus, the brand's image and the trust customers give to this brand, on a new product [Erdem, 1998, Erdem and Sun, 2002, Czellar, 2003, Keller and Lehmann, 2006, Völckner and Sattler, 2006]. Any umbrella branding strategy [Erdem, 1998, Hakenes and Peitz, 2004, 2008], i.e., the practice of labeling products in more than one product category with a single brand name [Sullivan, 1990, Erdem, 1998], is based on the assumption of the existence of such cross-category brand loyalty relations. But there is a lack of empirical evidence. The literature on brand extensions [Broniarczyk and Alba, 1994, Czellar, 2003, Keller and Lehmann, 2006, Völckner and Sattler, 2006] undermines the managerial relevance and empirical need of further research in the area of such umbrella branding strategies. On this account, the focus of the **second essay** lies therein to quantify a brand's ability to leverage brand loyal customers across product categories within the whole product assortment the brand competes.

The **third essay** attends to the limited explanatory power of empirical studies on brand loyalty in that it starts to examine some psychological determinants of brand loyalty. As risk is a crucial factor in the context of choice decisions [de Palma et al., 2008], the third essay especially investigates the relationship between multi-category brand loyalty and customers' risk aversion, whereat the first part of the empirical study in the second essay is used as base of examination. Researchers have maintained a long interest in how risk aversion affects various behaviors. These behaviors also include brand choice [Tellis and Gaeth, 1990]. The probability of buying the same brand in multiple product categories is higher when customers can reduce a product's performance of quality uncertainty by relying on past experiences, by seeking more information, or by using brand names as quality cues [Erdem, 1998, Erdem and Swait, 1998, Erdem et al., 2006, Kumar et al., 2008]. With a focus on the relation between risk aversion and cross-category brand loyalty, the third essay examines individual personality traits, which are derived from the theoretical research and empirical work on consumers' decision-making styles [Sproles and Kendall, 1986, Siu and Hui, 2001, Walsh et al., 2001, Wesley

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et al., 2006], as determinants of brand loyalty .

The third essay addresses the issue of introducing latent descriptors as regards content and only uses a sequential estimation approach in its empirical study. Thus, there is still room for methodological improvement. The **fourth essay** now delivers a methodological outlook on how to integrate a latent factor structure into choice models. In this way, the latent factor structure and the choice model can be estimated simultaneously. The incorporation of psychological factors as determinants of brand choice leads to a more behaviorally realistic representation of the choice process, and consequently, better explanatory power [Walker, 2001, Ben-Akiva et al., 2002a,b]. Hence, the fourth essay presents opportunities for further research in the area of multi-category brand loyalty models.

Table 1 provides an overview of the research contribution, the research focus, the used data, and the objects of investigation for each of the four essays.

	Contribution to brand loyalty research	Research focus	Data	Hypotheses / Objects of investigation
Essay 1 Silberhorn et al. [2008]	Extension of segmentation models	Methodo-logical	Simulated data	Depending on the software used for the estimation of nested logit models, the estimated coefficients differ in value, and the overall results in their consistency with the underlying random utility theory.
Essay 2 Silberhorn [2009]	Extension to a multi-category perspective	Empirical	Behavioral data	Following signaling theory, a household's probability of brand loyal behavior in an extension product category increases with a rise of the brand's share of category requirements in the umbrella brand's parent product category.
Essay 3 Silberhorn and Hildebrandt [2009]	Extension to latent descriptors	Empirical	Behavioral & attitudinal data	The personality trait of risk aversion is a psychological determinant of cross-category brand loyalty.
Essay 4 Dannewald et al. [2008]	Extension to an integrated mode-ling approach	Methodo-logical	—	The hybrid choice model allows to integrate a latent factor structure in predictive choice modeling.

Table 1: Overview

Summaries

The **first essay** [Silberhorn et al., 2008] approaches the limitations of standard brand choice models from the methodological perspective. Discrete choice models describe decision makers' choices among alternatives [McFadden, 1974, Train, 2003]. The multinomial logit model is derived under the assumption that the unobserved factors in the model are uncorrelated over individuals [de Palma et al., 2008], as well as having the same variance for all alternatives. The development of other models has arisen largely to avoid the independence assumption within a standard logit model. Generalized extreme-value models are based on a generalization of identically and independently extreme-value distributed error terms. The nested logit model [Guadagni and Little, 1998, de Dios Ortúzar, 2001] places the alternatives into several groups called nests, with unobserved factors having the same correlation for all alternatives within a nest and no correlation for alternatives in different nests [Ben-Akiva and Lerman, 1985, Train, 2003].

The nested logit approach is rooted in transportation research [McFadden, 1978, Train, 1980, Bhat, 1997, Ben-Akiva and Bowman, 1998, Knapp et al., 2001] but is also adequate for issues and topics in marketing [McFadden, 1980, 1986, Kannan and Wright, 1991, Chintagunta, 1993, Chintagunta and Vilcassim, 1998, Guadagni and Little, 1998, Chib et al., 2004, Ailawadi et al., 2007, Foubert and Gijsbrechts, 2007, Zhang and Krishna, 2007]. In all situations where subsets of choice alternatives share unobservable utility components, the nested logit model can be used for estimation. This is usually the case with brand choice decisions [Anderson and de Palma, 1992, Kamakura et al., 1996, Baltas et al., 1997, Ailawadi and Neslin, 1998, Guadagni and Little, 1998, Sun et al., 2003]. Marginal and conditional choice decisions are combined via a hierarchical nesting structure [Hensher et al., 2005]. Segmentation approaches in brand loyalty research can be improved in that customers' segmentation in brand loyals or switchers can be based on nested logit rather than on multinomial logit brand choice modeling. Moreover, the nested logit model allows the specification of a brand choice decision nested in the brand

choice decision in another product category, and therefore, to quantify the asymmetric bivariate relations between two categories the investigated brand competes.

The first essay gives an introduction to the nested logit model and mainly points attention to the existence of two different specifications that have been of only little awareness so far [Koppelman and Wen, 1998a,b, Hunt, 2000, Heiß, 2002]. In many publications, the specification used is not explicitly mentioned. The utility maximization nested logit (UMNL) model and the non-normalized nested logit (NNNL) model have different properties which impact the estimation results. In a simulation study, the consequences of the usage of different software packages for model estimation on the estimation results is demonstrated. It is also shown that only the UMNL specification with an imposed parameter restriction is consistent with the underlying random utility theory.

Whereas most empirical studies on brand loyalty are limited to a single-category perspective, the **second essay** [Silberhorn, 2009] empirically examines the cross-category relations between revealed brand preferences in the context of a major national non-food brand's complete product assortment. This empirical study builds on the notion that brand manufacturers are increasingly trying to leverage their brands by cross-selling different product categories under an umbrella brand [Kumar et al., 2008]. Given the cost and failure rate of new product introductions especially in fast moving consumer goods (FMCG), such so called brand extension strategies [Hem et al., 2003] are an established and widespread tool to implement new products into the market [Völckner and Sattler, 2006]. Growth through brand leverage [Tauber, 1988] is a standard business practice for experience goods and has received a lot of interest in the marketing literature in recent years [Hakenes and Peitz, 2008].

The second essay also contributes to the research on umbrella branding in that the success of an umbrella branding strategy is investigated using GfK's

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household panel purchase data that tracks grocery purchases of $20,000$ panelists over a two-year period from January 2007 to December 2008. A major German non-food national brand is picked for estimation, resulting in 28 product categories the investigated brand occurs.

Signaling theory provides a framework for the underlying psychological processes in consumers' brand choice behavior and can contribute in the formation and explanation of loyalty to the brand in multiple categories. As the brand's high-quality image is leveraged across different product categories, the risk associated with new product introductions is reduced by the signaling effect of the brand name. But all this is **given** the existence of cross-category brand loyalty. This empirical study applies one step before and aims at giving empirical evidence for the existence of this phenomenon, i.e., determining whether there is a tendency for loyal consumers from one product category to be loyal to the same brand in other product categories as well. Therefore, the panel households' revealed brand preferences in all examined product categories are taken as basis for the development of a cross-category brand loyalty leverage index.

A category-specific net loyalty leverage index value mirrors the importance of each product under the umbrella brand in its ability to stimulate brand purchases in other product categories, and in its affection by other product categories. This study reveals stronger and weaker product categories in view of the brand's ability to leverage brand loyalty to other product categories. The brand's extensions to several, more or less related product categories proved to be successful in terms of leveraging brand loyal customers back and forth. There is evidence for both, product categories with a strong 'feedback' role within the brand's product offering, developing a larger attractive force towards other product categories than exhibiting tractive force towards the other categories, and product categories with a strong leading role, exhibiting a larger tractive force towards the other categories than receiving attraction from other product categories. The fact that the brand's parent product category does not take the leading role when it comes to pulling

other categories the brand competes, is a surprising result that demands managerial interest. Managerial implications on the allocation of advertising budgets and promotional activities are derived.

In the **third essay** [Silberhorn and Hildebrandt, 2009], consumer-specific psychological determinants of cross-category relations between brand loyal choice decisions are discussed. The rise of cross-category brand loyalty can be lead back to various behavioral approaches. Besides the interpretation of brand loyalty as habitual purchase behavior, the theory of perceived risk delivers an important explanation and is therefore denoted as a core concept of consumer behavior. The customer tries to minimize the risk associated with the purchase of a special brand [Roselius, 1971, Jacoby and Kaplan, 1972, Keller, 1998] by remaining loyal to the same brand in multiple product categories. Consumers offer their loyalty with the understanding that the brand will provide them utility through consistent product performance [Keller, 1998].

The empirical research on single-category brand loyalty delivers some general hypotheses on the determinants of cross-category brand loyalty. Besides external influences (e.g. marketing instruments), also individual-specific characteristics and personality traits (e.g. risk aversion) largely impact brand choice behavior. Earlier work on consumers' general decision-making styles [Sproles and Kendall, 1986] serves as source for the proposition of the research hypotheses. It is argued that consumers' status quo bias, i.e. their habitual orientation towards consumption, as well as consumers' novelty consciousness and innovativeness are personality traits indicating their risk-taking propensity. In an empirical study, the concept of risk aversion is considered as the key determinant of cross-category brand loyalty.

The third essay ties to the second essay in that the segmentation of the panel households into cross-category brand loyals and non-loyals is based on parts of the before mentioned empirical study. These data are merged with GfK's 2006 household panel survey data on attitudes and personality

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traits. A principal component analysis with the attitudinal items reveals several decision-making styles which are then used as explanatory variables in a multivariate logistic regression on multi-category brand loyalty. Consumers' risk aversion is derived indirectly from their innovativeness and status quo bias. A dichotomous behavioral segmentation variable based on revealed preference data is used as group identifier in several t-tests, and as dependent variable in the logistic regression. The results are quite intuitive: Risk averse consumers, identified by their propensity to habitual decision-making and their low innovativeness, stay loyal to a brand in multiple categories to reduce the risk associated with the choice decision. These results are especially important for brand managers in the context of brand extensions. The brand has to reduce perceived risk by becoming a credible and consistent symbol of product quality.

The second and third essay do not use highly sophisticated methods on modeling brand choice behavior, but rather contribute to the brand loyalty research with regard to contents. Built on the results from the second (empirical evidence for cross-category brand loyalty) and the third essay (latent constructs as determinants of cross-category brand loyalty), the **fourth essay** [Dannewald et al., 2008] now provides a complex and demanding approach to model brand choice and consider latent descriptors simultaneously. That way, this so called hybrid choice model encounters the shortcomings of traditional choice models in that it incorporates latent constructs as explanatory variables.

In the fourth essay, the hybrid choice model is introduced to the broad marketing audience. Traditional choice models assume that observable behavior results from an unspecified evaluation process of the observed individual. When it comes to the revelation of this process mere choice models rapidly meet their boundaries, as psychological factors (e.g., personality traits like, consumers' perceptions, or attitudes towards products) are not directly measurable variables and therefore cannot offhand be integrated within the model structure. The causal-analytic approach offers the possibility to specify not

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directly measurable factors as latent variables, and can thus reasonably supplement choice models.

So far, methodological approaches investigating latent variables, and traditional choice models have been perceived and largely applied independently of one another. Such a sequential estimation process (as also used in the third essay) leaves the covariation between the manifest items and the choice decision unconsidered [Ashok et al., 2002]. Moreover, the adjusted latent variables are not without measurement errors. To overcome these issues, first methodological steps towards the integration of these approaches were already taken by Walker [2001] and Ben-Akiva et al. [2002a,b]. Silberhorn et al. [2007], Walker et al. [2007] and Temme et al. [2008] already applied the hybrid choice model in empirical studies.

The fourth essay presents a promising methodology to combine predictive choice modeling as examined in essay 1 [Silberhorn et al., 2008] with a latent factor structure as used in essay 3 [Silberhorn and Hildebrandt, 2009]. The possibilities of an integration of latent variables into traditional choice models is pointed out, and an introduction into the modeling of hybrid choice models is provided. Furthermore, potential areas of application in marketing research are outlined. Further research in the application of the hybrid choice model is in preparation [Silberhorn et al., 2010].

Essay 1

Estimation with the nested logit model: specifications and software particularities

Nadja Silberhorn, Yasemin Boztuǧ, Lutz Hildebrandt

Essay 2

Does umbrella branding really work? Investigating cross-category brand loyalty

Working Paper

Nadja Silberhorn

2.1 Introduction

Brand manufacturers are continuously searching for innovative ways to achieve and retain competitive advantage. Launching new products or increasing the sales volume and profits of those products already existing in the market can be attractive growth strategies. In the latter case, the focus can lie on the augmentation of the trial purchase rate (new customer attraction), or of the repeat purchase rate in that the share of loyal customers has to be escalated. Whereas, due to factors such as high advertising costs and the increasing competition for shelf space, succeeding with new products has become very difficult [Aaker, 1991, 1996], the increase of brand loyalty comes to a lower price and brings about some important benefits.

Brand loyal customers are a market entry barrier for potential new brands, and a brand switching barrier for brands already competing in the market [Delgado-Ballester and Munuera-Aleman, 1999]. It is those loyal customers who create a range of monopolistic price setting behavior, who offer cross-selling potential, and who contribute to new customer acquisition by positive word-of-mouth [Wildner and Twardawa, 2008]. Brand-loyal customers may be willing to pay more for a brand because they perceive some unique value [Chaudhuri and Holbrook, 2001], and are less price sensitive with regard to the choice decision but more price sensitive to the quantity decision [Krishnamurthi and Raj, 1991]. Altogether, a brand's loyal customer base is regarded as a company's strategic asset [Mellens et al., 1996].

Building on the notion that a brand is an intangible, market-based asset that can be leveraged with options to expand and extend the brand, on the other side, growth can also be reached by introducing new products into the market. Given the enormous cost and the extreme high failure rate of new product developments especially in fast moving consumer goods (FMCG) categories, brand extension[1] strategies have been developed to better implement new products into the market [Völckner and Sattler, 2006]. A motivation to extend a brand is to leverage the equity of an established brand to relatively easily develop profitable products [Balachander and Ghose, 2003]. The brand's image is leveraged across different product categories resulting in higher success rates than product introductions with a new brand. So when launching new products, an approach to reduce the risk for the company is to follow a brand extension strategy [Hem et al., 2003]. Extending brands beyond the original product category is determined to be more profitable and requires lower expenses such as advertising costs, trade deals, and price promotions [Tauber, 1988, Aaker, 1991, Völckner and Sattler, 2006]. Nevertheless, the success of such umbrella branding strategies is uncertain and, dependent on the product category, failure rates of brand extensions may be up to 80% [Völckner and Sattler, 2006].

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[1]Brand extension is the use of established brand names to launch new products [Völckner and Sattler, 2006].

The success of the brand extension depends on the ability to transfer parent brand awareness and associations to the extension [Aaker, 1991, Erdem, 1998]. Numerous studies on the drivers of brand extension success [Aaker and Keller, 1990, Broniarczyk and Alba, 1994, Hem et al., 2003, Völckner and Sattler, 2006] found evidence that parent-brand characteristics and the fit between parent brand and transfer product are the main and most influential factors driving brand extension success. Several empirical studies point to the fact that consumers' quality perceptions of the parent brand will be most likely transferred to the brand extension if the two product categories are perceived to fit [Aaker and Keller, 1990, Loken and John, 1993]. The transfer of these quality perceptions is the key in umbrella branding [Wernerfelt, 1988]. To assist consumers in their choice decision by signaling product quality, the same brand name is used for several products [Erdem, 1998, Erdem and Swait, 1998]. The reciprocal effect of brand extensions, i.e., the affection of the quality perception of the parent brand by the use experience with the extension product, has been underresearched so far. Our research contributes here in that we also investigate reciprocal relations (albeit no quality perceptions but choice probabilities) between several products under the same umbrella brand.

In empirical studies on the drivers of brand extension success, the ability of a brand to transfer its brand loyal customers from the parent to the extension category has been widely neglected. Brand loyalty can be regarded as a consequence of the underlying assumption of customers transferring their quality perceptions, their brand knowledge, and their experience with the brand from one category to the other [Erdem and Swait, 1998]. We aim at finding empirical evidence that consumers who are loyal to the brand in the leading (parent) product category show a higher probability to be loyal to that same brand in another (extension) category compared to those consumers who are not loyal in the leading category.

Signaling theory can contribute in the formation and explanation of cross-category brand loyalty. But this is already the second step, given that this

phenomenon does exist at all. We now focus on the first step and aim at giving empirical evidence for the existence of cross-category brand loyalty when considering all products under the umbrella brand. Without existence, the argumentation of signaling theory in the context of brand loyalty would grasp at nothing. Therefore, the purpose of this research is to provide some insights into cross-category loyalty for brands operating in multiple product categories. We want to determine whether there is a tendency for loyal consumers from one category to be loyal in other categories as well, or whether behavior is solely dependent on the product category. At this point, we do not aim at investigating the drivers of cross-category brand loyal behavior or the characteristics of cross-category brand loyal customers and refer to Silberhorn and Hildebrandt [2009] for personality traits as determinants of cross-category brand loyalty. Managerial implications, e.g., on the allocation of advertising budgets (see Erdem and Sun [2002], Balachander and Ghose [2003] for the investigation of advertising spillover effects in umbrella branding) are to be derived.

From the methodological side, we contribute in that we develop a measure to quantify the overall loyalty relations of any product under the umbrella brand with each other category the brand competes. With this new and unique approach, we are able to quantify the role and strength of each umbrella branded product with respect to its integration within the umbrella brand's product assortment in terms of brand loyalty leverage.

This paper is structured as follows: First, we give a brief overview over the conceptual and theoretical background of umbrella branding and derive our research hypotheses. The subsequent section focuses on the measurement of brand loyalty and introduces the share of category requirements approach as basis for customers' loyalty segmentation. In an empirical study using purchase data from a household panel we then investigate the existence of cross-category brand loyalty and discuss the cross-category brand loyalty relations of a major national non-food brand. We conclude with a summary and managerial implications, as well as some limitations and ideas for further

research.

2.2 Umbrella branding and signaling theory

Brand manufacturers are increasingly trying to leverage their brands by cross-promoting and cross-selling different product categories under an umbrella brand [Kumar et al., 2008]. The introduction of new products by labeling more than one product with a single brand name reaches a share of over 90% in many fast moving consumer good product categories [Sattler et al., 2005]. Umbrella branding is a form of economies of scope, as it economizes on the costs of creating a new brand [Cabral, 2007]. Growth through brand leverage [Tauber, 1988] is a standard business practice for experience goods and has received a lot of interest in the marketing literature in recent years [Hakenes and Peitz, 2008]. The marketing literature on brand extensions and umbrella branding is concerned with the sources of success and failure of these marketing instruments [Aaker and Keller, 1990]. It owes its success the fact that consumers make inferences from the characteristics, most important the quality of a product, observed in one product to the characteristics of others under the same umbrella brand [Hakenes and Peitz, 2004]. An umbrella brand can help consumers in their decision-making for new products when quality information is missing. Brand extensions work because all products under the umbrella contribute to the brand's reputation [Sullivan, 1990].

For brand manufacturers, brand extensions are a way to reduce the risk associated with new product introductions [Völckner and Sattler, 2006]. Many researchers have investigated the success factors of brand extensions [Aaker and Keller, 1990, Smith and Park, 1992, Broniarczyk and Alba, 1994, Reddy et al., 1994, Sattler and Zatloukal, 1998, Sattler, 2001, Hem et al., 2003, Sattler et al., 2003, Sattler and Völckner, 2003, Völckner and Sattler, 2006]. Amongst others, the transfer of parent brand associations to the extension [Aaker and Keller, 1990, Aaker, 1991, Reddy et al., 1994] has been identified as important determinant of the brand extension's success. Research suggests that consumer evaluations of the parent brand have an impact on the

perceived quality of the extension [Aaker and Keller, 1990, Loken and John, 1993]. These evaluations, especially consumer quality perceptions, are most likely to be transferred if the consumers perceive the extension to fit with the parent brand [Völckner and Sattler, 2006].

2.2.1 Theoretical background

The transfer of quality perceptions across products with the same brand name is the key in Wernerfelt's [1988] signaling theory of umbrella branding, which is built on the premises of existing uncertainty about product quality, and of consumers' believe that the extension of a high-quality brand is likely to be of high quality as well. Experimental and empirical work in the marketing literature shows that the signaling argument of umbrella branding is broadly consistent with the data [e.g., Reddy et al., 1994, Erdem, 1998, Balachander and Ghose, 2003]. Erdem [1998] applies this theory in that she develops a model of consumer learning under product quality uncertainty, which allows for quality perceptions to be correlated across categories. She finds evidence for consumer learning of quality through use experience across the two categories of toothbrushes and toothpaste.

The need to transfer quality perceptions arises from uncertainty about the true product quality because of asymmetric and imperfect information [Erdem et al., 2006]. Even after product usage, this uncertainty may still persist as some product attributes may not be fully revealed [Erdem and Swait, 1998]. Assuming that consumers dislike uncertainty, this uncertainty about product quality may induce perceived risk [Anand, 2003] in that consumers have to bear the risk of getting a low quality product. As consumers tend to be risk averse in most contexts [Rao and Bergen, 1992, Shimp and Bearden, 1982], and as strong brands are associated with higher perceived quality [Aaker, 1991], brands can reduce perceived risk by becoming symbols of product quality [Montgomery and Wernerfelt, 1992, Erdem and Swait, 1998, Erdem et al., 2006]. The clarity and credibility of brands as signals of product quality decrease this consumer perceived risk [Erdem and Swait,

1998, Erdem et al., 2006]. All products under the same umbrella brand may profit from 'brand credibility' as the key characteristic of a brand signal in that their expected utility and choice probability increases [Montgomery and Wernerfelt, 1992].

But why does umbrella branding work? Why do consumers associate their quality perceptions with the parent brand to any other product (if perceived to fit to the parent brand) under the same brand name? It is because of the reciprocal effect on the parent brand [Loken and John, 1993, Balachander and Ghose, 2003]. Parent brand perceptions and the parent brand's choice probability are expected to be affected by the extension. Negative use experience with an extension product due to poor quality will have a negative impact on the reputation of the parent brand. Consumers would then conclude that all other products with the same brand name are also of low quality, which threatens the profits from these other products [Erdem and Sun, 2002, Balachander and Ghose, 2003]. Firms cannot dare to offer low-quality products as these may harm the brand's overall image. Thus, in the case of umbrella brands, experience with any of the products is expected to affect the (positive) quality perceptions of other products that share the same brand name [Erdem, 1998].

The managerial relevance of umbrella branding results from the formation of consumer quality perceptions across product categories and their impact on consumer brand choice. Firms offering products in several product categories can use the brand name of an established and successful product for a new product, assuming that they have a good quality reputation [Erdem, 1998]. Consumers may be informed about the quality of brand extension by using the brand name as quality cue [Wernerfelt, 1988, Erdem, 1998, Erdem and Swait, 1998, Erdem et al., 2006]. Experience with the parent product provides consumers with information about the new product. Moreover, Erdem and Sun [2002] give evidence for the existence of marketing-mix spillover effects for umbrella branded products, resulting in an enhanced effectiveness of marketing-mix activities. Sullivan [1990] was the first to

present non-experimental evidence for spillovers in umbrella-branded products. Consumers are even loyal to a multiproduct firm when it does not offer a product that matches their preferences better than a product of competing firms [Anand and Shachar, 2004]. Anand and Shachar [2004] examine a new source of brand loyalty, called 'excess loyalty', based on a firm's profile. Morrin [1999] shows that brand extensions can modify the perceived profile of a multiproduct firm.

The framework of signaling theory proposes that brand loyalty is a consequence of brand equity, defined as the added value a brand gives a product [Erdem and Swait, 1998]. Consumers offer their loyalty with the understanding that the brand will provide them utility through consistent product performance [Keller, 1998]. They trust in the brand and its promise [Chaudhuri and Holbrook, 2001]. For the customer the brand is an indicator for a constant quality [Erdem and Swait, 1998]. Any product under the same umbrella brand is associated with high perceived quality whereby the perceived risk assigned to the product is decreased. Thus, the expected utility increases and motivates consumers to buy the same brand repeatedly. It is this increase in expected utility that underlies the value of a brand signal to consumers [Erdem and Swait, 1998]. Taken this as legality for any umbrella branded products, the existence of cross-category brand loyalty has been widely assumed in that explanations and determinants of this phenomenon are well discussed in the literature.

2.2.2 Hypotheses

There is a theory explaining a phenomenon whose existence has not yet been empirically confirmed in the context of an umbrella brand's complete product assortment. We fill this gap in that our approach is coming from the opposite direction. We examine cross-category brand loyalty in an empirical study with a data set covering 28 product categories in which a selected umbrella brand's products compete. Our contribution lies therein to quantify the cross-category brand loyalty relations between the products under the

umbrella brand, and thus, give empirical evidence for the theoretical argumentation of the underlying psychological process.

From the signaling theory approach we derive the following general hypotheses:

> H1: Consumers, who are loyal to the brand in the parent product category, exhibit a higher probability to also be loyal to that same brand in any extension product category, compared to consumers who are not loyal to the brand in the parent product category.

> H2: Consumers, who are loyal to the brand in an extension product category, exhibit a higher probability to also be loyal to that same brand in the parent product category, compared to consumers who are not loyal to the brand in the extension product category.

Parent brand experience and parent brand conviction have been identified as drivers of brand extension success [Völckner and Sattler, 2006]. Additionally following the argumentation of the signaling theory, the signaling effect of the umbrella branded product in the parent product category is highest. The core competence product is decisively responsible for the brand's equity and, therefore, for the pure existence of the brand's extension potential. On account of this, we hypothesize that

> H3: The probability to be loyal to the brand in any extension product category, given loyalty to the brand in the parent product category, is higher than the probability to be loyal to the brand in the parent product category, given loyalty to the brand in any extension product category.

> H4: The parent product category has a higher signaling role within the umbrella brand's product assortment than any of the extension products under the umbrella brand.

H5: The overall reciprocal signaling effect is highest on the parent product category.

The comparison of a branded product's overall signaling effect on all the other products under the same umbrella brand and the overall impact it receives, in terms of reciprocal signaling effects, from all the other products under the same umbrella brand yields to a net signaling balance. In line with H3 we finally hypothesize that

H6: The parent product category has a positive net signaling balance.

The hypotheses H1, H2, and H3 are addressed in section 2.4.5, the hypothesis H4 in section 2.4.6.2, the hypotheses H5 in section 2.4.6.3, and the hypothesis H6 in section 2.4.6.4 of the empirical study. Preliminary to the empirical study starting in section 2.4, we introduce our measure of brand loyalty in the subsequent section.

2.3 Measuring brand loyalty

The brand loyalty concept has been of enduring concern to both marketing practitioners and academics [Day, 1969, Wind and Frank, 1969, Jacoby and Chestnut, 1978, Aaker, 1991, Oliver, 1999, Chaudhuri and Holbrook, 2001]. Loyalty comes in many forms: contractual loyalty, transactional loyalty, functional loyalty, and emotional loyalty. The most widespread and largely supported conceptual definition of brand loyalty was presented by Jacoby and Chestnut [1978]. According to this definition, brand loyalty is: *"The (a) biased, (b) behavioral response, (c) expressed over time, (d) by some decision-making unit, (e) with respect to one or more alternative brands out of a set of such brands, and (f) is a function of psychological (decision-making, evaluative) processes,"* [Jacoby and Chestnut, 1978, p.80]. While there is a considerable agreement on the conceptual definition of brand loyalty, no standardized perspective to measure it has yet emerged. A vast overview of indices of brand loyalty can be found in Jacoby and Chestnut [1978]. These measures

can be classified (amongst others) into proportion-of-purchase, sequence-of-purchase, and probability-of-purchase measures. Mellens et al. [1996] discuss each of Jacoby and Chestnut's six requirements for brand loyalty in somewhat more detail and describe a systematic two-dimensional classification of brand loyalty measures. They distinguish between behavioral and attitudinal measures, and individual-oriented vs. brand-oriented measures, resulting in four main categories of brand loyalty measures (see table 2.1).

Behavioral loyalty is the willingness of the average consumer to repurchase the brand and is reflected in the repeated purchases of the brand. A consumer's degree of brand loyalty is inferred from her observed purchase behavior [Bhattacharya, 1997, Dekimpe et al., 1997, Chaudhuri and Holbrook, 2001]. In contrast, attitudinal loyalty refers to the level of commitment of the average consumer toward the brand [Jacoby and Chestnut, 1978] and includes a degree of dispositional commitment in terms of some unique value associated with the brand. The focus herein lies on the underlying evaluative and cognitive processes when interpreting a given purchasing decision as evidence of brand loyalty [Dekimpe et al., 1997, Chaudhuri and Holbrook, 2001]. Most often, brand loyalty - neglecting its attitudinal component - is measured according to the past purchasing patterns of customers [Chaudhuri and Holbrook, 2001]. So the majority of all brand loyalty measures are behavioral [Bhattacharya, 1997]. Behavioral measures are easier and less costly to collect than attitudinal data (especially relevant when studying the evolution of brand loyalty over an extended period of time) [Dekimpe et al., 1997]. Several publications introduce [Colombo and Morrison, 1989] or investigate [Bhattacharya et al., 1996, Dekimpe et al., 1997] possible measures for behavioral loyalty.

It becomes clear, that THE one and only brand loyalty measures does not exist, and that researchers and managers have to decide appropriate to the data availability and the context which measure to use. The share of cate-

	Attitudinal	Behavioral
Brand-oriented	Stated purchase intentions	Measures based on aggregated data
	Preference measures	(switching matrices, market shares)
	Commitment measures	Measures based on individual-level data
Individual-oriented	Measures on category level	Proportion-of-purchase measures
	General measures	Sequence-of-purchase measures

Table 2.1: *Main categories of brand loyalty measures*

gory requirements[2] measure has long been used as a metric of brand loyalty in the context of consumer packaged goods [Fader and Schmittlein, 1993] and has become an important metric of customer relationship strength [Du et al., 2007]. According to Rundle-Thiele and Mackay [2001] the share of category requirements measure is significantly strongly associated with the attitudinal brand preference measure, thus somehow combining attitudinal and behavioral aspects of brand loyalty as already postulated by Day [1969].

The **share of category requirements** (SCR) [Fader and Schmittlein, 1993, Bhattacharya, 1997, Yim and Kannan, 1999, Danaher et al., 2003, Stern and Hammond, 2004, Jung et al., 2009] captures the relative share of category purchases that individual households give to each brand they buy [Stern and Hammond, 2004], defined to be each brand's market share. The SCR measure indicates how much the customers of each brand satisfy their product needs by purchasing a particular brand rather than buying competing alternatives [Uncles et al., 1994]. Because of its simplicity and widespread use by brand managers and in academic research [e.g., Bhattacharya et al., 1996, Danaher et al., 2003, Stern and Hammond, 2004, Du et al., 2007], the SCR measure is a very common loyalty measure [Bhattacharya, 1997].

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[2]Du et al. [2007, p.96] define share of category requirements as the ratio of a customer's requirements for a particular category of products from a focal supplier to the customer's total requirements for products from all suppliers in the category (i.e., total category requirements).

Although the SCR measure[3] is generally reported at an aggregate level, several studies use it on an individual level [e.g., Du et al., 2007]:

$$SCR_{hicT} = \frac{\sum\limits_{t \in T} q_{hict}}{\sum\limits_{k} \sum\limits_{t \in T} q_{hkct}} \tag{2.1}$$

where SCR_{hicT} is household h's share of category requirements for brand i in category c during time period T, q_{hict} is the quantity of brand i purchased in category c by household h on purchase occasion t (where t is an index of all purchase occasions during time period T), and k is an index for all brands in the category.

The SCR as we use it can be classified as individual-oriented behavioral proportion-of-purchase measure according to table 2.1. Behavioral brand loyalty is of great importance when it comes to customer segmentation. According to their brand-specific SCR measure consumers can be segmented as first choice buyers (FCB), second choice buyers (SCB), and competitive choice buyers (CCB) with respect to a specific brand within a product category.

First choice buyers are those buyers of a brand who buy this brand the most in terms of the amount purchased of this particular brand in that category. In case of two brands with equal amounts, the monetary value spent on this brand is of relevance. Second choice buyers are those buyers of a brand who made purchases of that brand within a certain time period, but did not assign their highest preference to that brand in terms of the purchased total amount. The investigated brand is just an additional choice besides some other majorly preferred brand. Competitive choice buyers are those buyers who did not purchased this particular brand during the investigated time period at all. They rather chose one or more competitive brands in that product category.

Studies of the GfK Panel Services reveal that consumers' share of category

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[3]For detailed descriptions of the equation we refer to Bhattacharya et al. [1996].

requirements for their first choice brand has decreased from 71% in 1989 to 62% in 2007. And this is despite the fact that the average number of different brands purchased by a household within a product category has only little increased from 2.9 to 3 brands, although the number of competing brands has almost doubled within this period [Wildner and Twardawa, 2008].

The share consumers assign to a particular brand is one important aspect in the context of brand loyalty measurement. A second issue, though, is to account for different shopping types in terms of buying rates (see, e.g., heavy, average, and light buyers in Parfitt and Collins [1968]). Only the combination of category purchase frequencies and share of category requirements can bring important insights into consumers' brand loyal purchase behavior and arising customer potential. In our successional empirical study, we suggest a median split of households according to category purchase frequencies into frequent and seldom buyers.

2.4 An approach to estimate cross-category brand loyalty leverage in FMCG

In general, consumers are likely to be attracted to a product with a familiar brand name and form an impression-based expectation for what the product is like based on this name before considering the product's specific attributes and their relation to the product category with which the brand is associated [Yeung and Wyer, 2005]. Brand extension is an attempt, in part, to exploit the loyalty to the parent brand and to supposedly lower the company's risk of new product failure [Rundle-Thiele and Mackay, 2001]. Taking this into account, the prerequisite of a successful brand extension is the capability to draw the brand's loyal customers from the original product category to the newly introduced product in another category, i.e., to turn single-category brand loyal customers into cross-category brand loyals [Mundt et al., 2006].

With this empirical study, we combine research in umbrella branding, brand

extensions, and brand loyalty. Here we contribute in that the brand loyalty aspect, to the best of our knowledge, has been widely neglected in the empirical analysis of the determinants of successful brand extensions. Even though we do not investigate success factors of brand extensions in general (like, e.g., Völckner and Sattler [2006]), we do point attention to the existence of cross-category brand loyalty, which has to be considered when thinking about extending the brand or evaluating the success of a brand extension. Furthermore, in umbrella branding, firms take advantage of their reputation for quality by using the brand name of an established product for a new good. Within the signaling theory framework brand loyalty is regarded as a consequence of the added value a brand gives a product [Erdem and Swait, 1998]. Though, the empirical evidence of the existence of cross-category brand loyalty in the context of the complete product assortment under an umbrella brand has not yet been given.

In principle, our measure is based on the brand's share of category requirements [Bhattacharya, 1997, Jung et al., 2009]. According to that, we assign each panel household to the first, second, or competitive choice buyer segment for each product category separately. We propose that brand loyal (first choice) buyers of a brand exhibit a higher probability to also be brand loyal to that same brand in another category. Taking the behavior of the second or competitive choice buyers as baseline, we calculate the differences in conditional probability to be a first choice buyer in any other product category, given being a first choice buyer in the investigated product category. Significant differences are weighted depending on the probability level they emerge and summed up for all categories the brand competes. Detailed descriptions of the construction of our loyalty leverage measures follow in the sections 2.4.6.2 and 2.4.6.3.

2.4.1 The data set

Our data were provided by GfK SE. The household panel covers $20,000$ representative panel households in Germany. Our data includes the households'

2007 and 2008 self-reported FMCG purchase data. To account for panel membership duration the data are weighted with a continuous mass weight[4]. Reported are purchases of the household leader. This study does not distinguish between the decision makers, the buyers, and the users within a panel household. Still using our household panel data we could think of only selecting one-person households for analysis to overcome this mentioned issue.

Before starting with our analyses, we applied some general data screening criteria to improve data quality and adequateness. The data cover $1,290$ different brand names, one of them being the 'store brand' labeled brands. Store brand purchases are included and coded such that each store's store brand is treated as an individual brand. For the store brands we use the sub-brand label as identifier, leading to an additional 190 sub-brands. Altogether, we end up with $1,479$ different brands in 28 product groups in our basic data set.

Our data cover all purchases in those categories one major national brand in the FMCG non-food sector competes. This brand's core competence is in the area of body care. For a long time, the brand solely was competing in this market, before it was extended within an umbrella branding strategy to several other, more or less related product groups. We want to investigate each umbrella branded product's integration within the product assortment in that we identify cross-category umbrella brand loyal households and quantify the brand's ability to leverage loyal customers across product categories back and forth. Therefore, we start with investigating all the 28 product groups in the data set where our brand of interest occurs.

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[4]For example, a panel household with the continuous mass weight of 3.75 is representative for 3.75 households in the population in the whole evaluation period. Any analyses that are based on the household and its behavior or use the household's behavior as basis for segmentation, are weighted with this continuous mass weight.

2.4.2 Measuring aggregated overall purchase behavior

We counted each household's number of different shopping days over the two year examination period, regardless of the number of items purchased, the location of purchase, or the purchase volume. Households with a total of less than four shopping days during the two year examination period and not at least two shopping days in each of the years are not of interest and were eliminated, leading to 19, 098 remaining panel households for our investigations.

According to the median value of 28 shopping days in the two year observation period, households were then grouped into 'frequent' or 'seldom' buyers. This distinction holds true for any of the following analyses. To get an initial impression about the importance of the brand in the groups under investigation, for each household we first counted the total number of different product groups purchased, and second counted the number of product groups where our brand was purchased. Figure 2.1 plots the results.

The circle size in figure 2.1 represents the number of households. There is a remarkable number of households that does not buy the brand in any of their purchased product groups. The majority of households shows purchases in 5 to 15 different product groups with brand purchases in up to half of them.

The width of the product group spectrum may be susceptible for substitutional relations between product groups. Therefore, purchases in a high number of the 28 product groups become very unlikely. For this reason, we clustered the 28 product groups in 9 product categories (visage, beaute, hair, body, sun, hand, deo, clean, men). This clustering is data-based in that we cross-tabulated purchase frequencies for the 28 product groups against the brand's subbrands that represent different product categories. The product groups are then assigned to the product category with their only occurrence or with their highest occurrence frequency.

Along the lines of the plot in figure 2.1, figure 2.2 plots the corresponding

Figure 2.1: *Number of product groups with brand purchases (vertical axis) plotted against total number of product groups purchased (horizontal axis)*

results for the 9 product categories. All cells of the lower triangle are now taken. Nevertheless, there still is a considerable share of households that indeed exhibit a category preference, but do not buy our brand.

Now that we know that there are lots of households that purchase the brand in several product categories, our goal is to investigate the households' purchase intensity of the brand. How important in terms of purchase volume share is the brand in any of the 9 product categories? Figure 2.2 only displays the number of product categories where any brand purchase occurred. It does not display if these brand purchases are just a single item purchase of that brand in the two-year observation period, or if the brand is heavily purchased in that respective product category. Therefore, in the following section we calculate each household's share of category requirements in any of the 9 product categories that is dedicated to our brand.
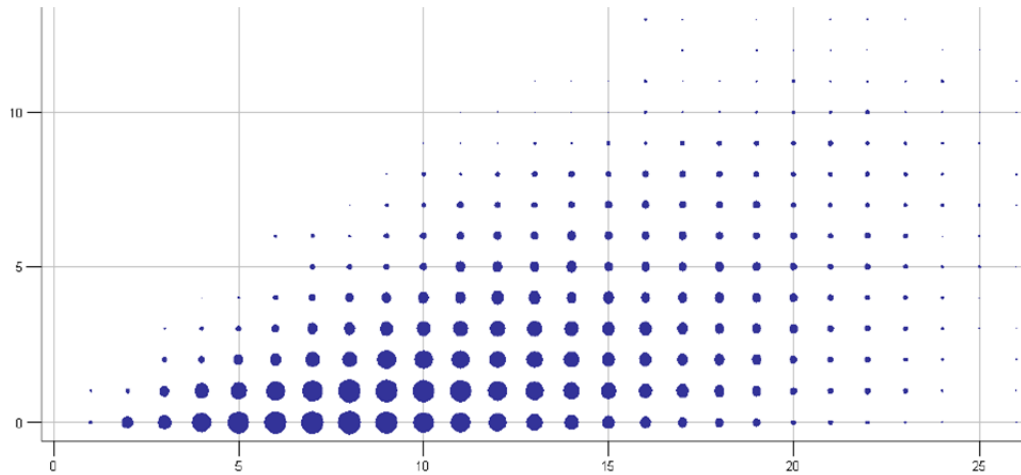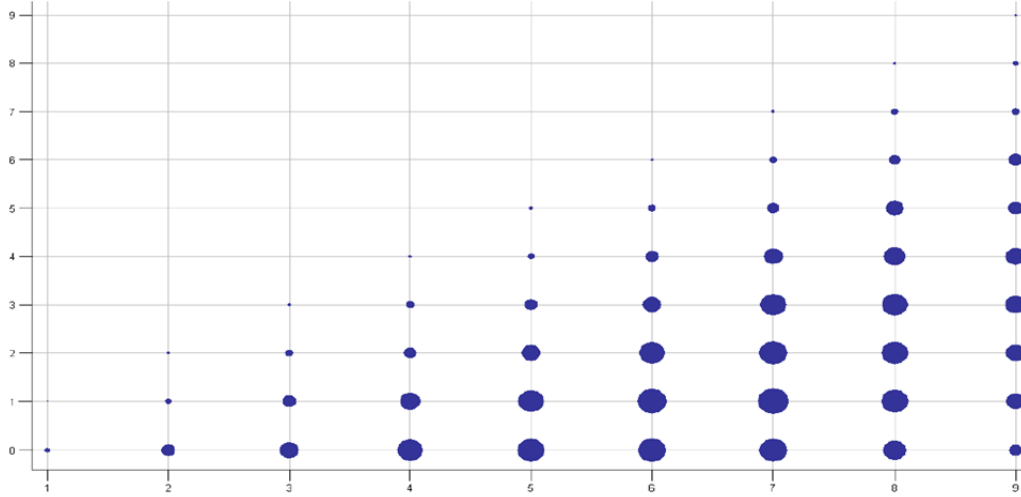
Figure 2.2: *Number of product categories with brand purchases (vertical axis) plotted against total number of product categories purchased (horizontal axis)*

2.4.3 Measuring aggregated category-specific brand loyalty

To shed more light on households' purchase behavior within each of the 9 product categories and also to start investigating households' loyalty behavior, we calculate the share of category requirements SCR_{hicT} for the brand i for each household h for any category c over the observation period T according to equation (2.1). A household h is finally assigned as first choice buyer (FCB), second choice buyer (SCB), or competitive choice buyer (CCB) for brand i in category c according to the following rules:

$$FCB_{ic} \text{ if } SCR_{hicT} \neq 0 \text{ and } SCR_{hicT} > SCR_{hjcT} \text{ for any } j \neq i$$
$$SCB_{ic} \text{ if } SCR_{hicT} \neq 0 \text{ and } SCR_{hicT} < SCR_{hjcT} \text{ for any } j \neq i$$
$$CCB_{ic} \text{ if } SCR_{hicT} = 0$$

Separately for frequent ($n = 10,473$) and seldom ($n = 8,626$) buyers, the tables 2.2 and 2.3 show the shares of first choice buyers, second choice buyers,

and competitive choice buyers of the investigated brand, as well as households that did not purchase (no choice) within each category.

For both, frequent and seldom buyers, the highest proportion of no choice

	FCB	SCB	CCB	choice	no choice
visage	**0.10**	0.16	0.58	0.84	0.16
beaute	**0.01**	0.10	0.81	0.91	0.09
hair	**0.07**	0.35	0.57	0.99	0.01
body	**0.20**	0.22	0.51	0.92	0.08
sun	**0.06**	0.03	0.45	0.54	0.46
hand	**0.03**	0.04	0.57	0.64	0.36
deo	**0.09**	0.20	0.64	0.92	0.08
clean	**0.06**	0.34	0.60	0.99	0.01
men	**0.21**	0.16	0.35	0.73	0.27

Table 2.2: *Relative frequencies of frequent buyers* ($n = 10,473$)

occurs in the sun product category. This should be due to the seasonality effect because sun lotion, after sun products, and self-tanning lotion strongly underlie seasonal variations. Hand care products also exhibit large shares of no choice which might be due to the fact that people regard hand care as less important than body, hair, and facial care, or use general care products for their hands rather than specialized hand care products.

Leaving out those households that do not exhibit any category preference, we re-calculate the shares of first choice, second choice, and competitive choice buyers among those households that made category purchases during the two year observation period (tables 2.4 and 2.5).

Among the category buyers, the highest shares of first choice buyers occur in the men (shaving equipment or men's deodorant) and in the body (body lotion, body gel, after depilatory creme) category. The exposed status of the men category may be the due to the special target market of its products.

	FCB	SCB	CCB	choice	no choice
visage	**0.06**	0.04	0.40	0.50	0.50
beaute	**0.00**	0.02	0.63	0.65	0.35
hair	**0.05**	0.15	0.72	0.91	0.09
body	**0.17**	0.08	0.46	0.71	0.29
sun	**0.03**	0.01	0.25	0.28	0.72
hand	**0.01**	0.01	0.29	0.31	0.69
deo	**0.06**	0.07	0.58	0.71	0.29
clean	**0.05**	0.15	0.75	0.95	0.05
men	**0.13**	0.07	0.29	0.49	0.51

Table 2.3: *Relative frequencies of seldom buyers ($n = 8,626$)*

The brand's core competence lies in body care products and was extended over decades to various other product categories. In the tables above it becomes obvious that the brand does not play a significant role in the beaute category. The brand's extension to this category has not (yet) established itself with regard to brand loyalty. This fact leaves room for speculation if the beaute category is too far away from the brand's core competence, and therefore, the brand name is not able to attract the brand's loyal customers in this area.

What the results in the tables 2.2 to 2.5 do not tell is whether there are first choice buyers within a category that are also first choice buyer in another category. The displayed results are only category-specific and do not allow to draw any conclusions on cross-category brand loyal behavior. The subsequent section is devoted to this aspect.

	FCB	SCB	CCB	choice	n
visage	**0.11**	0.20	0.69	1.00	_8,781_
beaute	**0.01**	0.11	0.88	1.00	_9,566_
hair	**0.07**	0.35	0.58	1.00	_10,392_
body	**0.22**	0.23	0.55	1.00	_9,679_
sun	**0.10**	0.06	0.84	1.00	_5,679_
hand	**0.04**	0.06	0.89	1.00	_6,680_
deo	**0.09**	0.21	0.69	1.00	_9,622_
clean	**0.06**	0.34	0.60	1.00	_10,415_
men	**0.29**	0.23	0.49	1.00	_7,606_

Table 2.4: _Relative frequencies of frequent buyers with category preference_

	FCB	SCB	CCB	choice	n
visage	**0.12**	0.09	0.79	1.00	_4,332_
beaute	**0.00**	0.04	0.96	1.00	_5,615_
hair	**0.06**	0.16	0.78	1.00	_7,871_
body	**0.24**	0.11	0.65	1.00	_6,106_
sun	**0.09**	0.03	0.88	1.00	_2,424_
hand	**0.05**	0.02	0.93	1.00	_2,692_
deo	**0.09**	0.09	0.82	1.00	_6,100_
clean	**0.05**	0.16	0.79	1.00	_8,209_
men	**0.27**	0.13	0.59	1.00	_4,253_

Table 2.5: _Relative frequencies of seldom buyers with category preference_

2.4.4 Measuring aggregated cross-category brand loyalty

So far, we have not yet crossed the product category boarders in the examination of brand loyalty. But the existence of households that are loyal to products of the umbrella brand not only in one but in multiple categories is a prerequisite for any further investigations. On this account, we now examine households' first choice buying behavior over the 9 product categories.

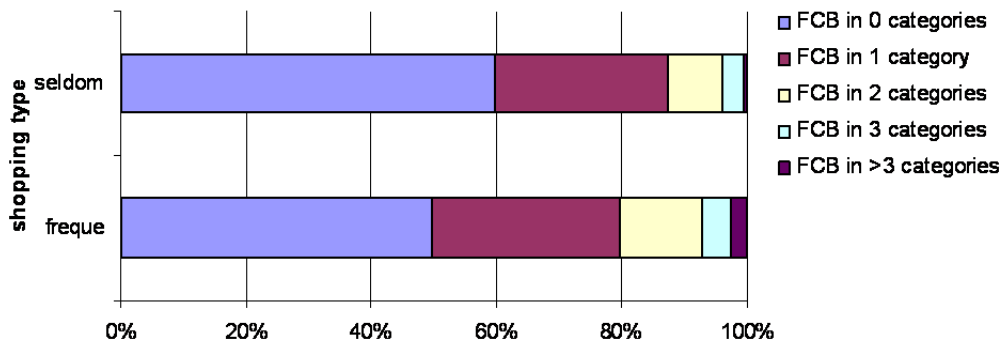Figure 2.3 underlines the assumption that there do exist customers that ex-

Figure 2.3: *Distribution of the number of categories where a household is the first choice buyer*

hibit brand loyalty in more than just a single product category. About 20% of the frequent shoppers ($n = 10,473$ households with at least 28 shopping trips in the two-year observation period) and 13% of the seldom shoppers ($n = 8,626$ households with at least 4 and a maximum of 27 shopping trips in the two-year observation period) dedicate their largest share in terms of purchase volume to our investigated brand in at least two different product categories. As the number of first choice buyer categories strongly depends on the total number of categories purchased, in the figure 2.4 we therefore

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additionally differentiate between the number of categories purchased.

Figure 2.4 displays that frequent buyers have to purchase in at least four different categories to exhibit cross-category first choice buying behavior. The majority (about 1/3) of frequent buyer households purchases in 8 of the 9 product categories, and also high numbers of households purchase in 7 or even 9 categories. One fifth to one fourth of these households are first choice buyers in at least two different categories. Both, the total number of households that are first choice buyers in at least 4 product categories, and the relative share within the respective buyer segment is comparably low. The majority (about 1/4) of seldom buyer households purchases in 6 of the 9 product categories, and also high numbers of households purchase in 5 or 7 categories. Again, both, the total number of households that are first choice buyers in at least 4 product categories, and the relative share within the respective buyer segment is very low.

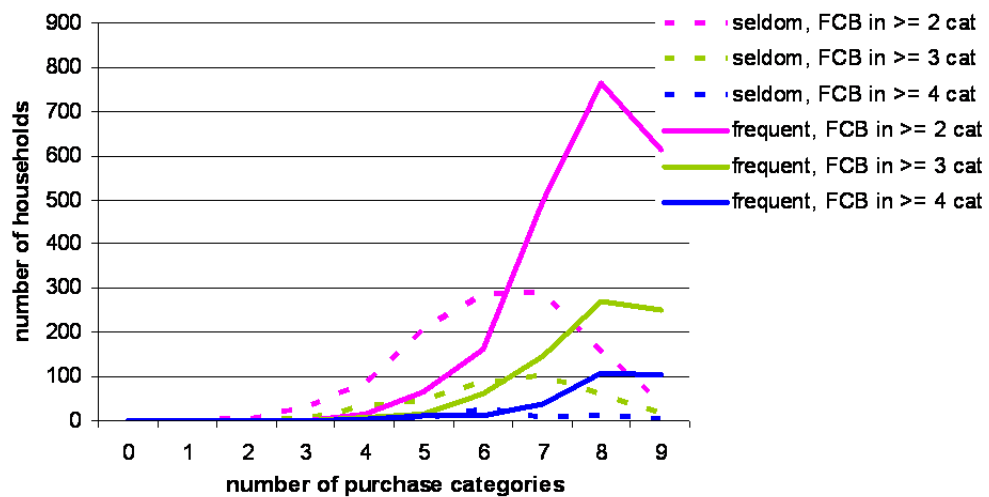Up to now, these initial results show that about 20% of the panel households

Figure 2.4: *FCB purchase behavior in total numbers (n = 10,473 frequent buyers, and n = 8,626 seldom buyers)*

do exhibit first choice buying behavior in multiple categories. Although a minimum number of purchases in 4 categories is needed to find evidence for the existence of cross-category brand loyalty. But in general, we provide evidence that the share of cross-category brand loyal customers cannot be neglected.

2.4.5 Measuring disaggregated cross-category brand loyalty

Subsequently, we leave the general perspective of cross-category brand loyalty and focus our view on any of the 9 product categories and their relations among each other separately. We aim at quantifying each category's role and strength in terms of its integration within the loyalty structure of the brand's product portfolio. Are there product categories in which customers exhibit a significantly higher share of loyalty to the umbrella branded product if they are also loyal to the umbrella brand in some other product category?

In this section, we examine our initially proposed research hypotheses H1 and H2 by (1) investigating the occurrence and relevance of cross-category brand loyalty, and (2) determining a household's probability to be brand loyal, i.e., to be a first choice buyer, in a product category provided she is also brand loyal in another category. It is also of interest, whether we find differences between product categories. Assuming that the sample's descriptive frequency statistics can be used for inferences about the underlying population, and thus, be taken as probability values, we derive the following hypotheses:

> H1a: If a household is a *first choice buyer* of the brand in the parent category, her probability to also be a *first choice buyer* of the brand in any extension category is higher compared to a household that is a *competitive choice buyer* of the brand in the parent category.
> $\rightarrow Prob(FCB_{ext}|FCB_{par}) > Prob(FCB_{ext}|CCB_{par})$

H1b: If a household is a *first choice buyer* of the brand in the parent category, her probability to also be a *first choice buyer* of the brand in any extension category is higher compared to a household that is a *second choice buyer* of the brand in the parent category.

$\rightarrow Prob(FCB_{ext}|FCB_{par}) > Prob(FCB_{ext}|SCB_{par})$

H2a: If a household is a *first choice buyer* of the brand in any extension category, her probability to also be a *first choice buyer* of the brand in the parent category is higher compared to a household that is a *competitive choice buyer* of the brand in the extension category.

$\rightarrow Prob(FCB_{par}|FCB_{ext}) > Prob(FCB_{par}|CCB_{ext})$

H2b: If a household is a *first choice buyer* of the brand in any extension category, her probability to also be a *first choice buyer* of the brand in the parent category is higher compared to a household that is a *second choice buyer* of the brand in the extension category.

$\rightarrow Prob(FCB_{par}|FCB_{ext}) > Prob(FCB_{par}|SCB_{ext})$

H3a: The probability to be a *first choice buyer* of the brand in any extension category, given being a *first choice buyer* of the brand in the parent category is higher than vice versa for the case of the comparison of *first and competitive choice buyers* of the brand.

$\rightarrow Prob(FCB_{ext}|FCB_{par}) - Prob(FCB_{ext}|CCB_{par}) >$
$Prob(FCB_{par}|FCB_{ext}) - Prob(FCB_{par}|CCB_{ext})$

H3b: The probability to be a *first choice buyer* of the brand in any extension category, given being a *first choice buyer* of the brand in the parent category is higher than vice versa for the case of the comparison of *first and second choice buyers* of the

brand.

$$\rightarrow Prob(FCB_{ext}|FCB_{par}) - Prob(FCB_{ext}|SCB_{par}) >$$
$$Prob(FCB_{par}|FCB_{ext}) - Prob(FCB_{par}|SCB_{ext})$$

We start with a cross-tabulation of segment membership (FCB, SCB, or CCB) frequencies for any possible combination of two categories, followed by a calculation of relative frequencies. As our data set is a quota sample ($n = 20,000$) of the total population and is representative in terms of the investigated attributes, we view the probability of a certain outcome as the frequency with which that outcome occurs in the long run, when the drawing from the population is repeated a large number of times (law of large numbers).

Our aim of research requires the calculation of conditional probabilities. For frequent buyers, table 2.6 displays the conditional probabilities of being a first choice buyer in the respective category (columns), given the category-specific purchase behavior in any category under investigation (lines). For example, the value 0.12 in the first line (visage FCB) and the third column (FCB hair) means that if we take any of the $n = 1,008$ households that is a first choice buyer in the visage category, with a probability of 12% this chosen household is also a first choice buyer in the hair category. On the other hand, if we take the third line (visage CCB) as basis, we get the result that choosing any of the $n = 6,059$ households that is a competitive choice buyer in the visage category with a probability of 6% she is also a first choice buyer in the hair category. The corresponding results for seldom buyers are available upon request, but not displayed here.

Both, for frequent and seldom buyers, the categories body, men, and visage exhibit the highest conditional probabilities, whereas the beaute category does not attract first choice buyers of the brand. To further investigate our hypotheses, we need to compare the conditional probabilities in the FCB and the CCB lines for the body category (H1a), and in the FCB and the SCB lines for the body category (H1b), as well as the FCB and CCB conditional probability values in the body category for any extension category (H2a),

and the FCB and SCB conditional probability values in the body category column for any extension category (H2b).

frequent $Pr(FCB_c\|behavior_{c^*})$			FCB visage	FCB beaute	FCB hair	FCB body	FCB sun	FCB hand	FCB deo	FCB clean	FCB men
c^*	behavior	n									
visage	FCB	1,008		0.02	0.12	0.37	0.14	0.07	0.17	0.14	0.28
visage	SCB	1,715		0.01	0.09	0.24	0.07	0.04	0.12	0.08	0.26
visage	CCB	6,059		0.00	0.06	0.16	0.04	0.02	0.07	0.05	0.19
beaute	FCB	53	0.32		0.24	0.34	0.09	0.03	0.36	0.23	0.39
beaute	SCB	1,065	0.20		0.12	0.24	0.10	0.05	0.14	0.11	0.27
beaute	CCB	8,448	0.08		0.06	0.19	0.05	0.03	0.08	0.05	0.20
hair	FCB	724	0.17	0.02		0.32	0.10	0.08	0.15	0.18	0.32
hair	SCB	3,674	0.11	0.01		0.22	0.06	0.04	0.11	0.07	0.26
hair	CCB	5,994	0.08	0.00		0.18	0.05	0.02	0.07	0.04	0.16
body	FCB	2,113	0.18	0.01	0.11		0.09	0.05	0.14	0.13	0.27
body	SCB	2,264	0.11	0.01	0.08		0.05	0.03	0.11	0.07	0.24
body	CCB	5,302	0.06	0.00	0.05		0.05	0.02	0.07	0.03	0.17
sun	FCB	590	0.24	0.01	0.12	0.32		0.07	0.14	0.15	0.29
sun	SCB	346	0.15	0.01	0.12	0.21		0.03	0.10	0.08	0.26
sun	CCB	4,744	0.08	0.00	0.06	0.17		0.03	0.08	0.05	0.20
hand	FCB	292	0.24	0.01	0.20	0.39	0.15		0.11	0.16	0.28
hand	SCB	434	0.16	0.01	0.10	0.24	0.09		0.09	0.10	0.28
hand	CCB	5,954	0.09	0.00	0.07	0.18	0.05		0.09	0.06	0.20
deo	FCB	914	0.19	0.02	0.12	0.31	0.09	0.04		0.17	0.33
deo	SCB	2,055	0.11	0.01	0.10	0.22	0.06	0.03		0.07	0.29
deo	CCB	6,653	0.08	0.00	0.05	0.17	0.05	0.02		0.04	0.17
clean	FCB	654	0.21	0.02	0.20	0.41	0.13	0.07	0.23		0.41
clean	SCB	3,525	0.12	0.01	0.09	0.25	0.07	0.04	0.11		0.29
clean	CCB	6,236	0.07	0.00	0.04	0.15	0.04	0.02	0.06		0.14
men	FCB	2,186	0.13	0.01	0.11	0.26	0.08	0.04	0.14	0.12	
men	SCB	1,715	0.08	0.00	0.06	0.21	0.07	0.03	0.09	0.05	
men	CCB	3,705	0.08	0.00	0.05	0.16	0.04	0.02	0.06	0.03	

Table 2.6: *Conditional probabilities of first choice buying behavior of frequent buyers*

We can only capture the cross-category impact of brand loyalty when comparing probability values, not when taking the absolute values of the conditional probabilities. The conditional probability of being a first choice buying household in category c, given being a first choice buying household in category c^* has to be related to a reference conditional probability value ('baseline' value), e.g., the conditional probability of being a first choice buying household in category c, given being a competitive buying household in category c^*. If the difference between those two values is very small or not significant, the loyalty behavior in category c is independent of the loyalty behavior in category c^*, regardless of the absolute value of the conditional probability. The differences between the two respective conditional probabilities are displayed in table 2.7 for H1a and H2a (FCB-CCB), and in table 2.8 for H1b and H2b (FCB-SCB).

The differences were tested on their statistical significance under the null hypothesis that the shares of first choice buyers in the respective category are equal, i.e., that there is no difference between the conditional probabilities. The t-test assesses whether the means of two groups are statistically different from each other. Even though we do not test the difference of means but rather the difference of (conditional) probabilities here, the t-test is appropriate, because the (conditional) probabilities are the share of first choice buyers (see Simonson and Tversky [1992] for a similar approach). First choice buyers are coded as '1', all else are coded as '0'. Calculating the mean of this variable returns the share of first choice buyers. A group test statistic for the equality of conditional probabilities is reported for equal and unequal variances. So before deciding which test is appropriate, a test for equality of variances was conducted ($\alpha = 0.05$) for any of the cases above. Depending on the results of these tests, the adequate t-test statistic was used, i.e., either the one for equal variances, or the one for unequal variances. The tables 2.7 and 2.8 display the significant absolute differences in conditional probabilities. These differences are a valuable measure to quantify the relation between two categories. As the absolute differences may differ from both directions, the matrices are asymmetric.

	visage	beaute	hair	body	sun	hand	deo	clean	men
visage(f)		0.02***	0.06***	0.21***	0.10***	0.05***	0.11***	0.09***	0.09***
visage(s)		0.01**	0.03**	0.14***	—	0.04***	0.08***	0.10***	—
beaute(f)	0.24***		0.18***	0.15***	—	—	0.28***	0.17***	0.19**
beaute(s)	0.28**		—	0.18*	0.18*	−0.02***	—	−0.05***	—
hair(f)	0.09***	0.01***		0.14***	0.05***	0.06***	0.09***	0.14***	0.16***
hair(s)	0.04**	—		0.12***	—	—	0.07***	0.09***	0.12***
body(f)	0.12***	0.00**	0.06***		0.04***	0.03***	0.07***	0.09***	0.10***
body(s)	0.06***	0.00**	0.04***		0.02***	—	0.05***	0.07***	0.06***
sum(f)	0.16***	—	0.06***	0.14***		0.05***	0.06***	0.09***	0.08***
sum(s)	—	—	—	0.12***		—	—	0.05*	—
hand(f)	0.14***	—	0.13***	0.20***	0.09***		—	0.10***	0.08**
hand(s)	0.14***	0.00***	—	0.09*	—		—	0.06*	0.14***
deo(f)	0.12***	0.02***	0.07***	0.14***	0.04***	—		0.12***	0.15***
deo(s)	0.09***	—	0.06***	0.13***	—	—		0.05***	0.05**
clean(f)	0.14***	0.02***	0.16***	0.26***	0.09***	0.05***	0.17***		0.27***
clean(s)	0.12***	0.00***	0.10***	0.23***	—	0.02**	0.06***		0.15***
men(f)	0.06***	—	0.05***	0.10***	0.03***	0.02***	0.08***	0.09***	
men(s)	0.04***	—	0.05***	0.10***	—	0.02***	0.05***	0.07***	

(f) frequent buyers
(s) seldom buyers

*** significance at α = 0.01
** significance at α = 0.05
* significance at α = 0.10

Table 2.7: *Differences between the conditional probabilities of first choice buyers and competitive choice buyers* ($\Delta(FCB - CCB)$)

According to table 2.7, for frequent buyers the hypothesis H1a (line body(f)) holds true in all cases but one. Only in the beaute category there is no difference in conditional probabilities. The picture does not change largely when investigating the seldom shoppers (line body(s)). The differences are lower in value, though, and we find one difference (hand category) that is lacking significance. The brand's parent category of body care products underlines its important position. The first choice buyers in the body category exhibit a significantly higher probability to also be a first choice buyer in any of the extension categories compared to competitive choice buyers in the body category.

> H1a cannot be rejected for frequent shoppers in all but the beaute category.

> H1a cannot be rejected for seldom shoppers in all but the beaute and hand category.

The results displayed in the body column of table 2.7 give empirical evidence for the hypothesis H2a. Both frequent and seldom shoppers exhibit a significantly higher probability to also be brand loyal in the parent body category if they are already loyal in any extension category, compared to competitive choice buyers in the respective extension category. Again, the differences in conditional probabilities are higher in value for the frequent than for the seldom shoppers.

> H2a cannot be rejected for frequent shoppers in all extension categories.

> H2a cannot be rejected for seldom shoppers in all extension categories.

Before examining the differences between first and second choice buyers (see table 2.8), we shortly look at the other results displayed in table 2.7. The insignificant results for frequent buyers all occur when the beaute or hand product category is involved. Taking the beaute category as basis, the changes in

conditional probabilities for the sun and hand category are not significant, and taking the hand category as basis, the changes for beaute and deo category are not significant. On the other hand, the conditional probabilities for being a first choice buyer in the beaute category do either exhibit significant but only small changes when comparing competitive and first choice buyers in the basis category, or do not change significantly at all. A similar picture is revealed for the conditional probabilities in the hand product category. The exceptional positions of the beaute and the hand category may be due to the relatively small number of first choice buyer households in those categories ($n = 53$ for beaute, and $n = 292$ for hand). Moreover, the hand category additionally suffers from a high share of households that do not buy at all in the category (see tables 2.2 and 2.3).

	visage	beaute	hair	body	sun	hand	deo	clean	men
visage(f)		—	0.03*	0.13***	0.07***	0.02**	0.05***	0.06***	—
visage(s)		—	—	0.09***	−0.05***	—	0.04*	0.11***	—
beaute(f)	0.12**		0.13**	0.10**	—	—	0.21***	0.11*	—
beaute(s)	0.27**		—	—	0.18*	−0.04**	—	−0.12***	—
hair(f)	0.06***	0.01**		0.10***	0.04***	0.04***	0.04***	0.11***	0.07***
hair(s)	−0.04*	—		0.09***	—	—	—	0.08***	0.08***
body(f)	0.07***	0.00*	0.03**		0.03***	0.03***	0.03*	0.06***	—
body(s)	0.02*	—	—		—	—	—	0.07***	0.06***
sun(f)	0.09***	—	—	0.10**		0.04**	—	0.07***	—
sun(s)	—	—	—	0.15***		—	—	—	—
hand(f)	0.08**	—	0.09***	0.14***	0.05*		—	0.06**	—
hand(s)	—	—	—	—	—		—	—	—
deo(f)	0.08***	0.02***	—	0.10***	0.03**	—		0.09***	—
deo(s)	0.03*	—	—	—	—	—		0.03*	−0.05**
clean(f)	0.10***	0.01**	0.11***	0.17***	0.06***	0.03***	0.12***		0.12***
clean(s)	0.08***	−0.01***	0.04**	0.08**	—	—	0.03*		—
men(f)	0.05***	0.01***	0.05***	0.05***	—	—	0.05***	0.07***	
men(s)	—	0.01**	0.04***	—	—	—	—	0.06***	

(f) frequent buyers
(s) seldom buyers

*** significance at $\alpha = 0.01$
** significance at $\alpha = 0.05$
* significance at $\alpha = 0.10$

Table 2.8: *Differences between the conditional probabilities of first choice buyers and second choice buyers* $(\Delta(FCB - SCB))$

Similar to the results in table 2.7 (comparison of FCB and CCB) table 2.8 (comparison of FCB and SCB) displays that frequent buyers that are first choice buyers in the parent body category exhibit a significantly higher probability to also be first choice buyers in any extension category when compared to second choice buyers in the parent body category (H1b). Besides the lack of a difference in conditional probabilities in the beaute category, the difference in the men category is also non-existent. For the seldom shoppers we only find three extension categories with significant differences: visage, clean, and men. In the clean category the difference is even larger in value than for frequent shoppers, and in the men category the significance of the difference is appearing.

> H1b cannot be rejected for frequent shoppers in all but the beaute and men category.

> H1b cannot be rejected for seldom shoppers in the visage, clean, and men category.

The results displayed in the body column of table 2.8 give empirical evidence for the hypothesis H2b. Frequent shoppers exhibit a significantly higher probability to also be brand loyal in the parent body category if they are already loyal in any extension category, compared to second choice buyers in the respective extension category. For seldom shoppers, we do not find significant differences in the beaute, hand, deo, and men category.

> H2b cannot be rejected for frequent shoppers in all extension categories.

> H2b cannot be rejected for seldom shoppers in the visage, hair, sun, and clean category.

Compared to the values in table 2.7, the differences between first and second choice buyers are lower in value, both for frequent and seldom shoppers. This is consistent with the assumption that buyers that at least have brand experience (second choice buyers) in a category, have a higher propensity to

be first choice buyers in any other category than those customers that do not have brand experience (competitive choice buyers).

Again, we have a look at the other results in table 2.8. For frequent buyers, only when the hair or clean product category is the basis category we get significant differences in any case. Besides the categories beaute and hand (as mentioned above), the categories sun, deo, and men now also suffer from insignificant results. Especially the results for the men category are noteworthy. The conditional probabilities for being a first choice buyer in the men category do not change significantly when comparing second and first choice buyers in the basis category, with the exception of hair and clean as basis category. Albeit the beaute category delivers significant results as basis category (see tables 2.7 and 2.8), the difference in conditional probability to be a first choice buyer in the beaute category, given a second choice vs. a competitive choice buyer in any basis category is either of a very small size or not significant. Altogether, when comparing first choice and competitive choice buyers, we do get significant differences in first choice buying probabilities for all categories.

So far, we have given evidence that, overall, brand loyal customers (first choice buyers) in the brand's parent category, exhibit a significantly higher probability to also be brand loyal in any of the extension categories, compared to competitive choice buyers in the parent category. The differences in first choice buying propensity are smaller when comparing first and second choice buyers in the parent category, and are mainly significant for frequent choice buyers. Vice versa, brand loyal buyers in any extension category exhibit a consistently significantly higher probability to also be brand loyal in the parent body category. This holds also widely true for seldom shoppers.

Following the argumentation of signaling theory, we have hypothesized (H3) that the matrix of conditional probabilities is asymmetric in that the probability to be loyal to the brand in any extension product category, given loyalty to the brand in the parent product category, is higher than vice versa. If we

compare the values in the body category line with those in the body category column both in the table 2.7 for the difference between first and competitive choice buyers, and in the table 2.8 for first and second choice buyers, we have to reject H3 for any case.

> H3a has to be rejected for frequent and seldom shoppers in all extension categories.

> H3b has to be rejected for frequent and seldom shoppers in all extension categories.

This means that if we randomly select a household that is brand loyal in any extension category, the probability that this household is also brand loyal in the parent product category is higher than the probability for a randomly selected parent category brand loyal household to also be brand loyal in any extension category. A joint occurrence of parent category and extension category brand loyalty is more likely among those who are brand loyal in an extension category than vice versa.

Our contribution up to this point lies in the proof of existence and in the quantification of the bilateral cross-category loyalty relations between the products under the umbrella brand. Hence, we have given empirical evidence for the theoretical argumentation of the underlying psychological process in signaling theory. Consumers exhibit a higher probability to be loyal to the brand in some extension product category if they are brand loyal in the parent product category, and vice versa. If we assume that any household becoming a first choice buyer behaves like a first choice buying household in our sample (statistical inference), we can derive the managerial implication that any marketing activity to increase the share of brand loyal customers in the parent category of body care involves positive effects in any of the extension categories, and vice versa.

The arising question now is whether this positive spillover effect is only true for the bilateral relation between the parent category and any one extension category, or also appears within the complete product assortment. Therefore,

in the subsequent section, we take all the bilateral relations a category can have (in our case one category has bilateral relations with 8 other categories) and generate an overall general measure for the brand's category-specific power in terms of cross-category loyalty leverage.

2.4.6 Quantifying the category-specific brand loyalty leverage force

In this section, we examine our initially proposed research hypotheses H4, H5, and H6 by quantifying the integration of the brand within the umbrella brand's product assortment by investigating the brand's ability to leverage brand loyal customers between product categories.

H4a: Comparing *first and competitive choice buyers* of the brand, the body product category has a higher loyalty tractive force than any extension product category under the umbrella brand.

H4b: Comparing *first and second choice buyers* of the brand, the body product category has a higher loyalty tractive force than any extension product category under the umbrella brand.

H5a: Comparing *first and competitive choice buyers* of the brand, the body product category has a higher loyalty attractive force than any extension product category under the umbrella brand.

H5b: Comparing *first and second choice buyers* of the brand, the body product category has a higher loyalty attractive force than any extension product category under the umbrella brand.

H6a: Comparing *first and competitive choice buyers* of the brand, the body product category has a positive net loyalty leverage force.

H6b: Comparing *first and second choice buyers* of the brand, the body product category has a positive net loyalty leverage force.

Investigating this, we may find evidence for an accentuated product category within the multiproduct firm's umbrella branded product portfolio, besides or instead of the parent product category.

So far, we have given evidence for different conditional probabilities of first choice buying of the umbrella brand. In the next section, we are no longer focusing on bilateral non-causative relations, and rather assume causal multilateral relations between the choice behavior in the investigated categories. Our goal is to derive directions of brand loyalty leverage between product categories. But as correlations do not prove causation, we first need to discuss the relation between conditional probabilities and causal inferences.

2.4.6.1 Conditioning and causation

A simple form of the frequency interpretation states that the conditional probability of an event A in a finite reference class B is the relative frequency of the actual occurrence of A within B. The notion of conditional probability is a basic tool of probability theory [Feller, 1968, Krämer and Gigerenzer, 2005]. The question of what constitutes relevant information, on which the computation of probabilities should be conditioned, was researched by Falk [1989]. From a psychological point of view, the person who assesses the conditional probability P(A/B) may perceive different types of relationships between A and B depending on the context [Tversky and Kahneman, 1982]. If B is perceived as a cause of A, P(A/B) is viewed as a *causal* relation, and if A is perceived as a possible cause of B, P(A/B) is viewed as a *diagnostic* relation [Falk, 1989, Diaz and de la Fuente, 2007].

There are two claims of causal inference. In *generic* causal claims, we are interested in establishing causal relations that hold for the population. Whereas in *single-case* causal claims, we focus on a particular individual [Russo, 2007]. The key question here is how to combine causal knowledge gathered from population-level or sample data with specific knowledge about a particular individual. Single-case causal claims do not state frequency of occurrence but express a belief, in particular a rational degree of belief, about

what did or will happen. Moreover, because single-case causal statements are informed by population-level causal knowledge, degrees of belief in the single case seem to be empirically based upon frequencies stated in the generic causal claim. It is a rational degree of belief in the hypothesis concerning the individual, given the available evidence about the generic causal claim. The knowledge about frequencies that hold at the generic level is leading to a support or a rejection of the hypothesis in the single case [Russo, 2007, Russo and Williamson, 2007].

An event that occurred later than the target event is legitimate as a conditioning[5] event. While this causal inference is natural and compatible with the time axis, the 'backward inference' calls for probabilistic reasoning that is indifferent to temporal order[6] [Falk, 1989]. Einhorn and Hogarth [1986] state, that *"whereas temporal order greatly affects causal judgements, it has no role in formal probability theory"* [Einhorn and Hogarth, 1986, p. 9].

In our case, even though our data cover two years in time, we did not carry out a dynamic analysis, and thus, we do not have a temporal order of choice behavior. But, inverting the argumentation of Einhorn and Hogarth [1986] and Falk [1989], we do not need it. What we do instead is to compare households' behavior in two different loyalty segments by balancing the two referring conditional probabilities. This can be explained by the following example: There are $1,000$ households that are brand loyal in category A. 200 of them are also brand loyal in category B, which is a conditional frequency of 20%. From the $4,000$ households that are **not** brand loyal in category A, 400 are also brand loyal in category B. This means that even though they are not brand loyal in category A, they do exhibit brand loyalty in category B. This can be interpreted as category B brand loyalty that is not caused by brand loyalty in category A. So 10% of the $1,000$ category A brand loyal households are brand loyal in category B **not** because of their brand loyalty

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[5]see Krämer and Gigerenzer [2005] for the differentiation of conditioning and conditional event

[6]see Falk [1989] for an urn example

in category A. But on the other hand, the category A brand loyalty is causal for category B brand loyalty in the remaining 100 cases.

Taking the argumentation above as legality and assumption in our further analyses, we state that a brand's cross-category loyalty leverage force in category c^* comes from two directions: tractive and attractive force. To what extent do first choice buyers in category c^* have a larger propensity to also be first choice buyer in category c, in comparison to second or competitive choice buyers in category c^* (tractive force of category c^*)? To what extent do first choice buyers in category c have a larger propensity to also be first choice buyer in category c^*, in comparison to second or competitive choice buyers in category c (attractive force of category c^*)?

2.4.6.2 Tractive force

We start with developing a measure of the tractive force by accounting for two different tractive levels: the difference in conditional probabilities between FCB (in the following referred to as group g_1 or number 1) and CCB (in the following referred to as group g_3 or number 3), and the difference between FCB and SCB (in the following referred to as group g_2 or number 2).

With the first measure (FCB vs. CCB) we can capture the total cross-category effect, consisting of a brand experience and a brand loyalty effect. For each product category c^* the two buyer segments of first and competitive choice buyers are compared regarding their buying behavior in any other category c. The competitive buyers are not only not loyal to the brand in category c^*, but do not even purchase the brand in category c^* during the two-year observation period, i.e., they neither exhibit brand loyalty, nor have any brand experience.

On the other hand, the second measure (FCB vs. SCB) disentangles the two effects and only captures the brand loyalty effect. In this case, the two buyer segments of first and second choice buyers are compared. The second choice buyers do have brand experience, i.e., they make purchases of the brand in

category c^*, but do not assign the largest share in volume to the brand.

The cross-category loyalty leverage measure $LoyL_{c^*,tractive}^{g_1-g_j}$ for the differences in conditional probabilities between first choice buyers (g_1) and second ($g_j = g_2$) or competitive choice buyers ($g_j = g_3$) in the product category c^* is composed of three components.

$$
LoyL_{c^*,tractive}^{g_1-g_j} = \left(\frac{1}{C-1} \sum_{c=1,c\neq c^*}^{C} d_{c^*c}^{g_1-g_j} w_{c^*c}^{g_1-g_j} I_{c^*c}^{g_1-g_j} \right) \cdot
$$
$$
\left(\frac{1}{C-1} \sum_{c=1,c\neq c^*}^{C} I_{c^*c}^{g_1-g_j} \right) \cdot \left(\frac{1}{w_{max}} \right) \tag{2.2}
$$
$$
j \in (2,3)
$$

In the first component, the differences d in conditional probabilities (see tables 2.7 (FCB-CCB) and 2.8 (FCB-SCB) for equation (2.2)) are weighted by a factor w and a dummy variable I, indicating the significance of the difference d, and are then summed up over all product categories $c \neq c^*$. This sum is averaged over the $(C-1)$ product categories under examination.

$$
d_{c^*c}^{g_1-g_j} = Pr\left(g_{1c}|g_{1c^*}\right) - Pr\left(g_{1c}|g_{jc^*}\right) \tag{2.3}
$$

$$
I_{c^*c}^{g_1-g_j} = 1 \text{ if } d_{c^*c}^{g_1-g_j} \text{ significant, 0 else} \tag{2.4}
$$

The weight w is introduced to capture the level of change in conditional probabilities, i.e., the same difference is evaluated differently dependent on the baseline conditional probability. For example, a rise from 0% to 5%, a rise from 20% to 25%, and a rise from 80% to 85% do all have the same difference of 5%. But do they all have the same value to our cross-category loyalty leverage measure? We suggest to give more value to changes in the lower regions of conditional probabilities. Comparable to Gossen's first law of decreasing marginal utility of a good we argue that the higher the baseline conditional probability already is (and, thus, the larger the share of loyal buyers of the brand among the reference group of second or competitive choice buyers), the fewer in value is the additional gain. Whereas starting with a

very low or even zero share of loyal customers, an increase and, thus, a move into appearance or perception is valued comparably higher.

So with this weight factor we accommodate the fact that gaining the first percentage point in market share is harder than expanding the market share when already competing in the market. Various studies on market share development underline this assumption of a logistic (s-shaped) functional relation (e.g., market and retailing space share [O'Kelly, 2001], or advertising spendings and the existence of threshold values [Vakratsas et al., 2004]).

$$w_{c^*c}^{g_1 - g_j} = arcsin\left(\frac{1}{exp\left(Pr\left(g_{1c}|g_{jc^*}\right)\right)}\right) \qquad (2.5)$$

The weight factor w considers $Pr\left(g_{1c}|g_{jc^*}\right)$, the basis level of conditional probability. By introducing the exponential function the case where the basis level is zero can also be included. The reciprocal of the exponential function accounts for the aimed effect of decreasing weight with increasing basis level of conditional probability. The *arcsin* function (domain $[-1; 1]$ and range $[-\pi/2; \pi/2]$) makes sure that the weight of $w = 1$ (meaning that the difference in conditional probabilities is exactly its nominal value) occurs for a basis level of conditional probability of 16.67%. This percentage corresponds to an equally distributed share among six competitors in the market, or six brands in a product category.

The theoretical construct of a consideration set includes those brands that the customer considers seriously when making a purchase decision [Hauser and Wernerfelt, 1990]. The size of the consideration set tends to be small relative to the total number of brands that are available. According to the Assessor database [Silk and Urban, 1978] the mean consideration set size for, e.g., shampoo is 6.1, and for soap is 4.8 [Hauser and Wernerfelt, 1990]. Based on this, our assumption that changes in conditional probabilities are weighted by 1 when the baseline of conditional probability is 16.67%, representing the case of six competing brands and equal shares of all competitors,

is justifiable. Differences corresponding to baselines below that value are weighted higher, differences corresponding to baselines above that value are weighted less. This argumentation also holds true for a decrease in shares. For example, a 5% rise in conditional probability from 3% to 8% is valued as 6.6%, whereas a 5% rise from 63% to 68% is valued 2.8%. The weight factor is plotted against the basis level of conditional probability (ranging from 0% to 100%) in figure 2.5.

In the second component of equation (2.2) the values of the dummy vari-
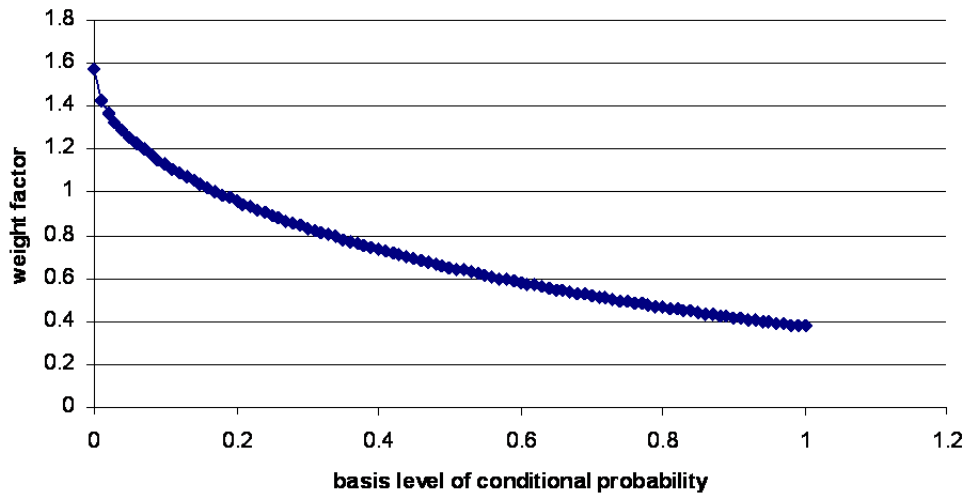
Figure 2.5: *Size of the weight factor w dependent on the baseline of conditional probability*

able, indicating significance of a difference in conditional probabilities, are summed up over all other categories $c \neq c^*$. The sum value represents the number of categories with significant differences in conditional probabilities. The before mentioned first component of equation (2.2) is weighted by this averaged sum value to especially account for the cross-category leverage effect. The more categories $c \neq c^*$ with significant differences, the larger the tractive force of the category c^*.

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The third component is a scaling factor. For reasons of interpretation, the range of the $LoyL_{c^*,tractive}^{g_1-g_j}$ index is normalized to $[0;1]$. The $LoyL_{c^*,tractive}^{g_1-g_j}$ index without division by w_{max} has range $[0;w_{max}]$. According to equation (2.5), the maximum value of the weight function (w_{max}) is 1.571 for the case of a conditional probability $Pr(g_{1c}|g_{jc^*})$ of zero. The maximum value is very unlikely, and can only be reached for significant changes in conditional probabilities from 0% to 100% in all of the examined categories.

As mentioned above, besides the weight factor $(w_{c^*c}^{g_1-g_j})$ and the number of
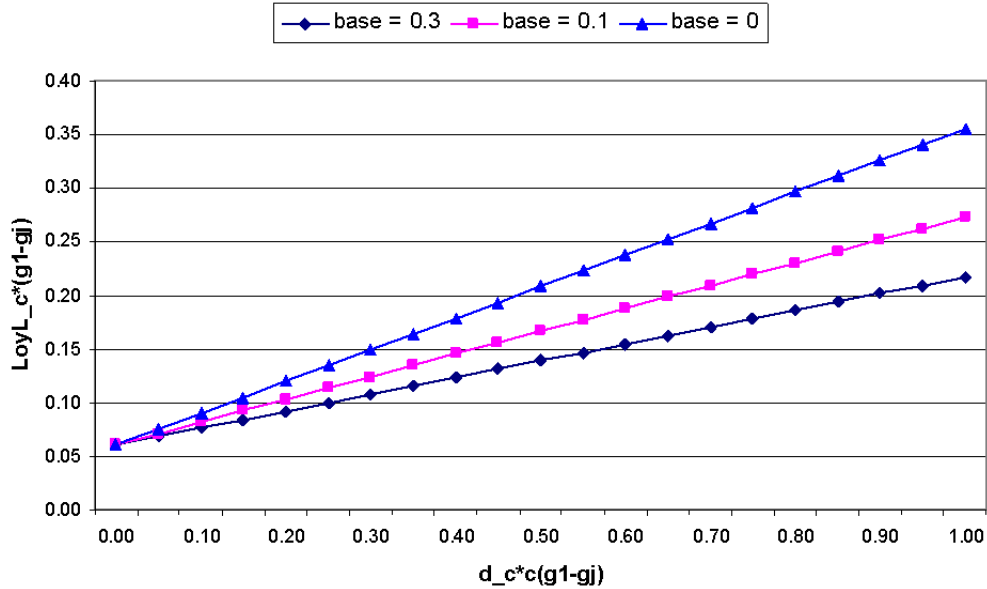
Figure 2.6: *Relation between $LoyL_{c^*,tractive}^{g_1-g_j}$ and difference in conditional probabilities*

categories with significant differences in conditional probabilities $(I_{c^*c}^{g_1-g_j})$, the size of the $LoyL_{c^*,tractive}^{g_1-g_j}$ index is dependent on the absolute difference in conditional probabilities $(d_{c^*c}^{g_1-g_j})$ and the baseline conditional probability $(Pr(g_{1c}|g_{jc^*}))$. Keeping all else constant, figure 2.6 displays the developing of $LoyL_{c^*,tractive}^{g_1-g_j}$ values dependent on $d_{c^*c}^{g_1-g_j}$ for three different baseline conditional probabilities $(0;0.1;0.3)$. The figure 2.7 shows the developing of the

$LoyL_{c^*,tractive}^{g_1-g_j}$ values dependent on the baseline for three different differences in conditional probabilities $(0.03; 0.13; 0.23)$.

There is a linear relationship between $d_{c^*c}^{g_1-g_j}$ and $LoyL_{c^*,tractive}^{g_1-g_j}$. The gradient is decreasing with an increasing baseline conditional probability (figure 2.6). On the other hand, there is a convex relationship between the value of the baseline conditional probability and $LoyL_{c^*,tractive}^{g_1-g_j}$ (figure 2.7). This course is more clearly visible with increasing $d_{c^*c}^{g_1-g_j}$.

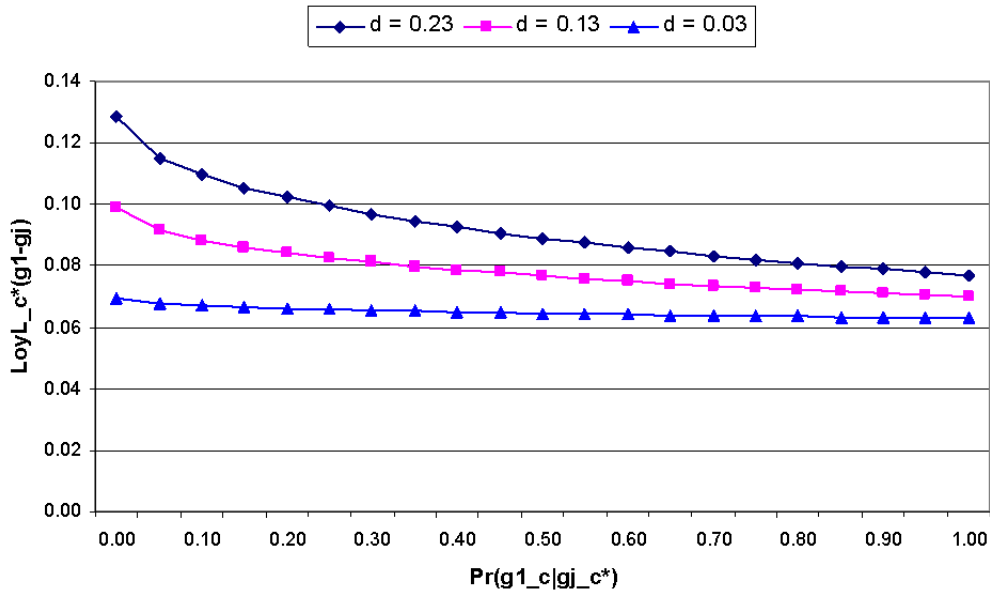Figure 2.8 displays the results for the different category-specific $LoyL_{c^*,tractive}^{g_1-g_j}$

Figure 2.7: *Relation between $LoyL_{c^*,tractive}^{g_1-g_j}$ and the baseline value of conditional probability*

indices for frequent and seldom buyers. As mentioned before, the range of the index is $[0; 1]$ with high occurrence probability of low values. The brand's tractive force in category c^* comes from brand loyalty (FCB-SCB), or from a total brand effect (FCB-CCB).

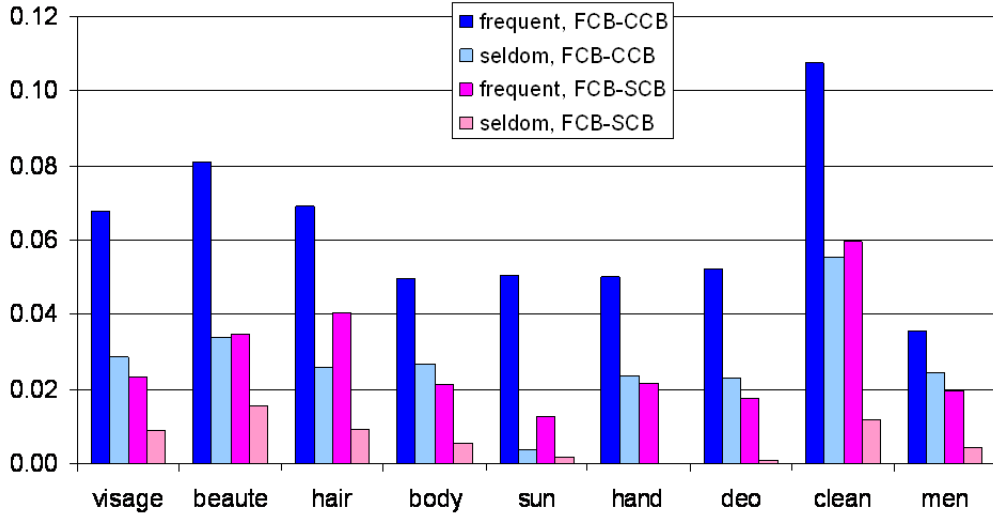For frequent buyers, the brand's highest tractive force occurs in the clean

Figure 2.8: *Cross-category loyalty leverage force* $LoyL_{c*,tractive}^{g_1-g_j}$

category, where soap, bath additives, and shower gel are combined. Brand loyal customers in this category have the highest propensity to also be brand loyal in any of the other categories the brand competes. Visage, beaute, and hair build the mid range of index values, hand, deo, body, sun, and men constitute the group of product categories with low values. Amazingly, the index value for the beaute category is comparably high. Having the marginal share of first choice buyers in the beaute category (see tables 2.2 and 2.3) in mind, this result is very surprising. In any case, we have to keep in mind that the conditional probabilities, and therefore the differences in conditional probabilities and their significance are based on frequency counts with different segment sizes. For example, there are $n = 2,113$ frequently buying households that are first choice buyer in the body category, which is a share of 22% among the category buyers. In contrast, there are only $n = 292$ frequently buying households that are first choice buyer in the hand category, which is a share of 4% among the category buyers.

The $LoyL_{c*,tractive}^{g_1-g_j}$ index only reaches a medium to small size for the brand's

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parent category (body). The cross-category tractive force of the brand in the body category falls off compared to other categories such as clean, beaute, visage, and hair. Even though there is a high share of brand loyal customers in the body category (see tables 2.2 to 2.5), those customers obviously are less likely to exhibit brand loyal behavior in any other category. Whereas in the beaute category, for example, the almost negligibly low share of brand loyal customers shows a high propensity to also be brand loyal in other categories.

The index is lower for the seldom buyers than for the frequent buyers, which should be due to the lower number of significant differences between the conditional probabilities. The highest overall value (FCB-CCB) appears for the clean category, which is in line with the results for frequent buyers. The highest difference in first choice buying propensity in any other category c occurs when comparing first and second choice buyers in the beaute category. The differences between first and second choice buyers (almost) disappear for the sun, deo, and hand category. Both these results for the seldom shoppers, and those for the frequent shoppers lead to the rejection of H4 (body category with the highest tractive force under the umbrella brand).

H4a has to be rejected for frequent and seldom shoppers.

H4b has to be rejected for frequent and seldom shoppers.

The highest signaling role within the umbrella brand's product portfolio comes from the umbrella branded product in the clean product category. Only in the comparison of first and second choice buyers who are seldom shoppers the beaute product category exceeds the clean product category in its signaling role.

2.4.6.3 Attractive force

The process and the argumentation of developing a measure for the attractive force of the brand in each category c^* takes the equivalent course as for the tractive force in section 2.4.6.2. Accordingly, we account for two different

attractive levels: the difference in conditional probabilities between FCB and CCB, and the difference between FCB and SCB. In the first measure (FCB vs. CCB), for each product category c the two buyer segments of first and competitive choice buyers are compared regarding their first choice buying propensity in the category c^*. In the second case (FCB vs. SCB), the two buyer segments of first and second choice buyers are compared respectively.

The cross-category loyalty leverage measure $LoyL^{g_1-g_j}_{c^*,attractive}$ for the differences in conditional probabilities between first choice buyers (g_1) and second ($g_j = g_2$) or competitive choice buyers ($g_j = g_3$) is composed of three components.

$$LoyL^{g_1-g_j}_{c^*,attractive} = \left(\frac{1}{C-1} \sum_{c=1,c\neq c^*}^{C} d^{g_1-g_j}_{cc^*} w^{g_1-g_j}_{cc^*} I^{g_1-g_j}_{cc^*} \right) \cdot$$
$$\left(\frac{1}{C-1} \sum_{c=1,c\neq c^*}^{C} I^{g_1-g_j}_{cc^*} \right) \cdot \left(\frac{1}{w_{max}} \right) \tag{2.6}$$
$$j \in (2,3)$$

The three components of $LoyL^{g_1-g_j}_{c^*,attractive}$ are similar to those of $LoyL^{g_1-g_j}_{c^*,tractive}$. The essential difference is the direction of examination and calculation. In equation (2.3), the differences between conditional probabilities are calculated between c^* and any other category c, with category c^* as anchor. In equation (2.7), the differences between conditional probabilities are calculated between c^* and any other category c, with any category c being the anchor one time. The same applies for the weight factor w (equations (2.5) and (2.9)) and the indicator variable I (equations (2.4) and (2.8)).

$$d^{g_1-g_j}_{cc^*} = Pr\left(g_{1c^*}|g_{1c}\right) - Pr\left(g_{1c^*}|g_{jc}\right) \tag{2.7}$$

$$I^{g_1-g_j}_{cc^*} = 1 \text{ if } d^{g_1-g_j}_{cc^*} \text{ significant, 0 else} \tag{2.8}$$

$$w^{g_1-g_j}_{cc^*} = arcsin\left(\frac{1}{exp\left(Pr\left(g_{1c^*}|g_{jc}\right)\right)} \right) \tag{2.9}$$

The weight factor now considers the basis level of conditional probability $Pr(g_{1c^*}|g_{jc})$, where the probability to be a first choice buying household in the investigated category c^* is conditioned on the behavior in category c. In the second component of equation (2.6) the values of the dummy variable, indicating significance of a difference in conditional probabilities, are summed up over all other categories $c \neq c^*$. The more categories $c \neq c^*$ with significant differences, the larger the attractive force affecting the category c^*. The scaling factor in the third component is again introduced for reasons of interpretation. Thus, the range of the $LoyL_{c^*,attractive}^{g_1-g_j}$ index is transferred from $[0; w_{max}]$ to $[0; 1]$. Figure 2.9 displays the results for the different category-specific $LoyL_{c^*,attractive}^{g_1-g_j}$ indices for frequent and seldom buyers. As mentioned before, the range of the index is $[0; 1]$ with high occurrence probability of low values.

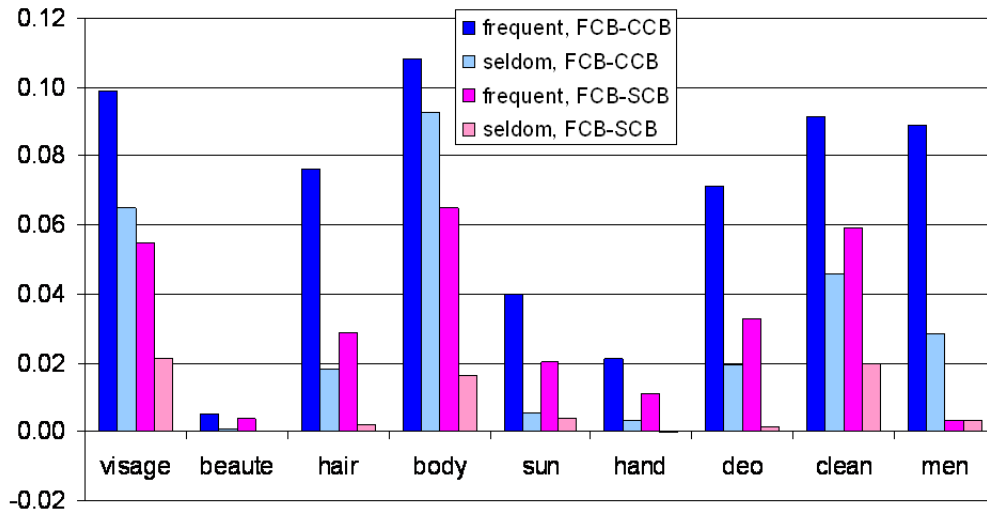In the frequent buyers case, the highest index values for the FCB-CCB case

Figure 2.9: *Cross-category loyalty leverage force $LoyL_{c^*,attractive}^{g_1-g_j}$*

appear for the body product category ($LoyL_{c^*,attractive}^{g_1-g_3} = 0.108$), where body

lotion, body creme, and body gel are combined, and the visage category ($LoyL_{c^*,attractive}^{g_1-g_3} = 0.099$), where facial masks, facial care, facial cleaning, and peeling are combined. Clean, men, hair, and deo build the mid range of index values, sund, hand, and beaute constitute the group of product categories with low values. The relatively high difference between the FCB-CCB and the FCB-SCB case for the men product category is surprising. Obviously, the brand's overall ability in all other categories c together to stimulate first choice buying behavior in the men category gains much of its impact from the difference between competitive and second choice buyers in the respective categories c. Whereas when comparing first and second choice buyers in the respective categories c, there is very little attractive force ($LoyL_{c^*,attractive}^{g_1-g_2} = 0.003$) towards brand loyal behavior in the men category. The lowest attractive force comes from the beaute category. The households' first choice buying behavior in any other category c is nearly independent of the households' behavior in the beaute category, i.e., the probability to be a first choice buying household in any category c is about the same for competitive, second, and first choice buyers in the beaute category.

The highest attractive force appears for the parent body category. The high $LoyL_{c^*,attractive}^{g_1-g_j}$ index in the body category denotes that brand loyal customers in any of the extension categories exhibit a higher propensity to also purchase the brand in the parent category. Purchases in the parent body category do less likely lead to first choice purchases in an extension category than vice versa. This result underlines the brand's strength in the parent category. Customers that are loyal to the brand in any of the extension categories, are also more likely to be brand loyal in the parent category.

The picture for the seldom shoppers is quite similar. There is one negative result: when comparing FCB-SCB, the index value for the hand category is slightly negative ($LoyL_{c^*,attractive}^{g_1-g_2} = -0.001$). This result suggests that the probability to be a first choice buyer in any other category c is higher if the household is a second rather than a first choice buyer in the hand category. Nevertheless, this effect, just as well as the effects in the sun and beaute

category are close to zero. The comparably strong attractive force affecting the parent body category becomes very distinct in figure 2.9. Moreover, the difference between the FCB-CCB and the FCB-SCB case is very explicit. Altogether, the results displayed in figure 2.9 by the majority support H5 (highest reciprocal signaling effect on body category).

H5a cannot be rejected for frequent and seldom shoppers.

H5b cannot be rejected for frequent shoppers, but has to be rejected for seldom shoppers.

The overall reciprocal signaling effect (what we call attractive force) is highest on the parent product category of body care. Only in the comparison of first and second choice buyers who are seldom shoppers the visage and clean product categories do better.

2.4.6.4 Overall cross-category leverage force

In the sections 2.4.6.2 and 2.4.6.3 we investigated each category's tractive force, i.e., its ability to stimulate brand loyal purchase behavior in any other category the brand competes, as well as the attractive force each category develops in all the other categories. The results are now combined by subtracting the $LoyL_{c^*,tractive}^{g_1-g_j}$ and the $LoyL_{c^*,attractive}^{g_1-g_j}$ index values. This net-effect allows to assess each category with regard to its role and importance within the brand manufacturer's product range.

$$LoyL_{c^*}^{g_1-g_j} = LoyL_{c^*,tractive}^{g_1-g_j} - LoyL_{c^*,attractive}^{g_1-g_j} \qquad (2.10)$$

A category with a positive $LoyL_{c^*}^{g_1-g_j}$ value evolves a stronger tractive force towards the other product categories, in comparison to the overall attractive force in the other categories. Accordingly, a negative $LoyL_{c^*}^{g_1-g_j}$ value denotes stronger attractive forces. The figure 2.10 displays the results for frequent and seldom buyers, distinguishing between the FCB-CCB and the FCB-SCB comparison.

For the frequent buyers, the core competence body category exhibits the

highest negative $LoyL_{c*}^{g_1-g_j}$ index values in both cases, meaning that this category is strongly affected by its attractive force towards all the other product categories the brand competes. Brand loyal customers in any other category are more likely also brand loyal customers in this core competence category than second or competitive choice buyers in those respective other categories. The same holds true, in a diminished manner though, for the deo and visage categories. On the other hand, there are categories like hand, clean, and beaute, whose tractive force towards the other product categories exceeds the attractive force. Brand loyal customers in these categories are more likely also brand loyal customers in any other category than second or competitive choice buyers. The results for the men, sun, and hair category differ between the two cases of FCB-CCB and FCB-SCB customer groups in that the hair and especially the men category are dominated by attractive forces when comparing first and competitive choice buyers, whereas the sun category in this case develops stronger tractive force. For the comparison of first and second choice buyers the results are vice versa.

For the seldom buyers, mainly the body, beaute, and visage category show mentionable results. In line with the results for the frequent buyers, the body and visage category are affected by attractive forces towards the respective other product categories, whereas the beaute category has stronger tractive force towards the other categories. The hand and the hair category exhibit tractive force, especially when comparing first and competitive choice buyers. For the clean category the picture differs when comparing first and second, or first and competitive choice buyers.
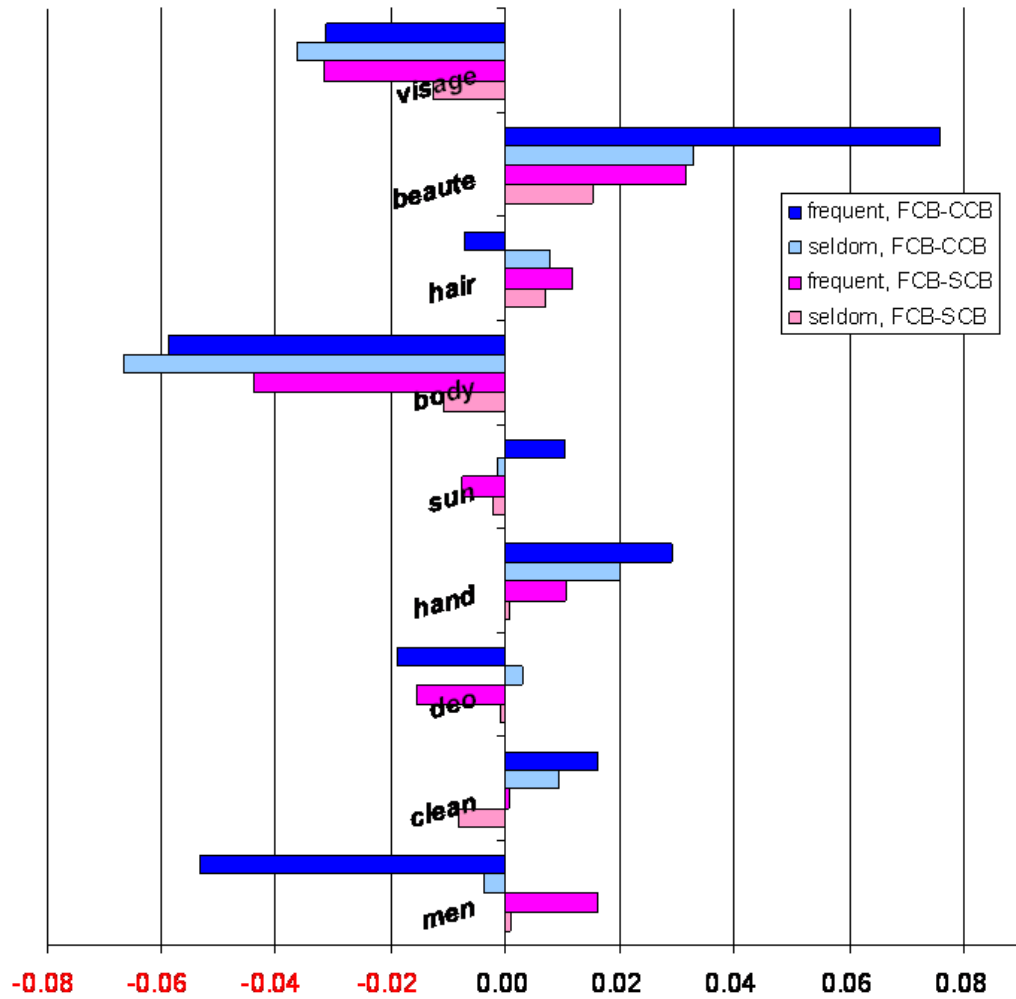
Figure 2.10: *Cross-category net loyalty leverage force $LoyL_{c^*}^{g_1-g_j}$*

Due to the negative net effects for the parent product category displayed in figure 2.10, H6 has to be rejected.

H6a has to be rejected for frequent and seldom shoppers.

H6b has to be rejected for frequent and seldom shoppers.

Altogether, we find evidence for stronger and weaker product categories in view of the brand's ability to leverage brand loyalty to other product categories within the product offering. We can identify product categories with a

strong 'feedback' role within the brand's product offering. These categories exhibit a larger attractive force towards other product categories than exhibiting tractive force on the other categories. Our main interest category of body care products is the leading category when it comes to attractive force. The fact, that the brand's parent product category does not take the leading role when it comes to pulling other categories the brand competes, is a surprising result that demands managerial interest.

2.5 Summary and managerial implications

The purpose of this research was to examine customers' brand loyal purchase behavior in the context of multi-category analysis, which is of special interest to brand manufacturers of brands competing in multiple categories. From the 2007 and 2008 GfK SE German household panel data we selected a major national non-food brand for our investigation. According to households' total purchase frequencies we made a median split with our data. The resulting distinction between frequent and seldom buyers is carried out throughout all our analyses. We calculated each household's share of category requirements for that brand and grouped households into first choice (FCB), second choice (SCB), and competitive choice (CCB) buyers of that brand for 9 different product categories.

The lowest shares of category buyers occur in the sun and hand product category. Only considering category buyers, the categories men and body show the highest shares of first choice buyers. Taking the men category as special case, conditional upon the special target market, the results reflect the brand's historical development. The basic positioning 'natural care' originates from the body product category. The body category is the brand's core competence category with the highest share of brand loyal customers. We get a clear overall picture for all product categories in which the investigated brand competes. A share of approx. 20% of the frequent buyer panel households exhibits first choice buying behavior to the brand in at least two different product categories. So in general, we do find evidence for cross-

category brand loyalty.

Given uncertainty about product quality, signaling theory proposes that consumers believe that the extension of a high-quality brand is likely to be of high quality as well. Taken this as legality for the products under an umbrella brand, our aim was to give empirical evidence for consumers' tendency to be cross-category brand loyal. Our accordingly stated propositions hold true for frequent buyers in the very most bilateral category relations. The probability to be a first choice frequent buyer in the respective other product category decreases with decreasing share of category requirements in the core competence product category. Especially in the parent category of body care, both propositions can be verified for frequent buyers, with the exception of the follower categories of beaute (in both, the FCB-CCB and FCB-SCB case) and men (in the FCB-SCB case). As required, for bilateral category-specific results the tables 2.7 and 2.8 deliver detailed results.

The brand's tractive force in the parent body category is lower compared to other categories like clean or hair. The fact that the brand's highest first choice buyers share occurs in the body category does not imply that this loyal customer base also involves brand loyalty in the extension categories. On the other hand, in the body category the brand develops a higher attractive force given the existence of brand loyal customers in the extension categories than in any other category. Altogether, we find evidence for medium force going from, and comparably high force coming to the parent body category.

Comparing the brand's $LoyL_{c*,tractive}^{g_1-g_j}$ and $LoyL_{c*,attractive}^{g_1-g_j}$ index values, especially for the frequent buyers' results, in the clean, beaute, sun, and hand category the tractive force of the brand is higher in absolute value than its attractive force. Within this group of categories, the clean category occupies an exposed position because its $LoyL_{c*,tractive}^{g_1-g_j}$ index value is the highest among the categories, and its $LoyL_{c*,attractive}^{g_1-g_j}$ index value is among the highest. In contrast, the categories body, deo, men, and visage have a larger $LoyL_{c*,attractive}^{g_1-g_j}$ index in absolute value than their $LoyL_{c*,tractive}^{g_1-g_j}$ index. The

index values for the hair category are quite even.

Even though there is a very little or even no share of first choice buyers in the beaute category, the category has a comparably high tractive force when it comes to stimulating loyal choice behavior in any of the other categories the brand competes. A similar, albeit alleviated picture is drawn in the clean category. These are starting points for the brand's management, i.e., the increase of the share of first and second choice buyers in these categories should be in the focus of marketing strategies. Once these shares are increased, there is a positive feedback effect also in other product categories.

In the other direction (attractive force), we find out that if there is a loyal customer base in any extension category, or if the brand management creates such a loyal customer base by promoting the brand accordingly, the probability to also keep those customers loyal to the brand in the parent body category is increased additionally. So in general, the loyal customers in the introduced brand extension categories altogether develop a shearing force for the brand in the parent body category. Only for the beaute and the hand category we need to cut back in this respect.

But overall, the brand's extensions to several, more or less related product categories proved to be successful in terms of leveraging brand loyal customers back and forth. We do find evidence for various relations between the different categories the brand is offered. Our results give references for the implementation of promotional activities and the allocation of advertising budgets across product categories. Against our expectation, promotional activities in the parent category are not recommended, as there are other extension categories with a higher net tractive force to involve positive spillover effects. Moreover, as we found empirical evidence for significant differences in brand loyalty already between second and competitive choice buyers of the brand in another category, e.g. free product trials could be a relevant marketing tool for an initial product or brand contact. This is given the assumption that category buyers who do not purchase the brand (CCB) would

behave like category buyers who buy the brand as one of several brands in the category (SCB).

2.6 Limitations and further research

In the second part of our empirical study (section 2.4.6), we follow the argumentation of Falk [1989] who states that temporal order has no role in formal probability theory and in probabilistic reasoning. We derive causality by balancing the conditional probabilities for brand loyalty in two different loyalty segments. The question here remains, though, if the resulting approach for the calculation of the loyalty leverage index really is pure causal reasoning. Of course, we are aware of the fact that this may be a potential target for criticism.

Our results present challenging opportunities for future research. First, our empirical analysis is ex post, i.e., after the investigated brand was extended from the core product category to various related product categories. We can only contribute on the question if, concerning the leverage of brand loyal customers, the umbrella branding strategy has been of success so far, and on the question of relative strength within the brand's product assortment. Though, it would be of enormous interest for the brand management to look ahead and examine further extension potential.

Second, it would be of enormous managerial interest to know about the households' characteristics. Therefore, we would like to stimulate further analyses that go beyond pure behavioral customer segmentation and investigate the drivers (e.g., demographics, attitudes, and marketing mix sensitivities) that may lie behind the shown purchase behavior. Who are those cross-category loyal customers that are valuable for any brand extension strategy? Provided with additional GfK SE household panel demographic and survey data, we broach this issue in a follow up paper [Silberhorn and Hildebrandt, 2009].

Third, we only investigated non-food product categories and the results may

therefore not necessarily be generalized to other markets. Further research should also include food categories for comparison. We expect differences due to involvement levels. Moreover, we have focused only on one major national brand. It might be fruitful to extend our model to other brands.

Fourth, we segment the panel households based on category-specific share of category requirements in first, second, and competitive choice buyers of the brand. So our measure of brand loyalty is based on revealed brand preferences. The integration of an attitudinal component would probably be a more realistic approach to brand loyal behavior. And also the use of conditional probabilities as measures of brand loyalty leverage might be too narrowly defined. We hope that our research stimulates more effort in developing more comprehensive measures of cross-category brand loyalty.

Essay 3

Is cross-category brand loyalty determined by risk aversion?

Working Paper

Nadja Silberhorn, Lutz Hildebrandt

3.1 Introduction

The need to understand and leverage consumer-brand bonds has become especially critical in a marketplace characterized by increasing unpredictability, diminishing product differentiation, and heightened competitive pressure [Shocker et al., 1994, Fournier and Yao, 1997]. This is especially true for fast moving consumer goods (FMCG) manufacturers and retailers. By offering products in multiple categories, they aim at attracting customers to also buy their particular brand(s) across several categories. Manufacturers and retailers today are increasingly trying to leverage their brands by cross-promoting and cross-selling different product categories under an umbrella brand [Kumar et al., 2008].

Among the several ways to achieve and retain competitive advantage, the brand extension strategy, i.e., the use of established brand names to launch new products, is regarded as being easier, more profitable, and less cost inten-

sive than launching a new product under a new name [Hem et al., 2003]. Here the questions of *whether* to extend the brand, *where* to extend the brand, and *how* to target the brand loyal customers arise. Marketing research has extensively investigated the factors that lead to brand extension success, emphasizing in particular *where* the brand should be extended. The focus herein lies on the perspective of the extension product rather than on the customers' perspective. Numerous studies on the determinants of brand extension success [Aaker and Keller, 1990, Smith and Park, 1992, Broniarczyk and Alba, 1994, Reddy et al., 1994, Sattler and Zatloukal, 1998, Sattler, 2001, Sattler et al., 2003, Sattler and Völckner, 2003, Völckner and Sattler, 2006] have found evidence that parent-brand characteristics and the fit between parent brand and transfer product are the most influential factors driving brand extension success. Several empirical studies point to the fact that consumers' quality perceptions of the parent brand will most likely be transferred to the brand extension if the two product categories are perceived to fit [Aaker and Keller, 1990, Loken and John, 1993]. The transferability of brand loyalty as success determinant of brand extensions has been widely neglected so far.

In general, consumers are likely to be attracted to a product with a familiar brand name and, from their impression of this brand name, form expectations for what the new product will be like. The brand is used as a cue before the product's specific attributes and their relation to the product category with which the brand is associated [Yeung and Wyer, 2005] are considered. Brand extension is an attempt, in part, to exploit a consumer's loyalty to the parent brand [Rundle-Thiele and Mackay, 2001]. Taking this into account, the prerequisite of a successful brand extension is the capability to draw the brand's loyal customers from the original product category to the newly introduced product in another category, i.e., to turn single-category brand loyal customers into cross-category brand loyal customers [Mundt et al., 2006].

Knowing why a customer stays loyal to a brand in multiple product categories is necessary for deriving suitable marketing strategies in the context of the brand extension. Yet research on the motives, characteristics, life styles and

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attitudes of cross-category brand loyal customers has been investigated only in a limited number of studies (e.g. Heilman and Bowman [2002]), despite the fact that it is of great relevance to know more about the cross-category loyal customers. Rungie and Laurent [2005] argue that market analysts should identify the causes and impact of brand loyalty rather than merely measure loyalty through repeat purchase. Unlike Klink and Smith [2001], Smith and Park [1992], and Völckner and Sattler [2006] who bring attention to product related consumer-specific factors that may influence brand extension success (such as parent brand involvement, parent brand experience, and brand knowledge), we focus our research on personality traits as determinants of cross-category brand loyalty.

When it comes to purchase decisions, it is often more relevant for consumers to avoid mistakes than to maximize utility. Because of this, risk has been regarded as a very influential variable on consumer behavior [Mitchell, 1999, Wang et al., 2005, de Palma et al., 2008] and is known to drive single-category brand loyalty. As perceived risk increases, the likelihood of loyalty to one brand increases [Javalgi and Moberg, 1997]. Customers may become uncertain about the performance and quality of products in categories in which they have not been purchased before. This uncertainty may create perceived risk which in turn reduces the overall utility the customers achieve by cross-buying. Assuming that consumers dislike uncertainty, i.e., consumers are risk averse, umbrella branding, the practice of labeling more than one product category with a single brand name [Sullivan, 1990, Erdem, 1998], has a positive influence on product choice decisions as umbrella brands decrease consumer perceived risk [Montgomery and Wernerfelt, 1992].

Risk aversion is a key concept not just in marketing but in economics and finance [Mandrik and Bao, 2005]. Researchers have long been interested in how it affects various behaviors, including brand choice [Tellis and Gaeth, 1990]. The probability of cross-buying is higher when customers can reduce the uncertainty by relying on past experiences, by seeking more information, or by using brand names as quality cues [Erdem, 1998, Erdem and Swait,

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1998, Erdem et al., 2006, Kumar et al., 2008].

Hence, our contribution may be summarized as follows. We will fill a gap in the literature on cross-category brand choice behavior by analyzing revealed preference data with respect to brand loyalty in several categories in which a brand competes. Provided with purchase and corresponding survey data we investigate the product portfolio of a leading nonfood FMCG brand. We segment consumers on the basis of their revealed brand preferences and identify cross-category brand loyal customers' personality traits as determinants of their brand loyal purchase behavior. In particular, the investigation of the relation between customers' risk aversion [Steenkamp et al., 1999] and their cross-category brand loyal purchase behavior comes to the forefront. The managerial purpose of our research is to derive suitable implications for the brand management in terms of how to address those customers, especially in the context of brand extensions.

This paper is structured as follows: we start with a short section on cross-buying in consumer research, followed by a discussion about brand loyalty as a theoretical construct. Then, we introduce our measure for cross-category brand loyalty, which is based on the share of category requirements approach. We then examine the determinants of cross-category brand loyal purchase behavior, followed by the derivation of our research hypotheses. In the empirical study, we start with a short introduction of our data, and an operationalization of the impact variables. We then approach our hypotheses from two sides: simple measures of contingencies and multivariate logistic regression analysis. In the final section, we summarize our results, derive implications for marketing management, and also offer some suggestions for future research.

3.2 Cross-buying and brand loyalty in consumer research

The identification of what drives cross-buying and the resulting improvement of marketing activities (e.g., direct mailing) by adequately and effectively targeting the right customers, i.e., those who are most likely to cross-buy, is of enormous relevance for retailers. By doing so, they are able to develop a cross-selling strategy and increase the revenue contribution from existing customers [Kumar et al., 2008]. Recent survey-based studies have investigated cross-buying in service markets [Verhoef et al., 2001, Ngobo, 2004, Mundt et al., 2006]. In these studies, there is only weak support for a relation between customers' perceived quality and satisfaction with the service provided on the one hand and cross-buying or cross-buying intentions on the other. The customers' perception of fairness of price, as well as demographic characteristics and marketing instruments (e.g., loyalty programs), however, are important determinants of cross-buying [Verhoef et al., 2001]. Kumar et al. [2008] identified exchange characteristics, such as average interpurchase time, ratio of product returns, and focused buying, as well as customer characteristics, such as age of the head of household and household income, as important drivers of cross-buying in a non-contractual retail setting. Reinartz and Kumar [2003] found that customers who buy in multiple product categories from a firm tend to have longer profitable lifetime duration.

Cross-buying in general does not necessarily imply brand (or product and/or service) loyalty across categories. But the degree to which consumers' brand loyalty is correlated over product categories [Cunningham, 1956, Wind and Frank, 1969] and to which a customer segmentation transcends category boundaries is of increasing managerial interest [Heilman and Bowman, 2002]. Such findings are a useful tool for managers developing and implementing a positioning strategy for brands that compete in multiple categories. The results of Heilman and Bowman [2002] show that it is difficult to use the results of a series of single-category segmentation analyses when devising consistent

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and executable strategies across all the categories in which a brand competes. While attention to a single product category provides a common ground on which the loyalty phenomenon can be examined, it does by definition limit the generalizability of findings obtained [Fournier and Yao, 1997]. However, the determinants of cross-buying and brand loyalty in general may also have an effect on the emergence of cross-category brand loyalty.

3.3 Brand loyalty and cross-category brand loyalty as theoretical constructs

3.3.1 The concept of brand loyalty

The conceptualization and operationalization of brand loyalty has been of enduring concern to both marketing practitioners and academics [Day, 1969, Wind and Frank, 1969, Jacoby and Chestnut, 1978, Aaker, 1991, Keller, 1998, Keller and Lehmann, 2006]. Loyalty is a multi-dimensional construct which has been the focus of much research in its own right. There are two conceptions of brand loyalty operationalization. From the economic perspective, brand loyalty is regarded as an observable process based on revealed brand choices (behavioral perspective). In contrast, the behavioral science perspective focuses on the attitudes that are underlying choice behavior (attitudinal perspective). There are also approaches that combine both perspectives in order to capture the complexity of brand loyalty [Dick and Basu, 1994].

Attitudinal loyalty refers to the level of commitment towards the brand as essential element of brand loyalty [Jacoby and Chestnut, 1978]. The focus lies on discovering the underlying evaluative and cognitive processes [Chaudhuri and Holbrook, 2001] contributing to brand loyalty involved in any given purchasing decision [Dekimpe et al., 1997]. Attitudinal measures are based on stated preferences, commitment or purchase intentions of the consumer and give insight into the motivations for brand loyalty [Mellens et al., 1996]. However, attitudinal measures are often based on data observed at a single

point in time and may not be an accurate representation of reality. Although attitudinal measures better account for the evaluative and affective components of brand loyalty, they often suffer from low predictive power: loyalty is determined on the basis of what people think and say but often does not predict what they will actually do [Dubois and Laurent, 1999].

On the other side, a consumer's degree of behavioral brand loyalty, i.e., her likelihood to repurchase the brand based on her past purchases of the brand, is inferred from the pattern of her observed purchase behavior [Bhattacharya, 1997, Dekimpe et al., 1997, Chaudhuri and Holbrook, 2001]. Behavioral brand loyalty is of great importance when it comes to customer segmentation. Behavioral measures have the advantage that they are not likely to be incidental as they are usually based on behavior over a period of time [Mellens et al., 1996]. However, they do not tell whether repeat buying was out of habit, for situational reasons, or for more complex psychological reasons [Odin et al., 2001].

Dick and Basu [1994] integrate behavioral and attitudinal loyalty components and introduce a conceptual framework to explain the relationship between relative attitude and repeat patronage. Knox and Walker [2001] identify both brand commitment (attitudinal) and brand support (behavioral) as necessary and sufficient conditions for loyalty. The matrix in table 3.1 is based on the classifications of Dick and Basu [1994] and Knox and Walker [2001] and illustrates the two components with a dichotomous intensity scaling and the resulting loyalty segments.

Besides attitudinal and behavioral measures, a distinction between individual-oriented and brand-oriented measures of brand loyalty can be made. Brand loyalty may be seen as a property of the brand [Aaker, 1991] or may be considered more as a characteristic of the consumer who processes the information [Sproles and Kendall, 1986]. If brand-oriented measures are used, a value of brand loyalty is derived for each brand, whereas the loyalty of specific customers is estimated by an individual-oriented measure.

		low	high
attitudinal component	high	latent loyalty (variety seekers)	loyalty (loyals)
	low	no loyalty (switchers)	spurious loyalty (habituals)
		low	high
		behavioral component	

Table 3.1: *Operationalization of brand loyalty*

In this study, we adopt the individual-oriented behavioral approach to brand loyalty, which is the approach on which most model development in brand loyalty over the last decade has been based [Bhattacharya, 1997]. While we do not argue that behavioral measures are always superior to attitudinal measures, we agree with Colombo and Morrison [1989] and Dekimpe et al. [1997] that behavioral data represent what consumers actually do, and therefore should, at the very least, be used as a benchmark or test of convergent validity to any other measure. Furthermore, as we want to use brand loyalty for segmentation purposes, we regard brand loyalty as a property of the individual and argue that an individual is brand loyal if one particular brand accounts for a high proportion of her total purchases in the product category (proportion-of-purchase measure). On the basis of the individual's brand choice behavior in any of the investigated product categories we then develop a measure of cross-category brand loyalty.

3.3.2 Measuring cross-category brand loyalty

One of the most widely used measures of brand loyalty is the **share of category requirements** (SCR) [Bhattacharya, 1997, Yim and Kannan, 1999, Rundle-Thiele and Mackay, 2001, Danaher et al., 2003, Stern and Hammond, 2004]. It captures the relative share of category purchases that individuals

give to each brand they buy, which is defined to be each brand's market share. The SCR measure indicates to what extent the customers of each brand satisfy their product needs by purchasing a particular brand rather than buying competing alternatives [Uncles et al., 1994]. Because of its simplicity[1] and widespread use by brand managers and by academics [Fader and Schmittlein, 1993, Bhattacharya et al., 1996, Danaher et al., 2003, Stern and Hammond, 2004, Du et al., 2007, Silberhorn, 2009], the SCR measure is a very common loyalty measure [Bhattacharya, 1997] and has become an important measure of customer relationship strength [Du et al., 2007]. It has been shown that the share of category requirements measure is significantly strongly associated with the attitudinal brand preference measure [Rundle-Thiele and Mackay, 2001], thus somehow combining attitudinal and behavioral aspects of brand loyalty [Day, 1969].

Although the SCR measure[2] is generally reported at an aggregate level, several studies use it on an individual-level [e.g., Du et al., 2007]:

$$SCR_{hicT} = \frac{\sum\limits_{t \in T} q_{hict}}{\sum\limits_{k} \sum\limits_{t \in T} q_{hkct}} \qquad (3.1)$$

where SCR_{hicT} is household h's share of category requirements for brand i in category c during time period T, q_{hict} is the quantity of brand i purchased in category c by household h on purchase occasion t (where t is an index of all purchase occasions during time period T), and k is an index for all brands in the category.

According to equation (3.1), an individual customer-specific SCR measure

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[1] *"In applied marketing settings, it may be advisable to use simple measures, as they are often cheaper, easier and faster to obtain. Moreover, more complicated techniques often require data of higher quality. If these data are not available (or are too expensive to collect), increased measurement errors may offset the theoretical advantages of the advanced methods. Also, theoretical research has not yet adequately shown the severity of the (potentially negative) consequences of using simple measures."* Mellens et al. [1996, pp. 527–528]

[2] For detailed descriptions of the equation we refer to Bhattacharya et al. [1996].

can be calculated for each brand in any category. The primary value of the SCR measure is its use as basis for a category-specific customer segmentation. First choice buyers (FCB) are those buyers of a brand who prefer this brand the most in terms of the amount purchased of this particular brand in that category ($SCR_{hicT} \neq 0$ and $SCR_{hicT} > SCR_{hjcT}$ for any $j \neq i$). In the case of two brands with equal amounts, the monetary value spent on this brand is of relevance. Second choice buyers (SCB) are those buyers of a brand who made purchases of that brand within a certain time period, but did not assign their highest preference to that brand in terms of the purchased total amount ($SCR_{hicT} \neq 0$ and $SCR_{hicT} < SCR_{hjcT}$ for any $j \neq i$). The investigated brand is merely an additional choice besides some other majorly preferred brand. Competitive choice buyers (CCB) are those buyers who did not purchase this particular brand in the category during the investigated time period at all ($SCR_{hicT} = 0$). Rather, they choose one or more competitive brands in that product category. Henceforth, we will regard first choice buyers of our investigated brand as brand loyal households in that respective product category.

We extended the SCR's limited category perspective by combining the respective category-specific SCR measures for each considered brand. Our measure of individual cross-category brand loyalty is based on a household's category-specific SCR measures. For each household, we calculated the share of product categories in which brand loyalty to our investigated brand is exhibited. To account for product group preferences, we first selected only households that have made purchases in a minimum number of categories. We then randomly selected product categories for each household and calculated the share of first choice buying categories among them. This share is the basis for the segmentation of panel households into cross-category brand loyals or non-loyals. Our approach will be described in more detail in the empirical study in section 3.4.2.

3.3.3 Explaining cross-category brand loyalty

Regardless of the way brand loyalty is operationalized and measured, the literature on how brand loyalty can be conceptualized is characterized by two divergent streams of research: the stochastic and the deterministic approach [Knox and Walker, 2001, Odin et al., 2001, Jensen and Hansen, 2006]. In the stochastic conception of repeat purchase, consumers are considered to purchase brands in a random fashion which is predictable from known probability distributions of purchases [Schmittlein et al., 1985, 1987, Ehrenberg, 1988, Fader and Schmittlein, 1993]. Applications of this view do not provide any causative explanations [Colombo and Morrison, 1989, Bayus, 1992, Dekimpe et al., 1997], and it is impossible to detect any causes of repeat purchases. Therefore companies gain no understanding of how to influence repeat purchasing behavior and build brand loyalty [Odin et al., 2001]. Contrary to this, in the deterministic view of repeat purchase behavior, a limited number of causes are considered influential for product choice decisions [Jacoby and Chestnut, 1978, Knox and Walker, 2001]. In the deterministic approach, brand loyalty is conceptualized more as an attitudinal concept, with which the researcher can investigate the determinants. As these influential factors may provide valuable insights into the creation and retaining of brand loyalty among customers, we adopted this deterministic approach to try to explain cross-category brand loyalty.

From the customers' perspective, the brand can be seen as a signal that a product possesses many favorable features associated with a particular brand. Brand extensions take advantage of the fact that consumers make inferences from the characteristics observed in one product, most important being the quality of the product, to the characteristics of others under the same umbrella brand [Erdem, 1998, Hakenes and Peitz, 2004]. Negative feelings about a product result in a preference for a different brand because these negative feelings create perceptions of risk about the product, and this perception, in turn, leads to a preference for a favored alternative [Chaudhuri, 1998]. Consumers offer their loyalty with the understanding that the brand will

provide them utility through consistent product performance [Keller, 1998], they trust in the brand and its promise [Chaudhuri and Holbrook, 2001]. For the customer, the brand is an indicator of constant quality and reduces the risk of incomplete information for the customer. Customers may become uncertain about the performance and quality of products in those categories in which they have not purchased before. Lack of experience with a new product results in a significant level of uncertainty and risk, and this in turn reduces the overall utility the customers achieve by cross-buying. The probability of cross-buying is higher when customers can reduce the uncertainty by either relying on past experiences or by seeking more information [Kumar et al., 2008], but also by using brand names as quality cues [Erdem, 1998, Erdem and Swait, 1998, Erdem et al., 2006].

Some general hypotheses on the determinants of cross-category brand loyalty may be derived from both the theoretical research and empirical work on single-category brand loyalty [Sheth and Parvatiyar, 1995, Matzler et al., 2008]. On the one hand, individual-specific characteristics (e.g., age, household size, gender) and personality traits (e.g., risk aversion, variety seeking, innovativeness) may guide behavior. Their influence, on the other hand, is moderated by marketing-mix variables (e.g., price, promotion, display) as well as by individual preferences for a particular brand or attitudes towards a brand.

The structural model in figure 3.1 clarifies the relation between general psychological variables of the customer and the observable brand choice pattern revealing cross-category brand loyalty.

The model displays that the pattern of behavior (cross-category brand loy-
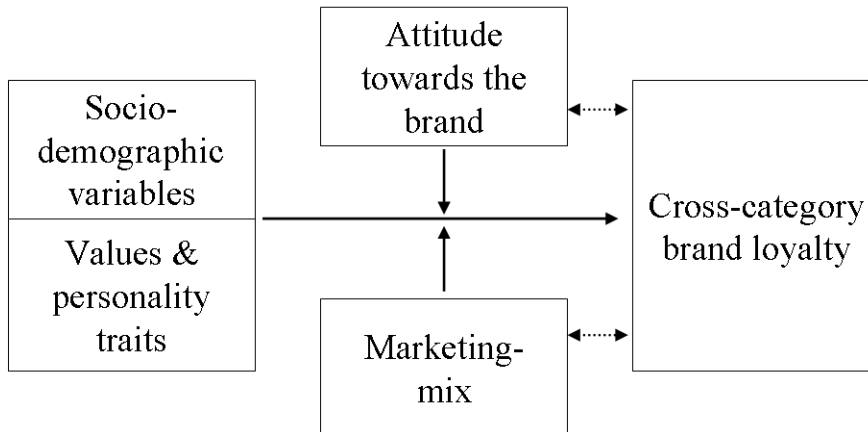

Figure 3.1: *Structural model*

alty in our case) is dependent on more general psychological constructs. As psychologists *"think of personality traits as relatively enduring, general factors influencing many if not all behaviors"* [Sproles and Kendall, 1986, p.268], values and typical personality traits like innovativeness, risk aversion, or quality orientation may be regarded as such "general factors". In our empirical study we will focus on the relation between those personality traits as causal factors for cross-category brand loyalty and on socio-demographic descriptors as control variables. In a natural choice setting, we would also have to account for specific attitudes towards a brand and implemented marketing mix [Yim and Kannan, 1999, Danaher et al., 2003], which are both correlated to brand loyalty.

3.3.4 Hypotheses

Our specific research hypotheses (see figure 3.2) focus on a selection of the general determinants of brand loyalty displayed in figure 3.1, and are derived from the theoretical research and empirical work on consumers' general

decision-making styles [Sproles and Kendall, 1986, Siu and Hui, 2001, Walsh et al., 2001, Wesley et al., 2006] which are influenced and determined by their individual personality traits. Consumers are thought to approach the market with certain basic decision-making styles, e.g., quality seekers, information seekers, or brand loyal customers [Jacoby and Chestnut, 1978, Bettman, 1979]. These decision-making styles are stable over time and may play an important role in their purchase and loyalty behavior.

Sproles and Kendall [1986] assume that consumer decision-making behavior can be explained by eight decision-making dimensions (see table 3.2) that influence a consumer's decision-making behavior. These styles are defined as a mental orientation characterizing a consumer's approach to choosing a product.

High-quality consciousness / perfectionism	Decision style of consumers who systematically search for the best quality products possible.
Brand consciousness / price equals quality	Decision style of consumers concerned with getting the most expensive, well-known brands.
Novelty consciousness	Decision style of consumers who like new and innovative products and who gain excitement from seeking out new things.
Recreational and shopping consciousness	Decision style of consumers who take pleasure in shopping and who shop just for the fun of it.
Price consciousness / value for money	Decision style of consumers who are concerned with getting lower prices.
Impulsiveness / carelessness	Decision style of consumers who tend to buy spontaneously and who are unconcerned about how much money they spend.
Confusion from overchoice	Decision style of consumers who feel they have too many brands and stores to choose from and who likely experience information overload in the market.
Habitual orientation towards consumption	Decision style of consumers who shop at the same stores and tend to buy the same brands each time.

Table 3.2: *Consumers' decision-making styles*

We consider the concept of risk aversion as the key variable to loyal purchase behavior and aim at giving empirical evidence that cross-category brand loyalty is determined by risk aversion. The concept of risk aversion evolved from discussions of risk taking by early decision theorists, mostly working with economic applications [Kahneman and Tversky, 1979]. Until now it has been conceived as an individual difference or predisposition, an attitude toward taking risks that is relatively invariant across situations [Tellis and Gaeth, 1990, de Palma et al., 2008]. Mandrik and Bao [2005] investigate a 'general risk aversion' construct as a personality trait and find evidence for the existence of an overall attitude toward risk.

It can be assumed that consumers exhibiting high risk aversion have a more sensitive perception of different types of risk [Keller, 1998]. Although there are a number of different means by which consumers handle these risks, the main way by which consumers buying in different product categories cope with this is to only buy well-known brands. Uncertainty about product quality (see the signaling theory literature by Wernerfelt [1988] and Montgomery and Wernerfelt [1992]) may induce perceived risk [Anand, 2003] in that consumers have to take the risk of getting a low quality product. Thus, a consumer who perceives a great risk associated with an unknown brand or a product category will be more prone to remain brand loyal. Matzler et al. [2008] state that brands can serve as a means to reduce risk and find evidence that consumers with higher levels of risk aversion tend to be more loyal.

We argue that consumers' status quo bias and innovativeness may be regarded as indicators of consumers' risk-taking propensity. The status quo bias [Samuelson and Zeckhauser, 1988] refers to what Sproles and Kendall [1986] call 'habitual orientation towards consumption' and represents the decision style of consumers who tend to buy the same brands at the same stores repeatedly. As an implication and natural consequence of risk aversion, individuals have a tendency to remain at the status quo [Kahneman et al., 1991]. For decisions in a business context, the concern for familiarity and se-

curity is shown to be related to the avoidance of risky decisions [Tan, 2001]. Risk averse decision-makers are in favor of keeping the status quo, rather than switching to unknown alternatives in general, or new product introductions in particular. Innovativeness refers to what Sproles and Kendall [1986] call 'novelty consciousness' and is a personality trait related to an individual's receptivity to innovative ideas and her willingness to try new product concepts and brands (see the literature on diffusion of innovations [Rogers, 1983]). Innovative consumers are not afraid of trial purchases of new products and might even gain excitement from seeking out new things [Sproles and Kendall, 1986]. The response differences between more and less innovative individuals may also reflect risk-taking propensity [Klink and Smith, 2001]. Individuals high in innovativeness are more willing to try new products and brands [Steenkamp and Baumgartner, 1992] and hence are less likely to be loyal to the same brand in several product categories.

Studies by Delgado-Ballester and Munuera-Aleman [1999] and Chaudhuri and Holbrook [2001] introduce brand trust as central determinant of brand loyalty. Their proposition is based on the theory of brand commitment in relationship marketing [Fournier and Yao, 1997, Fournier, 1998]. For risk averse consumers, strong brands reduce perceived risk, because they stand for a certain credible and consistent product quality [Erdem and Swait, 1998]. Consumers may want to simplify the choosing process or may not want to spend time and effort evaluating other choice alternatives, thus trusting in brands which offer quality [Keller and Lehmann, 2006].

Assuming that these patterns of behavior for single-category brand choice decisions also hold true for brand choice decisions in multiple categories, we state the following hypotheses (see figure 3.2).

> H1: Risk averse consumers are **more** likely to be cross-category brand loyal, in that

> H1a: Habitual consumers are **more** likely to be cross-category brand loyal.

H1b: Innovative consumers are **less** likely to be cross-category brand loyal.

H2: Consumers who trust in the brand (and its quality) are **more** likely to be cross-category brand loyal.
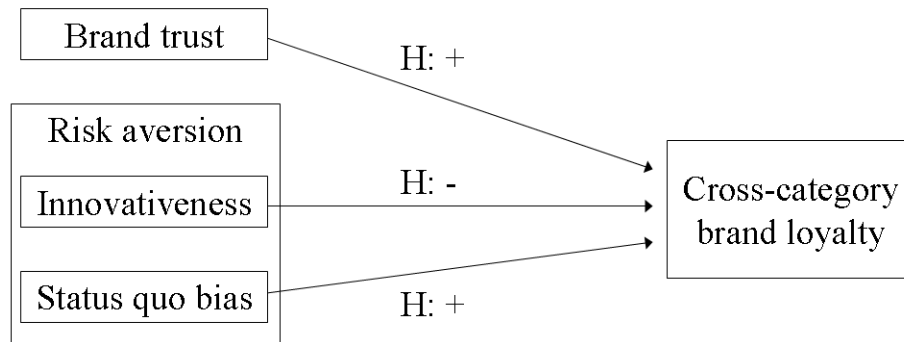

Figure 3.2: *Research hypotheses*

In summary, we propose that (1) consumers with less brand trust, (2) innovators and non-habitual consumers who, hence, are less risk averse, are less cross-category brand loyal than other consumers. In the context of brand extensions one can induce that innovative consumers are open to brand extensions, and try the new product, but do not stay loyal to it, whereas risk averse consumers try to cope with the different risks associated with new products by staying loyal to a brand.

3.4 Empirical study

In the following empirical study, we combine research in umbrella branding, brand extensions, and brand loyalty. Our research contribution is that we investigate customers' purchase decisions in order to identify cross-category

brand loyal customers in the context of the brand's complete product assortment. Furthermore, in combining purchase and survey data, the determinants of cross-category brand loyalty are examined. We aim at finding evidence that cross-category brand loyal customers exhibit higher brand trust and a higher propensity to habitual decision-making, as well as lower innovativeness and risk-taking propensity, as they rely on the belief that the extensions of a high-quality brand are also of high quality, leading to brand loyalty in several of the brand's categories.

3.4.1 The data

The GfK SE household panel data covers $20,000$ representative panel households in Germany and includes the households' 2007 and 2008 self-reported FMCG purchase data, as well as corresponding survey data from the year 2006 on the households' attitudes, characteristics, and behavioral habits. To account for panel membership duration, the data are weighted with a continuous mass weight[3]. Reported are the purchases of the household leader. This study does not distinguish between the decision makers, the buyers, and the users within a panel household. The panel households' demographics, as well as their views and attitudes on various topics[4], are surveyed with a paper-and-pencil questionnaire.

The provided purchase data include all purchases in the product groups where one major national non-food FMCG brand competes, i.e., purchases of that brand and competitive purchases. By now, the brand's assortment comprises 28 different product groups. The brand's core competence has been extended over the last decades to various more or less related product groups bit by bit. Each store's store brand is treated as an individual brand (using the

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[3]For example, a panel household with the continuous mass weight of 3.75 is representative of 3.75 households in the population in the whole evaluation period. Any analyses that are based on the household and its behavior or use the household's behavior as basis for segmentation, are weighted with this continuous mass weight.

[4]e.g., media involvement, recent trends, advertising, environmental issues, health, nutrition, etc.

sub-brand label as identifier) and included in our analyses. We eliminated the 'residual manufacturers' and 'residual brands' cases from the purchase data.

Furthermore, since the width of the brand's product offerings may be susceptible to substitutional relations between product groups, and since, therefore purchases in a high number of the 28 product groups would then become very unlikely, we clustered the 28 product groups into 9 product categories (visage, beaute, hair, body, sun, hand, deo, clean, men). This clustering is data-based in that we cross-tabulated purchase frequencies for the 28 product groups against the brand's subbrands that represent different product categories. The product groups are then assigned to the product category of their highest occurrence frequency.

Households with a total of less than four shopping days (regardless of the number of items purchased, the location of purchase, or the purchase volume) during the two year examination period and not at least two shopping days in each of the years are not of interest and were eliminated. Afterwards, households were grouped into 'frequent' or 'seldom' buyers according to the median value[5] of 28 shopping days in the two year observation period.

In order to gain an overall initial impression about the households' cross-category brand purchase behavior, figure 3.3 plots the total number of different categories purchased against the number of categories where the investigated brand was purchased. The circle size represents the number of households for each combination.

Here we see that there do exist lots of households that purchase the brand in several product categories. The data on the bisecting line represent the cases where the investigated brand was purchased in any of the product categories. Our goal now is to investigate the households' cross-category brand loyal buying intensity and to find the determinants of such a behavior.

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[5]For another application of the median split approach see Bettman and Sujan [1987].
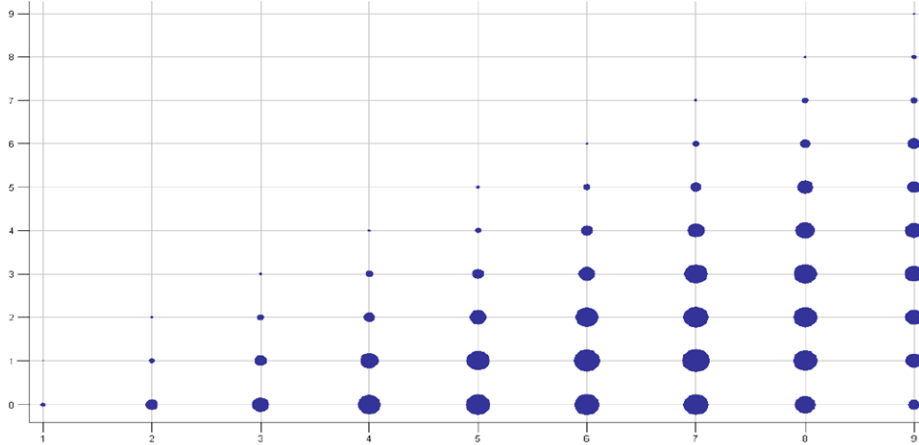
Figure 3.3: *Number of product categories with brand purchases (vertical axis) plotted against total number of product categories purchased (horizontal axis)*

3.4.2 Selection of households and product categories from the purchase data

Among the panel households, there may exist different product category preferences, and the fact that a household does not make purchases within a particular product category may be due to such individual preferences. Without such a category preference, the household can never be brand loyal in that respective category. In order to avoid biased results, we must account for this phenomenon. We therefore suggest the following data selection approach.

First, we decided on a minimum number of categories in which a household has to make purchases. Table 3.3 shows the distribution of the number of purchased product categories. A total of $16,516$ panel households, representing 86.48% of the selected sample, make purchases in 5 or more different product categories, which is more than half of the categories available. This is then supposed to be our self-selected lower limit of categories purchased. All households that only exhibit purchases in 4 or less categories are elimi-

nated from the data set.

For each panel household individually, we then selected 5 product categories

categories	count	pct	cum freq	cum pct
9	2,626	13.75	2,626	13.75
8	4,174	21.85	6,800	35.60
7	4,094	21.44	10,894	57.04
6	3,306	17.31	14,200	74.35
5	**2,316**	**12.12**	**16,516**	**86.48**
4	1,528	8.00	18,044	94.48
3	736	3.85	18,780	98.33
2	284	1.48	19,063	99.82
1	35	0.18	19,098	100.00

Table 3.3: *Number of categories purchased*

that are further investigated with respect to cross-category brand loyal purchase behavior. Those households with the minimum number of 5 categories purchased are hence considered with respect to exactly those 5 categories, and we randomly selected 5 product categories for households with more than the minimum of 5.

3.4.3 Operationalization of the key variables

3.4.3.1 Cross-category brand loyalty

We calculate the share of category requirements SCR_{hicT} for the brand i for each household h for any category c over the observation period T according to equation (3.1). A household h is finally assigned as first choice buyer FCB_{ic} of the brand i in category c if $SCR_{hicT} \neq 0$ and $SCR_{hicT} > SCR_{hjcT}$ for any $j \neq i$. Since our goal is to determine a household's cross-category brand loyalty, we consider all 5 product categories 3.4.2 together and calculate the share of categories where the household is loyal to the brand, i.e., where the household is a first choice buyer of the brand. The share, resulting

from the number of categories selected for investigation, can only take six different values (see column 'FCB share' in table 3.4). The distribution of the first choice buying share is given in table 3.4.

FCB share	count	cum freq	pct	cum pct
0	10,004	10,004	60.57	60.57
0.2	4,643	14,647	28.11	88.68
0.4	1,412	16,058	8.55	97.23
0.6	372	16,430	2.25	99.48
0.8	63	16,494	0.38	99.87
1	22	16,516	0.13	100.00

Table 3.4: *First choice buying share over five product categories*

A share of 0.4 and above means that the household is loyal to the brand in at least 2 of the 5 considered product categories. This group of households constitutes the segment of cross-category brand loyal customers, in contrast to those who are either no first choice buyers in any of the 5 categories or first choice buyers in just 1 of the 5 categories. The binary variable CCL reflects the classification of households, that is, the cross-category brand loyal households are coded $CCL = 1$, and the others are coded $CCL = 0$. This split of the data is carried out approximately at the 90% percentile.

3.4.3.2 Impact variables on cross-category brand loyalty

Now that we know about the panel households that exhibit brand loyalty in multiple product categories, we further investigate the characteristics of those households and the determinants of cross-category brand loyalty. For this reason, the purchase data are merged with the survey data via the household identifier variable. Due to missing survey data, the number of households for our further investigations reduces to $n = 11,178$. Our proposed research hypotheses are examined in two ways. First, we apply t-tests (section 3.4.4) on the statistical significance of the difference in the means of the two groups,

cross-category brand loyal or non-loyal panel households. Second, the binary *CCL* variable, indicating cross-category brand loyalty, is used as the dependent variable in a logistic regression (section 3.4.5).

In advance, 28 general (not referring to a specific brand) attitudinal variables from the survey data were taken to run an exploratory factor analysis to learn about the underlying dimensionality. We thus reduce the quantity of variables to a smaller number of unknown factors. The majority of the variables were surveyed on a 5-point Likert scale from "*I do not agree at all*" (value 1) to "*I totally agree*" (value 5). The remaining variables were measured on a 4-point scale, and were recoded to a 5-point scale without mid value for our analyses. Although we have an ordinal measurement level here, the variables are treated as interval-scaled with the assumption of equal appearing intervals [Janssens et al., 2008].

Principal component analysis with prior communality estimates set to 1 is used for factor extraction. By choosing the correlation matrix as input for the factor analysis, the standardization of the variables beforehand is unnecessary [Janssens et al., 2008]. The Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) indicates if the variables involved are sufficiently correlated to one another. In our case, we get an overall MSA value of 0.79 for the whole correlation matrix, and individual MSA values for each variable of values between 0.65 and 0.88. According to Kaiser and Rice [1974] this means 'mediocre' (> 0.60), 'middling' (> 0.70) or even 'meritorious' (> 0.80) correlation, indicating that the variables are appropriate for a factor analysis.

	F1	F2	F3	F4	F5	F6	F7	commu-nality
superflu	-.01	-.27	**.60**	.00	.01	-.02	-.05	.44
newprodu	.00	**.70**	-.21	-.04	-.16	.08	.13	.59
notknown	.07	**.83**	-.09	.03	-.05	.05	-.01	.71
newmucke	.04	-.02	**.67**	-.04	.21	-.01	.02	.49
enjoymon	.04	.09	.11	.02	.00	**.73**	-.03	.56
lookprod	.04	**.70**	-.07	-.06	-.03	.18	.10	.55
mistradv	.01	-.11	**.72**	-.01	-.01	-.01	.00	.53
sceptica	-.08	-.07	**.76**	-.04	.13	-.01	.04	.60
enjoylif	-.06	.23	.03	-.04	-.13	**.62**	.15	.48
earlybuy	.07	**.84**	-.13	.02	-.04	.11	.00	.74
nochange	.03	-.12	.22	.07	**.63**	-.07	-.01	.47
succeedi	.08	-.07	.05	.05	**.72**	.07	-.06	.55
foodqual	**.66**	.09	.10	.17	-.10	-.01	-.01	.49
brandbet	**.70**	.06	-.10	.02	.24	.09	.00	.57
nosorrow	.09	-.02	-.04	**.82**	.03	.17	-.02	.71
oldmoney	.11	-.01	-.03	**.88**	.04	.11	-.03	.80
foresigh	.13	-.01	-.02	**.75**	-.01	-.10	.02	.59
quantity	-.02	.09	-.02	-.01	.05	.02	**.81**	.66
newshops	-.11	.08	.02	-.01	.01	.01	**.79**	.65
foodbran	**.62**	-.04	-.12	.08	-.20	-.03	-.21	.49
trustbra	**.68**	.00	.03	-.03	.26	.02	-.01	.53
wellprov	.04	-.07	.06	.02	**.67**	-.04	.12	.48
demandin	.41	.26	.13	.12	-.14	.13	.10	.31
familiar	**.73**	.04	-.10	-.01	.28	.05	.04	.62
livehere	-.01	-.01	-.04	.06	.01	**.76**	-.08	.59
whatlike	.12	.14	-.19	.11	-.08	.53	.05	.37
shopqual	**.63**	-.03	.04	.17	-.26	-.05	-.11	.51
caredare	-.09	-.01	.03	-.10	.45	-.30	.02	.31
explained variance	2.98	2.67	2.16	2.13	2.04	2.01	1.44	

Table 3.5: *Rotated factor pattern and communalities*

Following the 'Kaiser criterion' (*eigenvalue* > 1), seven factors can be extracted from the data (see table 3.5). For the present sample size, a factor loading will be statistically significant if it is greater than or equal to 0.30 [Janssens et al., 2008]. Items with factor loadings larger than 0.6 in value (explaining about 1/3 of the variance) are assigned to the corresponding factor. There are three variables (*demandin*, *whatlike*, *caredare*) that do not load on any of the seven factors.

Examining the variables that highly load on the factors F1 to F7 respectively, we suggest that these seven factors are *brand trust* (F1) with brands being quality cues, *innovativeness* (F2), *mistrust* (F3), *light heartedness / precaution* (F4), *status quo bias* (F5), *pleasurable living* (F6), and *price consciousness* (F7). Table 3.6 displays our interpretation of the extracted factors and the corresponding variables with significant factor loadings.

The factors F1, F2, F5, and F7 correspond to Sproles and Kendall's [1986] decision-making styles, and for F1, F2, F3, and F7 there is a direct relation to shopping behavior and purchase decisions. The remaining factors F4, F5, and F6 represent some general attitudes and lifestyles. Our research propositions (see section 3.3.4) can be tested with the factors F1, F2, and F5. As our special interest is on the relationship between consumers' risk aversion or risk-taking propensity and their cross-category brand loyalty, we argue that lower scores on factor 2, as well as higher scores on factor 5 coincide with a higher probability for brand loyalty in multiple categories.

Then, we used the calculated factor scores as variables in t-tests (section 3.4.4) and as explanatory variables in logistic regression analyses (section 3.4.5). In the subsequent section, we start with examining the characteristics of the two loyalty groups, basing our examination on the results of the factor analysis.

Factor 1: Brand trust (*brandqua*)	*foodqual*	When buying food products, I only consider quality even if it is considerably more expensive.
	shopqual	I mainly consider quality when shopping.
	brandbet	Brand name products are better than products with unknown names.
	trustbra	I do not have sincere trust in food products without brand names.
	familiar	Food products with familiar brand names are better than those with unknown names.
	foodbran	I consider brand rather than price when buying foods.
Factor 2: Innovative-ness, novelty consciousness (*innovati*)	*newprodu*	I like to try new products.
	notknown	Many products, that I buy, are not yet known by other housewives.
	lookprod	I am always looking for new products that match my needs.
	earlybuy	I buy new products before my friends do.
Factor 3: Mistrust (*mistrust*)	*newmucke*	If you buy totally new products, you often regret it.
	superflu	Most products that are introduced to the market are superfluous.
	mistradv	I regard advertising claims with great mistrust.
	sceptica	New products are often more expensive than the old ones, but not any better.
Factor 4: Light hearted-ness, precaution (*careless*)	*nosorrow*	I do not fret about my future.
	oldmoney	I do not fret about my financial state at old age.
	foresigh	I am financially prepared for old age.
Factor 5: Status quo bias (*statuquo*)	*nochange*	I do not like changes in my lifestyle, rather I stick to my old habits.
	succeedi	I only cook dishes that I know will be successful.
	wellprov	I prefer cooking well-tested recipes.
Factor 6: Pleasurable living (*enjoying*)	*enjoymon*	You should enjoy life with your money rather than save it.
	enjoylif	I want to enjoy my life to the full.
	livehere	I prefer living in the here and now rather than thinking about tomorrow.
Factor 7: Price consciousness (*pricecon*)	*quantity*	If I regard an offer as reasonably priced, I tend to buy more than originally planned.
	newshops	If there is an attractive offer, I'll shop in a store where I normally do not.

Table 3.6: *Factors and corresponding variables*

3.4.4 Simple measures of contingencies

The t-test assesses whether the means of the two loyalty groups are statistically different from each other, under the null hypothesis of equal means. A group test statistic for the equality of conditional probabilities is reported for equal and unequal variances. So, before deciding which test is appropriate, a test for equality of variances was conducted ($\alpha = 0.05$). Depending on the results of these tests, the adequate t-test statistic was used: either the one for equal variances or the one for unequal variances. The purchase decision on the investigated brand and the corresponding product categories (body care products) should be a question of age and income. Thus, besides the factor scores of the seven factors extracted in the factor analysis, we additionally include the age of the household leader (age), which is ordinally scaled from 1 (< 20 years) to 12 (> 70 years), the household's average monthly net income since 2002 ($hhincome$), which is ordinally scaled from 1 ($<500\,€$) to 16 ($>4,000\,€$), the average net income per capita since 2002 ($avgincome$) which is ordinally scaled from 1 ($<500\,€$) to 12 ($>2,000\,€$), and the household size ($hhsize$).

The factor scores of the seven extracted factors have mean zero and variance one due to the standardization of the data matrix. A negative factor score means that a household exhibits a below average value for this factor compared to all other households and vice versa for a positive factor score. A factor score of zero indicates that the household has an average value with respect to this factor. The results of the t-tests are displayed in table 3.7.

| | | total | | frequent | | seldom | |
| | | $(N_0 = 9,971, N_1 = 1,207)$ | | $(N_0 = 6,111, N_1 = 754)$ | | $(N_0 = 3,860, N_1 = 453)$ | |
Variable	CCL	Mean	StdErr.	Mean	StdErr.	Mean	StdErr.
brandqua	0	-0.04	0.01	-0.04	0.01	-0.05	0.02
brandqua	1	0.36	0.03	0.37	0.04	0.34	0.05
brandqua	Δ	0.40***	0.03	0.41***	0.04	0.40***	0.05
innovati	0	0.01	0.01	0.00	0.01	0.03	0.02
innovati	1	-0.11	0.03	-0.09	0.03	-0.13	0.05
innovati	Δ	−0.12***	0.03	−0.09**	0.04	−0.16***	0.05
mistrust	0	0.01	0.01	-0.03	0.01	0.06	0.02
mistrust	1	-0.04	0.03	-0.11	0.04	0.08	0.05
mistrust	Δ	n.s.		−0.08**	0.04	n.s.	
lighthea	0	-0.02	0.01	-0.02	0.01	-0.01	0.02
lighthea	1	0.12	0.03	0.10	0.04	0.16	0.05
lighthea	Δ	0.14***	0.03	0.12***	0.04	0.17***	0.05
statuquo	0	-0.01	0.01	0.00	0.01	-0.03	0.02
statuquo	1	0.07	0.03	0.06	0.04	0.09	0.05
statuquo	Δ	0.08***	0.03	n.s.		0.11**	0.05
enjoying	0	0.00	0.01	-0.03	0.04	0.05	0.02
enjoying	1	-0.02	0.03	0.01	0.04	-0.06	0.05
enjoying	Δ	n.s.		n.s.		−0.11**	0.05
pricecon	0	0.01	0.01	0.01	0.01	0.02	0.02
pricecon	1	-0.09	0.03	-0.10	0.04	-0.07	0.05
pricecon	Δ	−0.10***	0.03	−0.11***	0.04	−0.08*	0.05
age	0	7.11	0.03	7.15	0.04	7.05	0.05
age	1	7.92	0.08	7.88	0.10	7.98	0.15
age	Δ	0.81***	0.09	0.73***	0.11	0.93*	0.15
hhincome	0	8.48	0.04	8.77	0.05	8.01	0.06
hhincome	1	9.18	0.11	9.34	0.14	8.92	0.18
hhincome	Δ	0.71***	0.11	0.57***	0.14	0.91***	0.18
hhsize	0	2.54	0.01	2.67	0.02	2.34	0.02
hhsize	1	2.30	0.04	2.41	0.04	2.11	0.05
hhsize	Δ	−0.24***	0.03	−0.26***	0.05	−0.23***	0.06
avgincome	0	7.03	0.03	6.98	0.04	7.10	0.05
avgincome	1	8.07	0.09	7.94	0.10	8.30	0.15
avgincome	Δ	1.04***	0.09	0.96***	0.12	1.20***	0.15

Table 3.7: *t-test results*

Households buying the brand in multiple product categories seek above average quality and are brand conscious (*brandqua*), whether they are frequent or seldom buyers. This gives rise to the conclusion that they are not searching for the best price offer, but rather trust in the brand, its quality, and its promise. Given this, together with the cognition from above, we can conclude that households that are already loyal to the brand in multiple categories, despite the fact that they are not actively searching for new products, do exhibit a higher propensity to also buy the brand in another new extension category.

Cross-category brand loyal households are less novelty conscious and innovative (*innovati*) than non-loyals. Their search for new and innovative products is not as distinctive as that of non-loyals. This initial result is in line with our proposed research hypothesis. Assuming that innovative consumers have a higher risk-taking propensity, the results of the t-tests show that risk aversion correlates with cross-category brand loyalty.

Only for frequent buying households do we find evidence for a negative relation between consumers' mistrust (*mistrust*) and their revealed brand loyal purchase behavior. Customers loyal to the brand in multiple categories are significantly less mistrustful. So on the one hand, cross-category brand loyals do not actively search for new and innovative products in the market, but generally encounter them with less suspicion.

The significant difference in light heartedness (*lighthea*) is that cross-category brand loyal households do not worry about their future. They worry less about their life, their future, and their financial subsistence, because they have already taken financial precautionary measures.

A lifestyle characterized by the pursuit of familiarity and security is more common among households that are brand loyal in multiple categories. It is the loyal households who stay with their habits and known processes, and therefore stay with their favorite brand (*statuquo*). If we investigate frequent

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and seldom buyers separately, we only find a significant difference for seldom buyers.

There is no significant difference between brand loyal and non-loyal households when it comes to a lifestyle of enjoyment (*enjoying*). Only for seldom buyers do we find evidence for a significant negative relation between cross-category brand loyalty and a pleasurable way of living. Loyal households prefer living in the here and now and take pleasure in spending below average.

Cross-category brand loyals are significantly less price conscious (*pricecon*), whereas the loyal households are predominantly not price conscious, and the non-loyals are in an almost neutral position. The differentiation between frequent and seldom buyers does not contribute any further insights.

So far, we can conclude from the results of the t-tests displayed in table 3.7, that our proposed research hypotheses cannot be rejected.

> H1a: Cross-category brand loyal households exhibit significantly higher scores on the status quo index than non-loyals, meaning that loyals tend to be risk averse.

> H1b: Cross-category brand loyal households exhibit significantly lower scores on innovativeness than non-loyals, meaning that loyals tend to be risk averse.

> H2: Cross-category brand loyal households exhibit significantly higher scores on brand trust than non-loyals.

Concerning the demographic variables, we find evidence that the household leaders of loyal households are older than those of non-loyal households (*age*). The household leaders of cross-category loyal households are aged between 50 and 54, whereas those of non-loyal households are on average 5 years younger. With a mean of 2.30 persons, loyal households are a littler smaller than non-loyal households, where on average 2.54 persons live (*hhsize*). The

more members of a household, the more preferences have to be met, leading to a higher propensity to variety seeking rather than staying loyal to one single brand. The higher per capita income (*avgincome*) for loyal households is in line with these findings: A smaller household size means that there are fewer children living there, which in turn allows the parents to work full-time and have double the income. The average monthly net income per capita is about 1,300 € for loyals, and about 100 € to 200 € lower for non-loyal households. The household's total monthly net income (*hhincome*) is also on average slightly higher for loyals.

Keeping these initial results in mind, we further investigate the determinants of cross-category brand loyalty. We aim at explaining the binary categorical variable of loyalty segment membership on the basis of the factors extracted in the factor analysis, including socioeconomic and demographic control variables.

3.4.5 Multivariate analysis using logistic regression

Unlike OLS regression, logistic regression does not assume linearity of relationships between the independent and dependent variables, does not require normally distributed variables, does not assume homoscedasticity, and in general has less stringent requirements. It does, however, require that observations are independent and that the independent variables are linearly related to the logit of the dependent. It is often difficult to correctly specify loyalty models for a variety of reasons, e.g., causal factors are unknown or unmeasured, or the model has unknown functional form. Bodapati and Gupta [2004] present a counterintuitive result: with very large samples, a binary regression to identify and target customers, even with an incorrectly specified response model, achieves better predictive performance than a continuous regression [MacLachlan and Park, 2009]. This is in line with our interest to examine the differences between loyalty segments rather than examining the explanatory variables' general impact on the share of first choice buying categories.

To test our proposed research hypotheses and to get an idea of how the segmented households can be further described and differentiated, we conducted a logistic regression analysis. The logistic regression model is used to explain the effects of the explanatory variables x_j on the binary response of cross-category brand loyalty ($CCL = 1$) or not ($CCL = 0$).

$$ln \left(\frac{\pi_{h,CCL=1}}{\pi_{h,CCL=0}} \right) = \alpha + \sum_{j=1}^{J} \beta_j x_{jh} \tag{3.2}$$

where

π_h = probability of household h to belong to a certain segment

α = intercept

x_{jh} = characteristic of the explanatory variable j for household h

β_j = effect coefficient for variable j

h = household

The expected probability for any household h to belong to the cross-category loyal segment $CCL = 1$ for given values of x_j is given by

$$\pi_{h,CCL=1} = \frac{exp \left(\alpha + \sum_{j=1}^{J} \beta_j x_{jh} \right)}{1 + exp \left(\alpha + \sum_{j=1}^{J} \beta_j x_{jh} \right)}. \tag{3.3}$$

The goal of a logistic regression analysis is the prediction of an event which may or may not occur, as well as the identification of variables which play an important role in allowing this prediction to be made [Janssens et al., 2008]. Contrary to a linear regression analysis, a logistic regression analysis does not conduct an estimation of the dependent variable's binary observations, but to infer occurrence probabilities for these observations. Positive coefficients state that higher values of the corresponding explanatory variable increase the probability of belonging to the considered segment (in this case, $CCL = 1$), whereas negative coefficients state that higher values of the corresponding explanatory variable decrease the probability to belong to the

considered segment, and increase the probability of belonging to the reference segment (in this case, $CCL = 0$). The coefficient that can be interpreted straightforwardly is the *odds ratio* which is equal to a translation of the estimated coefficient with the exponent function, i.e., the exponent constant is raised to the power of the estimated coefficient. For a one unit change in the predictor variable, the odds ratio for a positive outcome is expected to change by the respective coefficient, given that the other variables in the model are held constant. Values greater than 1 indicate that the probability that the event occurs (in our case $CCL = 1$) is *odds ratio* times higher as the value of the corresponding explanatory variable is increased one unit. Likewise, values smaller than 1 indicate that the event is *odds ratio* times less likely with an increase of the explanatory variable by one unit. An odds ratio of value 1 indicates that there is no relationship between the explanatory variable and the event [Long, 1997, Hosmer and Lemeshow, 2000, O'Connel, 2006].

Although they are not of primary theoretical interest to our study, we include socioeconomic and demographic control variables in our model. Their major purpose here is to help remove statistical noise due to omitted variable bias in a case in which we can capture effects that have been shown elsewhere to make a difference [Chaudhuri and Holbrook, 2001]. A correlation analysis did not reveal any significantly high correlations between the variables used in the regression. The factor scores of the seven extracted factors in the factor analysis possess no correlation. The multicollinearity problem present with regard to the original variables is thus compensated for.

$N_{CCL=1}$	1,207			754			453		
$N_{CCL=0}$	9,971			6,111			3,860		
	total			frequent			seldom		
		Std.	Odds		Std.	Odds		Std.	Odds
Variable	Est.	Err.	Ratio	Est.	Err.	Ratio	Est.	Err.	Ratio
intercept	−2.50***	0.15		−2.38***	0.20		−2.65***	0.23	
brandqua	0.32***	0.03	1.38	0.33***	0.04	1.39	0.31***	0.05	1.36
innovati	−0.11***	0.03	0.90	−0.09**	0.04	0.91	−0.13**	0.05	0.88
mistrust	−0.06*	0.03	0.94	−0.10***	0.04	0.90	**n.s.**		
careless	**n.s.**			**n.s.**			**n.s.**		
statuquo	0.08**	0.03	1.08	**n.s.**			0.12**	0.05	1.13
enjoying	**n.s.**			**n.s.**			−0.10**	0.05	0.90
pricecon	−0.06**	0.03	0.94	−0.08**	0.04	0.93	**n.s.**		
age	0.04***	0.01	1.04	0.03**	0.02	1.03	0.04*	0.02	1.04
hhincome	0.06***	0.01	1.07	0.05***	0.01	1.05	0.08***	0.02	1.09
hhsize	−0.20***	0.03	0.82	−0.19***	0.04	0.83	−0.24***	0.06	0.79
Model Fit Statistics									
Cox & Snell-R^2	0.03			0.03			0.03		
Nagelkerke-R^2	0.05			0.05			0.06		
Hosmer-Lemeshow Goodness-of-Fit Test									
Chi^2	7.61			6.01			11.49		
Pr>Chi^2	0.47			0.65			0.18		
Association of Predicted Probabilities and Observed Responses									
Somers' D	0.30			0.29			0.34		
Gamma	0.31			0.29			0.34		
Tau-a	0.06			0.06			0.06		

Table 3.8: *Results of logistic regression analysis*

3.4.5.1 Model fit

Before interpreting the estimates of our model, we carefully look at the model fit statistics. There is no widely-accepted direct analog to OLS regression's R^2 [Hosmer and Lemeshow, 2000]. This is because R^2 is used to learn about the percentage of variance explained, but the variance of a dichotomous dependent variable depends on the frequency distribution of that variable. In the binary case, variance is at a maximum with a $50 - 50$ split, and the more lopsided the split, the lower the variance. Nonetheless, a number of logistic R^2 measures have been proposed, all of which may be reported as approximations to OLS regression R^2, not as actual percent of variance explained. They are not goodness-of-fit tests but rather an attempt to measure strength of association [Garson, 2009].

There are several approaches to thinking about R^2 in OLS regression. These different approaches lead to various calculations of pseudo R^2 with regressions of categorical outcome variables. In both, the Cox & Snell-R^2 and the Nagelkerke-R^2, the ratio is indicative of the degree to which the model parameters improve upon the prediction of the null model: the smaller this ratio, the greater the improvement and the higher the R^2. Note that Cox & Snell's pseudo R^2 has a maximum value that is less than 1 [Cox and Snell, 1989]. Nagelkerke's R^2 adjusts Cox & Snell's so that the range of possible values extends to 1 [Nagelkerke, 1991].

In our case, neither of these R^2 measures indicates a satisfying model improvement upon the prediction of the null model. But, as many researchers consider these R^2 substitutes to be of only marginal interest, we rely on classification rates which are regarded as a preferable measure of effect size [Garson, 2009]. Several chi-square tests are used to indicate how well the logistic regression model fits the data.

The purpose of any overall goodness-of-fit test is to determine whether the fitted model adequately describes the observed outcome experience in the data [Archer and Lemeshow, 2006]. A model fits if the differences between

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the observed and estimated values are small. A test that is commonly used to assess model fit is the Hosmer-Lemeshow test [Hosmer and Lemeshow, 1989, 2000, Archer and Lemeshow, 2006]. The Hosmer-Lemeshow statistic is a measure of lack of fit. Hosmer and Lemeshow [1980] recommend partitioning the observations into equal sized groups according to their predicted probabilities. The observed number of cases in each group is compared with the expected number of cases in this group under the null hypotheses of no difference between the numbers. Ideally, incorrect model specifications such as non-linearity in the predictors or missing predictors should be detectable by this statistic. Lower values (and nonsignificance) indicate a good fit to the data and, therefore, good overall model fit.

In our case, the chi-square test statistics suggest that there is no lack of fit. The null hypotheses of no differences between observed and expected responses cannot be rejected at the 95% significance level. We get two contradictory results for the goodness-of-fit of our model. On the one hand, our proposed model only very slightly improves upon the null model (Cox & Snell-R^2 and Nagelkerke-R^2). A considerable proportion of variability in the data cannot be accounted for by our statistical model. But how meaningful are these R^2 measures given the fact that our dependent variable has a very lopsided distribution of about $10-90$? On the other hand, the Hosmer-Lemeshow statistic suggests a very good model fit. Hosmer and Lemeshow [2000], Archer and Lemeshow [2006], and Garson [2009] argue that the latter is the preferable measure for dichotomous dependent variable regressions. Reverting to this, we can proceed with the interpretation of the coefficients estimated in the logistic regression.

3.4.5.2 Interpretation of results

The intercept term represents the mean when all variables in the model are evaluated at zero. It is very rarely of interest by itself, but it is important for the model fit statistics, a comparison of the model with intercept only, and the model with intercept and covariates.

A higher score on brand trust (*brandqua*) increases the probability of being cross-category brand loyal. This indicates that although there may be several well-known and established brands available, the households stick to just one brand they trust in. This underlines the notion that brands in general deliver high-quality. Once consumers have found their high-quality brand, they exhibit a higher probability to stay loyal to that brand across several product categories where this brand is available.

We find evidence for a significant negative relation between the households' innovativeness (*innovati*) and their probability of belonging to the cross-category brand loyal segment, that is, the higher the score on the households' innovativeness, the higher the probability of being a non-loyal household. Innovative households search for new and innovative products and do not stay loyal to just a single brand. Viewed from the opposite perspective, cross-category brand loyals are rather risk averse in that they are less interested in searching for new and innovative products compared to non-loyals. They meet their risk aversion with loyalty to the brand in multiple categories.

We also find a significant negative effect of suspiciousness (*mistrust*) on cross-category brand loyalty group membership. Households that encounter new products with mistrust are less likely to be loyal to the brand in multiple categories. Whereas novelty conscious and innovative households search for new products and variety and therefore exhibit a smaller probability of purchasing the same brand in various categories, mistrustful households exhibit a smaller cross-category loyalty probability because they do **not** search for new products and rather stick to their old habits. However, we do not find evidence for that in the case of the seldom buyers.

There is no significant effect between the households' lifestyle of enjoying a carefree life (*careless*) and brand loyalty in multiple categories. This might be due to the very general items that constitute that factor. The transfer to decision-making in every day shopping might be too big.

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Besides consumers' innovativeness and a continuous hunt for new products (*innovati*), their reliance on well-proven processes (*statuquo*) can be seen as an indicator of their risk-taking propensity. Except in the case of frequent buyers, we find evidence for a positive relationship between consumers' need for familiarity and their loyalty to a brand in multiple product categories. They are afraid of the unknown, so they do not switch between brands and continue with their habitual brand choice behavior.

A pleasurable way of living, i.e., spending one's life in the here and now rather than worrying about the future, does not turn out to be influential on consumers cross-category buying pattern. Only for seldom buyers is the fact that households prefer spending their money rather than saving it (*enjoying*) of negative influence on brand loyal purchase behavior. This lifestyle does not match with a responsible purchase behavior.

There is a significant negative relation between the (frequent buying) household's price consciousness (*pricecon*) and the propensity to buy the same brand in multiple product categories. The greater the sensitivity to prices, the more a household does not stay loyal to the brand but rather search for the best price offer.

We can conclude from the results of the logistic regression analysis displayed in table 3.8, that both proposed research hypotheses cannot be rejected.

> H1a: Households with a higher score on the status quo index, meaning that they tend to be risk averse, exhibit a higher probability of being cross-category brand loyal.

> H1b: Households with a lower score on innovativeness, meaning that they tend to be risk averse, exhibit a higher probability of being cross-category brand loyal.

> H2: Households with a higher score on brand trust exhibit a higher probability to be cross-category brand loyal.

The older the household leader (*age*), the higher the propensity to be cross-category brand loyal. Elderly people might have had a better experience with the brand or have already found their favorite brand and will therefore stay within their developed brand relationship. The household's monthly net income (*hhincome*) appears to have a significant positive relation to the cross-category loyalty group membership. The higher the monthly net income, the higher the probability of being loyal to the brand in multiple categories. This might be due to the fact that the investigated brand is neither a premium priced brand nor a brand taking part in the downward price competition. The household size (*hhsize*) appears to have a negative relation to the household's probability of being cross-category brand loyal, that is, the more people living in a household, the less likely the household's brand loyalty. This result is quite intuitive, as the variety of different product and brand preferences increases with the number of household members.

3.5 Discussion

3.5.1 Summary

We used purchase and survey data from the GfK SE household panel in our empirical study and investigated one major national FMCG non-food brand that competes in 28 different product groups. To overcome substitutional relations between those groups, we clustered them into 9 product categories which were then used for further examinations. Based on the share of category requirements approach we used the share of category requirements as a loyalty measure, which captured consumers' cross-category brand loyalty. To account for category preferences, we randomly selected five product categories for each household individually. Panel households were then segmented into cross-category brand loyals and non-loyals based on their revealed purchase behavior in those five categories. The dichotomous variable indicating cross-category brand loyalty was used as a grouping variable in various t-tests and as a dependent variable in logistic regression analysis.

In a factor analysis on 28 attitudinal variables from surveying the panel households, we could extract seven factors that could partly be interpreted according to Sproles and Kendall's [1986] decision-making styles. t-tests revealed significant differences between the two loyalty segments. The results of the t-tests were basically confirmed in logistic regression analyses, and the Hosmer-Lemeshow statistic indicated a good model fit. There are only minor differences between predicted and observed segment membership.

Our goal was to determine the personality traits of cross-category brand loyal households, our focus being the investigation of the impact of consumers' decision-making styles and risk aversion on their cross-category brand loyalty. Based on earlier empirical findings, we argued that novelty conscious consumers like to try new and innovative products. This innovativeness is negatively related to consumers' risk aversion. Risk averse consumers, again, stay loyal to a brand in multiple categories to reduce the risk of dissatisfaction with the product. Moreover, we supposed that households that prefer staying with their habits and following known processes (status quo bias) would have a higher propensity for a cross-category brand loyal purchase behavior. We find evidence for our research hypotheses that households with a higher score on innovativeness, and therefore regarded as less risk averse, as well as with a lower score on the pursuit of a lifestyle of familiarity and security, exhibit a smaller propensity to be loyal to the brand in multiple categories. In other words, our results suggest that risk aversion indeed is a determinant of cross-category brand loyalty (see figure 3.1).

Moreover, brand loyalty in multiple categories is determined by several decision-making styles [Sproles and Kendall, 1986]. Price consciousness and suspiciousness were found to be negatively related to cross-category loyalty. Furthermore, cross-category loyal households are on average larger in size, have an older household leader, and have a higher disposable income.

3.5.2 Managerial implications

For brand manufacturers it is important to extend their product lines giving variety-seeking consumers the opportunity to vary their purchase experiences without having to switch brands. Reaching a large part of the target market is of enormous relevance for the success of the newly introduced brand extension. A new product's trial rate is for the most part composed of two customer segments: innovative and risk-averse consumers. On the one hand, there are innovative consumers who are novelty conscious and like to try new products. Novelty conscious households search for new and innovative products and do not stay loyal to just a single brand. Confronted with brand extensions, they may purchase the new product, but do not stay loyal to it over time, buying new products on and off. On the other hand, there are risk averse consumers who might already know the brand from previous experiences in other product categories and therefore trust in the brand and its promise. It is those loyal customers who are essential for the brand extension's success in the long run.

Numerous studies on the causes of brand extension success found evidence that parent-brand characteristics and the fit between parent brand and transfer product are the most influential factors driving brand extension success [Aaker and Keller, 1990, Broniarczyk and Alba, 1994, Hem et al., 2003, Völckner and Sattler, 2006]. Besides these product-specific prerequisites, adequate targeting of the consumers plays an essential role. When brand managers think about extending their product portfolio by launching a new product in a new category but under the same brand name, they also need to account for certain consumer personality traits when promoting and advertising this brand extension. Already Raj [1982] has found evidence that advertising has a different effect on loyal and non-loyal consumers. The integral role of advertising in maintaining and leveraging current loyal buyers often goes unrecognized and unappreciated. Advertising plays a large role for the loyals in increasing the risks associated with moving away from the brand (see also Knox and Walker [2001]); currently loyal buyers may be kept from drifting

into competing brands and may be persuaded to increase their purchase of the advertised brand.

Our empirical findings give hints on how to target these brand loyal customers. Based on their motives and personality traits, brand managers can derive suitable marketing strategies. As cross-category brand loyal consumers tend to be risk averse, the brand has to reduce perceived risk by becoming a credible and consistent symbol of product quality. Transferring perceptions of a brand's quality to the brand extension, the key to umbrella branding, has to be the focus of the new product's communication strategy.

3.5.3 Limitations and further research

Our results present challenging opportunities for future research. First, our study is about fast moving consumer goods, and its results should not necessarily be generalized to other markets. Moreover, we have focused only on one major national non-food brand. It might be fruitful to extend our model to other non-food brands and categories, as well as to also investigate food brands. Studies on other product classes, such as luxury goods, services, and impulse purchases, might reveal findings that corroborate or extend our approach.

Second, our proposed segmentation is based on category-specific share of category requirement measures for each panel household. Moreover, the dichotomous dependent variable could be regarded as too narrowly defined. We hope that our research stimulates more effort in developing more comprehensive measures of cross-category brand loyalty.

Third, we used secondary attitudinal survey data that was not specifically collected for our needs. A more specifically tailored data ascertainment could give better insights into the determinants of cross-category brand loyalty and how marketing activities in the context of brand extensions may be targeted to cross-category brand loyal customers.

Fourth, a consumer may have different styles for each product category and thus, the generality of consumer style characteristics may be doubtful. Can we assume that a brand conscious consumer would consider 'name' products on every decision? We deal with this issue in part by investigating several product categories. Nevertheless, a more thorough examination of various consumer decisions could be addressed in future research.

Fifth, our measure of brand loyalty is based on revealed brand preferences. Although Elrod [1988] argues that for frequently purchased low-priced goods behavioral and attitudinal measures of brand loyalty are likely to agree, the integration of an attitudinal component would bring about a better understanding of the reasons for loyal behavior.

Sixth, we only capture a small cutout of the conceptual background displayed in figure 3.1. A comprehensive causal model including external and internal determinants of brand loyalty, as well as correlations between the investigated constructs, would enhance the understanding of reciprocal effects and could shed more light on the impact factors underlying cross-category brand loyal purchase behavior.

Seventh, our model does not account for potential hierarchical relations between the several latent constructs. The hybrid choice model [Walker, 2001, Ben-Akiva et al., 2002a,b, Dannewald et al., 2008] offers the possibility to integrate a (hierarchical) latent factor structure into predictive choice models. This comprehensive and sophisticated approach enables the simultaneous estimation of attitudinal and behavioral components of brand loyalty and may bring about some important insights into brand loyal purchase behavior and its determinants.

Essay 4

Das Hybride Wahlmodell und seine Anwendung im Marketing

Till Dannewald, Henning Kreis, Nadja Silberhorn

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Erklärung gemäß §13(4) der Promotionsordnung der Wirtschaftswissenschaftlichen Fakultät der Humboldt-Universität zu Berlin vom 17.10.2007

Hiermit erkläre ich, dass ich in meiner eingereichten Dissertation mit dem Titel

"Four essays on modeling brand choice and brand loyalty"

außer der angeführten Literatur keine weiteren Hilfsmittel benutzt habe. Hilfe habe ich im Rahmen von §12(2) der Promotionsordnung von Herrn Professor Dr. Lutz Hildebrandt im Rahmen des Betreuungsverhältnisses erhalten. Ich bezeuge durch meine Unterschrift, dass meine Angaben über die bei der Abfassung meiner Dissertation benutzten Hilfsmittel, über die mir zuteil gewordene Hilfe sowie über frühere Begutachtungen meiner Dissertation in jeder Hinsicht der Wahrheit entsprechen.

Berlin, 16. Oktober 2009

Dipl.-Kffr. Nadja Silberhorn

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