

LAURENS SLOOT

Understanding Consumer Reactions to Assortment Unavailability



Deka wijst klant op prijsconflict

VELSEN – Dekamarkt heeft zijn klanten met schapkaartjes gewezen op de moeizame prijsonderhandelingen met Haribo. Enkele snoepartikelen waren daardoor niet leverbaar.

Edeka schrapt aantal producten Müller en McCain

HAMBURG – De Duitse foodretailer Edeka heeft van zuivelfabriek leverancier Müller en McCain afscherming gemaakt. De ondernemers, die als 'Zehnigste Compagnie' de prijsstrijd nog lang niet afmaken. Volgens Edeka hantelen fabrikanten voor de prijsvechters gunstiger condities dan voor de servicesupermarkten.



GEACHTE KLANT,
TOT ONZE SPIT HEBBEN WIJ MOMENTEEL
MET ASSORTIMENT VAN HARIBO NIET VOLLEDIG OP VOORBAAD.
DIT IS EEN GEVOLG VAN EEN LOPENDE DISCUSSIE OVER DE
WISDOEPRIJZEN
OH U IN DE TOEKOMST LAGE PRIJZEN TE KUNNEN BLIJVEN
GARANDEREN KOPEN WIJ OP UW BEGRIP HIERVOOR.

Misgrijpen bij Matsweken

Superunie boycot Heineken, Laurus in de clinch met Unilever en Coca-Cola

Harde strijd supers en A-merken

Het is een harde strijd tussen de supermarkten en de A-merken. De drie Laurus-formules worden onderzocht door AC Nielsen en marktaandeel van 21,4 procent. De Boer als Edah.

Boycot voor Fanta en Sprite

BEESD – De schappen met Fanta en Sprite blijven de komende tijd bij de Superunie-leveringsoverhandelingen. De boycotorganisatie van Superunie-leveringsoverhandelingen.

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**UNDERSTANDING CONSUMER REACTIONS TO
ASSORTMENT UNAVAILABILITY**

UNDERSTANDING CONSUMER REACTIONS TO ASSORTMENT UNAVAILABILITY

Een onderzoek naar consumentenreacties ten gevolge van assortimentsafwezigheid

Proefschrift

ter verkrijging van de graad van doctor
aan de Erasmus Universiteit Rotterdam
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PREFACE (IN DUTCH)

Begin 2001 schreef ik het voorstel voor mijn proefschriftonderzoek. Eén ding stond bij voorbaat vast: het onderwerp moest iets te maken hebben met de levensmiddelensector, want daar ligt mijn voornaamste vakinhoudelijke interesse. Al gauw kreeg ik het idee dat assortimentsafwezigheid een interessant thema zou kunnen zijn. Uit het onderzoek CBL ConsumentenTrends bleek dat out-of-stock en artikelsaneringen tot de belangrijkste ergernissen behoorden van supermarktklanten. Bovendien was hier nog niet zoveel over geschreven in de wetenschappelijke literatuur. Achteraf kan ik zeggen dat dit onderwerp juist gekozen was, want door de economische recessie in de afgelopen jaren en de prijzenoorlog zijn supermarkten veel kritischer gaan kijken naar de omvang van hun assortiment. Hierdoor kreeg het onderwerp geleidelijk een steeds hogere relevantie.

Het schrijven van een proefschrift naast een full-time baan als directeur van een snel groeiende business school (EFMI bv) en het vaderschap van een snelgroeiend gezin (Sloot bv) is geen sinecure. Dat het toch allemaal af is gekomen beschouw ik dan ook als een klein wonder. Ondanks de grote drukte in de afgelopen jaren, sluit ik het proefschrifttraject met een goed gevoel af. Enerzijds omdat ik de eindstreep heb gehaald, anderzijds omdat ik mijn academische vaardigheden verder heb kunnen aanscherpen.

Promoveren is in de kern van de zaak een individualistische bezigheid. Toch heb ik de afgelopen jaren veel hulp gehad. Vandaar dat ik een aantal mensen persoonlijk wil bedanken. Allereerst bedank ik mijn promotoren Ed Peelen en Harry Commandeur voor hun geduld met deze ‘lastige klant’, voor hun commentaar op de manuscripten en voor het feit dat zij mij überhaupt ‘aan het promoveren’ hebben gekregen. Zeer grote dank ben ik verschuldigd aan Peter Verhoef, die drie jaar geleden aan het promotieteam werd toegevoegd als copromotor en, na zijn benoeming als hoogleraar aan de Rijksuniversiteit Groningen, als promotor. Peter, met jouw grote mate van gastvrijheid, drive en intellectueel vermogen, heb je me veelvuldig geholpen. Op de momenten dat de machine stil viel, kreeg jij deze telkens weer draaiende, met een aantal mooie publicaties als gevolg. Je hebt je een ware vriend getoond! Ik verheug me erop om onze samenwerking de komende jaren verder uit te bouwen.

In de moderne marketingwetenschap zijn multi-disciplinaire teams een absolute must. Bij het schrijven van diverse artikelen heb ik ervaren dat het samenwerken met econometristen niet alleen een boeiende aangelegenheid is, maar bovendien tot een aanzienlijke kwaliteitsverbetering kan leiden. Ik dank Philip-Hans Franses en Dennis ‘the wizard’ Fok voor de prettige samenwerking. Bij het schrijven van de artikelen die ten grondslag liggen aan dit proefschrift

heb ik regelmatig een beroep gedaan op collega's van diverse marketingvakgroepen. Ik dank de volgende personen voor hun nuttige commentaren: Marnik Dekimpe, Eline de Vries - van Ketel, Bas Donkers, Peter Leeftang, Koen Pauwels, Els Gijsbrechts en Erica van Herpen.

Ook vanuit het EFMI heb ik veel steun gekregen. Allereerst natuurlijk van mijn 'soul mate' Marcel van Aalst. Marcel, bedankt voor alle steun en collegialiteit in de afgelopen jaren. Een betere collega dan jij kan ik me niet indenken. We gaan de komende jaren nog veel moois beleven! Ik bedank alle medewerkers, kerndocenten en commissarissen van EFMI voor hun steun en collegialiteit in de afgelopen jaren. In het bijzonder dank ik Leo Kivits en Jan-Willem Grievink voor het delen van hun kennis en inzichten in de levensmiddelensector. Verder wil ik Marion de Voogt, Irene van Berlo en Rocco Kellewink expliciet bedanken. Zij hebben zich zeer dienstbaar gemaakt bij de grootschalige onderzoeken in supermarkten en bij de verwerking van de enquêtes. Een deel van het veldwerk is verricht door medewerkers van het marktonderzoeksbureau USP. Ondanks dat het voor hen een 'gewone klus' was heb ik veel waardering voor hun flexibiliteit, klantgerichte instelling en scherpe tarieven.

Dit proefschrift was niet mogelijk geweest zonder de hulp van veel bedrijven uit de levensmiddelensector. Een aantal bedrijven heeft de onderzoeken financieel mogelijk gemaakt en een aantal heeft toegang verleend tot interessante databronnen. Ik noem de volgende bedrijven in het bijzonder: Super de Boer, Konmar, Coca-Cola, Interbrew, Beiersdorf, Unilever, Douwe Egberts, Vrumona, Heineken, H.J. Heinz en SCA Hygiene Products. Daarnaast dank ik de vele EFMI-cursisten die enquêtes hebben ingevuld om productgroepen en merken te classificeren.

'Last but not least' bedank ik mijn familie. Allereerst natuurlijk Gerdien, mijn lieve vrouw, die mij de afgelopen jaren de maximale vrijheid heeft gegeven om mijn loopbaan verder uit te bouwen. Ik hoop dat ik net zo'n steun voor jou kan zijn in de komende jaren. Mijn drie deugnietjes - Luuk, Leonie en Emmelie - bedank ik voor alle vrolijkheid thuis. En mijn moeder dank ik zeer voor haar nimmer aflatende positieve instelling en enthousiasme. Ook bedank ik mijn vader, die mijn promoveren helaas niet meer mee kan maken. Ik weet dat hij trots op mij zou zijn geweest.

Ik hoop met jullie allen nog een hoop plezier te beleven!

Laurens Sloot

Harderwijk, november 2005

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CHAPTER 1: INTRODUCTION AND OVERVIEW

1.1 Introduction and thesis content

“Product not available!” Any regular grocery shopper will be familiar with the annoying situation in which his or her preferred product is not available at the moment (s)he wants to buy it. Shopper research even shows that the unavailability of products is one of the most significant annoyances for grocery shoppers. For example, the grocery shopper study *ConsumentenTrends 2005* (EFMI and CBL 2005) reports several irritations experienced by regular visitors to supermarkets and lists 2005’s six most important as follows:

1. Long waiting time at the check-out line.
2. Items not available due to assortment reductions.
3. Restocking shelves when the store is open.
4. Out-of-stocks of regular items.
5. No good opportunity to pack products when the check-out is passed.
6. Out-of-stocks of promotional items.

If we analyze this list, we find three consumer annoyances related to the unavailability of an assortment that, at least from the consumer’s perspective, should have been available: numbers 4 and 6 report annoyances with regard to stock-outs, and assortment reductions evidently constitute a major annoyance for consumers (number 2). This list highlights that assortment unavailability in general is an important factor in many grocery shoppers’ dissatisfaction. Research on consumer reactions to assortment unavailability can help retailers gain insight into the effects of assortment unavailability and understand the variables related to these effects.

Assortment unavailability can be temporary (e.g., part of the day or a few days) or permanent (a few months or longer) in nature. A temporary unavailability is signaled by an open space in the shelf, in which case consumers generally know that the product normally is available and will be available again soon (e.g., their next shopping trip). Compared with temporary assortment unavailability, a permanent unavailability is more difficult to signal for consumers, because the

store readjusts the shelf after a delisting. In general, only consumers that are looking for the eliminated item or brand will explicitly notice that their product is no longer available.

Temporary assortment unavailability

Temporary assortment unavailability is also referred to as an out-of-stock or a stock-out. Stock-outs are regular phenomena for grocery shoppers. For example, out-of-stock percentages in Dutch supermarkets generally vary between 5% and 10%, with an average of 7% on regular (i.e., non-promoted) items (EFMI 2000). These stock-out percentages are comparable to other western European countries such as France and the United Kingdom but somewhat lower than those in the United States.

There are several reasons temporary assortment unavailability occurs. A study by the Coca-Cola Retailing Research Council (Andersen Consulting 1996) found that stock-outs in the United States usually were caused by mistakes in the store order process. In 70% of the stock-outs, the supermarket simply forgot to order the product during the last store order round. Other reasons for stock-outs include a too limited volume order or inadequate shelf space to handle regular consumer demand. Also, missing shelf tags, which make it difficult for employees to recognize the specific item that is unavailable, are an important cause of stock-outs.

Permanent assortment unavailability

The reasons for permanent assortment unavailability differ from those for temporary assortment unavailability. In general, permanent unavailability occurs as a result of a well-considered decision by the retailer to reduce one or more items. In this thesis, we distinguish four types of assortment reductions. The first type we consider are *maintenance-oriented reductions*, which occur when a retailer decides to adopt new items and makes space for those items by eliminating existing items. A retailer also might remove items that provide a negative sales development or do not meet regular margin standards. Typically, maintenance-oriented reductions focus on one or a few categories, and the number of items involved are limited (e.g., 5% or less of the category assortment).

The second type of assortment reductions we consider are *supply chain-oriented reductions*. These reductions occur when a retailer “cleans up the barn” to save costs in the supply chain, such as when a retailer wants to close a warehouse or achieve lower procurement complexity.

Most supply chain-oriented reductions include many items (e.g., greater than 5% of items) and can be focused on one, a few, or many categories. An example of a multicategory type of assortment reduction is Operation Pitstop by the Dutch grocery retailer and market leader Albert Heijn. In the summer of 2001, this retailer eliminated items in most of its packaged product categories, eventually reducing almost 1,500 items from an assortment that covered approximately 20,000 items total.

The third type of assortment reductions we distinguish are *category strategy-oriented reductions*, which may occur when a retailer redefines the role of a specific category. For example, if the category role is changed from “destination” to “routine,” the retailer will remove many items because it no longer is attempting to cover 95% or more of category demand (Dhar, Hoch, and Kumar 2001; ECR Europe 1998). Category strategy-oriented reductions usually involve just one or a few categories and a limited to modest number of item reductions (e.g., more than 5% of the items within a category).

The fourth and last type of reductions we consider are *political-oriented reductions*. These reductions generally occur when retailers try to improve buying conditions for their store. For example, a retailer can delist (or threaten to delist) items or the complete brands of a supplier if the supplier does not lower its prices and/or improve slotting fees. Political-oriented reductions also occur when a retailer wants to punish a supplier. For example, German retailer Edeka eliminated several items from the dairy manufacturer Muller because this manufacturer also produced fancy labels for Edeka’s hard discount competitor Aldi (*Distrifood Daily* 2004).

In general, the first two types of assortment reduction (maintenance- and supply chain-oriented) affect a greater number of items and brands than do the last two types. That is, category strategy-oriented and political-oriented delistings are limited to a few items or brands and a few suppliers. In this thesis, we will study both limited (Chapter 2 and 3) and extended (Chapter 4) assortment reductions.

Thesis

This thesis is fully dedicated to the topic of assortment unavailability. The body of the thesis is formed by three essays that investigate consumers’ reactions to temporary or permanent assortment unavailability. In Chapter 2, we study the effect of temporary assortment unavailability (out-of-stocks) by researching consumer reactions and their antecedents for

hypothetical stock-outs in a wide variety of product groups. In Chapters 3 and 4, we present essays that study the effects of permanent assortment unavailability on variables such as category sales, store sales, complaining behavior, assortment satisfaction, and perceived assortment variety. In Chapter 3, we specifically address the situation in which a retailer delists one brand within a category, whereas in Chapter 4 we focus on the situation in which a retailer cuts a category assortment by 25%.

The current chapter continues with a general discussion of the Dutch supermarket channel, which will give the reader a general understanding of the context in which the studies took place. In section 1.3, we discuss the importance of assortment and other retail mix variables, such as price and promotions, in the supermarket decision process of consumers. Next, we present the main research question of this thesis and the research methodology used in the studies to answer that question. We continue with a discussion of the scientific contributions of this thesis (section 1.5). Finally, in section 1.6, we elaborate on the managerial relevance of the studies presented herein.

1.2 Developments in the Dutch supermarket channel

Because all the studies in this thesis are conducted with Dutch supermarkets, this section provides a description of the structure and main developments in the Dutch supermarket channel in the past decade. After reading this section, readers who might not be familiar with grocery retailing in general or the Dutch grocery retail sector in particular should be able to understand the research setting of the studies presented herein.

The total turnover in the Dutch supermarket channel was euro 26.2 billion in 2004 (ACNielsen 2005). Due to a severe price war, initiated in October 2003 by market leader Albert Heijn, sales have been rather stable since that time. Also due to the price war, the net price level of grocery products has declined by more than 5% during the period October 2003–September 2005 (EFMI 2005).

The number of supermarkets in the Netherlands is, similar to almost all western European countries, gradually decreasing (see Table 1.1). In 2004, there were 4,592 supermarkets in the Netherlands, down from 6,592 in 1995 (–30%). Small supermarkets (e.g., floor space less than

400 square meters) are disappearing in particular. In 1995, for example, 3,661 small supermarkets remained in the Netherlands, whereas in 2004, this number had decreased to only 1,531 (-58%). At the same time, the number of large supermarkets (e.g., floor space between 1,000 and 2,500 square meters) is still growing. In 1995, there were 592 large supermarkets, whereas in 2004 the number of large supermarkets increased to 869 (+47%) (EIM 2005).

Table 1.1: Number of supermarkets in the Netherlands, Belgium, Germany and France (EIM 2005).

Country	1995	1997	1999	2000	2001	2002	2003	2004
Netherlands	6,529	6,214	5,907	5,583	5,229	4,968	4,663	4,592
Belgium	12,966	12,694	11,520	10,676	9,891	9,192	8,770	8,629
Germany	76,400	72,300	68,400	66,400	64,200	62,230	60,000	57,700
France	41,957	39,479	38,460	37,864	37,637	37,559	37,598	37,812

Although service-oriented supermarket chains like Albert Heijn (28%) and C1000 (16%) still have the largest market shares, hard discount supermarkets have gained ground in the Netherlands. The combined market share of the hard discount chains Aldi and Lidl has grown from 6% in 1996 to 13% in 2004 (EFMI 2005). Service-oriented supermarkets still need to find an effective strategy to stop hard discount sales from growing any further. However, since Albert Heijn initiated a rollback on its prices on October 2003, the sales growth of Aldi has been tempered (ACNielsen 2005).

Another major trend in the Dutch supermarket channel is the rise of private labels' market share. National operating retail chains, such as Albert Heijn, Super de Boer, C1000, Edah, and Plus, have extended their private-label portfolios during recent decades. For example, Albert Heijn offers approximately 4,500 private-label items out of its total of 20,000 items. Concomitantly, the total market share of private labels within the supermarket channel has grown from 16% in 1996 to 22% in 2005 (IRI 2005).

1.3 The role of assortment in the supermarket choice process

The main streams of research on the effect of choice in both psychological and marketing literature show that more choice generally has positive effects on motivation, satisfaction, perceived control, perceived variety, and assortment attraction (e.g., Deci and Ryan 1985; Kahn and Lehmann 1991; Langer 1983; Oppewal and Koelemeijer 2005). This idea has largely been adopted by grocery retailers as they have gradually extended their assortments (Boatwright and Nunes 2001). In countries such as the United Kingdom and France, more than 40% of total grocery sales occur in superstores and hypermarkets. These retail formats often carry a range of 40,000–80,000 stock-keeping units (SKUs). In the Netherlands, superstores and hypermarkets are less dominant, and regular supermarkets, with commercial floor spaces of 400–1,200 square meters, account for more than 70% of total grocery sales. These supermarkets tend to carry fewer items than superstores and hypermarkets. For example, most regular Albert Heijn supermarkets offer an assortment that consists of about 20,000 SKUs, whereas stores of its competitors, like C1000 and Super de Boer, offer on average 10,000 and 15,000 items, respectively.

The question thus emerges: Does an extended assortment attract more customers? We specifically study the behavior of grocery shoppers. In the Netherlands, the consumers that are primarily responsible for buying groceries for their households (hereafter, grocery shoppers) go to a supermarket, on average, 2.6 times per week (EFMI and CBL 2005). Because of several factors, such as the higher penetration of cars, a higher percentage of women with (paying) jobs, and the decreasing number of supermarkets, the average number of store visits per week has gradually decreased during the past decade. For example, in 1990, Dutch consumers went to the supermarket on average 3.3. times per week (EFMI and CBL 2005).

In addition, most grocery shoppers are not loyal to only one supermarket. A total of 87% of grocery shoppers use two or more different supermarkets for their grocery purchases. On average, grocery shoppers visit 2.8 different supermarkets each month, which suggests that they tend to spread their purchases among different stores (EFMI and CBL 2005). There might be several reasons why consumers are not loyal to one store. For example, stores may differ in the price level, promotional tactics, services, and assortment level they offer (Fox and Hoch 2005). Specifically, with regard to the assortment they offer, supermarkets strongly differ. For example, Aldi offers an average of only 800 items, whereas an Albert Heijn XL store offers 30,000 or

more. However, Aldi is known to be much cheaper than Albert Heijn, so in many cases, grocery shoppers make a trade-off among price, service, and assortment.

In the report *Consumenten Trends 2005* (EFMI and CBL 2005), grocery shoppers reported their most important criteria when choosing their primary supermarket (i.e., the supermarket from which they buy most of their grocery items); the top five are as follows: (1) low prices, (2) good quality, (3) wide assortment, (4) good promotions, and (5) many fresh products. Thus, in the top five selection criteria, two directly refer to the assortment offered: “wide assortment” (3) and “many fresh products” (5), while “good quality” (2) seems indirectly related to the assortment offered. Therefore, we again conclude that assortment is an important retail mix variable for attracting consumers.

However, the importance of an extended assortment varies among customers. For example, if we were to compare the primary customers of hard discount stores (e.g., Aldi, Lidl) with the primary customers of service supermarkets (e.g., Albert Heijn, Super de Boer, C1000), we would find that primary customers of service supermarkets give relatively more weight to assortment variety than do the hard discount shoppers when they choose their primary supermarket (see Table 1.2). Hard discount shoppers, in contrast, are more interested in low prices and good promotions.

Table 1.2: Relative importance of top five supermarket choice criteria (EFMI 2005)

Importance of Choice Criteria when Choosing a Supermarket (% very important)	Primarily Hard Discount Shoppers (n = 560)	Primarily Service Supermarket Shoppers (n = 4.179)	Significance
Low prices	71%	36%	$p < 0.001$
Good quality	46%	57%	$p < 0.001$
Extended assortment	18%	34%	$p < 0.001$
Good promotions	44%	29%	$p < 0.001$
Many fresh products	26%	42%	$p < 0.001$

Thus, an extended assortment is an important variable for grocery shoppers when they are making decisions about which supermarket to visit. Furthermore, the level of the importance of assortment varies across customers. In general, those who shop primarily at service supermarkets

value assortment more than do those who usually patronize discount supermarkets. In summary, we conclude that assortment is a main consumer driver for supermarket choice. Because assortments continuously change, it is very important to understand how consumers react when their preferred items are not available.

1.4 Main research questions and research method

In this thesis, we are mainly interested in the effects of temporary and permanent assortment unavailability on consumer reactions. Furthermore, we research some antecedents that might help explain these reactions. Thus, our main research question is as follows:

What are the effects of temporary and permanent assortment unavailability on consumer reactions, and what are the main antecedents of these reactions?

In the following three chapters, we present closely related studies that each aim to answer part of the main research question. Whereas Chapter 2 focuses on measuring and explaining consumer responses to a temporary assortment unavailability (out-of-stock), Chapters 3 and 4 deal with understanding (short- and long-term) consumer responses to permanent assortment unavailability (assortment reduction). In these studies, we distinguish several types of consumer reactions:

- Cognitive, such as consumers' perceived assortment variety and perceived assortment efficiency.
- Affective, such as assortment and store satisfaction.
- Behavioral, such as store switching, brand switching, and complaining behavior (individual consumer reactions) and category sales (aggregated consumer reactions).

Furthermore, in the several studies we conducted to investigate these consumer reactions, we use various types of antecedents to explain consumer reactions to assortment unavailability (see also Campo, Gijsbrechts, and Nisol 2000). In our studies, we included and tested four main groups of antecedents of consumer reactions to assortment unavailability: (1) brand-related

antecedents, such as the brand equity of the brand that is unavailable; (2) product- and category-related antecedents, such as the hedonic level of the product that is unavailable or the assortment size within the product group; (3) store-related antecedents, such as the type of store (service or price oriented); and (4) consumer-related antecedents, such as age, educational level and household income.

Table 1.3: Classification of research methods

Subject of Study	Research Method		
	Laboratory Experiment	Survey	Field Experiment
Effect of <i>temporary</i> assortment unavailability (stock-outs)		Chapter 2 (Multi-product group survey)	
Effect of <i>permanent</i> assortment unavailability (assortment reductions)	Chapter 3 (Beer experiment)	Chapter 3 (Multi-product group survey)	Chapter 4 (Detergent experiment)

In these studies, we use a variety of research methods to study consumer responses to assortment unavailability. For an overview of these research methods, see Table 1.3. To study consumer responses to temporary assortment reductions (out-of-stocks), we developed a survey that we used to interview 749 grocery shoppers of thirteen Dutch supermarkets and thereby monitor stock-out responses in eight categories (Chapter 2).¹ To study consumer responses to permanent assortment unavailability, we use a laboratory experiment, a survey, and a field experiment. In the laboratory experiment (Chapter 3), we test the effect of delisting a low- or high-equity brand on assortment satisfaction and perceived assortment variety. This experiment was conducted in close cooperation with Heineken. In a survey (also Chapter 3), we test the effect of an hypothesized brand reduction in ten product groups among 16 stores of the Dutch grocery retailers Albert Heijn, Super de Boer, C1000, and Edah. Finally, in the field experiment (Chapter

¹ This study has appeared in the *Journal of Retailing* (Sloot, Verhoef, and Franses 2005).

4), we test the short- and long-term effects of a major assortment reduction (25% of the items) in the detergent category.² This test was conducted in close cooperation with a major Dutch retailer.

Each method has its own advantages and disadvantages (Churchill 1995). For example, a field experiment (Chapter 3) enables us to create a situation with the desired conditions and manipulate some variables while controlling others (e.g., assortment size). Therefore, we can measure the effect of the manipulation of an independent variable (e.g., type of delisted brand) on several dependent variables (e.g., assortment perception, brand switching intention) by minimizing the effects of other, possibly relevant variables. This approach enhances the internal validity of the results. Furthermore, a field experiment (Chapter 4) allows us to manipulate an independent variable (e.g., number of delisted items). However, compared with a laboratory experiment, a field experiment offers a much lower degree of control over the research setting because it is conducted in a natural setting. This loss of control lowers the internal validity but enhances the external validity of the results.

We also use a survey in several studies (see Chapters 2 and 3). The major advantage of a survey is its flexibility in measuring many different dependent and independent variables. Also, a survey enables us to measure variables that are not directly observable, such as cognitive or attitudinal variables, and to build and measure conceptual models that might explain consumer responses to assortment unavailability with a wide variety of independent variables.

Finally, using several research methods to study consumer responses to assortment unavailability allows us to compare results. Furthermore, if the results from different methods point in the same direction, we achieve greater confidence in the “true” effects on consumer responses to assortment unavailability.

1.5 Scientific contributions

With this thesis, we aim to contribute to the literature in several ways. First, we study the effects of assortment reductions using different research methodologies. We also test the effects for a wide variety of product groups, which improves the both the rigor and the generalizability of our study results. For example, with the cross-sectional studies (surveys), we investigate antecedents

² This study will appear in the *Journal of Marketing Research* (Sloot, Fok and Verhoef, forthcoming).

of assortment reduction responses and thereby can generalize the findings to a variety of product groups. In conjunction, the laboratory experiment enables us to improve the internal validity of the assortment reduction effects found through our field experiments. Furthermore, the field experiment (Chapter 4) adds to the external validity of our findings.

Second, most studies on the effects of assortment reduction focus on either behavioral or affective influences. With our study in Chapter 3, we study both types of effects simultaneously.

Third, we develop conceptual models, which include a broad variety of explanatory variables, that explain part of the variety in consumer responses to assortment reductions (Chapter 3) and out-of-stock situations (Chapter 2). Therefore, our models offer excellent starting points for other researchers in the field of assortment unavailability.

Fourth, we decompose the category sales effects of an assortment reduction into short- and long-term effects. In Chapter 4, we present a natural experiment and show that the short- and long-term effects of assortment reductions may differ significantly. Previous studies on assortment reductions have not made this important distinction (e.g., Boatwright and Nunes 2001; Broniarczyk, Hoyer, and McAlister 1998). Therefore, this study adds important findings to the literature on the short- and long-term effects of retail mix variables.

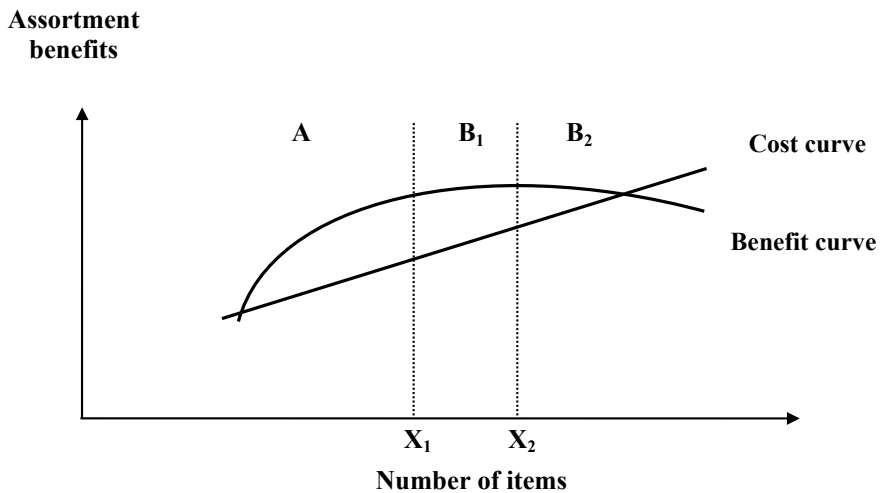
Fifth, this thesis is the first study that demonstrates that a real-life assortment reduction attracts new category buyers (Chapter 4). With this interesting finding, we support the notion that “too much” choice in a category can lead to category ignorance among customers. We further support this finding with an another study that shows that a reduced assortment actually can improve consumers’ perceived search efficiency and overall assortment satisfaction.

1.6 Managerial relevance

As we noted, assortment unavailability is a major shopping irritant for consumers that can cause direct category sales losses if the consumer decides not to switch to an alternative the retailer offers within that category. It also may lead to category sales losses in other categories if the consumer decides to switch stores. Hence, the managerial relevance of this thesis is clear. Managers must understand how consumers react when they cannot buy their preferred products and what antecedents drive consumers’ behavior in these circumstances.

Furthermore, assortment is a major cost driver for retailers. Therefore, managers must achieve a balance between an efficient assortment and an assortment that provides the necessary levels of variety. This balance is graphically depicted in Figure 1.1. In general, adding items to an assortment will lead to higher assortment benefits (e.g., category sales, perceived assortment variety), as demonstrated by areas A and B1 in Figure 1.1. However, after a certain point (B2), adding more items to an assortment can have a negative impact on assortment benefits; for example, as an assortment gets too “crowded,” consumers may find it more difficult to choose or be unable to find their preferred item.

Figure 1.1: Hypothetical relation among assortment benefits, assortment costs and number of items



Should retailers continue adding items until the assortment benefit curve reaches its maximum level? The answer to that question depends on the costs associated with adding to the assortment. Adding items usually adds costs in the supply chain (see cost curve in Figure 1.1) that might even be progressive, because the last added items will probably consist of slow-moving items. Therefore, from a business perspective, an assortment that is less optimal in terms of its assortment benefits might be preferable. Research on the effect of assortment reductions on

assortment benefits and assortment costs also might be beneficial for practitioners that want to find more optimal assortment levels.

With the several studies provided in this thesis, managers can improve their decision-making abilities when they are forced to decide which items and/or brands to delist. For example, our research provides indications for category sales losses with regard to the type of brand that is delisted, type of category and type of store. Furthermore, we provide insights into the short- and long-term effects of assortment reductions. We also measure assortment reduction effects on qualitative variables, such as assortment satisfaction and complaining behavior.

Our study on out-of-stocks also gives clear guidelines for managers about the types of stock-outs that will cause significant negative effects for their category sales. With these guidelines, managers can set priorities in their efforts to prevent stock-outs.

CHAPTER 2

THE IMPACT OF BRAND EQUITY AND THE HEDONIC LEVEL OF PRODUCTS ON CONSUMER STOCK-OUT REACTIONS

Abstract

In this chapter, we investigate the impact of brand equity and the hedonic level of the product on consumer stock-out responses. We also examine whether the hedonic level of the product moderates the effect of brand equity. Using a sample of Dutch consumers divided into eight product groups and eight retail chains, we test our hypotheses and find that consumers are more loyal to high-equity brands than to low-equity brands in the case of a stock-out situation. In hedonic product groups, consumers are more likely to switch to another store. Purchasers of high-equity brands in hedonic product groups, compared with purchasers of high-equity brands in utilitarian product groups, are less inclined to postpone the purchase but more likely to switch to another item by that brand. In addition to these two main variables, we also investigate the effect of variables from prior research and some new variables, such as stockpiling and impulse buying. Finally, we discuss the theoretical and managerial implications of the findings.

2.1 Introduction

Out-of-stock (OOS) is a regular phenomenon for grocery shoppers. The percentages of OOS occurrences regularly vary among 5% (The Netherlands), 7% (France), and 8% (United States) of the total SKU level of supermarkets (Andersen Consulting 1996; *Foodmagazine* 1999; Roland Berger Strategy Consultants 2002). This rather common temporary unavailability of items rates high on shoppers' irritation lists and causes a lower level of consumer satisfaction (CBL 2000; Fitzsimons 2000). An OOS occurrence may have a direct impact on a retailer's financial outcome, because it leads to a loss of category sales if consumers decide to switch stores or cancel their purchases completely. If consumers decide to switch stores, a loss of sales might result in a loss of sales in other categories as well. The resulting gross margin losses for retailers resulting from OOS are estimated to lie between \$7 and \$12 billion per year in the United States (Andersen Consulting 1996).

In response, some efficient consumer response (ECR) projects have focused on developing methods to improve the supply chain. According to Vergin and Barr (1999), the application of continuous replenishment planning can decrease OOS levels by 55%. Although some ECR projects have showed encouraging decreases in OOS levels, a substantial decrease of OOS levels has not yet been observed in practice (EFMI 2000). Due to extensions in assortments and because shelf space is often fixed in the short and mid-terms, OOS occurrences likely will remain regular phenomena for shoppers. Therefore, retailers need additional insights into the effects of OOS on consumer behavior, particularly regarding which types of OOS situations lead to high levels of store switching, postponement or cancellation of purchases. Another important issue for retailers pertains to the product groups and brands for which OOS occurrences result in substantial sales losses.

For brand manufacturers, OOS is important as well, because high OOS levels for a specific brand may lead to losses in brand sales and decreased brand loyalty. In addition to the important financial consequences of OOS, understanding consumers' OOS responses improves manufacturers' insight into the importance of distribution and shelf space allocation. In this respect, consumer OOS reactions may provide valuable information about the possible effects of OOS when an item or a brand is permanently delisted (Campo, Gijsbrechts, and Nisol 2004).

In marketing literature, there has been substantial interest in the topic of consumer reaction to OOS since the 1960s (Peckham 1963). The majority of early studies on OOS mainly

focused on the definition and measurement of consumer OOS reactions (Emmelhainz, Stock, and Emmelhainz 1991; Gattorna 1988; Peckham 1963; Zinszer and Lesser 1981) or the financial consequences of OOS (Walter and Grabner 1975). More recently, researchers have developed and tested theory-based models to explain OOS reactions (Campo, Gijsbrechts, and Nisol 2000; Verbeke, Farris, and Thurik 1998; Zinn and Liu 2001). Campo, Gijsbrechts, and Nisol's (2000) study is particularly noteworthy, because it provides and tests a theoretical framework to explain consumer OOS responses. In general, these studies are limited in their consideration of only a small number of product categories. They also often limit their attention to one particular supermarket or retail format. Finally, most studies have not considered whether OOS reactions vary among product categories and brands. As a result, theories that may explain observed differences in reactions between product categories and brands are not well developed.

In this study, we aim to fill these research gaps. We develop a theoretical framework in which brand equity and the hedonic level of the product are the two main antecedents of consumer OOS reactions. The inclusion of these variables is based on the notion, common in marketing literature, that both brand equity and the hedonic nature of products affect how consumers react to certain marketing stimuli (Aaker 1991; Ailawadi, Lehman, and Neslin 2002; Batra and Ahtola 1991; Chandon, Wansink, and Laurent 2000; Dhar and Wertenbroch 2000; Hirschman and Holbrook 1982; Keller 1993, 2002).

We also consider how the hedonic level of the product moderates the effect of brand equity on these reactions. In doing so, we extend the current literature about antecedents of OOS reactions in the following ways: First, no studies have considered the impact of the hedonic nature of products on OOS reactions.³ Second, though some studies have included consumer-based brand loyalty indicators as antecedents, no studies explicitly have tried to explain consumer OOS reactions from a brand equity perspective. As a corollary, we investigate whether the effect of brand equity is moderated by the hedonic nature of a product. Third, in contrast to

³ In this study, we specifically refer to the hedonic level of a product category. In many product categories in a supermarket, this hedonic level may be considered the opposite of the utilitarian level, as is supported by our empirical measurements of the variables. In the discussion of our hypotheses, we therefore also talk about hedonic versus utilitarian products. Note however that some products might provide both utilitarian and hedonic benefits for consumers, such as shampoo or meat.

other explanatory studies, we study OOS responses in a modest number of product groups and retail chains, which improves the generalizability and external validity of our results.

In addition to its theoretical contribution, our study also provides a clear managerial framework. Using this framework, both retailing and manufacturing managers can set priorities regarding which product groups and brands for which OOS should be minimized.

We continue this chapter with a review of the prior literature on OOS. Next, we discuss our conceptual model and the underlying hypotheses. We subsequently describe the research methodology and empirical results, and we end with a discussion of the managerial implications, research limitations, and directions for further research.

2.2 Literature review

In this section, we provide a literature review of prior studies on OOS reactions and discuss the objectives, research methodology, research setting, OOS reactions considered, and antecedents of OOS reactions. In Table 2.1, we provide an overview of the published studies about consumer stock-out reactions in marketing and business logistics literature.

2.2.1 Objectives

The objectives of early studies on OOS were mainly to define and measure OOS reactions and their financial impact. In some of these studies, OOS reactions were explained in an explorative way (e.g., Peckham 1963). Schary and Christopher's (1979) study was the first to attempt to explain OOS reactions. In the early 1990s, Emmelhainz, Stock, and Emmelhainz (1991) continued to focus on explaining OOS reactions. Although their study is mainly descriptive in nature, they take some interesting product and situational variables into account to explain OOS reactions. Campo, Gijbrecchts, and Nisol (2000) were the first to explicitly build a theoretically based conceptual framework to explain consumer reactions to OOS.

2.2.2 Research methodology

Most studies apply either a field experiment or a survey. In field experiments, true stock-outs are studied. Researchers either remove specific items or brands in advance of the research or ask consumers if they encountered an OOS situation during their shopping trip (quasi-experiments).

Table 2.1: Methodological overview of studies about consumer responses to OOS

Author(s)	Products included	Main Objective(s) of Study	Main OOS Reactions Measured	Study Design	Stock-out Type (true or hypothetical)	Range of OOS (item or brand)	Data Collection Method	Number of Categories Involved	Number of Brand Types Involved	Number of Retail Chains and Stores Involved
Peckham (1963)	Grocery products	Determining the level of consumer OOS confrontations and describing consumer OOS behavior	Substitute brand bought (Y/N)	Quasi-experiment	True	Brand	Personal interviews in a supermarket setting after check-out (n = 1173, 24% experienced unavailability)	14	No information given	Many different retail chains and many stores (exact number not given)
Walter and Grabner (1975)	Liquor products	Describing consumer OOS behavior and determining the economic costs of stock-outs to retailers	Store switch Brand switch Item switch Defer	Survey	Hypothetical	Item	Written survey, distributed by the cashier (n = 1433)	Specific number not given	No information given	One retail chain, ten stores
Schary and Christopher (1979)	Grocery products (branded food items)	Describing and explaining consumer OOS responses from store- and product-related characteristics	Brand switch Product switch Store switch No buy Postpone	Quasi-experiment	True	Item	Personal interviews with shoppers just leaving the check-out area (n = 1167, 343 effectively)	Specific number not given	No information given	One retail chain, two stores
Emmelhainz, Stock, and Emmelhainz (1991)	Grocery products	Identifying consumer OOS behavior and analyzing the impact of product and situation influences on consumer OOS behavior	Item switch Brand switch Product switch Delay purchase Different store Special trip	Field experiment	True	Item	Personal interviews (n = 2810, 375 effectively)	5	5 leading selling varieties	One retail chain (discount), one store
Verbeke, Farris, and Thuriik (1998)	Grocery products	Identifying consumer OOS reactions for high-selling brands and explaining OOS reactions by store-related and situational characteristics	Brand switch Store switch Postpone purchase	Field experiment	True	Brand	Interviews by telephone (n = 590)	5	5 high-share brands	One retail chain, eight stores
Campo, Gajshochts, and Nislo (2000)	Grocery products (margarine and cereals)	Explaining consumer OOS reactions based on a conceptual framework with major determinants of consumer OOS reactions	Size switch Item switch Store switch Defer Canceled	Survey	Hypothetical	Item	Personal interviews in the supermarket (n = 995 cases, margarine 544, cereals 449)	2	3 (generics, private labels, and national brands)	One retail chain, one store
Fitzsimons (2000)	All types of products	Explaining OOS effects (store switch, satisfaction) by cognition and attitude	Store switch Consumer satisfaction	Laboratory experiment	Hypothetical	Hypothetical items	Four experiments with written surveys.	Specific number not given	No information given	No retail outlet context
Zim and Liu (2001)	Small appliances, home decoration items, furniture, and jewelry	Explaining consumer OOS reactions from a consumer psychology context (consideration set, commitment, attractiveness of alternatives, and perceived complexity of choice process)	Substitute item Delay purchase Leave the store	Quasi-experiment	True	Item	Written questionnaire, (n = 283)	Specific number not given	No information given	One retail chain (discount), four different stores

Studies that apply exploratory designs (e.g., surveys) consider hypothetical stock-out situations. In these cases, respondents are asked how they would react if a purchased item or brand were unavailable. We expect that these differences in research design influence the OOS reactions of consumers. For example, the “cost” of switching stores is obviously lower in surveys, because consumers do not really have to perform this time-consuming activity.

With respect to the research design, the type of OOS also is important. Generally, two types of OOS can be distinguished: item and brand. In the first case, a single item of a brand (e.g., regular Coca-Cola) is OOS, whereas in the second case, all items of a single brand in a product group (e.g., all Coca-Cola products) are OOS. As we might expect, the reported OOS reactions differ. Moreover, in the case of brand OOS, an item switch (e.g., purchasing diet Coca-Cola instead of regular Coca-Cola) is not possible. When different research designs are used, it is difficult to derive empirical generalizations about the determinants of OOS reactions.

2.2.3 Research setting

Studies about OOS reactions have been executed in a variety of product categories. As a result of their methodology, studies that consider actual OOS experiences (quasi-experiments) usually measure reactions for most categories in the store. With respect to the type of brands studied, our review reveals that some studies only consider high-share brands (e.g., Verbeke, Farris, and Thurik 1998), whereas others consider manufacturer brands and private labels (e.g., Schary and Christopher 1979). However, despite the consideration of a broad range of brands, OOS studies usually do not regard the type of brand as an explanatory variable for OOS response. Finally, our review of the research setting shows that studies are usually executed within stores of a single retail chain, which limits the generalizability of their results.

2.2.4 Consumer OOS reactions

To define and measure OOS reactions, six main behavioral consumer responses usually are distinguished. Ranked from relatively high to relatively low brand loyalty, these reactions are as follows:

- (1) Store switch: going to another store on the same day to buy the item that is OOS;
- (2) Item switch: switching to another format or variety of the same brand;
- (3) Postponement: postponing the intended buy until the next regular trip to the supermarket;

- (4) Cancel: dropping the intended purchase completely or postponing it for a longer period of time;
- (5) Category switch: buying a substitute product from another product category; and
- (6) Brand switch: buying another brand within the same product category.

Studies of OOS reactions typically do not consider these six reactions simultaneously. For example, Verbeke, Farris, and Thurik (1998) only focus on reactions 1, 3, and 6, whereas Campo, Gijsbrechts, and Nisol (2000) do not explicitly consider reactions 5 or 6. In addition, different definitions and measurement approaches are used by different researchers. For example, Campo, Gijsbrechts, and Nisol (2000) include a brand switch within the item switch reaction, though they differ significantly. Buying another item of the same brand can be considered an indication of brand loyalty; buying an item of another brand indicates the opposite.

Prior studies also show that the frequency of cancel and category switch reactions is very small. In our empirical study, which we present subsequently, we also find small frequencies. Therefore, we focus on the four most common reactions—store, item, and brand switches and postponement—in our discussion of the antecedents of OOS reactions and the hypotheses that underlie our empirical model.

2.2.5 Antecedents of OOS response

In Table 2.2, we provide an overview of the empirical evidence regarding the effect of possible determinants of OOS reactions. In line with prior research (Campo, Gijsbrechts, and Nisol 2000; Zinn and Liu 2001), we distinguish among the following clusters of antecedents: (1) product-related variables, (2) store-related variables, (3) situation-related variables, and (4) consumer-related variables.

Product-related variables. The first group of variables relates to the specific product category, including the brands, for which the stock-out appears. Several studies have claimed that the perceived availability of acceptable alternatives is an important determinant of consumer response to OOS occurrences. For example, Campo, Gijsbrechts, and Nisol (2000) show that the availability of acceptable alternatives is negatively related to store switching and positively related to brand switching, and Emmelhainz, Stock, and Emmelhainz (1991) report that the risk consumers perceive with respect to the substitutes offered negatively affects brand switching.

Table 2.2: Methodological overview of explaining variables for consumer stock-out reactions (significance $p < 0.05$)

Antecedents	Description of Characteristic	Variable	Brand Switch	Store Switch	Item Switch	Postpone Purchase	
Product-related variables	Variables related to the specific product category or brand in which the (hypothetical or factual) stock-out appears	Availability of acceptable alternatives (Campo, Gijbsbrechts, and Nisol 2000) *	+	-	+	-	
		Perceived attractiveness of alternatives (Fitzsimons 2000)	-	-	-	+	
		Perceived risk of switching to an alternative (Emmelhainz, Stock, and Emmelhainz 1991)	-				
		Stock-out item is in consideration set (Fitzsimons 2000)		+			
		Brand loyalty (Campo, Gijbsbrechts, and Nisol 2000)		+			
Store-related variables	Variables related to the store or retail chain in which the stock-out occurs	Repeat purchases (Emmelhainz, Stock, and Emmelhainz 1991)	-				
		Private label (Scharly and Christopher 1979)		-		+	
		Store loyalty in general (Campo, Gijbsbrechts, and Nisol 2000)	+	-	+	+	
		Percentage of shopping trips at survey store (Campo, Gijbsbrechts, and Nisol 2000)	+	-	+	+	
		Store loyalty (Emmelhainz, Stock, and Emmelhainz 1991)		-			+
Situation-related variables	Variables related to the specific shopping trip in which the stock-out appears	Store loyalty: large (Verbeke, Farris, and Thuriik 1998)		+			
		Required purchase quantity (Campo, Gijbsbrechts, and Nisol 2000)	+	-	+	- and +	
		Urgency (Zinn and Liu 2001)					-
		Available shopping time (Campo, Gijbsbrechts, and Nisol 2000)	+	-	+	+	
		Time pressure (Campo, Gijbsbrechts, and Nisol 2000)	+	- and +	+	- and +	
Consumer-related variables	Variables related to the consumer (shopper) who is confronted with the stock-out	Major shopping trip (Campo, Gijbsbrechts, and Nisol 2000)	+	+	+	- and +	
		Shopping attitude (Campo, Gijbsbrechts, and Nisol 2000)	-	+	-	- and +	
		Complexity of decision-making process set (Fitzsimons 2000)		-			-
		Amount of purchase: small versus large (Verbeke, Farris, and Thuriik 1998)	+	+	+	-	
							-

* Campo, Gijbsbrechts, and Nisol (2000) define variety switch (another SKU of same brand) and brand switch as elements of an item switch and pay separate attention to size switches. In most other studies about consumer reactions to stock-outs, size and variety switch within the same brand are defined as item switch, whereas a brand switch is measured as a separate switching reaction

A second important characteristic is brand loyalty. Several studies have shown that the more loyal a consumer is to a specific brand (in terms of attitude or behavior), the less likely he or she is to switch to another brand in the case of an OOS occurrence. Furthermore, brand-loyal consumers are more likely to buy the OOS item or brand in another store (Campo, Gijsbrechts, and Nisol 2000; Emmelhainz, Stock, and Emmelhainz 1991; Peckham 1963; Verbeke, Farris, and Thurik 1998).

A third variable is the level of safety stock consumers generally maintain before they make a new purchase (Campo, Gijsbrechts, and Nisol 2000; Narasimhan, Neslin, and Sen 1996). Some perishable products, such as milk or sour cream, are unlikely to be stockpiled. Consumers tend to buy these products to consume them within a few days. Therefore, for such products, it is less likely that consumers will postpone their purchase if the preferred item is OOS.

A fourth variable is the type of brand that is unavailable. Schary and Christopher (1979) find a significant effect of the type of brand on OOS reactions. National brand buyers have a greater tendency to switch stores in the case of OOS than do private label buyers. This effect may be caused by the limited distribution level of private labels compared with national brands. As a consequence, it is relatively more inconvenient for private label buyers to obtain their favorite item if it is OOS than for national brand buyers.

Store-related variables. Store-related antecedents pertain to variables that are related to the store or retail chain in which the OOS occurs. Several studies include store loyalty (attitudinal and behavioral) as an antecedent of OOS reactions. Not surprisingly, most report a positive effect of store loyalty on item switching, brand switching, and postponement of the purchase. Store-loyal consumers are less likely to switch to another store in the case of an OOS occurrence (Campo, Gijsbrechts, and Nisol 2000; Emmelhainz, Stock, and Emmelhainz 1991).

Some studies also have considered the availability of alternative stores in the vicinity of the store in which the OOS appears. Not only the number of alternative stores but also the acceptability of these stores plays an important role in shoppers' decision to switch stores. For example, attributes such as the available parking space, price level, and service level of alternative stores may influence the decision to switch stores in the case of an OOS occurrence. Theoretically, consumers with many acceptable alternative stores within a reasonable distance are more likely to switch to another store and less likely to buy a substitute (item or brand switch) or postpone the purchase. Although this expectation seems logical, no studies have supported this effect (e.g., Verbeke, Farris, and Thurik 1998).

Situation-related variables. Situation-related variables pertain to antecedents that focus on the specific conditions of the consumers' shopping trip. Several studies have suggested that buying urgency is an important determinant of OOS response (Campo, Gijsbrechts, and Nisol 2000; Emmelhainz, Stock, and Emmelhainz 1991; Zinn and Liu 2001). When a specific product is needed immediately, consumers cannot postpone the purchase. Therefore, they are more likely to buy a substitute or switch stores to buy the needed item.

Campo, Gijsbrechts, and Nisol (2000) also consider the type of shopping trip as an antecedent of OOS reactions. Consumers who visit the store for a major shopping trip are less likely to switch to another store and more likely to buy a substitute. The underlying rationale for this effect is that a major shopping trip is very time consuming, and consumers are therefore reluctant to spend additional time shopping in another store.

Consumer-related variables. Consumer-related variables consist of those variables related to the consumer who faces the OOS occurrence. One such characteristic is shopping attitude. Consumers with a positive shopping attitude are more likely to switch stores in the case of an OOS because they value visiting different stores (Campo, Gijsbrechts, and Nisol 2000). Another characteristic is shopping frequency. Consumers who shop frequently are more likely to postpone a purchase, because the chance of being without the product at home is smaller than for consumers who shop less frequently. However, there is no empirical evidence for such an effect (Campo, Gijsbrechts, and Nisol 2000).

The time constraint or time pressure also may be an explanatory variable. Campo, Gijsbrechts, and Nisol (2000) show that consumers who have less time to shop are less likely to switch stores and more likely to buy a substitute. Related to time constraint is the age of the consumer. Peckham (1963) reports that age is negatively related to substitute buying. A possible reason for this relationship may be that older people have more spare time to shop; therefore, they have fewer time constraints against switching stores.

2.3 Conceptual model and hypotheses

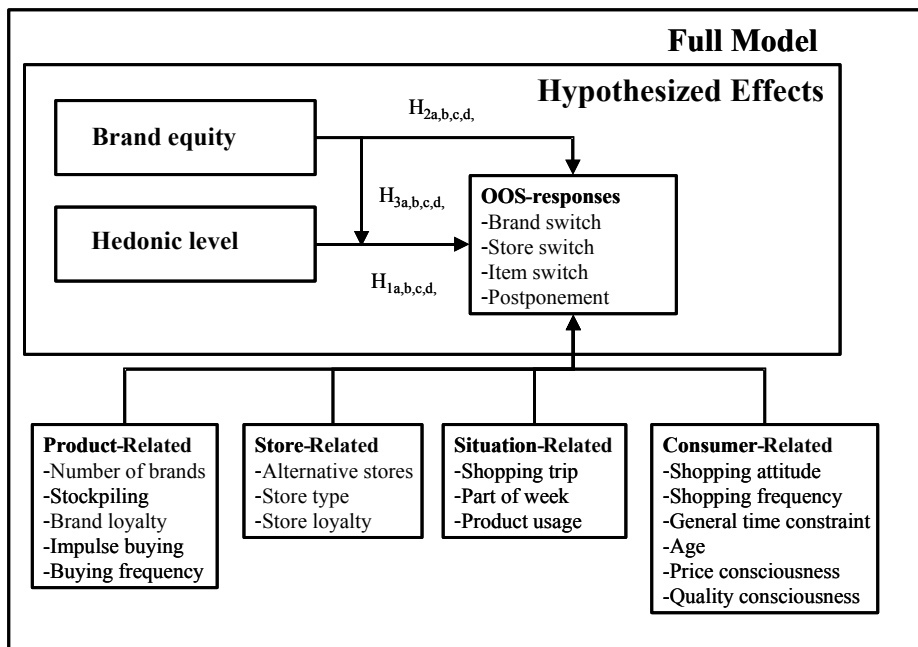
In Figure 2.1, we show our conceptual model. In the main model, we focus on the effect of brand equity, the hedonic level of the product, and the moderating effect of the hedonic level of the product on the effect of brand equity. In the full model, we also include variables that could be

important determinants of OOS reactions according to the literature. These variables are classified according to the four categories: product-, store-, situation-, and consumer-related.

2.3.1 Brand equity

In defining brand equity, Chandon, Wansink, and Laurent (2000) make a distinction between high- and low-equity brands. A brand has high customer-based brand equity when consumers react more favorably to a product when the brand is identified than when it is not (Keller 2002). In general, consumers value high-equity brands more than low-equity brands. Compared with high-equity brands, low-equity brands do not provide as many benefits and are bought mainly because of their lower price (Chandon, Wansink, and Laurent 2000). Therefore, some researchers suggest that the difference in price level between a national brand and a private label is a good indicator of brand equity (Kamakura and Russell 1993). A theoretical advantage of using brand equity as an antecedent of OOS reactions is that both manufacturer and retailer brands (i.e., private labels) can be classified according to this criterion (Ailawadi, Lehmann, and Neslin 2002).

Figure 2.1: Conceptual model of stock-out responses



As noted, consumers generally prefer high-equity brands and therefore are willing to exercise more effort to obtain their favorite high-equity brand. Furthermore, high-equity brands tend to have a greater distribution level than low-equity brands, which often consist of private labels, regional brands, and price brands. From the perspective of both brand loyalty and brand availability, consumers who are confronted with an OOS situation for an item of a high-equity brand will be more inclined to switch to another store to purchase the preferred item. Schary and Christopher (1979) provide some preliminary evidence for this hypothesis by showing that national brand buyers are more likely to switch to another store than are private label buyers in case of a stock-out situation.

Therefore, we expect that the level of brand equity is positively related to store switching, item switching, and postponement of the intended purchase and negatively related to brand switching. We hypothesize that for OOS situations,

H_{1a}: Brand equity negatively affects the probability of brand switching.

H_{1b}: Brand equity positively affects the probability of store switching.

H_{1c}: Brand equity positively affects the probability of item switching.

H_{1d}: Brand equity positively affects the probability of postponing.

2.3.2 Hedonic level

Several studies have suggested that the type of product is an important variable in explaining OOS behavior and that this variable should be taken into account (Campo, Gijbrecchts, and Nisol 2000; Emmelhainz, Stock, and Emmelhainz 1991; Schary and Christopher 1979). However, products can be classified according to various dimensions. For example, in explaining promotional elasticity, Narasimhan, Neslin, and Sen (1996) use dimensions such as stockpiling, impulse buying, and number of brands in the category to classify product groups. Although we take many of these product-related variables into account in our full model, in our theoretical framework, we specifically focus on the basic benefits that a product provides to consumers. These benefits can be utilitarian and/or hedonic. Products with hedonic benefits like ice cream and salty snacks provide more experiential consumption, fun, pleasure, and excitement, whereas products with utilitarian benefits (hereafter referred to as utilitarian products), like detergent and toilet paper, are primarily instrumental and functional (Batra and Ahtola 1991; Dhar and Wertenbroch 2000). Some products may offer both utilitarian and hedonic benefits to consumers.

Shampoo, for example, combines a utilitarian benefit (cleaning hair) with a hedonic benefit (nice smell). Moreover, even products that are bought mainly out of utilitarian motives may provide some hedonic benefits. For example, consumers may perceive a product such as milk, which is often bought for its nutritional value (utilitarian benefit), as very tasty (hedonic benefit).

The different nature of utilitarian and hedonic products may affect the buying process, in that the buying process of utilitarian products will be driven mainly by rational buying motives. In the buying process of hedonic products, in contrast, emotional motives also play an important role, which may affect OOS responses. The unavailability of utilitarian products, such as detergent, margarine, or toilet paper, may influence the functioning of the household. Therefore, consumers will be less likely to postpone a purchase and more likely to buy a substitute in the case of utilitarian products.

In contrast, hedonic products provide more emotional value to the consumer. For example, when a consumer plans to purchase beer, ice cream, or salty snacks and consume it that evening, he or she will be very disappointed if unable to purchase the desired product (Fitzsimons 2000). This reasoning is supported by Dhar and Wertenbroch (2000), who find that consumers are less satisfied if they experience a problem in the hedonic dimensions of a service and that consumers bond more to hedonic benefits. This trend may lead to more store switching for hedonic products than for utilitarian products. The personal bond to the hedonic benefits of a product also might lead to the lower probability that consumers postpone the purchase.

Thus, we find two contrasting theories regarding the effect of the hedonic nature of the product on OOS responses. In general, we adopt the first theoretical explanation in our hypotheses. We expect that item switching and brand switching will be lower in product categories with a high hedonic level, whereas a postponement of purchase will occur more frequently for hedonic product categories. Following Dhar and Wertenbroch (2000), we expect that store switching behavior in OOS situations will be greater for hedonic products.

H_{2a}: The hedonic level of a product negatively affects the probability of brand switching.

H_{2b}: The hedonic level of a product positively affects the probability of store switching.

H_{2c}: The hedonic level of a product negatively affects the probability of item switching.

H_{2d}: The hedonic level of a product positively affects the probability of postponing

2.3.3 The interaction of hedonic level and brand equity on OOS reactions

Two main rationales exist for a moderating effect of the hedonic level of a product on the effect of brand equity in OOS reactions. First, hedonic products offer more opportunities to differentiate the brand in consumers' minds than do utilitarian products (Keller 2002; Rossiter and Percy 1997). In utilitarian product groups, brands mainly are differentiated by product quality. In hedonic product groups, however, emotional and symbolic aspects play an important role in positioning the brand. Strong hedonic brands, such as Coca-Cola, Budweiser, and Marlboro, have built dominant and relevant association networks in many consumers' minds. Due to the stronger position of high-equity brands in hedonic product categories, the effect of brand equity on brand or store switching should be greater in hedonic categories than in utilitarian categories.

Second, high-equity brands in hedonic categories usually provide more items on the shelf relative to high-equity brands in utilitarian categories. For example, in a utilitarian category like milk, there are only a few items for the leading brand, whereas consumers may choose among many sizes and flavors (e.g., regular, vanilla, cherry) of leading brands in a hedonic product group like cola. This provides the consumer with more switching alternatives of the same brand, which may lead to increased item switching. In addition, consumers have a greater need for variety in hedonic categories than in utilitarian categories (Van Trijp, Hoyer, and Inman 1996) and therefore may be more willing to switch to another size or flavor. Thus, the probability that consumers will switch items is higher for high-equity brands in hedonic product groups than for high-equity brands in utilitarian product groups. In the same fashion, the greater availability of items of the same brand leads to less postponement for high-equity brands in hedonic product groups than for high-equity brands in utilitarian product groups.

H_{3a}: The hedonic level of a product group increases the negative effect of brand equity on the probability of brand switching.

H_{3b}: The hedonic level of a product group increases the positive effect of brand equity on the probability of store switching.

H_{3c}: The hedonic level of a product group increases the positive effect of brand equity on the probability of item switching.

H_{3d}: The hedonic level of a product group decreases the positive effect of brand equity on the probability of postponing.

2.3.4 Other explanatory variables

On the basis of our review of OOS-oriented literature, we selected explanatory variables that have been shown to be antecedents of consumer stock-out reactions (see “Antecedents of OOS response”). Through the inclusion of these variables, we aim to gain insight into whether the hedonic level of a product and brand equity are important antecedents of OOS reactions. We also aim to provide a more general test of the significance of antecedents found in previous research, in that we study OOS responses in several product groups and retail chains.

On the basis of literature on switching behavior from a category perspective, we also include new variables (e.g., Narasimhan, Neslin, and Sen 1996; Van Trijp, Hoyer, and Inman 1996)⁴ that can be classified according to our four types. On the basis of research by Narasimhan, Neslin, and Sen (1996) and Beatty and Ferrell (1998), we include impulse buying as a product-related antecedent for stock-out reactions. These studies show that impulse buying is important to explain consumer responses to promotions, in that, in the case of an impulse purchase, a consumer does not plan to buy the product in advance. Therefore, in these situations, consumers are less inclined to purchase the specific product if it is unavailable. We also include buying frequency, a product-related antecedent, for several reasons. First, if a product is purchased frequently, consumers must live with the consequences of buying a less preferred item for only a limited period of time (Bawa and Shoemaker 1987). Second, heavy users generally use a wider variety of brands than do light users. Therefore, we propose that buying frequency is negatively related to postponement and store switching and positively related to brand and item switching.

As a store-related explanatory variable, we add the type of store. We distinguish between stores with relatively limited assortments (less than 10,000 grocery items) and stores with relatively extended assortments (greater than 15,000 grocery items). If a retailer offers many different items in the same category, it may be easier for consumers to find an acceptable alternative if the preferred item or brand is OOS. This antecedent also might shed some light on the importance of conducting studies such as this in supermarkets that belong to different retail chains.

The part of the week and personal usage are added as situation-related variables. The part of the week pertains to the point in the week when the purchase takes place. In countries and areas where stores are closed for part of the weekend, this variable may be especially relevant.

⁴ Some of these variables were recommended by the anonymous reviewers of the *Journal of Retailing*.

For example, supermarkets are usually closed on Sundays in The Netherlands. Therefore, if a purchase trip is made early in the week, the consumer will be more likely to postpone purchase than if he or she shops at the end of the week, or just before the day the supermarket is closed. Personal usage refers to whether the consumer bought the product for his or her own use or for the use of other persons in the household or visitors. It may be more difficult to switch to another brand or item if the buyer is not the user, because the buyer does not want to disappoint other persons. The effect of this variable also may be affected by the specific user and/or type of product. For example, the effect might differ among products bought for visitors (e.g., wine), other adults in the household (e.g., beer), or children (e.g., diapers).

In shopping-related literature, price and quality consciousness are regarded as important variables (Lichtenstein, Ridgway, and Netemeyer 1993). Many retailer merchandising strategies focus on attracting price- or quality-sensitive consumers. In the United Kingdom, for example, the supermarket chain Sainsbury is known for its high-quality offers in terms of assortment and service, whereas Wal-Mart in the United States attracts many consumers through its guarantee of everyday low prices. For a price-conscious shopper, loyalty is not directed to a specific brand but to a certain price range. Therefore, price consciousness may be related positively to substitute buying (brand or item switching) and negatively to store switching and postponement. In the same fashion, quality-conscious shoppers are loyal to a specific quality range, and though consumers can easily compare different prices of different brands, it is more difficult to compare brands according to their quality level. Therefore, it may be more difficult for a quality-conscious shopper to switch to another brand or item if the preferred item is OOS. Such shoppers may be more inclined to switch stores to obtain the preferred item or postpone purchase if they do not want to or cannot spend extra time shopping.

2.4 Research methodology

2.4.1 Data collection

The data collection took place in Dutch supermarkets. Data on consumer OOS responses and antecedents were collected using a structured questionnaire, which offers good opportunities to collect data about consumer OOS responses, as well as about a variety of antecedents of such responses. In our research setting, we work with hypothetical OOS situations instead of real ones, which has been used in previous explanatory studies (e.g., Campo, Gijsbrechts, and Nisol

2000). A possible drawback of this design is that people do not always act in the same way they claim that they would or sometimes have difficulties imagining what action they would actually take. This limitation might lower the external validity of reported OOS behavior. However, the major advantage of working with hypothetical stock-outs is that it enables us to study OOS behavior for different products groups and brands with varying brand equity levels. In light of the objectives in this study, we use hypothetical OOS situations.

Data were collected by means of personal interviews with respondents who had just visited a supermarket by a team of three to four experienced interviewers of a research agency. The interviews took place in 12 different supermarkets of eight retail chains. Through visual inspection of their shopping baskets at the check-out lanes, the interviewers preselected consumers who purchased the product groups of interest. After leaving the check-out area, the preselected consumers were asked to participate in a study about shopping behavior. Approximately two-thirds of the preselected consumers agreed to participate. A basket analysis then was conducted to highlight the item of interest, and questions pertaining to OOS responses were asked with reference to this purchased item. The advantage of interviewing shoppers shortly after their shopping trip is that consumers can recall more easily their real decision-making situation. We believe this data collection procedure enhanced the realism of the OOS situation and, therefore, the validity of the OOS reactions.

To select the product groups of interest, we created a short list of twenty product groups. Then, 40 food experts (managers and academics) classified the preselected product groups as utilitarian or hedonic. On the basis of these evaluations, we selected four product groups with a clear utilitarian nature (eggs, milk, margarine, and detergent) and four with a clear hedonic nature (cigarettes, salty snacks, beer, and cola).

A quota system was used to gather enough responses in those product groups with a relatively low purchase frequency (e.g., detergent). Actual responses per product group varied between 74 (detergent buyers) and 102 (beer and margarine buyers). Interviews took place throughout the week to control for the part of the week variable and were spread throughout the day (8:00 AM–12:00 PM 35%, 12:00–3:00 PM 29%, and 3:00–6:00 PM 36%). In total, 793 respondents participated in the study. In the data screening process, respondents with missing values for the dependent variable or with two or more missing values for independent variables were excluded. Some additional respondents were deleted because the interviewer noted that they had difficulty understanding several questions. After data screening, 749 cases (95 percent)

were selected for further analyses. Compared with general information about the background of regular Dutch shoppers, our sample of 749 cases is in line with the profile of regular shoppers (see Table 2.3).

Table 2.3: Sociodemographic characteristics of sample

Demographic Variable	Regular Dutch Shoppers (CBL 2000)	Our Sample
Sample size	n = 2045	n = 749
<u>Sex</u>		
Female	78%	77%
Male	22%	23%
<u>Age</u>		
34 or below	28%	32%
35 till 54	45%	40%
55 or older	27%	28%
<u>Household size</u>		
1–2 persons	54%	59%
3–4 persons	37%	32%
5 or more persons	9%	9%
<u>Education (based on Dutch system)</u>		
Lower	23%	27%
Middle	51%	42%
Higher	24%	30%
Doesn't say	2%	2%

2.4.2 Dependent variable

On the basis of prior literature, we define six types of OOS responses: store switch, item switch, postponement, cancel, category switch, and brand switch. To measure the dependent variable, we used the following procedure: After selecting the item of interest, the interviewer asked the consumer what he or she probably would have done if the selected item had been OOS during the shopping trip. Consumers could choose between the following responses: (1) buy a substitute item in this store, (2) go to another store today to buy the preferred item, (3) postpone the purchase until the next shopping trip, (4) cancel the purchase, or (5) don't know/other. Respondents who reported that they would buy a substitute were asked if this substitute item would be of the same or a different product group. If the respondents claimed they would buy a

substitute item of the same product group, they were asked if they would buy an item of the same brand or switch to another brand.

In the studied product groups, the brand switch OOS response was the most common among the respondents (34%), followed by postponement (23%), store switch (19%), and item switch (18%). Respondents mentioned the specific OOS reactions of canceling the purchase (3%) and switching categories (2%) less frequently. These results are roughly in line with the results of a field experiment conducted by Emmelhainz, Stock, and Emmelhainz (1991), who created OOS situations in five different product groups by removing the top-selling item of the market leader in each group. The OOS reactions they reported were as follows: item switch (41%), brand switch (32%), store switch (14%), and postponement or cancellation of purchase (13%). Note that the relatively high percentage of item switch behavior in their study may be due to the relatively high variety of alternatives often offered by market leader brands

2.4.3 Main independent variables

In our main model, we distinguish two main antecedents for OOS responses: brand equity and the hedonic level of a product. These variables were measured independently by food experts. A group of 17 senior managers participating in a senior food executive program of the Erasmus University evaluated all researched brands ($n = 124$) on three brand equity indicators: perceived price level, perceived quality, and perceived consumer preference (see Chandon, Wansink, and Laurent 2000). The managers used a seven-point Likert scale to rate each brand on each of the three brand equity indicators (1 = low, 7 = high). The alpha score of this three-item brand equity scale was 0.85. To check the external validity of the brand equity scale, we calculated the average level of brand equity for the market leader brands, the market challenger brands (ranked 2–4 in the category), and the market follower brands (ranked 5 or lower). Market leaders scored an average of 6.1 on the brand equity scale, market challenger brands scored 5.1, and market follower brands scored an average of 4.4 ($F = 221.8, p < 0.01$). Thus, our brand equity measure seems valid.

The product groups involved in the OOS study were, prior to the survey, classified as utilitarian or hedonic using the judgments of 40 food experts (practitioners and academics), who evaluated each preselected product group on two seven-point scales (hedonic level: 1 = not hedonic, 7 = very hedonic; utilitarian level: 1 = not utilitarian, 7 = very utilitarian). In the survey, utilitarian and hedonic benefits were explained using Batra and Ahtola's (1991) definitions. For

example, a key utilitarian benefit is considered “useful,” whereas “attractive” and “enjoyment” are typical hedonic benefits. Our results reveal a very strong negative correlation between the hedonic and utilitarian levels of products ($r = -0.94$; $p = 0.00$), in which the hedonic level of a product can be considered a continuum from very utilitarian (not hedonic) to very hedonic (not utilitarian). Note that we selected typical utilitarian or typical hedonic categories for our research, which may partly explain the high negative correlation between the utilitarian and hedonic items.

On the basis of these empirical results, we sum the two items to form a measure of the hedonic level of our selected product categories, which increases the reliability of this measure.⁵ The hedonic and utilitarian scores of each category are given in Table 2.4.

Table 2.4: Utilitarian and hedonic levels of selected product groups (n = 40)

Product	Average Utilitarian Level (UL) (1 = low, 7 = high)	Average Hedonic Level (HL) (1 = low, 7 = high)	t-Test (2-tailed)	Classification
Eggs	5.0	2.8	$p = 0.00$	Utilitarian
Margarine	5.2	2.8	$p = 0.00$	Utilitarian
Milk	5.3	3.2	$p = 0.00$	Utilitarian
Detergent	6.2	2.5	$p = 0.00$	Utilitarian
Beer	3.0	5.9	$p = 0.00$	Hedonic
Chips	2.7	5.5	$p = 0.00$	Hedonic
Cigarettes	2.0	5.4	$p = 0.00$	Hedonic
Cola	3.3	5.2	$p = 0.00$	Hedonic

2.4.4 Other independent variables

Because stock-out reactions and most of our antecedents are measured in the same instrument, we specifically pay attention to common-method variance (Bickart 1993), particularly the widely used self-reported Likert scales, which seem to encourage respondents to give socially desirable, and thereby “logical,” answers. For example, in a situation in which a respondent tells the interviewer that he or she would probably go to another supermarket to buy the desired item, the measurement item: “I think of myself as a loyal customer of my supermarket” provides an obvious clue that the questions are related to the OOS reaction. To decrease the influence of

⁵ We thank an anonymous reviewer of the *Journal of Retailing* for suggesting the inclusion of these scores instead of dichotomous variables.

common-method variance, we implemented more straightforward measures (Rossiter 2002). For example, to measure store loyalty and brand loyalty, we used a behavioral measure (primary store no/yes, primary brand no/yes) instead of a self-reported Likert-type item (e.g., “I consider myself loyal to this brand”). To measure impulse buying, we asked if buying the product was planned in advance (no/yes). For stockpiling, food experts (n = 15) rated each of the eight product groups on the level of safety stock (low, medium, high) that consumers usually maintain at home before they go to the supermarket to buy the product (e.g., Campo, Gijsbrechts, and Nisol 2000; Narasimhan, Neslin, and Sen 1996). We also used objective criteria to measure antecedents. For example, as an indication of the availability of alternative stores, we used the number of supermarkets with a more or less similar merchandising strategy within a radius of 250 meters and/or 4 minutes of walking of the supermarket of interest. For other antecedents, we used self-reported scales if there was no direct relation with the dependent variable. For example, we used self-reported scales to measure shopping attitude, price consciousness, quality consciousness, and general time constraints. In Appendix 2A, we provide an overview of the explanatory variables, their measurement methods, and their sources.

2.4.5 Analysis

As already noted in our literature review, the cancellation and category switch OOS responses are uncommon, which does not enable us to estimate parameters reliably for these choice categories. Therefore, we added cancellation to the rather similar postponement category. However, the category switch response is not similar to any of the other categories and therefore is not considered in our model. As a consequence, our number of valid cases drops from 749 to 734. After this procedure, the dependent variable consists of four different choice categories: (1) brand switch, (2) store switch, (3) item switch, and (4) postponement. Because these categories are unordered, we use a multinomial logit model (Paap and Franses 2000; Guadagni and Little 1983), whose parameters are estimated using the statistical software package Limdep 7.0 (Greene 1998) for the maximum likelihood procedure, to test our hypotheses. We calculate the marginal effects and their accompanying standard errors and significance levels (Campo, Gijsbrechts, and Nisol 2000; Greene 1998), which show the effect and direction of a predictor variable X on a choice category.

The mathematical formulation of the multinomial logit model states that the probability (P) of choosing OOS reaction j by consumer i is given by:

$$P_{j,i} = \frac{\exp(V_{j,i})}{\sum_{j=1}^4 \exp(V_{j,i})}. \quad (1)$$

The model in which we include brand equity (BE), the hedonic level of the product (HL), the interaction effect (BE * HL) and K other variables (X) (see Appendix 2A for examples) is defined as follows:

$$V_{j,i} = \sum_j \alpha_{0,j} + \alpha_{1,j} * BE_i + \alpha_{2,j} * HL_i + \alpha_{3,j} * BE_i * HL_i + \sum_{k=1}^K \gamma_{k,j} * X_{k,i}. \quad (2)$$

The inclusion of an interaction effect between brand equity and the hedonic level of the product may affect our estimation results. We therefore standardize brand equity and hedonic level and include the standardized scores in our model (Aiken and West 1991). Thus, the interaction effect is included as the multiplication of the two standardized variables (see Equation 2).

2.5 Empirical results

2.5.1 Descriptive analysis

We explore differences in OOS reactions according to the nature of the product (utilitarian versus hedonic) and the level of brand equity (low versus high) using cross tabulations (see Table 2.5). Our analysis shows that buyers of low-equity brands are much more likely to switch brands (51%) than are buyers of high-equity brands (26%). Buyers of high-equity brands are more likely to switch stores (25%) than are buyers of low-equity brands (10%), as well as switch items (21% versus 14%, respectively). A χ^2 test reveals a significant association between brand equity and OOS reaction ($\chi^2 = 54.622, p = 0.000$).

In both utilitarian and hedonic product groups, the most common reaction to an OOS occurrence is brand switching. However, the percentage of brand switching is higher for utilitarian product groups (39%) than for hedonic product groups (31%). In contrast, store

switching occurs more frequently in hedonic product groups (26%) than in utilitarian product groups (13%). Again, the χ^2 test shows a significant association between product type (utilitarian of hedonic) and OOS reactions ($\chi^2 = 22.581, p = 0.000$).

Table 2.5: Descriptive analysis of stock-out response per brand equity type and hedonic level

	Brand Equity (n = 734) ⁶			Hedonic Level (n = 734) ⁷		
	Low (n = 261)	High (n = 473)	t-Test (two-tailed)	Low (n = 360)	High (n = 374)	t-Test (two-tailed)
Brand switch	51%	26%	$p = 0.000$	39%	31%	$p = 0.02$
Store switch	10%	25%	$p = 0.000$	13%	26%	$p = 0.000$
Item switch	14%	21%	$p = 0.012$	19%	18%	NS
Postpone purchase	26%	27%	NS	29%	25%	NS

2.5.2 Multinomial logit model

Prior to estimating the multinomial logit model for Equation 2, we assess whether multicollinearity might cause severe problems in our data by considering the correlation among the independent variables. The correlation matrix, displayed in Table 2.6, shows that correlation between independent variables in general is low and that multicollinearity will not affect our estimation results significantly (Leeflang et al. 2000).

Due to the addition of product-, store-, situation-, and consumer-related variables, the valid case number drops from 734 to 681. The estimation results of the multinomial logit model (Equation 2) appear in Table 2.7. The χ^2 of the multinomial logit model is 235.24 (d.f. = 60, $p = 0.00$).

⁶ Low brand equity < 5.00; high brand equity ≥ 5.00 .

⁷ Low hedonic level < 4.00; high hedonic level ≥ 4.00 .

Table 2.6: Correlation matrix dependent and independent variables⁸ (N = 681)⁹

Dependent Variables		Independent Variables																						
	BS	SS	IS	PP	BE	HL	NB	SP	BL	IB	BF	SL	AS	ST	TR	WK	PU	SA	SF	TC	AG	PC	QC	
BS	1.00																							
SS	-36	1.00																						
IS	-36		1.00																					
PP	-45	-29	-29	1.00																				
BE	-19	.15	.11	-03	1.00																			
HL	-06	.18	-03	-06	.30	1.00																		
NB	-16	.18	.01	-07	-09	.12	1.00																	
SP	.02	-10	-10	.15	.02	.33	.07	1.00																
BL	-26	.16	.01	.13	.20	.10	.05	-05	1.00															
IB	-01	-13	.00	.12	.03	-00	-06	.02	-13	1.00														
BF	.01	.13	-01	-11	.11	.31	-14	-23	.16	-08	1.00													
SL	.02	-07	.06	-02	-06	-06	-05	-03	.14	-04	.11	1.00												
AS	-04	.06	-02	.01	.02	-01	.01	-03	-06	.02	.03	-07	1.00											
ST	-04	.03	.02	.00	.09	-01	-04	-07	.01	.03	.04	-10	.51	1.00										
TR	.03	-06	.04	-01	-12	-03	.01	.06	.05	-10	-09	.12	-16	-15	1.00									
WK	.06	.00	.07	-13	-06	.01	.03	-01	-11	-01	-06	-05	-48	-00	.14	1.00								
PU	-02	.01	.04	-03	-07	-18	-16	-19	-06	-01	.04	.04	-06	-12	.06	.06	1.00							
SA	-01	.02	.04	-05	-01	-03	-05	-01	-08	.03	.03	-09	-00	-02	-07	.06	.01	1.00						
SF	-01	.08	-02	-05	.04	.07	.08	-02	.04	-02	.12	-03	.06	.04	-34	.01	-07	.13	1.00					
TC	-01	-01	.00	.01	.09	.10	.05	.06	-03	.08	-03	-10	.00	.07	-04	-00	-01	-35	-19	1.00				
AG	-07	.06	-02	.04	-10	-20	.01	-07	.06	-13	.00	.14	.08	.09	.06	-05	.02	.07	.01	-23	1.00			
PC	-09	-16	-05	.09	-28	-21	-03	.06	-13	.01	-14	.04	.10	.05	-05	-04	-02	.09	.00	-08	.11	1.00		
QC	-11	.04	.01	.09	.04	-04	.00	.01	.16	.05	-03	.03	.02	.05	.05	.03	-04	-01	-09	.16	.15	.15	1.00	

⁸ Dependent variables are dummy variables (no/yes). BS = brand switch, SS = store switch, IS = item switch, and PP = postponement/cancel. Independent variables; see Appendix 2A for abbreviations and measurement.

⁹ Significant relations ($p < 0.05$) are bolded.

Table 2.7: Marginal effects of full model (*p*-value) (n = 681)

	Brand Switch	Store Switch	Item Switch	Postpone Purchase
Constant	0.62 (0.01)	-0.37 (0.02)	0.04 (0.83)	-0.29 (0.14)
Brand equity	-0.09 (0.00)	0.04 (0.05)	0.09 (0.00)	-0.03 (0.11)
Hedonic level	0.01 (0.71)	0.05 (0.02)	-0.03 (0.25)	-0.03 (0.24)
Brand equity × Hedonic level	-0.02 (0.51)	-0.01 (0.76)	0.06 (0.01)	-0.04 (0.07)
Product-related antecedents				
Number of brands	-0.03 (0.00)	0.02 (0.00)	0.11 (0.12)	-0.02 (0.81)
Stockpiling	0.03 (0.61)	-0.10 (0.02)	-0.17 (0.00)	0.24 (0.00)
Brand loyalty	-0.26 (0.00)	0.09 (0.03)	-0.03 (0.38)	0.21 (0.00)
Impulse buying	-0.03 (0.63)	-0.17 (0.00)	0.00 (0.93)	0.20 (0.00)
Buying frequency	0.02 (0.22)	0.01 (0.49)	-0.01 (0.42)	-0.02 (0.19)
Store-related antecedents				
Store loyalty	0.05 (0.39)	-0.06 (0.09)	0.08 (0.05)	-0.07 (0.13)
Availability of alternative stores	0.01 (0.67)	0.05 (0.05)	0.01 (0.65)	-0.07 (0.02)
Store type	-0.04 (0.46)	-0.04 (0.27)	0.01 (0.75)	0.07 (0.17)
Situation-related antecedents				
Shopping trip (0 = minor; 1 = major)	0.04 (0.41)	-0.05 (0.16)	0.03 (0.39)	-0.02 (0.60)
Part of the week (0 = beginning; 1 = end)	0.08 (0.20)	0.07 (0.12)	0.08 (0.10)	-0.23 (0.00)
Personal usage	-0.03 (0.58)	-0.01 (0.78)	0.01 (0.73)	0.02 (0.60)
Consumer-related antecedents				
Shopping attitude	-0.03 (0.23)	0.01 (0.38)	0.03 (0.13)	-0.01 (0.52)
Shopping frequency	0.01 (0.48)	0.00 (0.90)	0.00 (0.99)	-0.01 (0.38)
General time constraint	-0.01 (0.56)	0.00 (0.79)	0.01 (0.56)	-0.00 (0.96)
Age/100	-0.29 (0.04)	0.25 (0.01)	-0.05 (0.62)	0.09 (0.46)
Price consciousness	0.02 (0.27)	-0.03 (0.01)	-0.01 (0.44)	0.02 (0.13)
Quality consciousness	-0.04 (0.04)	0.01 (0.41)	0.00 (0.86)	0.03 (0.15)

Hypothesized effects. We find the expected significant negative effect of brand equity on brand switching, in support of H_{1a}. However, no effect of the hedonic level of a product on brand switching is found, so H_{2a} is not supported. In addition, the univariate descriptive analysis shows a significant relationship between the hedonic level of a product and the percentage of brand switching. A possible explanation for this discrepancy may be that brands in hedonic product groups generally have a higher level of brand equity. This claim is supported by the positive

correlation between the hedonic level of a product and brand equity ($r = 0.30, p < 0.01$, see Table 2.6). Also, no significant interaction effect between the hedonic level of a product and brand equity on brand switching is found. Therefore, H_{3a} is not supported. Both brand equity and the hedonic level of a product have a positive significant effect on store switching, in support of H_{1b} and H_{2b} . However, the effect of brand equity on store switching is not moderated by the hedonic level of the product, so H_{3b} is not supported.

With respect to item switching, we find significant effects for two of the three main variables. Brand equity and the interaction between brand equity and hedonic level are positively related to item switching. No significant effect is found between hedonic level of a product and item switching. These results support H_{1c} and H_{3c} . No significant effects for either the hedonic level of a product or brand equity are found on postponement. Thus, H_{1d} and H_{2d} are not supported. Note that H_{1d} approaches significance in the opposite direction as hypothesized, as the p -value is 0.11. The interaction between brand equity and the hedonic level of a product is negative and marginally significant ($p = 0.07$), in partial support of H_{3d} .

The results show that our main variables brand equity and hedonic level of a product are relevant explanatory variables for OOS responses, particularly for brand, store and item switching responses. However, the postponement response is poorly explained by the three main variables, though it may be better explained by our other explanatory variables.

Other explanatory variables. For product-related variables, we find that the number of brands has a negative significant effect on brand switching and a positive significant effect on store switching. These effects seem counterintuitive and contrast with results of previous studies, which indicate that the availability of acceptable alternatives has a positive effect on brand switching. One possible explanation for this finding may be that some product groups carry more brands than others because of the many market segments in a particular product group, which provides ample room for brands with different intrinsic and extrinsic values (Narasimhan, Neslin, and Sen 1996). Stockpiling has a negative significant effect on store and item switching, though it has a positive significant effect on postponement. This result has not been found in prior research (e.g., Campo, Gijsbrechts, and Nisol 2000). In line with previous research, we find that brand-loyal consumers are significantly less likely to switch to another brand and significantly more likely to postpone purchase. We also find significant effects for impulse buying. If the purchase was not planned in advance, consumers are less likely to switch stores and more likely to postpone the purchase. No significant effects are found for buying frequency.

The store-related variables seem somewhat less important in explaining OOS behavior. Store loyalty is positively related to brand switching (not significant) and item switching ($p = 0.05$) and negatively related to store switching ($p = 0.09$) and postponement ($p = 0.13$). Although this variable is not strongly significant, the expected signs are logical. Consumers who are more loyal to a store tend to be more inclined to find a substitute in their primary store. The number of alternative stores in the vicinity of the store has a positive effect on store switching and a negative effect on postponement. However, the store type variable is not significantly related to any of the studied OOS responses; that is, customers of stores with relatively extended assortments tend to behave in the same way as those of stores with relatively limited assortments.

With respect to the situation-related variables, the variable part of the week has a significant effect, which may be of particular interest for countries or states where supermarkets are closed on Sundays. The results show that if shopping takes place in the first part of the week (Monday–Wednesday), consumers are more likely to postpone. Although the findings are not or only marginally significant, consumers also are more likely to switch brands ($p = 0.20$), switch items ($p = 0.10$), or switch stores ($p = 0.12$) during the second part of the week. A possible explanation for this finding may be that some consumers have weekly planning cycles for their grocery shopping. If consumers face an OOS of a desired item early in the week, they may already know that their next shopping trip will be within a few days and thus be more inclined to postpone the purchase. The shopping trip (minor or major trip) and personal usage variables do not display significant effects.

With respect to the consumer-related variables, our results show no significant effect for general time constraints, inconsistent with Campo, Gijsbrechts, and Nisol (2000), who find this variable significant in their research to explain OOS responses. Part of the lack of effect in our research may be caused by the inclusion of age as explanatory variable. Because age is negatively related to general time constraints ($r = -0.23, p = 0.00$), it may function as a proxy for general time constraints. For example, older, “empty nester” shoppers, who have a great deal of spare time, have fewer time constraints. The results, which show that age has a significant positive effect on store switching and a negative effect on brand switching, support this theory. In line with Campo, Gijsbrechts, and Nisol (2000), we find no significant effects of shopping frequency. Finally, we find some significant effects for price and quality consciousness. Price consciousness is negatively related to store switching; quality consciousness is negatively related to brand switching.

2.6 Discussion

In this study, we investigate the effect of brand equity and the hedonic level of a product on OOS responses, as well as the moderating effect of the hedonic level of the product on the effect of brand equity. In addition, we examine the effect of prior researched and additional product-, store-, situation-, and consumer-related variables. Because we have tested our model using eight product groups and eight retail chains, our study provides an important discussion of the role of these variables in OOS situations.

In Table 2.8, we provide a summary of our hypotheses results. In our full model, six of our twelve hypotheses are supported. Although further confirmation of these results in other studies are needed, the main variables appear important in explaining OOS responses. None of the twenty antecedents in our full model is significantly related to all four different OOS responses. We therefore conclude that OOS responses can be explained in a reasonable way only through the use of comprehensive models. Models with too few antecedents may suggest significant relationships that would not be significant if more antecedents were included. However, as further support for the relevance of our main variables, we note that the effects of our main variables are approximately the same in both the basic and the full model. That is, though we included many other explanatory variables, the effects of brand equity and the hedonic level of the product remain significant.

2.6.1 Effect of brand equity and hedonic level of the product

Brand equity and the hedonic level of a product are important variables to explain OOS responses. Keller (2002) argues that consumers of brands that have positive customer-based brand equity react more favorably to the brand. We show that this also holds true in OOS situations. Our results also show that purchasers of high-equity brands are less inclined to switch brands, more inclined to switch stores, and more inclined to postpone the purchase. The first two reactions can be explained by brand equity literature. The impact of brand equity on postponement shows that the preference for high-equity brands, in many cases, is not only brand directed but also item directed. For example, a consumer who prefers regular Coca-Cola may be loyal to Coca-Cola in general and to the regular variety specifically. If regular Coca-Cola is not available, that consumer might postpone his or her intended purchase until the next visit to the supermarket, at which point the consumer will purchase regular Coca-Cola.

Table 2.8: Summary of hypotheses and results

Independent Variables	Hypothesized Relationship to Stock-Out Reaction	Result Multinomial Model (Equation 2)
	Effect on brand switch	
H1a: Brand equity	–	Supported
H2a: Hedonic level	–	Not supported
H3a: Brand equity × Hedonic level	–	Not supported
	Effect on store switch	
H1b: Brand equity	+	Supported
H2b: Hedonic level	+	Supported
H3b: Brand equity × Hedonic level	+	Not supported
	Effect on item switch	
H1c: Brand equity	+	Supported
H2c: Hedonic level	–	Not supported
H3c: Brand equity × Hedonic level	+	Supported
	Effect on postponement	
H1d: Brand equity	+	Not supported
H2d: Hedonic level	+	Not supported
H3d: Brand equity × Hedonic level	–	Supported

Our results also reveal a positive main effect of the hedonic level of a product on store switching. In hedonic product groups, consumers are more likely to switch to another store. We find two significant moderating effects of the hedonic level of a product on the effect of brand equity. In hedonic product groups, purchasers of high-equity brands are relatively more inclined to switch to another item, whereas they are less likely to postpone. Consumers value the brand more in hedonic categories and are less inclined to postpone the purchase because they feel a relatively strong urgency to purchase the preferred brand immediately. One solution for the consumer is to purchase another item of the same brand.

2.6.2 Effect of other explanatory variables

With respect to the other explanatory variables, our results confirm some prior research and put forward some new variables as antecedents of OOS reactions. In particular, we confirm prior findings that brand loyalty is an important variable for the explanation of OOS. However, our results do not show that buying frequency, the type of shopping trip, shopping attitude, or general time constraints are important determinants of OOS responses.

Following the literature on promotion responsiveness (e.g., Narasimhan, Neslin, and Sen 1996), we included impulse buying and stockpiling as antecedents. Our results show that these variables are important antecedents of OOS responses. In the case of impulse purchases, consumers are less likely to switch to another store and more likely to postpone the purchase because the need to buy a product impulsively is less strong if the preferred item in the category is not available. When consumers stockpile products at home, they do not need the product immediately; thus, stockpiling negatively affects store and item switching and positively affects postponement.

Shopping frequency, similar to our results for buying frequency, is not related to OOS responses. However, brand and item switching occurs more often at the end of the week, whereas postponement occurs less frequently at the end of the week. In addition, no effect of store type was found, and OOS reactions do not differ significantly between supermarkets that offer less or more variety. Finally, our results indicate that price-conscious consumers are less likely to switch stores, whereas quality-conscious consumers are less likely to switch brands. One of several plausible explanations for this finding may be that price-conscious shoppers are more loyal to a specific price range instead of a specific brand or item; quality-conscious shoppers may be more inclined to buy a certain quality level that is embodied by the brand they prefer.

In summary, we conclude that product- and brand-related antecedents (including the three main variables) appear particularly important for explaining OOS responses. In our study, store-, situation-, and consumer-related variables affect OOS reactions to a much lesser extent. Furthermore, the full model shows that there are many antecedents for OOS responses. Of the 20 explanatory variables in our full model, 13 show significant relations to one or more specific OOS responses. Compared with the main model, the full model sheds particular light on the antecedents of purchase postponement. Although this OOS response is not well explained by our main model, variables such as stockpiling, brand loyalty, impulse buying, and the part of the week appear highly related to postponement.

2.7 Managerial implications

Our research provides some clear guidelines for how retailers and manufacturers should handle OOS occurrences. On the basis of our two main variables—brand equity and the hedonic level of the product—the assortment of supermarkets can be classified in four segments. For each

segment, we provide managerial directions for retailers and manufacturers with regard to how they can handle the OOS problem (see Table 2.9).

Table 2.9: Managerial implications for OOS management

	Utilitarian Products	Hedonic Products
Low-equity brands	<i>Implications for Retailers:</i> <ul style="list-style-type: none"> - low priority in reducing OOS occurrences - simplify assortment of low-equity brands 	<i>Implications for Retailers:</i> <ul style="list-style-type: none"> - medium priority in reducing OOS - stock the main items of a wide variety of low-equity brands
	<i>Implications for Manufacturers:</i> <ul style="list-style-type: none"> - high priority in reducing OOS occurrences for own items - invest in retail relations and trade conditions to improve shelf space allocation of own items 	<i>Implications for Manufacturers:</i> <ul style="list-style-type: none"> - high priority in reducing OOS for own items - invest in trade conditions to maintain or improve shelf position (short term) - build brand equity by investing in product innovation and build brand image by advertising (long term)
High-equity brands	<i>Implications for Retailers:</i> <ul style="list-style-type: none"> - high priority in reducing OOS - simplify assortment by gradually reducing the number of listed high-equity brands - extend the number of items of “surviving” high-equity brands 	<i>Implications for Retailers:</i> <ul style="list-style-type: none"> - top priority in reducing OOS - seek cooperation with main brand manufacturers to reduce OOS levels - use caution in reducing allocated space and listed items for high-equity brands
	<i>Implications for Manufacturers:</i> <ul style="list-style-type: none"> - medium priority in reducing OOS of own items relative to manufacturers of low-equity brands - keep brand equity at a high level - gain shelf space by introducing line extensions - invest in category management projects to limit the assortment of competing items in category 	<i>Implications for Manufacturers:</i> <ul style="list-style-type: none"> - medium priority in reducing OOS of own items relative to manufacturers of low-equity brands - keep brand equity at a high level - gain shelf space by introducing line extensions - seek participation with retailers to lower OOS levels on a category basis and improve position as category captain

2.7.1 Implications for retailers

A retailer should maintain an active policy to reduce OOS occurrences, because a stock-out can result in store switching, postponement or cancellation of purchase. However, the damage of OOS occurrences for a retailer varies according to the product group and brand. Retailers should

consider this finding when they attempt to decrease their OOS problems and pay special attention to the segment of high-equity brands in hedonic categories. In this segment, retailers should try to minimize OOS occurrences, for example, by allocating more shelf space to such items at the expense of items in the low-equity brands, utilitarian segment. Furthermore, retailers should consider minimizing the breadth of their assortment in utilitarian product groups and increase the number of items per brand for high-equity brands.

We also believe that consumer OOS reactions provide insights into the short-term reactions of consumers in the case of permanent unavailability. If retailers notice many complaints or a strong drop in product group sales when certain items in certain product groups are OOS, they should be careful about permanently delisting those items.

2.7.2 Implications for manufacturers

Table 2.9 also includes guidelines for manufacturers. If a manufacturer faces high OOS levels for its own brand, it will lose sales, even if the brand is a high-equity brand in a hedonic product group. Therefore, all manufacturers should try to help retailers lower OOS levels, especially because research shows that OOS levels between 5% and 10% are common. Particularly, manufacturers of low-equity brands in utilitarian categories can suffer severe damage of OOS occurrences; in many cases, consumers will simply switch to items of another brand. For these manufacturers the necessity to lower OOS levels is relatively more important than for other manufacturers because it may not be a high priority for the retailer.

The objectives for retailers and manufacturers with regard to OOS management often are contradictory. For retailers, item switching does not present a significant problem, because retailers tend to focus instead on OOS situations in which consumers do not buy a substitute. Therefore, retailers will focus on lowering OOS among brands and product groups for which the OOS hurts the most. Particularly, these are the high-equity brands in the hedonic product groups. In addition, many manufacturers of low-equity brands will probably not have state-of-the-art knowledge in the category and supply chain management areas. These manufacturers probably will not be first in line to cooperate with retailers to solve the OOS problem. Therefore, we recommend that manufacturers of low-equity brands focus on holding their shelf space, for example, through short-term-oriented trade allowances. In contrast, manufacturers of high-equity brands could attempt to remedy retailers' OOS problems by participating in category management projects that focus on reducing OOS levels. In doing so, these high-equity brand

manufacturers demonstrate their category management capabilities and improve their relationship with retailers.

2.8 Limitations and further research

Our study has several important limitations that may provide interesting opportunities for further research. First, the findings regarding the role of the hedonic level of the product are based on data about only eight product groups. To test the robustness of our findings, additional research should take other and/or more product groups into account. Second, we used hypothetical OOS situations to measure consumer OOS responses instead of real OOS situations, which could affect the validity of the reported OOS responses. Therefore, measuring OOS responses with consumer household panel data, combined with a panel survey, might provide more valid information about true OOS reactions and the effect of brand equity and the hedonic level of the product. Furthermore, a household panel might shed additional light on the role of the number of brands and changes in this number on OOS responses (Campo, Gijsbrechts, and Nisol 2003). Third, our study does not measure the specific effect of promotional buying on OOS reactions. Consumers may become frustrated if a highly valued promotion is OOS, especially if the promotion was the main reason for the consumer to visit to the store. Further studies on OOS reactions might include promotional buying as an antecedent for OOS reaction. Fourth, we only interviewed consumers who bought items in one of the eight selected product groups. Therefore, consumers who actually encountered an OOS and decided to cancel, postpone, or switch stores were not interviewed. This limitation should not affect the validity of the significant findings, but it may have minimized the significance of some hypotheses that were not confirmed in our study. Fifth, available items in the total store were used as a proxy for the availability of substitutes in a specific product category. A better measure might use both the number of items of preferred and other brands in the product category, which would enable a better separation of the effects of brand and item switching. We leave this as an issue for additional research. Sixth and finally, we recommend studies that focus on illuminating the relationship between consumer reactions to temporary assortment unavailability (OOS) and permanent assortment availability (item or brand delisting). This work may help retailers make more sound listing and delisting decisions.

Appendix 2A: Overview and definition of independent variables

	Concept	Measurement Instrument
Main variables		
Brand equity (BE)	Strength of brand in terms of price level, awareness, and quality	Brands are rated by food experts on a three-item, seven-point scale. Coefficient alpha = 0.85
Hedonic level (HL)	Hedonic level of product category	Categories are rated by food experts on a two-item, seven-point scale. Correlation = 0.94.
Product-related variables		
Number of brands (NB)	Number of national brands in category X with a market share \geq 3%	Market share within product category. Based on retail scanner data from ACNielsen
Brand loyalty (BL)	Loyalty toward brand Y in category X	Dummy variable, equal to 1 if the hypothesized stock-out brand is the primary brand for the consumer in category X
Stockpiling (SP)	The level of safety stock consumers usually have in their homes before they restock the product	Categories are rated by food experts on regular stockpiling level before consumers restock (low, medium, high). Based on Campo, Gijsbrechts, and Nisol (2000) and Narasimhan, Neslin, and Sen (1996)
Impulse buying (IB)	Distinction between unplanned and planned purchases	Dummy variable, equal to 1 if product and brand was not planned in advance.
Buying frequency (BF)	Average buying frequency	Number of times a product is bought on a monthly basis
Store-related variables		
Store loyalty (SL)	Loyalty towards store Z when shopping for groceries	Dummy variable, equal to 1 if the supermarket with the hypothesized stock-out is the primary supermarket for the consumer
Availability of alternative stores (AS)	Number of competing supermarkets in the same shopping area	Number of supermarkets with a similar merchandising strategy within a radius of approximately 250 meters and/or 4 minutes walking of the supermarket where the OOS occurs. Based on general information about supermarket locations in the Netherlands (Levensmiddelenkrant 2002)
Store type (ST)	The number of items the supermarket offers to the consumer	Dummy variable, equal to 1 if the assortment of the supermarket is relatively wide and deep and 0 if the assortment is relatively limited. Based on real assortment levels of supermarkets (internal company sources)

Appendix 2A: Overview and Definition of Independent Variables (continued)

	Concept	Measurement Instrument
Situation-related variables		
Shopping trip (TR)	Distinction between minor and major shopping trips	Dummy variable, equal to 1 for major shopping trips and 0 for minor shopping trips
Part of the week (WK)	Distinction of the part of the week when the shopping trip took place	Dummy variable, equal to 1 for trips at the end of the week (Thursday–Saturday) and 0 for trips during the first part of the week (Monday–Wednesday)
Personal usage (PU)	Product is bought for own usage	Dummy variable, equal to 1 if the buyer is (one of the) users
Consumer-related variables		
Shopping attitude (SA)	Perception of shopping as a necessary task or an activity that brings enjoyment	Four-item self-reported scale (based on Babin, Darden, and Griffin 1994; Sproles and Sproles 1990) (coefficient alpha = 0.79) Example: “Shopping is truly a joy”
Shopping frequency (SF)	Average shopping frequency	Average number of shopping trips per week
General time constraint (TC)	Time constraint in general for grocery shopping	Degree of perceived spare time for grocery shopping on five-point scale Example: “In general, I do not have much spare time for shopping”
Age (AG)	Age of respondent	Age in number of years
Price consciousness (PC)	Focus on price level when shopping for groceries	Degree of price focus on five-point scale (based on Lichtenstein, Ridgway, and Netemeyer 1993) Example: “I always focus on the price when I am shopping for groceries”
Quality consciousness (QC)	Focus on quality level of products when shopping for groceries	Degree of quality focus on five-point scale Example: “I always focus on the quality of products when I am shopping for groceries”

CHAPTER 3

UNDERSTANDING THE IMPACT OF BRAND DELISTINGS ON ASSORTMENT EVALUATIONS AND STORE SWITCHING AND COMPLAINING INTENTIONS¹⁰

Abstract

Recently, retailers have begun considering which brands they can delist without reducing customer satisfaction, losing category sales, or increasing store switching behavior. Although several studies have considered assortment reductions, none has explicitly investigated the impact of total brand delistings. Therefore, in this chapter, we study the impact of brand delistings on assortment evaluations and store switching and complaining intentions. We execute both a controlled experiment and a survey and find that brand delisting mainly has negative consequences when the delisted brands have high equity, assortment size is limited, the assortment consists of a low proportion of high-equity brands, and the brand delistings take place in categories with high hedonic levels. At the end of this chapter, we discuss the theoretical and managerial implications of these findings.

¹⁰ Chapter 3 is based on a working paper by Laurens Sloot and Peter Verhoef (2005).

3.1 Introduction

Since the publication of the Efficient Consumer Response report (Kurt Salmon Associates 1993), the topic of assortment efficiency has received considerable attention from practitioners in the retailing and manufacturing fields, as well as from marketing academics (Broniarczyk, Hoyer, and McAlister 1998; Food Marketing Institute [FMI] 1993; Kumar 2004). The traditional perspective asserted that retailers could improve assortment attractiveness and customer retention by extending their assortments (e.g., Borle et al. 2003; Hoch, Bradlow, and Wansink 1999; Oppewal and Koelemeijer 2005). However, recent studies have shown that large assortments do not necessarily lead to greater perceived variety or higher assortment evaluations. For example, Van Herpen and Pieters (2002) find that assortment size may not be a good proxy for perceived assortment variety, and Iyengar and Lepper (2000) similarly show that extensive assortments may undermine consumers' satisfaction. In an assortment reduction-based context, Broniarczyk, Hoyer, and McAlister (1998) show that delisting less preferred items while maintaining constant category space does not harm assortment evaluations.

In contrast with widely held beliefs, some studies have provided examples of assortment reductions that resulted in an increase of category sales (Drèze, Hoch, and Purk 1994; FMI 1993). Boatwright and Nunes (2001) find that small cuts in an assortment may increase category sales, whereas greater cuts engender category sale declines. That retailers carrying limited assortments can be very successful has been proven in practice by discount retailers, such as Aldi, Lidl, and Trader Joe's, that have become fierce competitors of service retailers in many markets. Finally, on the basis of thorough analyses of the success of hard discounters in Germany, the McKinsey consulting agency claims that limited assortments not only facilitate efficient shopping but also emphasize a low-price image (*Distrifood* 2004a).

A specific type of assortment reduction is brand delisting. Whereas assortment reductions usually pertain to the delistings of multiple items of different brands, a brand delisting refers the total delisting of a single brand (no items of that brand are sold anymore) in a category. Brand delisting is a very relevant topic is today's retailing practices for several reasons. First, some retailers (e.g., Wal-Mart, Home Depot, The Gap) are now considered strong brands themselves and have developed successful store brands (Ailawadi and Harlam 2004; Henderson and Mihas 2000; Steenkamp and Dekimpe 1997). These retailers' assortments, in addition to other factors such as their price and service level, represent an important point of differentiation. For example,

the Dutch food retailer Edah delisted hundreds of national brands because it wanted to create more shelf space for its profitable, distinctive store brand (*Distrifood* 2004a). Second, since the mid-1990s, many service retailers have adopted a category management model (Dhar, Hoch, and Kumar 2001) that assigns specific category roles to each product category, which has had various implications for the offered assortment (ECR Europe 1998). For example, a retailer may decide to lower the number of premium brands it offers in a product category because it has changed the category role from a destination to a routine (Dhar, Hoch, and Kumar 2001). Third, retailers can exert buying power over suppliers by threatening to delist brands if buying conditions are not improved (Bloom and Perry 2001) or delist brands to punish a certain supplier. Although some moral issues surround this topic, retail boycotts of individual brands are no longer exceptions. For example, the U.K. retailer ASDA refused to stock the Proctor & Gamble brand Charmin (*Marketing Week* 2000), and the German retailers Edeka and Metro delisted some national brands because they were unsatisfied with the pricing and distribution policy of those manufacturers (*Distrifood* 2004b).

Prior research on assortment reductions mainly has considered the effect of item deletions on category and/or store sales using natural experiments in which a considerable percentage of items in a category was delisted (e.g., Boatwright and Nunes 2001; Borle et al. 2003; Broniarczyk, Hoyer, and McAlister 1998; Drèze, Hoch, and Purk 1994; FMI 1993). In contrast with the focus of current studies on the consequences of item delistings, we investigate brand delistings, which we define as permanent deletions of all items of a brand from the assortment of a retailer. By including “permanent” in our definition, we imply that store employees are not able to order a particular brand for a longer period of time because the retailer does not list the brand anymore.

The objectives of this research are twofold. First, we want to quantify consumer responses to brand delistings; second, we want to investigate the antecedents that moderate this response. In Study 1, we conduct a controlled experiment in which we vary the assortment size and structure. We then measure the effect of assortment variation on assortment evaluation (AE) and store switching intentions (SSI) in situations in which consumers’ primary brand is delisted. In the second study, we conduct a survey in a natural environment by which we measure the effect of a hypothetical brand delisting on SSI and complaining intentions (CI). Because we conducted Study 2 in 16 supermarkets for 10 different product categories, we are able to

generalize our results and test several objective brand-, product category-, retailer assortment-, and store-related antecedents for consumer responses to a brand delisting.

The rest of this chapter is organized as follows: We first review prior literature on assortment reductions. We then continue by presenting the hypotheses, the research methodology, and the empirical results of Study 1. Subsequently, we present Study 2 with its underlying hypotheses, the applied research methodology, and the results of our data analysis. We end with a discussion of the theoretical and managerial implications of our study, as well as its research limitations.

3.2 Literature review

A broad stream of experimental research addresses assortment size, variety, composition, and evaluation (Hoch, Bradlow, and Wansink 1999; Kahn and Lehmann 1991; Kahn and Wansink 2004; Oppewal and Koelemeijer 2005; Van Herpen and Pieters 2002). These studies, in which respondents are confronted with hypothetical assortments, generally indicate that large assortments with more variety are better. However, some recent studies have pointed to the negative effects of providing extensive choice in assortments (e.g., Iyengar and Lepper 2000). Related to this research stream are studies on the effect of an assortment reduction, in which consumers are confronted with a delisting of one or more items that previously were part of the assortment known to the consumer.

Most assortment reduction studies are based on field experiments and focus on the relationship between item delistings and category sales (Boatwright and Nunes 2001; De Clerck et al. 2001; Drèze, Hoch, and Purk 1994; FMI 1993), though some also study the impact of item delistings on store sales (Borle et al. 2004). Because of the differences in the depth of the assortment cuts studied in natural experiments (i.e., the percentage of items in a category), it is not surprising that different results regarding the cuts' effect on category sales have been found. For example, whereas De Clerck and colleagues (2001) review minor deletions from a wide variety of product categories of a grocery retailer and conclude that category sales were not affected in most categories, Drèze, Hoch, and Purk (1994) conduct a natural experiment and, among other assortment changes, cut the assortment of a few product categories by as much as 10% of the poorly selling items. They report an average category sales increase of 3.9%. The

FMI (1993) conducts natural experiments in six categories, examines reductions of varying size (from “limited” to “extended”), and concludes that small cuts can lead to (small) category sales increases, whereas extended cuts may result in small category sales losses. Boatwright and Nunes (2001) consider the effect of major assortment cuts in most categories of an online grocer. In line with previous research, they conclude that eliminating brands and flavors to a small degree helps sales but that deep cuts decrease sales.

Some of the results found in the natural experiments have been confirmed by controlled experiments. Broniarczyk, Hoyer, and McAlister (1998) conduct two controlled experiments to measure the effect of item reductions on assortment perceptions and store choice. They show that retailers may be able to make substantive reductions in the number of items they carry without negatively affecting customers’ assortment perceptions and store choice, as long as only low-preference items are eliminated and category space is held constant. However, related research on assortment variety (number of items) and attraction (e.g., Kahn and Wansink 2004; Van Ketel, van Bruggen, and Smidts 2003) shows that more variety improves assortment perceptions, though this effect diminishes if the actual assortments become larger.

The literature on out-of-stocks is closely related to studies of assortment reductions. An OOS situation differs from an assortment reduction in several aspects but primarily in that an OOS is temporary, whereas an assortment reduction is permanent. In contrast to the assortment reduction literature, most OOS studies show that temporary assortment unavailability leads to significant sales losses (Campo, Gijsbrechts, and Nisol 2000; Emmelhainz, Stock, and Emmelhainz 1991; Sloot, Verhoef, and Franses 2005). This loss is surprising because the temporary assortment unavailability of a brand seems less severe than the permanent assortment unavailability of a brand. However, when Campo, Gijsbrechts, and Nisol (2004) investigate the differences between consumer reactions to out-of-stocks and permanent assortment delistings more systematically, they conclude that the effect of a permanent assortment reduction in terms of sales losses is, as expected, greater than the effect of temporary assortment reductions.

On the basis of the preceding literature review, we can derive several conclusions. First, prior literature on assortment reductions has not considered brand delistings as a distinct type of assortment reduction. Instead, previous studies focus on measuring the effect of a specific number of item deletions on, for example, assortment perceptions or category sales. Because item deletions still allow the possibility of switching to other items of the same brand, the effect of brand delistings, in which case no switching alternatives for the same brand are available,

might be different. The only exception to this trend is Boatwright and Nunes (2001), who show that if an item delisting implies a brand delisting, the effect on category sales is more negative than if not all the items of a brand are delisted. Although this finding emphasizes the possible negative effect of brand delistings, their study does not provide an in-depth investigation of the effect of brand delistings. Because brands differ in terms of brand equity, as a result of their advertising and R&D investments, we question whether consumers react differently to a delisting of a high-equity brand than they do to a delisting of a low-equity brand.

Second, previous literature provides some contrasting results. Several natural experiments have shown that assortment reduction can lead to a growth in category sales (e.g., Boatwright and Nunes 2001; Drèze, Hoch, and Purk 1994). These findings contrast with findings from the OOS literature, which demonstrate that most OOS situations lead to category sales losses. Third, most studies in the assortment reduction literature stream are descriptive in nature and do not test models that include several antecedents to explain the effect of a brand delisting. This limitation causes a gap in retailers' understanding of the factors that affect brand delisting responses.

In the following sections, we present two studies on the effect of brand delistings in our attempt to fill the preceding research gaps. Study 1 involves a controlled experiment in which consumers' primary brand is delisted. Study 2 employs an in-store survey in which consumers are confronted with the hypothetical delisting of a brand they have just purchased.

3.3 Study 1

In Study 1, we specifically focus on measuring the effect of brand equity, assortment size, and assortment structure on AE and SSI if the consumers' primary brand, whether high or low equity, is delisted. In a controlled experiment, we test whether consumers' reactions to this brand delisting depend on the assortment size (number of brands within the category) or assortment structure (proportion of high-equity brands) presented to the respondent after the brand was delisted. The inclusion of the dependent variable AE is based on prior research on the effect of item delistings and category space on assortment perceptions (Broniarczyk, Hoyer, and McAlister 1998). Our inclusion of the dependent variable "SSI with regard to purchase in the product category" is based on the notion that delistings may affect category and store sales if

customers no longer or less frequently buy products in the store in which the delisting occurred (Boatwright and Nunes 2001; Campo, Gijsbrechts, and Nisol 2003; Drèze, Hoch, and Purk 1994).

3.4 Hypotheses

3.4.1 Brand equity of delisted brand

Chandon, Wansink, and Laurent (2000) distinguish between high- and low-equity brands. A brand has high customer-based brand equity if consumers react more favorably to a product when the brand is identified than when it is not (Keller 2002), whereas a brand with low equity does not provide many benefits and is purchased mainly because of its low price (Chandon, Wansink, and Laurent 2000). High-equity brands enjoy higher perceived quality, brand preference, and brand awareness than do low-equity brands (Aaker 1991; Keller 2002), which enables retailers to charge a price premium for them (Ailawadi, Lehmann, and Neslin 2003). Consumers of high-equity brands tend to be more committed to their brand (Aaker 1991), which makes a negative reaction to a brand delisting more likely. Retailers offer both low- and high-equity brands within their product category assortment so that they can fulfill the heterogeneous needs of their customers (Hoch, Bradlow, and Wansink 1999). In an assortment reduction context, Broniarczyk, Hoyer, and McAlister (1998) show that delisting less preferred items has a smaller impact on assortment perceptions than does delisting more preferred items. Sloat, Verhoef, and Franses (2005) show that, in the context of an OOS situation, the brand equity of the unavailable item negatively affects store loyalty. Therefore, we propose that the brand equity of the delisted brand will affect both AE and SSI.

H₁: When a high-equity brand is delisted, (a) AE will be lower and (b) SSI will be higher than when a low-equity brand is delisted.

3.4.2 Assortment Size

When the consumers' primary brand is delisted, the assortment size in terms of the number of remaining brands in the category may reduce the effects of the delisting on AE and SSI. First, a larger assortment provides consumers with more switching alternatives (Campo, Gijsbrechts, and Nisol 2000), which may lead to higher AE and lower SSI. Second, because of their need for

variety seeking, many consumers will use several brands to fulfill their category requirements (Van Trijp, Hoyer, and Inman 1996), so a larger assortment may lead to higher AEs. Moreover, Broniarzyck, Hoyer, and McAllister (1998) show that larger assortments have a higher AE when the preferred item is delisted.

H₂: When consumers' primary brand is delisted from a large assortment, (a) AE will be higher and (b) SSI will be lower than it would be for small assortments.

3.4.3 Assortment structure

In line with H₁ regarding the effect of the brand equity of the delisted brand, we define the assortment structure as the proportion of high-equity brands (versus low-equity brands) in the category and theorize that it may influence both AE and SSI. First, because consumers are more committed to high-equity brands than to low-equity brands, they probably will value assortments with a high proportion of high-equity brands over assortments with a low proportion of high-equity brands (Kahn and Lehmann 1991). Second, in a delisting situation, consumers are forced to make new purchase decisions and search for alternatives within the assortment because they cannot buy their preferred brand. During this search and evaluation process, consumers will try to reduce their risks (Campo, Gijsbrechts, and Nisol 2000). High-equity brands are particularly suited to reduce risks because they are well known and have a higher perceived quality (Aaker 1996) and therefore are usually more acceptable alternatives than are low-equity brands. That is, assortments with a high proportion of high-equity brands provide more acceptable alternatives than do assortments with a low proportion of high-equity brands.

H₃: When customers' primary brand is delisted and the assortment offers a high proportion of high-equity brands, (a) AE will be higher and (b) SSI will be lower than when the assortment offers a low proportion of high-equity brands.

3.4.4 Interaction effect: Brand equity × Assortment structure

If consumers are confronted with a delisting of their primary brand, they are forced into a new decision-making process, during which they might search for brands they consider acceptable alternatives. A consumer who regularly buys low-priced (low-equity) brands will search for alternatives in the same equity range to achieve the same value. This phenomenon is, to some

extent, comparable to the tendency of consumers to purchase the same type of brands (e.g., private labels) in different categories (Batra and Sinha 2000; Richardson, Jain, and Dick 1996). Thus, when a high- (low-) equity brand is delisted and there are relatively few high- (low-) equity brands in the remaining assortment, there will be fewer acceptable alternatives than when there are relatively more high- (low-) equity brands.

H₄: When consumers' primary brand is delisted and the equity of the delisted brand is congruent with the equity structure of the assortment, (a) AE will be higher and (b) SSI will be lower than when they are not congruent.

3.4.5 Interaction effect: Assortment size × Assortment structure

Kahn and Lehmann (1991) show that consumers' assortment preference is positively affected by a combination of assortment size and assortment variety. This finding may be relevant for the interaction effect between assortment size and assortment structure because an assortment with a high proportion of high-equity brands may be perceived to offer more variety than an assortment with a low proportion of high-equity brands. From a consumer's perspective, a "complete" assortment may be one that carries most of the available brands (assortment size) and in which all the well-known (high-equity) brands are available. In this respect, we expect that an extensive assortment that is missing several high-equity brands will be considered incomplete by consumers compared with an extensive assortment that carries all high-equity brands but excludes a few low-equity brands.

H₅: When consumers' primary brand is delisted, assortment size's (a) positive effect on AE and (b) negative effect on SSI will be greater for those assortments with a high proportion of high-equity brands than for those with a low proportion of high-equity brands.

3.5 Experimental design

3.5.1 Procedure and measurement

We test our hypotheses in a controlled experiment with 395 respondents, who were participants in an online panel of buyers of regular beer in the Netherlands. An international beer brewer with several leading brands in the Netherlands provided access to this panel. On the basis of information about their past beer buying behavior, respondents were confronted with an assortment that excluded the brand they previously bought most often (primary brand). The shown assortment varied in size (six or nine brands)¹¹ and structure (one-third or two-thirds high-equity brands). Each respondent was randomly assigned to one of the four experimental conditions. Within each condition, the brands presented to the consumer were randomly selected from a list of seven high- and seven low-equity brands, which together represented more than 90% of the total sales in the regular beer category.

We assigned the brands to the two brand equity categories as follows: In a survey, 40 food industry managers rated the brand equity level of the 14 selected beer brands by noting on a seven-point scale the perceived quality (high versus low), perceived price level (high versus low), and perceived consumer preference (high versus low) for each brand (Chandon, Wansink, and Laurent 2000). The Cronbach's alphas, calculated across participants for each brand, averaged 0.88. We averaged the scores across the three items and used a median split to assign seven brands each to the two groups.

After viewing an online presentation of the assortment (see Figure 3.1), respondents filled out a questionnaire that assessed their AE and SSI. For their AE, we used a three-item (negative–positive, unattractive–attractive, and not inviting–inviting), bipolar, seven-point scale (Van Ketel, van Bruggen, and Smidts 2003). The coefficient alpha for the scale is 0.90. Because SSI is relatively straightforward, we used a single-item, five-point scale (Rossiter 2002) on which respondents indicated the probability that they would switch to another store for future purchases of regular beer (1 = will definitely keep on buying regular beer in this store, 5 = will definitely go to other stores to buy regular beer).

¹¹ Store checks revealed that most service supermarkets carry assortments that vary between six and nine beer brands; most of these brands can be considered high-equity brands.

Figure 3.1: Graphical display of assortment



3.5.2 Sample

The sampling frame consisted of more than 18,000 regular beer buyers participating in an online beer panel. Only subjects who were primary buyers of one of the 14 selected regular beer brands could be part of the sample. To include a substantial number of low-equity buyers, we used a stratified sampling procedure to select the subjects. For each brand, we set a target response of 25 respondents, but because the total number of primary buyers for low-equity brands was relatively low within the beer panel, we could not achieve this target for some of these brands. Assuming a response rate of approximately 50%, 705 regular beer buyers were invited to participate in the online survey, and 395 (56%) responded. Of the respondents, 42% were classified as low-equity buyers and 58% as high-equity buyers.

3.6 Experimental results

We provide the average AE and SSI scores in Table 3.1. To test the significance of the three independent variables and the two interaction variables, we use an ANOVA (394 degrees of freedom [d.f.] and 5 d.f., respectively). We display the ANOVA results in Table 3.2.

Table 3.1: Descriptive statistics of the controlled experiment (n = 383)

	Assortment Evaluation (1–7)		Store Switching Intention (1–5)		n
	Average	Standard Deviation	Average	Standard Deviation	
Equity of delisted brand					
- Low	4.38	1.23	2.94	1.37	160
- High	3.86	1.42	3.45	1.32	223
Assortment size					
- Small (6 brands)	3.92	1.38	3.41	1.33	196
- Large (9 brands)	4.24	1.34	3.18	1.42	187
Assortment structure					
- One-third high equity	3.85	1.45	3.46	1.35	192
- Two-thirds high equity	4.30	1.24	3.14	1.38	191

3.6.1 Main effects

The first hypothesis predicts that AE will be lower (H_{1a}) and SSI will be higher (H_{1b}) when a high-equity brand is delisted than when a low-equity brand is delisted. In support of these hypotheses, the AE is lower (3.86 versus 4.38; $F = 15.1, p < 0.01$) and SSI is higher (3.55 versus 2.9; $F = 20.1, p < 0.01$) for high-equity brand delistings than for low-equity brand delistings. We also find support for the proposition that AE will be higher (H_{2a}) and SSI lower (H_{2b}) when a brand delisting occurs in a large instead of a small assortment; AE is higher for larger assortments (3.92 versus 4.24; $F = 5.8, p < 0.01$), and SSI is higher for smaller assortments (3.41 versus 3.18; $F = 3.0, p < 0.01$). Finally, H_{3a} and H_{3b} predict that, when the percentage of high-equity brands is higher, AE will be higher and SSI will be lower. Our results show that

consumers evaluate assortments that consist of two-thirds high-equity brands higher than they do assortments with one-third high-equity brands (4.30 versus 3.84; $F = 10.8, p < 0.01$), and their intention to switch stores is lower when the assortment consists of two-thirds high-equity brands (3.14 versus 3.46; $F = 4.7, p < 0.05$), in support of H_{3a} and H_{3b} .

Table 3.2: ANOVA results

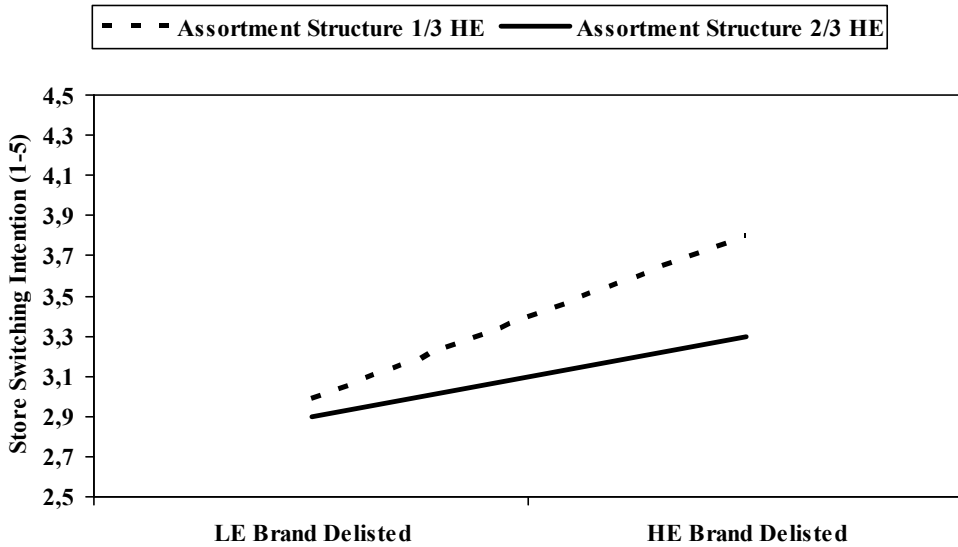
Variable	Assortment Evaluation		Store Switching Intention		Store Switching Intention	
	F-value	<i>p</i> -value	F-value	<i>p</i> -value	F-value	<i>p</i> -value
Brand equity (BE)	15.08	0.000	20.203	0.000	8.423	0.002
Assortment size (AS)	5.835	0.008	3.027	0.042	0.471	0.245
Assortment structure (STR)	10.755	0.005	4.683	0.016	0.767	0.191
BE × STR	1.295	0.128	2.074	0.076	1.274	0.130
AS × STR	2.622	0.054	4.186	0.021	2.000	0.079
Assortment evaluation					139.86	0.000

Notes: *p*-values are one sided. Significant relations ($p < 0.05$) are bolded.

3.6.2 Interaction effects

Although H_{4a} , which proposes an interaction effect between the brand equity of the delisted brand and the assortment structure on AE, is not supported ($F = 1.3, p > 0.10$), we find weak support for H_{4b} ($F = 2.1; p < 0.10$), which predicts the effect for SSI (Fig. 2). As we show in Figure 3.2, the assortment structure might reduce the absolute effect of brand equity on SSI. We also find support for the hypothesized interaction effects between assortment structure and assortment size (H_{5a} : $F = 2.6, p < 0.10$; H_{5b} : $F = 4.2, p < 0.05$), as we show in Figure 3.3. Thus, the effect of assortment size in assortments with a high percentage of high-equity brands is smaller than in assortments with a low percentage of high-equity brands.

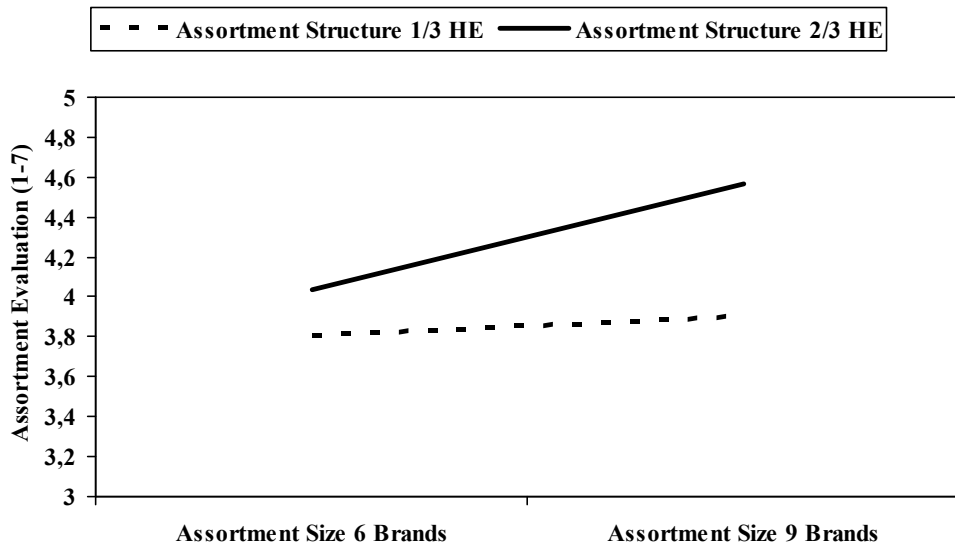
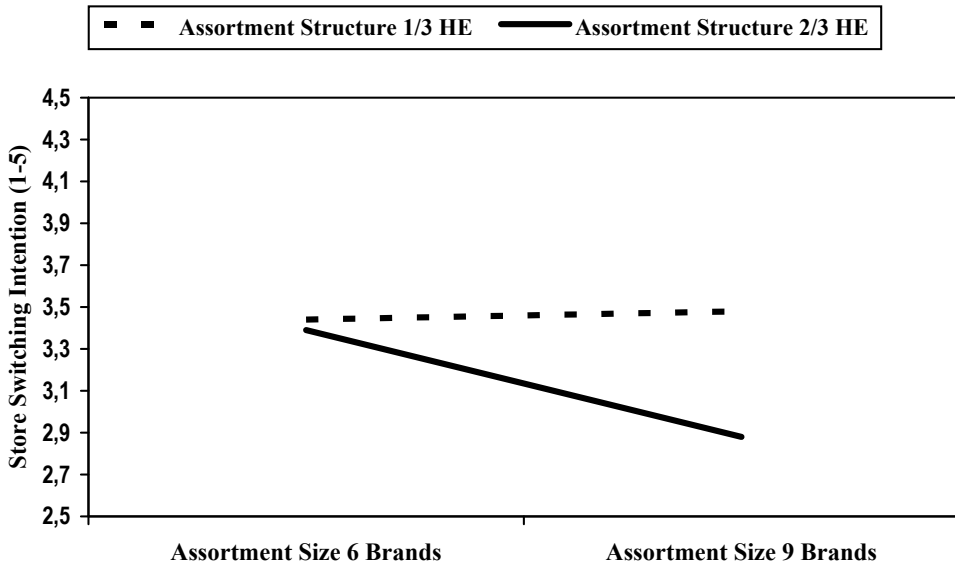
Figure 3.2: Interaction effect of brand equity × assortment structure



3.6.3 Mediating effect of assortment evaluations

Broniarczyk, Hoyer, and McAllister (1998) show that assortment perceptions may mediate the effect of assortment characteristics on store choice. We therefore estimated an ANOVA for SSI in which we include AE as a covariate (see Table 3.2). In line with Broniarczyk, Hoyer, and McAllister (1998), we find that AE relates strongly to SSI ($F = 139.9, p < 0.01$) and acts as a mediating variable for the effect of assortment size on SSI (see Figure 3.3). It also mediates the effect of assortment structure. However, the effect of brand equity remains significant in this model ($F = 8.4, p < 0.01$). Thus, brand equity has a direct effect on SSI when we control for the effect of AE.

Figure 3.3: Interaction effect of assortment structure \times assortment size



3.7 Study 2

In Study 2, we develop and test a conceptual model by which we attempt to understand the determinants of SSI and CI after a delisting. We use in-store surveys of 1,213 consumers, collected in 16 supermarkets of four retail chains, that pertained to purchases in 10 preselected product categories. Unlike in Study 1, we focus solely on behavioral intentions here. Moreover, whereas the SSI variable in Study 1 basically measured SSIs at the category level (buy brand in another store), here we study the impact of delistings on switching intentions at the store level (fewer visits to the store in which the hypothetical brand delisting occurs). This type of SSI results in sales losses that extend beyond category sales losses in the product category in which the delisting occurs. In addition, we include CI as a consequence of brand delistings because, theoretically, complaining is an important consumer response if consumers are dissatisfied with the product or service (Singh 1990). Moreover, in-depth interviews with four retail managers revealed that retailers carefully compile complaints after a delisting operation and use them to consider whether to relist the brand in the assortment.

In this second study, we include the same independent variables (brand equity, assortment size, and assortment structure) as in Study 1, but we also test hypothesized interaction effects. The breadth of this study (16 supermarkets of four different retail chains, 10 different product categories) provides generalizability for the findings of Study 1. We also include other antecedents of SSI and CI, which can be classified as (1) brand-related, (2) product category-related, (3) retail assortment-related, and (4) store-related antecedents. By including only objective variables (i.e., no individual perceptions, such as brand preference, brand, loyalty, or store preference), we distinguish this model, prevent common method bias, and provide a model that can be used easily by retailers to estimate the effects of several proposed brand delistings.

3.8 Hypotheses

3.8.1 Brand-related antecedents

The first group of variables relates to the specific brand for which the brand delisting occurs. In line with Study 1, we consider the brand equity of the delisted brand an explanatory variable for

SSI (H_1). We expect that the brand equity level of the delisted brand will relate positively to CI because we assume that consumers are more committed to high-equity than to low-equity brands.

A second brand characteristic is the type of delisted brand, for which we distinguish between store and manufacturer brands (Dhar and Hoch 1997). In contrast with manufacturer brands, store brands are distributed only in a particular retail chain, which means that if a store brand is delisted, consumers cannot switch to a competing store to obtain the same store brand. Several researchers also have suggested that store brands are associated with higher store loyalty (Corstjens and Lal 2000; Steenkamp and Dekimpe 1997), though other researchers argue that heavy users of store brands are loyal to store brands in general, not necessarily to the store brand of a particular retailer (Ailawadi and Harlam 2004). Because consensus does not exist for this point, we do not formulate a hypothesis about the relationship between the type of brand and SSI and CI.

H₆: The brand equity level of the delisted brand will be positively related to (a) SSI and (b) CI.

3.8.2 Product category–related antecedents

The first product category variable is the type of product: utilitarian or hedonic (Batra and Ahtola 1991). Hedonic products, such as ice cream and salty snacks, provide more experiential consumption (i.e., fun, pleasure, excitement), whereas utilitarian products, such as detergents and toilet paper, provide primarily instrumental and functional benefits (Dhar and Wertenbroch 2000; Hirschman and Holbrook 1982). The different nature of utilitarian and hedonic products may affect the buying process, in that the buying process of utilitarian products may be driven mainly by rational buying motives, whereas that of hedonic products includes emotional motives as well. Because of these emotional buying motives, consumers may be more committed to brands in hedonic product categories than to those in utilitarian product categories. Therefore, we expect that consumers will demonstrate higher SSIs and CIs if a brand delisting occurs in a hedonic rather than a utilitarian product category.

The second considered product category–related variable is the concentration level of brands in the product category. A highly concentrated product group is characterized by few dominant brands with high market shares, which may reflect significant perceived differences between these dominant brands and others. We measure brand concentration level as the squared market shares of each brand to encompass the combined market power of the available brands

(Ailawadi and Harlam 2004). Therefore, we expect that a high concentration level will relate positively to SSIs and CIs, because if consumers do not consider other brands good alternatives, they will either visit another store or complain.

The third product-related variable we study is the number of brands in the product category. If this number is greater, it should be easier for consumers to find an acceptable alternative in the case of a brand delisting. However, a higher number of brands in a category also may signal a segmented market in terms of consumer preferences (Narasimhan, Neslin, and Sen 1996) because retailers offer many brands when they assume large variety in consumer needs for a category (Hoch, Bradlow, and Wansink 1999). In this case, because each brand satisfies a specific need, there are no suitable alternatives in the assortment. In summary, because we find opposing arguments for the effect of the number of brands on SSI and CI, we do not put forward a directional hypothesis for this effect.

H₇: The type of product will be positively related to (a) SSI and (b) CI.

H₈: The concentration level of brands in the product category will be positively related to (a) SSI and (b) CI.

3.8.3 Retail assortment–related antecedents

The third group of antecedents we distinguish relates to the product category assortment offered by the retailer. As in Study 1, we consider assortment size, but in Study 2, we measure it as the number of brands offered by the retailer in a certain category compared with the number of brands offered in the same category by other participating retailers. In line with Study 1, we hypothesize that assortment size negatively relates to SSI, and we also expect that it is negatively related to CI. When faced with a smaller assortment, which makes it more difficult to find a suitable alternative, consumers are more likely to complain.

We also consider assortment structure. In line with Study 1, we expect that assortments with a high proportion of high-equity brands will have lower SSI; we use similar reasoning to hypothesize that consumers will be less likely to complain.

H₉: The assortment size will be negatively related to (a) SSI and (b) CI.

H₁₀: The assortment structure will be negatively related to (a) SSI and (b) CI.

3.8.4 Store-related antecedents

Finally, the fourth group of antecedents pertains to the type of retail situation in which the brand delisting occurs. The first variable we study is store type, for which we distinguish between price- and service-oriented stores (Shankar and Bolton 2004). Service-oriented stores generally carry a wider and deeper assortment, offer better facilities (e.g., parking lot, shopping assistance), and have a higher price level than price-oriented stores. We expect that SSIs are lower if the brand delisting occurs in a service-oriented store, because consumers will have more alternatives from which to choose. However, the expected effect of store type on CI is not in line with its effect on SSI. Because their expectations are based on prior experiences with the store (Boulding et al. 1993), customers of service-oriented stores may have higher expectations about assortment availability than customers of price-oriented stores. Therefore, a brand delisting should create more dissatisfaction for shoppers at service-oriented stores than for shoppers at price-oriented stores, which may lead to a higher level of complaining by shoppers of service-oriented stores.

The second store-related variable is the number of alternative stores. Theoretically, the costs of switching to another store are lower if the number of alternative stores in the environment is higher (Campo, Gijbrecchts, and Nisol 2000), so the number of alternative stores should be positively related to SSI. However, the effect of the number of alternative stores on CI is less clear. Consumers may be more demanding when there are many stores, but this scenario also may provide consumers with more alternatives, which may lead them to consider complaining a waste of time. Therefore, we do not hypothesize about the relation between the number of alternative stores and CI.

H₁₁: Store type will be (a) negatively related to SSI and (b) positively related to CI.

H₁₂: The number of alternative stores will be (a) positively related to SSI.

3.8.5 Control variables

As control variables, we include age and gender in our model. We also include “promotional buy” to measure whether the hypothetically delisted brand was on a promotion. Consumers may not be as brand loyal to a brand purchased on promotion as they are to a brand purchased without a promotion. Therefore, we expect that promotional buy is negatively related to SSI and CI and should be included as a control variable.

3.9 Research methodology

3.9.1 Data collection

Data about consumer brand delisting responses were collected using a survey. In line with out-of-stock research, we use a hypothetical brand delisting (Campo, Gijsbrechts, and Nisol 2000) so that we can study brand delisting behavior for various brands in different categories and different stores. Although brands might be delisted in a natural experiment as well, a natural experiment would limit the scale of the research to a small number of stores, product categories, and brands, which undermines our ability to develop and test a conceptual model with, for example, product category– and store-related antecedents.

Data were collected by four experienced interviewers employed by a research agency through personal interviews with respondents who had just visited a supermarket. The interviews took place in 16 different supermarkets that belong to four retail chains (four stores per chain). Through visual inspection of the consumers' shopping baskets at the checkout lanes, the interviewers preselected consumers who purchased the product groups of interest. After they left the checkout area, the preselected consumers were asked to participate in a study about their shopping behavior. Approximately 60% of the preselected consumers agreed to participate. A basket analysis was conducted to highlight the brand of interest, and questions pertaining to brand delisting responses were asked with reference to that purchased brand. The advantage of interviewing shoppers shortly after their shopping trip is that consumers can recall more easily their real decision-making situation. We believe this data collection procedure enhances the realism of the brand delisting situation and therefore the validity of the responses.

Interviews took place throughout the week and across the individual days to ensure a regular pattern of shoppers. In total, 1,213 respondents participated in the study. Actual responses per product category varied between 93 (rice) and 151 (cola).

3.9.2 Dependent variables

As we mentioned previously, with this study we hope to measure the effect of a hypothetical brand delisting on SSI and CI. Although consumers' intentions about future behavior in this context cannot be translated perfectly to actual future behavior, research shows that intentions are related to actual behavior (Morwitz, Steckel, and Gupta 1997). Therefore, to measure the dependent variables, we used the following procedure: After selecting the brand of interest from

among the 10 specified product groups, the interviewer asked the consumer what he or she probably would do in the future if the store decided to delist the brand. Consumers rated their SSI on a five-point scale, in which they could indicate their probability of visiting the store (1) as frequently as before, (2) somewhat less often, (3) less often, (4) much less often, or (5) stop buying at the store at all. In case of a brand delisting, 2.8% of the consumers said they would probably stop buying at the store at all, whereas 88.7% indicated that they would visit the store as frequently as before. To measure CI, we used a three-item formative scale (Fornell 1987) developed on the basis of Singh's (1990) work. Consumers were asked to indicate the probability they would engage in each of the following complaining actions: (1) ask a store employee about the delisting, (2) send a complaint to consumer services, and (3) tell about the brand delisting to third parties (e.g., friends, family). These three items may be considered a set of distinct facets of the CI construct. For example, a disappointed consumer may ask the stores' employee about the delisting but not send a complaining letter to the organization. Indeed, interitem correlations among the three complaining items are rather low (r between 0.2 and 0.3). In this situation, we therefore define the latent variable CI using a linear sum of the three complaining items (Bagozzi 1994).

3.9.3 Independent variables

To prevent common method bias (Baumgartner and Steenkamp 2001; Bickart 1993), we measured the independent variables separately from the dependent variables. Therefore, we limited the measures used for objective or intersubjective measures, with the exceptions of the control variables promotional buy, age, and gender, which we could measure in a straightforward way. We provide all the measures in Appendix 3A.

Brand-related antecedents. In designating each of the hypothetically delisted brands as either a manufacturer or a store brand, we used the evaluations of 40 food industry managers for three brand equity dimensions: (1) perceived quality, (2) perceived price level, and (3) perceived consumer preference (Chandon, Wansink, and Laurent 2000). The managers used a seven-point Likert scale to rate each brand on each of the three brand equity indicators (1 = low, 7 = high). The average alpha score among the 111 brands was 0.78, with a standard deviation of 0.086; therefore, we summed the scores for the three items and calculated the average brand equity score for each brand, which we then employed in our database.

Product-related antecedents. We assessed the hedonic level of the product category with the same group of 40 food industry managers, who scored each product category on the following items: (1) attractive, (2) nice, and (3) enjoyment (1 = low, 7 = high) (Batra and Ahtola 1991). The average coefficient alpha across the 10 product categories was 0.79 (see Table 3.3). We summed the three items, calculated the average score for each category, and included it in our database as the hedonic-level score for each category. We operationalized the concentration level of a product category as a Herfindahl-Hirschman index. For each product group, we summated the squared market shares of each of the top four brands (Ailawadi and Harlam 2004; Schmalensee 1977). A number closer to 1 indicates a high concentration level, whereas a score closer to 0 indicates a low concentration level. We measured the number of brand antecedents as the number of brands available from each retailer, garnered from store checks, in the product category.

Table 3.3: Hedonic level as judged by managers of selected product categories (n = 40)

Product Category	Cronbach's Alpha (three-item scale)	Average Hedonic Level (1–7)	Standard Deviation
Margarine	0.83	3.40	1.21
Rice	0.84	3.86	1.21
Detergent	0.80	3.90	1.45
Toilet paper	0.86	3.92	1.54
Frozen vegetables	0.74	4.05	1.06
Sauces	0.83	4.54	1.22
Cola	0.82	5.03	1.22
Coffee	0.54	5.38	0.81
Beer	0.73	5.55	0.97
Cigarettes	0.88	5.78	0.94

Retail assortment–related antecedents. We calculated assortment size as an index that reveals the relative choice level for a particular product group from retailer X compared with the choice level for that product group offered by other participating retailers. For example, if retailer X offers 9 brands of beer and the average number of beer brands offered by all participating retailers is 12, the index for retailer X in the beer category is 0.75. To assess the choice level of each store, we counted the number of brands offered by each considered store. For assortment structure, we measured the percentage of high-equity brands in the product category by the retailer. For example, if retailer A offers 9 brands of beer, 6 of which are classified as high-equity brands (based on a median split of the brand equity scores in the category), the assortment consists of 67% high equity brands and 33% low equity brands.

Store-related antecedents. For the variable store type, we distinguish between service- and price-oriented stores on the basis of supermarket classifications by the market research agency GfK (2004) of each of the 16 participating supermarkets. A store is classified as service oriented when its prices are relatively high and its assortment level is extended, whereas a store is classified as price oriented when its prices are rather low and its assortment is limited. Theoretically, an everyday low price store can combine low prices and a high service level, but Study 2 includes only hi-lo retailers (Kahn and McAlister 1997). We measured the number of alternative stores as the number of stores in the same zip code of the store at which the hypothetical delisting was investigated.

3.9.4 Analysis

In this study, we are interested in the effects of brand-, product category-, retail assortment-, and store-related variables on SSI and CI. The general model that holds for both delisting responses is formulated as follows (see Appendix 3A for abbreviations):

$$\text{Delisting response}_{i,b,p,r,s} = \alpha_0 + \alpha_1 \text{BE}_{i,b} + \alpha_2 \text{BT}_{i,b} + \alpha_3 \text{PT}_{i,p} + \alpha_4 \text{CL}_{i,p} + \alpha_5 \text{NB}_{i,p} + \alpha_6 \text{AS}_{i,p,r} + \alpha_7 \text{STR}_{i,p,r} + \alpha_8 \text{ST}_{i,s} + \alpha_9 \text{NAS}_{i,s} + \alpha_{10} \text{PB}_i + \alpha_{11} \text{Sex}_i + \alpha_{12} \text{Age}_i + \beta \text{SD}_i + \varepsilon_i. \quad (1)$$

Note that we model the response of consumer i for both independent variables, which means that we include variables for four different aggregation levels: brand level b , product category level p , retail assortment level r , and store level s . In this model we also account for possible store-specific effects with the inclusion of a vector of dummies for each store (SD). We also test for

interaction effects between assortment structure and brand equity and between assortment structure and (relative) assortment size. To do so, we estimate an additional model in which we add the following interaction terms to Equation 1: $STR_{i,p,r} \times BE_{i,b}$ and $STR_{i,p,r} \times AS_{i,p,r}$.

We measure SSI on a single five-point scale. Because this scale should be considered an ordinal scale, we use an ordered probit model instead of the standard linear regression model to estimate Equation 1 (Long 1997). In an ordered probit model, the observed response variable is modeled on an underlying continuous variable y_i^* , which depends linearly on explanatory variables. We estimate the model with maximum likelihood in E-Views 4.0. To estimate the effect of our explanatory variables on assortment satisfaction and complaining behavior, we use a standard linear regression model with ordinary least squares, because the summation of the three CIs can be considered an interval scale.

Prior to estimating the model for Equation 1, we assess whether multicollinearity might cause severe problems in our data by considering the correlation among the independent variables (see Table 3.4). In general, the correlation among the independent variables is low. We also compute the variance inflation factors and find that all are less than 2. Therefore, we conclude that multicollinearity will not affect our estimation results (Hair et al. 1998; Leeflang et al. 2000). We use White's (1980) method to correct for potential heteroscedasticity in the errors and variables.

Table 3.4: Average, standard deviation (s.d.), and correlation coefficients for variables in Study 2 (n = 1213)¹²

	Average	s.d.	SSI	CI	BE	BT	PT	CL	AS	STR	NB	ST	NAS	PB	SEX	AGE
SSI	1.29	0.85	1.00													
CI	2.79	1.38	.16	1.00												
BE	5.28	1.05	.16	.15	1.00											
BT	0.17	0.37	-.08	-.06	-.60	1.00										
PT	4.58	0.79	.15	.16	-.12	-.12	1.00									
CL	0.23	0.14	.15	.16	-.04	-.04	.19	1.00								
AS	1.00	0.11	-.02	.03	.05	.05	.00	-.02	1.00							
STR	0.56	0.17	-.06	-.05	-.11	-.11	-.24	.04	.01	1.00						
NB	7.04	1.97	-.02	.04	-.19	-.19	.07	-.38	.32	.19	1.00					
ST	0.50	0.50	.01	.10	.04	.04	.03	.01	.29	-.05	.13	1.00				
NAS	3.11	1.44	-.01	-.02	-.02	-.02	-.02	-.01	-.12	.00	-.05	-.12	1.00			
PB	0.12	0.33	-.04	-.06	.01	.01	-.11	-.05	-.01	-.02	-.03	.05	.02	1.00		
SEX	0.77	0.42	-.10	.01	.04	.04	-.13	-.00	.02	.05	-.02	.01	.06	.03	1.00	
AGE	2.55	0.85	-.01	.06	.04	.04	-.09	-.02	.02	-.08	.03	.13	.02	.00	.04	1.00

3.10 Empirical results

3.10.1 Descriptive statistics

We used median splits to classify the antecedents into low-equity versus high-equity brands and then calculated the average SSI and CI for each group. We also used median splits to distinguish between store-loyal and store-switching consumers and complainers and noncomplainers. In Table 3.5, we report the average SSI and CI and the percentages of store switchers and complainers for each antecedent. We find substantial significant differences that underline the

¹² The abbreviations and measurements of the dependent and independent variables appear in Appendix 3A. Significant relations ($p < 0.05$) are bolded.

importance of several of the antecedents in our conceptual model (Table 3.5). For example, if a high-equity brand is delisted, 17% of its buyers indicate that they will visit the store less frequently. For a low-equity brand, this percentage is only 8%. If a brand delisting occurs in a product group with a high hedonic level, 20% of its buyers indicate that they would be less loyal to the store, whereas the percentage of store switchers for brand delistings in low hedonic product categories is only 7%

Table 3.5: Averages and percentages of store switching intentions and complaining intentions per antecedent (n = 1213)¹³

Antecedent	Store Switching			
	Intentions		Complaining Intentions	
Brand equity	1.17	1.41	2.62	2.96
(low versus high)	(8%)	(17%)	(41%)	(52%)
Brand type	1.32	1.13	2.83	2.60
(manufacturer versus store brand)	(14%)	(6%)	(47%)	(41%)
Product type	1.14	1.46	2.53	3.11
(low versus high hedonic level)	(7%)	(20%)	(38%)	(57%)
Concentration level	1.21	1.39	2.63	2.99
(low versus high)	(9%)	(17%)	(49%)	(53%)
Assortment size	1.31	1.25	2.82	2.74
(low versus high)	(14%)	(11%)	(48%)	(45%)
Proportion of high-equity brands	1.30	1.23	2.78	2.80
(low versus high)	(14%)	(9%)	(46%)	(48%)
Number of brands	1.32	1.24	2.76	2.81
(low versus high)	(14%)	(11%)	(44%)	(49%)
Store type	1.28	1.29	2.65	2.93
(price- versus service-oriented)	(13%)	(12%)	(42%)	(51%)
Number of alternative stores	1.30	1.26	2.78	2.79
(low versus high)	(14%)	(11%)	(45%)	(48%)
Total	1.28 (13%)		2.78 (46%)	

¹³ Significant relations ($p < .05$) are bolded.

3.10.2 Store switching intentions

We present the estimation results of Equation 1 in Table 3.6. The model for SSI is significant and explains 20% of the variance, according to the R^2 of McKelvey and Zavoina (1975). We find that five of the seven hypothesized effects are significant (four at $p < 0.05$, one at $p < 0.10$). In particular, we find a positive effect of brand equity, product type (hedonic level), and concentration level on SSI. We find negative significant coefficients for assortment size ($p = 0.08$) and assortment structure. Furthermore, the analyses show that the number of brands in the category is positively related to SSI, which confirms the findings of Narasimhan, Neslin, and Sen (1996) that categories with many brands reflect heterogeneity in the market, which leads to fewer good alternatives for delisted brands. Together, these results support H_{6a} , H_{7a} , H_{8a} , H_{9a} , and H_{10a} . However, we do not find support for either store-related hypotheses, H_{11a} or H_{12} . Our results also confirm the results of Study 1, in which we found significant effects for brand equity, assortment size, and assortment structure. We also tested for interaction effects between assortment structure and brand equity and between assortment size and assortment structure, but our results reveal no significant interaction effects ($p = 0.44$; $p = 0.12$), so our findings from Study 1 with regard to these interaction effects are not replicated in Study 2.

3.10.3 Complaining intentions

Our model explaining CIs is significant and explains 10.7% of the variance. Specifically, we find that five of the six hypothesized effects are significant (four at $p < 0.01$, one at $p < 0.10$). Similar to our findings for SSI, we find a positive effect of brand equity, product type, and concentration level. Furthermore, we find that store type is positively related to CI. Thus, customers of service-oriented supermarkets are more inclined to complain in response to a brand delisting. Also, the number of alternative stores is positively related to CI, in support of the idea that consumers who have more stores in the vicinity tend to be more critical about the assortment that should be available. We also find a positive significant effect of the number of brands, which confirms again that the number of brands reflects heterogeneity in the category. We find a positive effect for age that implies that older consumers are more inclined to complain than are younger consumers. Also similar to our explanation of SSI, we find a negative significant effect for assortment structure ($p = 0.08$). Our results thus support H_{6b} , H_{7b} , H_{8b} , H_{10b} , and H_{11b} but not H_{9b} . Finally, we estimated the interaction effects between assortment structure and brand equity and between assortment structure and assortment size and find marginal support for the interaction

Table 3.6: Estimation results of ordered probit and ordinary least squares analyses, Study 2 (n = 1213)¹⁴

	Hypothesis	Store Switching Intentions¹⁵	Complaining Intentions
Constant ¹⁶		3.05 (0.00) 3.14 (0.00) 3.60 (0.00) 3.84 (0.00)	-0.21 (0.76)
Brand-Related			
Brand equity (BE)	6 _{a,b}	0.13 (0.02)	0.15 (0.00)
Brand type (BT) (1 = store brand; 0 = manufacturer brand)		-0.12 (0.27)	0.13 (0.16)
Product Category-Related			
Product type (PT)	7 _{a,b}	0.18 (0.00)	0.17 (0.00)
Concentration level (CL)	8 _{a,b}	1.84 (0.00)	1.49 (0.00)
Number of brands (NB)		0.07 (0.03)	0.07 (0.00)
Retail Assortment-Related			
Assortment size (AS)	9 _{a,b}	-0.81 (0.08)	-0.38 (0.17)
Assortment structure (STR)	10 _{a,b}	-0.68 (0.01)	-0.35 (0.08)
Store-Related¹⁷			
Store type (ST) (1 = service-oriented; 0 = price-oriented)	11 _{a,b}	-0.33 (0.12)	0.36 (0.02)
Number of alternative stores (NAS)	12	0.03 (0.39)	0.18 (0.01)
Control Variables			
Promotional buy (PB) (1 = yes; 0 = no)		-0.12 (0.45)	-0.19 (0.09)
Gender (SEX) (1 = female; 0 = male)		-0.19 (0.07)	0.09 (0.35)
Age (AGE)		0.03 (0.67)	0.08 (0.09)
General Statistics			
LR statistic /F-value (<i>p</i> -value)		108.75 (0.00)	5.48 (0.00)
(McKelvey and Zavoina) R ²		0.203	0.107

¹⁴ We estimated several other model specifications (i.e., OLS instead of ordered probit) and systems of equations to account for correlations between errors. The estimated coefficients and associated *p*-values do not change significantly when we use these models.

¹⁵ We report one-sided *p*-values for our hypothesized relationships and two-sided *p*-values for the constant and nonhypothesized variables.

¹⁶ In an ordered probit model, there is no single constant. Instead, we estimate four limit points (5–1).

¹⁷ We included dummy variables for each store to adjust for unmeasured variance at the store level. TO explain SSI, one of the store dummy variables is significant at *p* < 0.05, to explain CI, two store dummy variables are significant at *p* < 0.05.

effects indicated in Study 1 ($\beta = -0.31, p = 0.07$; $\beta = -3.28, p = 0.09$). Note, however, that the dependent variable CI differs from the AE and SSI variables measured in Study 1.

3.11 Discussion

With this research, we study the impact of brand delisting on AE, SSI, and CI. We thereby contribute to the literature on the effects of assortment reductions in several ways. First, our research setting differs from other studies of assortment reductions because its starting point is the delisting of the consumers' preferred brand. Previous natural and controlled experiments have focused on measuring the effect of multiple item delistings within or across categories. Our focus on brand delisting also adds to the understanding of the effect of brand-specific characteristics, such as brand equity, on consumer responses to a brand delisting.

Second, our focus on single brand delistings instead of assortment reduction is in line with recent retail management developments. In the 1990s, many retailers aimed to increase their operating profits by creating efficient assortments (FMI 1993). On many occasions, retailers reduced their assortments by 10–15% by removing low-selling stockkeeping units (ECR Europe 1998). In today's retailing environment, brand delistings continue to be common. Due to the growth of private labels, retailers believe they are less dependent on individual national brands (Serdar, Hoch, and Raju 2002; Steenkamp and Dekimpe 1997). In addition, retailers have begun to consider their distinctive assortments in their decisions about which brands to list, which means that fewer retailers are interested in selling all well-known brands. Finally, to improve buying conditions, retailers threaten manufacturers with brand delisting.

Third, various studies on assortment reductions seem to suggest that assortment reductions may not harm or even be beneficial for retailers. Our study reveals that the majority of brand delistings will lead to lower AEs and at least some disappointed customers. In most brand delisting situations, at least a small percentage of consumers indicate that they would be less loyal to a store that delisted their preferred brand, which implies a potential sales loss beyond the product category in which the delisting occurs. Prior findings might not include this effect because these negative consequences may be weaker for pure item deletions or may not be statistically significant at an aggregate level. However, an overall store sales loss of a

“statistically marginal” 1% of consumers due to a brand delisting is very significant for the retailers’ operating profit.

Fourth, prior studies of assortment reductions have not developed a conceptual model that attempts to explain brand delisting consequences on the consumer level. Usually, such studies are descriptive in nature (Drèze, Hoch, and Purk 1994; FMI 1993) or consider only a limited number of explanatory variables, such as assortment size or item preference. Also, prior studies have been based on a limited number of categories and/or stores. In this study, we include several new variables, such as brand equity, assortment structure, product type, and store type. Furthermore, we test the effect of these antecedents on brand delisting responses in 16 different stores and 10 product groups, which enables us to generalize our findings across stores and product categories. We suggest that the variance in the brand delisting responses across stores, product categories, and brands may explain the mixed results in natural experiments on assortment reduction.

We consider the following findings the most important of our research: First, delisting high-equity brands has stronger negative effects than does delisting low-equity brands. The effects of high-equity brand delistings are, however, less negative if retailers provide sufficient alternative high-equity brands in their remaining assortments. However, brand loyalty toward even so-called “small brands” may be very high for individual consumers, such as was the case for “fanatic” Double-Cola buyers (Wolburg 2003). Second, brand delistings have stronger negative consequences when they are executed in product categories with a high hedonic level, such as beer, cola, or cigarettes. Third, in line with prior assortment reduction literature, retailers who provide a large category assortment are less affected by brand delistings. However, this finding does not imply that delisting brands in categories that contain a high number of brands will be less harmful; rather, we find that in categories that carry many brands (e.g., beer), brand delistings have greater negative consequences than they do in categories with only a few brands. A possible explanation for this counterintuitive finding may be that the absolute number of brands in a category is a reflection of a narrowly segmented market in terms of consumer preferences (Narasimhan, Neslin, and Sen 1996). Fourth, we find that CIs after a brand delisting are higher for service-oriented stores than for price-oriented stores, but SSIs do not differ between store types.

3.12 Managerial implications

Retailers have several motivations for brand delistings. Our main conclusion is that retailers should be careful when delisting brands, because it may result in significant sales losses among buyers of the delisted brands. Note that a small loss in category sales may be mitigated by the cost savings and lead to an improved operating profit. Furthermore, retailers can decide to reduce their assortment and lower the average price level in the category at the same time, which may even lead to growing category sales and an improved assortment perception among the total group of buyers. In some situations, retailers may think that they offer too much choice within a category, particularly if former extensions of the assortment did not result in category sales increases. In such situations, assortment reduction may decrease the level of overproliferation in the category, though even in this scenario, retailers must recognize that most brand delistings will result in some dissatisfied customers. Therefore, retailers should develop communication methods that lower the negative effects of a brand delisting. For example, market leader Albert Heijn in the Netherlands decided to delist the brand Kanis & Gunnik. Using information from its loyalty card program, the store identified approximately 15,000 heavy users of the brand and sent these users a letter in which it explained the delisting reasons. The letter also contained a coupon offer for an alternative brand.

We believe that there are two major implications of our findings for retailers. First, two major variables are very important in the context of brand delistings: brand equity and hedonic level. Retailers should be especially careful when they delist high-equity brands in hedonic categories. When high-equity brands are delisted, a larger group of consumers indicates that they will switch to another store. Moreover, additional analysis suggests that brand equity is strongly correlated with market share. Because high-equity brands often have high market shares, delisting a high-equity brand will affect more consumers.

Second, our results show that a large assortment size may mitigate the negative effects of delistings, which means there are better opportunities for delistings in large assortments. However, many retailers, especially price-oriented stores, have reduced their assortment sizes dramatically. If smaller assortments lead to stronger negative delisting effects, at some point past the minimum required assortment size, further reductions will no longer be feasible.

Although this study focuses on the retailers' perspective, the results may be useful for brand manufacturers as well. By consistently building brand equity, manufacturers can strengthen their

brand to such a level that retailers would have difficulty delisting it. Thus, brand equity increases not only the price premium that consumers are willing to pay but also manufacturer power when negotiating buying conditions with retailers. Furthermore, as store loyalty in general is stronger than brand loyalty, manufacturers should develop strategies to connect the customer to their brands. For instance, Unilever developed its own consumer magazine *Yata Yata* that is distributed directly to households. With this magazine, Unilever aims to improve the link between the consumer and the Unilever brands.

3.13 Limitations and further research

A major limitation of our research is that the results in both studies are based on hypothetical situations. A possible drawback of this research design is that people do not always act the way they claim they would or have difficulty imagining what action they would take. This limitation may lower the external validity of the reported brand delisting responses. Therefore, we suggest that additional research should test the effects of actual brand delistings, though retailers may not be willing to cooperate with research in which several high-equity brands are delisted across several product groups. Another limitation of our study is that we measure the effect of a brand delisting among buyers of the delisted brand and therefore cannot comment on how nonbuyers of the delisted brand may react. The AE of nonbuyers of a delisted brand may even be more favorable after the delisting because fewer brands in the category might lower their search costs. Further research therefore should test the effect of a brand delisting on the assortment perceptions of nonbuyers.

Additional research also could focus on the long-term effects of brand delistings, because the majority of assortment reduction studies have considered only short-term effects. Brand delistings also are not executed in isolation. For example, a brand delisting may be accompanied by an increase in the service level of the store or the addition of new categories (e.g., bakery, coffee stand, more fresh food), which might eliminate some of the negative consequences of brand delistings. Moreover, consumers may be confronted with multiple brand delistings in a single and/or multiple categories, so further research should study this issue.

Appendix 3A: Overview and definition of variables

Variable	Concept	Measurement Instrument
Dependent variables		
Store switching intention (SSI)	Store visit frequency	Degree of expected store visits in post-delisting period on five-point scale (1 = same store visit frequency as before, 5 = stop buying at this store at all).
Complaining intention (CI)	Complaining actions	Three-item formative scale (1–7) consisting of three distinct types of complaining behavior.
Independent variables		
<i>Brand-related</i>		
Brand equity (BE)	Brand strength	Degree of brand equity based on a three-item scale consisting of perceived price, perceived quality, and perceived consumer preference (1=low, 7 =high). Brands evaluated by a group of 40 food industry managers.
Brand type (BT)	Manufacturer or retailer brand	Dummy variable, equal to 1 if the brand is a store brand.
<i>Product category-related</i>		
Product type (PT)	Hedonic level of product	Three-item scale consisting of attractive, nice, and enjoyment (1 = low, 7 = high). Product categories evaluated by a group of 40 food industry managers.
Concentration level (CL)	Brand concentration	Squared market share of top four brands (Hirschman-Herfindahl index).
Number of brands (NB)	Number of brands	Number of brands offered in product category of retailer X. Source: counts of number of brands in product category during store visits.
<i>Retail assortment-related</i>		
Assortment size (AS)	Relative number of brands	Relative number of brands offered in a product category compared with the average number of brands offered in the product group by all participating retailers. Source: counts of number of brands in product category during store visits.
Assortment structure (STR)	Proportion of high-equity brands	Proportion of high-equity brands among brands with a 2% or higher market share for each participating retailer.
<i>Store-related</i>		
Store type (ST)	Service or price oriented store	Dummy variable, equal to 1 if the retailer has high scores on perceived service elements as quality, friendliness of employees, assortment size, etc. Source: GfK (2004).
Number of alternative stores (NAS)	Number of other stores available to consumers	Number of supermarkets in the same zip code area.
Control variables		
Promotional buy (PB)	Brand is bought on promotional	Dummy variable, equal to 1 if the purchased brand was on promotion at the moment of purchase.
Gender (SEX)	Gender of respondent	Dummy variable, equal to 1 if respondent is female.
Age (AGE)	Age of respondent	Four-point scale (1 = 30 years or younger, 4 = 65 years or older).

CHAPTER 4

THE SHORT- AND LONG-TERM IMPACT OF AN ASSORTMENT REDUCTION ON CATEGORY SALES

Abstract

In a collaborative study with a major Dutch retailer, we assess the short- and long-term effects of a 25% item reduction on category sales. On an aggregate level, a major assortment reduction can lead to substantive short-term category sales losses with only a weak negative long-term category sales effect. Short-term category sales losses are caused mainly by fewer category purchases by former buyers of delisted items. Our results also indicate that the assortment reduction attracts new buyers due to decreased search complexity, which partially offsets the sales losses among former buyers of the delisted items. An additional study, in which assortment perceptions and actual search time are investigated before and after the assortment reduction, provides evidence that the delisting results in reduced search complexity.

4.1 Introduction

Since the early 1990s, increased competition from “category killers” such as Wal-Mart and Aldi have forced traditional grocery retailers to implement cost-saving programs (Basuroy, Mantrala, and Walters 2001; Dhar, Hoch, and Kumar 2001). One common way to save costs has been to reduce the number of offered items. Some assortment reduction projects use a “cutting the tail” strategy in which low-selling items in a category are eliminated (e.g., Boatwright and Nunes 2001; Drèze, Hoch, and Purk 1994; FMI 1993). These assortment reduction projects can be regarded as natural experiments to assess the impact of assortment cuts. The results of these experiments are, however, mixed.

Table 4.1: Overview of prior studies on assortment reductions

	Assortment Perceptions	Purchase Behavior/Category Sales
Laboratory experiment, hypothetical reductions	Broniarczyk, Hoyer, and McAlister (1998); Oppewal and Koelemeijer (2005); Van Herpen and Pieters (2002)	Broniarczyk, Hoyer, and McAlister (1998)
Natural experiment, real reductions	Broniarczyk, Hoyer, and McAlister (1998)	FMI (1993), Drèze, Hoch, and Purk (1994), Boatwright and Nunes (2001), De Clerck et al. (2001), Borle et al. (2005), Zhang and Krishna (2005)
	This study: Additional study that includes actual search time	This study: Main study with addition of short- and long-term impacts and entrance of new buyers

In Table 4.1, we provide a schematic overview of prior literature on assortment reductions, in which we classify existing studies according to two dimensions: (1) the type of experimental method (laboratory versus natural experiment) and (2) the dependent variables chosen (assortment perceptions versus purchase behavior/category sales). Laboratory experiments tend to focus on perceptions (e.g., Oppewal and Koelemeijer 2005), though some studies have

considered both assortment perceptions and stated purchase behavior (e.g., Broniarzyck, Hoyer, and McAllister 1998). Perceptions that have been studied include perceived assortment variety and assortment satisfaction or evaluation. In contrast, natural experiments focus only on category or store sales.

Neither these laboratory experiments nor the studies based on natural experiments distinguish between the short- and long-term effects of assortment reductions. However, this essential distinction can provide valuable insights into the effectiveness of marketing tactics (Dekimpe and Hanssens 1995; Dekimpe et al. 2005). Moreover, ignoring the short- and long-term effects of assortment reductions may lead to the wrong conclusions. For example, if the long-term effect is less than the short-term effect, the retailer may overstate the negative consequences of an assortment reduction, which would lead to an overly restrictive policy on assortment reductions and in turn to inefficient assortments. Therefore, it becomes essential to study both the short- and the long-term effects of assortment reductions.

In this study, we use a natural experiment to measure the effect of an assortment reduction in a single category (detergents) on category sales. We extend current assortment reduction studies that employ assortment sales as the dependent variable by distinguishing between the short- and long-term effects of assortment reductions. Furthermore, we add to this literature stream by analyzing the entrance of new buyers. Our research questions in this collaborative study can be summarized as follows:

- (1) What are the short- and long-term effects of a major assortment reduction on total category sales?
- (2) Do these short- and long-term effects on category sales differ between former buyers and former nonbuyers of delisted items?
- (3) Does the assortment reduction affect the sales percentage accounted for by new category buyers?

Our study is conducted in close cooperation with a major Dutch retailer. We use customer loyalty card data from over 25,000 households in two test stores and two control stores to assess the short- and long-term category sales effects of an assortment reduction. To provide insights into explanations of the sales effects, we execute an additional study in which we investigate

changes in assortment perceptions (i.e. assortment variety, search efficiency, and assortment satisfaction) and actual search time due to the assortment reduction.

The remainder of this chapter is structured as follows: In the following section, we discuss the collaborative research project that underlies this study in more detail. Subsequently, we discuss the theory, methodology, and results. We then briefly discuss the results of our additional study, followed by a discussion of our results and managerial implications, in which we also specifically focus on the implications for our collaborative research partner. We end with research limitations and resulting future research issues.

4.2 Collaborative assortment reduction project

A team—consisting of a retailer, a brand manufacturer, and academics—carried out this assortment reduction project. The retailer aimed to save costs in the supply chain and reduce complexity by lowering the number of items in various categories, particularly those defined as “routine categories” (Dhar, Hoch, and Kumar 2001). Primarily, the retailer’s objective was to lower its total number of store items by approximately 1,500, which would enable it to close a warehouse. The associated cost savings were estimated to be approximately €4.5 million per year. However, the retailer feared that such an assortment reduction might affect its category sales. Therefore, we conducted a pilot project in one category to investigate the impact of a major assortment reduction.

In this chapter, we focus on the results of this pilot project, which considers an assortment reduction in the detergent category. The retailer used to offer 150 detergent items in its assortment. Despite this large number of items, this category performed below its fair share compared with a price-aggressive competitor with only approximately 80 items in its detergent assortment. Hence, the retailer decided to remove 37 items of the total 150 items. The removed items constituted 25% of the total number of category items and 14% of the category sales. Thus, in general, low-selling items were removed. For each delisted item, the assortment manager verified that there was at least one reasonable alternative item within the remaining assortment. The 37 delisted items include brand delistings (all items of one brand are delisted) and item delistings (e.g., a delisting of a package format or variety within a brand). Overall, the assortment reduction resulted in the delisting of six complete brands, corresponding with 17 different items.

All the delisted brands can be considered low-equity brands. For the other 20 delisted items, consumers could still switch within the brand. The selection of items that were delisted in the test stores was based on item turnover statistics and a consumer decision tree analysis provided by the manufacturer. First, items that did not meet regular turnover demands were selected for reduction. Second, the consumer decision tree analysis showed in which detergent segments there was potential overlap between items. The retailer's category manager made the final decision which items should be delisted. In the case of clear "me-too" items, the category manager preferred to delist the item with the lowest gross margin.

Category space was held constant by giving the remaining items more shelf space and keeping the overall structure (e.g., location of items on the shelf) of the presented assortment constant. Furthermore, no new items were introduced during the test. Sales data before and after the assortment reduction were collected from two test stores and two control stores. The perception data were collected in the two test stores before and after the assortment reduction occurred. On the basis of the outcomes of this project, the retailer decided whether the assortment reduction would be rolled out nationwide and, if necessary, which adaptations it needed to make.

4.3 Theoretical background

4.3.1 Sales effects of assortment reductions

Several studies have considered the category sales effects of assortment reductions. Drèze, Hoch, and Purk (1994), for example, report positive sales effects, though their positive effects may be due to other changes to the assortment presentation in their study. Using six categories, FMI (1993) reports both negative and positive sales effects of assortment reductions, though the negative effects mainly occurred in categories with deep cuts. Boatwright and Nunes (2001, 2004) report, on average, a neutral sales effect of reductions for an online grocery store, though they find negative sales effects in categories with very deep assortment cuts. In a recent working paper, Zhang and Krishna (2005) also report sales decreases of assortment reductions in three categories in an online retail context. Moreover, practical experiences show the negative effects of assortment reductions. For example, in 2001, the leading Dutch grocery retailer Albert Heijn deleted almost 1,500 items across categories, which caused widespread consumer complaints (*Foodmagazine* 2002).

Negative sales effects may occur because, after the assortment reduction, a percentage of buyers will not be able to find their preferred item anymore (Broniarczyk, Hoyer, and McAlister 1998). These buyers may initially postpone their purchase but eventually may decide to switch items or switch stores (Campo, Gijsbrechts, and Nisol 2000, 2004). If the customer switches to another item, no category sales losses will occur. However, if he or she decides to switch stores, category sales decreases will result for the retailer.

However, assortment reductions may also have positive sales effects. Previously, the general belief has been that more assortment is always better (Oppewal and Koelemeijer 2005). Recently, however, research has suggested the opposite may be true (Broniarczyk and Hoyer 2005). Several studies in consumer research and psychology have shown the negative effects of overly large assortments and the positive effects of small assortments (e.g., Gourville and Soman 2005; Iyengar and Lepper 2000). Negative effects of assortment size may occur due to the excessive search complexity associated with overly large assortments (Botti and Iyengar 2004), which may cause retail customers not to buy products in a category with an overly large assortment, or defer their purchase (Huffman and Kahn 1998). Reducing assortment size would decrease search complexity, which might induce nonbuyers in the category to start buying products. As a result, positive sales effects might emerge, which may explain why Drèze, Hoch and Purk (1994) and Boatwright and Nunes (2001) find either positive sales effects or no sales effects for reductions. In the latter case, positive sales effects due to the entrance of new buyers might offset negative sales effects among former buyers.

In summary, ample empirical and theoretical evidence indicates the negative sales effect of an assortment reduction, especially among former buyers of delisted items. However, this negative sales effect might be (partially) offset by the attraction of new buyers, which may compensate for the initial negative effect in the long run. The latter sales effect has not been empirically investigated.

4.3.2 Short- versus long-term effects

Numerous marketing studies have considered the short- and long-term sales effects of marketing mix variables, such as advertising, promotions, pricing, and new product introductions (Bijmolt, van Heerde, and Pieters 2005; Dekimpe and Hanssens 1995; Nijs et al. 2001; Pauwels, Hanssens, and Siddarth 2002; Pauwels et al. 2004). However, the literature on assortment reductions contains no studies that distinguish between short- and long-term effects.

Clear evidence indicates that the short- and long-term effects of marketing mix instruments may differ. For example, Nijs and colleagues (2001) demonstrate a short-term effect of price promotion that dissipates in the long run. According to Hanssens, Parsons, and Schultz (2000), most effects of marketing actions dissipate over time. The question is whether these findings hold for assortment reductions as well. Note that an assortment reduction is fundamentally different from previously studied promotions because it is permanent, whereas promotions are temporary events. Long-run effects of an assortment reduction are therefore more likely.

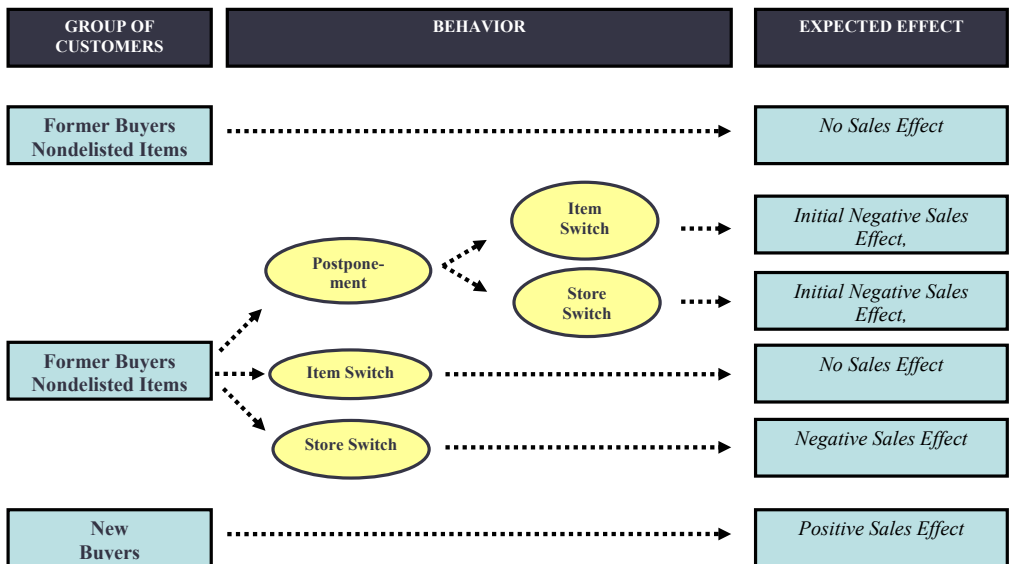
To understand the short- and long-term effects of assortment reductions further, we first focus on the reactions of former buyers of delisted items, because we expect that negative sales effects will occur mainly for them (Broniarczyk, Hoyer, and McAlister 1998). As we noted previously, negative sales effects among these former buyers are manifested when they switch to another store to buy the preferred item or brand or postpone their purchase. Because most consumers visit several stores to buy their grocery products, a store switch with regard to detergent purchases may lead to permanent sales effects. Postponement mainly induces a short-term effect; following the terminology of Van Heerde, Leeflang, and Wittink (2000), this effect may be labeled the post-assortment reduction dip. After a certain time period, the customer must buy the product, because the stock at home has been depleted. At that time, the customer who initially postponed the purchase will need to decide whether to switch stores to buy the preferred item or switch to another item. As a consequence, the early downward peak in sales might be followed by an upward peak in sales some weeks after the assortment reduction, due to item switching. Note that to investigate such a pattern, we must study not only the direct and long-run effects but also the effect of the reduction in the interim period. Thus, in principle, we expect a relatively large negative sales effect in the short run due to postponement and store switching and a smaller sales effect in the long run, because part of the group that initially postponed will switch to another item within the store. Overall, the total resulting sales effect among former buyers might remain negative and significant in the long run.

A complicating factor is the entrance of new buyers due to the assortment reduction, which may occur gradually over time. Hence, this entrance of new buyers will not compensate for negative sales effects directly after the reduction, though the possible negative sales effects in the long run among former buyers might be minimized. On a total category sales level, we

therefore might question the existence of a long-run negative sales effect of an assortment reduction.

To summarize our total discussion of these expected sales effects, we offer Figure 4.1, which clearly shows the expected sales effect among different groups of category buyers.

Figure 4.1: Expected sales effects of an assortment reduction among different groups of buyers



4.4 Research methodology

4.4.1 Data

We analyze customer loyalty card data to measure the effect of the assortment reduction on category sales. Data on household purchases is available for two stores in which the assortment reduction actually took place and two control stores in which the assortment remained unchanged. These control stores are essential to distinguish between the effects of the delisting and other exogenous changes in sales. The selected stores are geographically quite far apart, so it is unlikely that a household will visit more than one store in our sample.

The retailer supplied a database detailing the purchases of 26,941 households in the detergent category in the four stores. The data are based on purchases by individual households that participated in the customer loyalty card program of the participating retailer, which account for more than 80% of total store sales. The data cover a period of 52 weeks, 26 weeks before and 26 weeks after the assortment reduction was implemented.

4.4.2 Decomposition of sales effects

The preceding theoretical discussion reveals that sales effects might differ across groups of retail customers. To formally investigate this possibility, we decompose the sales effects for these different groups of buyers. Previous studies decomposed sales effects of marketing actions, such as promotions, on the basis of the behavioral source of this effect (i.e. category expansion, brand switching, stockpiling) (Van Heerde, Gupta, and Wittink 2003; Van Heerde, Leeﬂang, and Wittink 2004). In this study, we decompose sales effects on the basis of the type of customer, where the type is determined by that consumer’s behavior before the delisting (T_1). That is, we consider three customer groups in our database: (1) former category buyers of delisted items before the assortment reduction, (2) former category buyers of nondelisted items before the assortment reduction, and (3) new category buyers after the assortment reduction (noncategory buyers in the 26 weeks before the assortment reduction). The category sales after the assortment reduction at time T_1 can thus be formally decomposed as follows:

$$\text{Sales}_t = \text{Sales}_{t,1} + \text{Sales}_{t,2} + \text{Sales}_{t,3} \quad t > T_1. \quad (1)$$

In our analysis, we first consider the total sales effects. Subsequently, we focus on former category buyers only, thereby distinguishing between buyers of delisted items and nonbuyers of delisted items. Households that have not bought detergents before the delisting cannot be assigned to either subpopulation, so our final analysis focuses on the entrance of these new buyers. For clarity, we provide an overview of our separate analyses in Table 4.2, which also contains the different samples of customers for which we executed these analyses.

We expect that the percentage of preferred items delisted will affect the impact of the assortment reduction on household behavior. Although it would be interesting to investigate this hypothesis, we lack sufficient data to test it. We therefore focus on our binary distinction; that is, we consider households that have bought a delisted item and households that have not done so.

observed sales prior to the delisting. This final function is the key point of our analysis, because it indicates the change in sales unique to the test stores. Our model contains four equations, one for each store. For the error terms, we assume a joint normal distribution, namely, $(\varepsilon_{1t}, \varepsilon_{2t}, \varepsilon_{3t}, \varepsilon_{4t}) \sim N(0, \Sigma)$.

To complete the model specification, we specify $f(t|\gamma)$ and $g(t|\theta)$. There are several possibilities for doing so with varying degrees of sophistication. The most straightforward specification would assume a constant effect, that is, $f(t|\gamma) = \gamma$ and $g(t|\theta) = \theta$ for all t . However, the change in category sales after the delisting may not be the same for all time periods, and we have already highlighted the need to study intermediate points between the short- and the long-run effects. We could also include time dummies, but because we consider category sales on a weekly basis, we believe doing so would yield too many parameters. Instead, we chose a specification that falls in between assuming a constant effect and using time dummies.

In our model, we opt for a cubic spline approach. The resulting function is a smooth piecewise cubic function. To illustrate this technique, we first consider the simplest form of the cubic spline. We introduce two parameters that represent the function value at T_1 and T (referred to as knots); the function value for $T_1 < t < T$ is obtained by simple linear interpolation. In this case, the cubic spline reduces to a linear trend, that is, $g(t|\gamma) = \theta_1 + (\theta_2 - \theta_1)(t - T_1)/(T - T_1)$. In other words, we estimate the instantaneous (short-term) effect at the time of the delisting ($t = T_1$) by θ_1 and the effect at the end of the sample ($t = T$) by θ_2 . Between these two extremes, we interpolate the effect using a straight line. For example, halfway between T_1 and T , the function value equals $0.5(\theta_1 + \theta_2)$. In a regression context, it is easy to estimate θ_1 and θ_2 because they appear linearly in the function specification, though in many cases, the assumption of linearity may be too restrictive. However, we can add more parameters and increase the flexibility of the function by introducing more knot points. Furthermore, instead of linear interpolation, we use a smooth piecewise cubic function (for a general discussion of cubic splines, see Monahan 2001; Poirier 1976; for an application, see Koopman and Ooms 2003; for an application of linear splines in marketing, see Wedel and Leeflang 1998). For this technique, we must select additional knot points next to T_1 and T . We can obtain a model specification with time dummies if we place a knot at every time period. In our application, we use five knot points distributed evenly over the period after the delisting. The first knot is located at the start of the delisting, and the final knot is the end of our observation sample, so the function value at the end of the sample indicates the long-term effect of the assortment reduction, and the function $f(t|\gamma)$ is specified

analogously. The resulting complete model can be estimated using generalized least squares, because the cubic spline is linear in its parameters.

Decomposition analysis. To study the category sales of subpopulations within a store, we can easily extend Equations 2a and b by including additional equations (one for every subgroup) and more spline functions.

Within the group of detergent buyers before T_1 , we decompose the sales effects between former buyers and nonbuyers of the delisted items. On the basis of their observed purchase behavior before T_1 , we assign each household to one of two groups: (1) those that bought at least one item involved in the delisting or (2) those that had not bought such an item. There is no reason to believe there will be differences in the composition of each group across stores, because the assignment is based on behavior before the assortment reduction became effective. When we restrict the sample to households that bought at least one detergent item in the period prior to the delisting, we note that every household makes at least one purchase before T_1 , but we are not sure that they will make a purchase afterward. Our selection therefore introduces a selection or survival bias in the data, such that the sales generally will show a negative trend. However, this trend will occur for the test stores as well as the control stores and therefore not interfere with the estimate of the effect of the delisting, in support of our use of control stores.

For each group, we calculate the total sales per week, denoted by S_{ijt} , where $j = 1$ corresponds to former buyers of detergent items that were not delisted and $j = 2$ corresponds to the former buyers of a delisted item. The model we use is a straightforward extension of Equations 2a and b, in which we introduce an additional dummy variable for the former buyers and two additional spline functions, as follows:

Former non-buyers (j=1)

$$\log S_{i1t} = \alpha_i + \beta' x_{i1t} + I[t \geq T_1] \{f(t | \gamma)\} + \varepsilon_{i1t} \quad i \in \text{Control} \quad (3a)$$

$$\log S_{i1t} = \alpha_i + \beta' x_{i1t} + I[t \geq T_1] \{f(t | \gamma) + g(t | \theta)\} + \varepsilon_{i1t} \quad i \in \text{Test} \quad (3b)$$

Former buyers (j=2)

$$\log S_{i2t} = \alpha_i + \delta + \beta' x_{i2t} + I[t \geq T_1] \{f(t | \gamma) + h(t | \phi)\} + \varepsilon_{i2t} \quad i \in \text{Control} \quad (3c)$$

$$\log S_{i2t} = \alpha_i + \delta + \beta' x_{i2t} + I[t \geq T_1] \{f(t | \gamma) + h(t | \phi) + g(t | \theta) + k(t | \nu)\} + \varepsilon_{i2t} \quad i \in \text{Test} \quad (3d)$$

where i denotes the store ($I = 1, 2, 3, 4$), δ denotes an additional intercept for the former buyers of delisted items, and Control and Test denote the sets of control and test stores, respectively (Test stores = $\{1,3\}$). We now have eight equations instead of four (two groups times four stores). In Table 4.3, we provide an overview of the interpretation of the four spline function in Equation 3. The functions $f(t|\gamma)$ and $g(t|\theta)$ retain the same interpretation; the first function captures the general pattern of detergent sales after the delisting, and the second function gives the sales development specific to the test stores. Recall that we expect former buyers of delisted items to behave differently than former nonbuyers, irrespective of the assortment reduction, because we have selected them to demonstrate specific behavior. The function $h(t|\phi)$ measures this difference in behavior and gives the specific effect for former buyers of delisted items in general, that is, across test stores and control stores. The function $k(t|\nu)$ specifies in what way former buyers in the test stores are different from former buyers in general. Again, we are most interested in the estimates for $k(t|\nu)$. We model the entire time path of the (possible) changes in category sales to observe not only the size of the effect but also its timing and duration.

Table 4.3: Change of category sales after the delisting, split into control stores versus test stores and former buyers of delisted items versus former nonbuyers.

	Former Nonbuyers of Delisted Items	Former Buyers of Delisted Items
Control stores	$f(t)$	$f(t)+h(t)$
Test stores	$f(t)+g(t)$	$f(t)+h(t)+g(t)+k(t)$

Controlling for other marketing interventions. Unfortunately, no detailed price information is available in our database, though this concern turns out not to be a serious problem. As we stated previously, our database pertains to purchases in four different stores. In two stores, the delisting actually took place, whereas in the other two, all detergent items remained on the shelf. We selected the control stores to be rather similar to the test stores in terms of size (large supermarkets), intensity of competition (five or more competitive supermarkets within a range of four kilometers), and urbanization (located in urban areas). Furthermore, the stores employ the same basic marketing efforts, including the same (price) promotions that occur in all stores at the same time. Therefore, the delisted items were not promoted in the control stores, which means

changes in the price level do not influence any relative comparison across brands. We recognize that estimates for the development of category sales in the control stores will be affected by promotions, so to integrate for the presence of promotions, we construct a promotional indicator. Because we know that promotions occur in all stores at the same time, we base the promotional indicator on the total sales across all stores. To identify the weeks in which a promotion of some sort took place, we estimate a model with a cubic spline function for total sales across all stores. We assume that a promotion occurred for each observation with a large positive error. We then reestimate the same model, which now includes the promotion indicator, to identify those promotions that had a smaller impact.

4.5 Empirical results

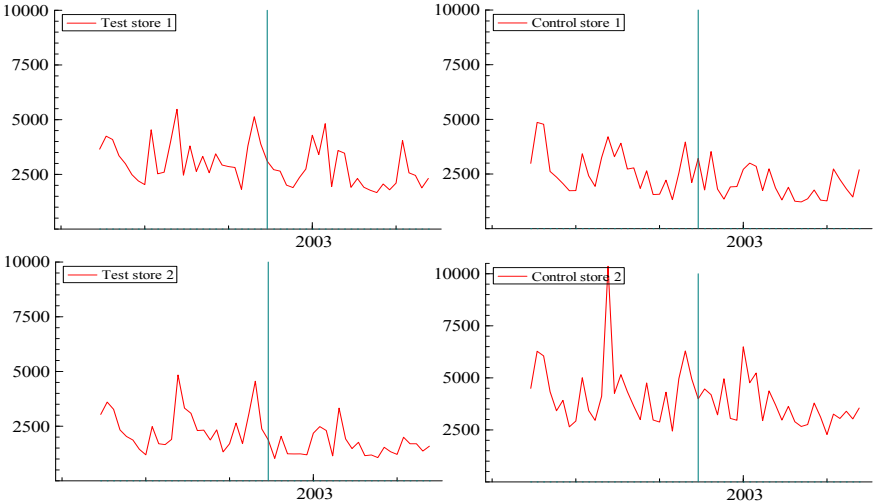
4.5.1 Analysis 1: Total category sales

We first focus on the weekly total category sales for each store, which can be directly obtained from the database by simple aggregation. In Figure 4.2, we show time series plots for the category sales in each store, which demonstrate a slight decrease in sales for all four stores. This overall decrease in detergent sales cannot be attributed to the delisting because, in the control stores, the number of available items remained constant. To assess the actual effect of the assortment reduction, we must compare the changes in the test stores to changes in the control stores.

In Table 4.4, we provide the parameter estimates for Equations 2a and b, with which we model the total category sales per store. As regressors, we include the promotional indicator to control for promotional effects, which will lead to a better fit in the models and thus a smaller residual variation. We also include a dummy variable to correct for an influential outlier that corresponds to a week of extremely low reported sales in one of the stores. The retailer informed us that this was due to an error in the data collection system and that the actual sales were higher but that the exact figures were unknown. Although the stores were selected in advance for their similarities in detergent shelf metrics, the estimated store intercepts show some differences in baseline sales across the four stores, which may be explained by the unique characteristics and environment of each store. The most interesting results appear in the final lines of Table 4.4, which display the estimated function value of $f(t|\gamma)$ and $g(t|\theta)$ at the chosen knot points, as well as the associated standard errors. The results clearly show that the effect changes over time and

that a model in which the effect of the delisting is captured by a single dummy variable is therefore not valid. In Figure 4.3, we depict the same values together with the interpolated values with a 95% confidence interval to indicate the uncertainty in these estimates. The function value of the spline at any point in time is a linear combination of the parameters. The confidence intervals therefore can be obtained easily from the covariance matrix of the parameter estimates.

Figure 4.2: Total weekly category sales per store

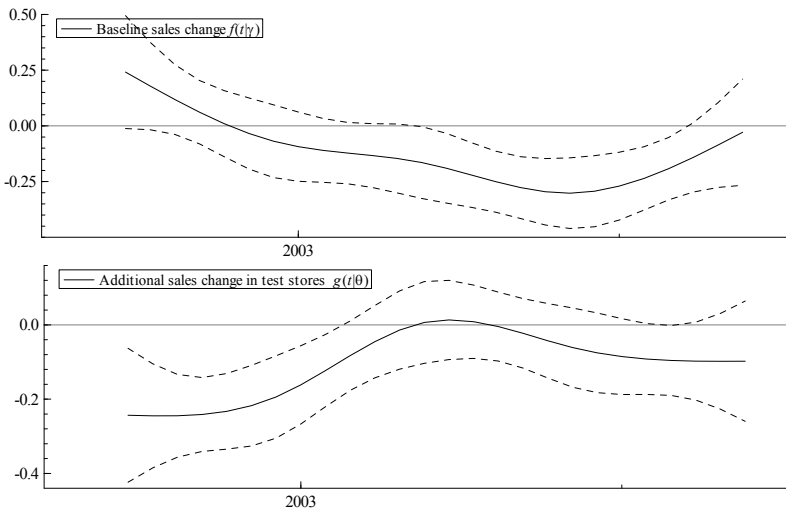


Notes: Vertical lines indicate start of the delisting in the test stores.

Table 4.4: Estimated parameters for log weekly category sales (Equations 2a,b)

	Estimate	Standard Error
<i>Store Dummies and Regressors</i>		
Test store 1	7.928	(0.036)
Control store 1	7.640	(0.042)
Test store 2	7.540	(0.039)
Control store 2	8.184	(0.039)
Promotion	0.501	(0.051)
Outlier dummy	-0.404	(0.155)
<i>Baseline Sales Change $f(t \gamma)$</i>		
2002:46	0.241	(0.082)
2002:52	-0.069	(0.081)
2003:06	-0.164	(0.081)
2003:12	-0.302	(0.079)
2003:19	-0.028	(0.119)
<i>Additional Change in Test Stores $g(t \theta)$</i>		
2002:46	-0.243	(0.055)
2002:52	-0.194	(0.055)
2003:06	0.007	(0.055)
2003:12	-0.061	(0.053)
2003:19	-0.098	(0.081)

Figure 4.3: Effect of delisting size on detergent category sales (95% confidence bounds)



The first graph in Figure 4.3 shows that the decrease in overall detergent sales, in the test stores as well as the control stores, occurs mainly during several weeks in early 2003. For this period, $f(t|\gamma)$ is significantly different from 0 and negative. The second graph portrays the effect that may be attributed to the delisting. As we expected, the drop in category sales reaches its maximum negative sales effect in the first few weeks after the delisting took place. In later periods, sales recover, and at the end of the sample, the decrease in sales is only significant at the 10% level. These results seem to indicate that the delisting mainly had a (substantive) short-term effect. In contrast, we only find weak evidence for a long-term effect. These results also show that a model with a single intervention dummy or a linear function would not have captured the changes in sales adequately because the effect we find is obviously nonlinear.

4.5.2 Analysis 2: Decomposition of former buyers versus former nonbuyers

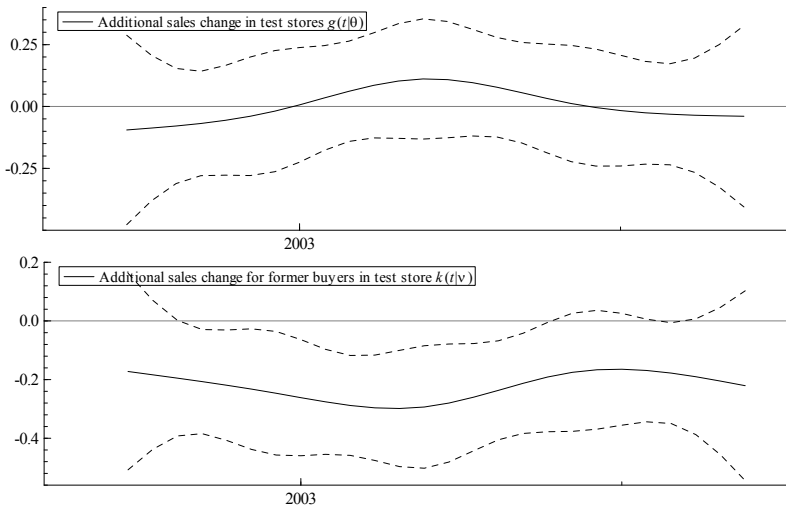
The parameter estimates for Equation 3 appear in Table 4.5. In this case, we consider only sales generated by households that made at least one detergent purchase prior to T_1 . The baseline sales in the control and test stores do not differ significantly after the delisting, as demonstrated by the estimates for $g(t|\theta)$. Former buyers of delisted items in the control stores also do not behave significantly differently from the other households in the control stores, as demonstrated by the estimates for the function $h(t|\phi)$. However, in the most interesting case, for consumers actually confronted with the removal of their preferred item or brand, we find a significant decrease in sales, which is reflected in the estimates for $k(t|\nu)$ and depicted in Figure 4.4. The two graphs in Figure 4.4 indicate the changes in sales in the test stores relative to the control stores. The top graph shows that for households in the test stores that have not bought a delisted item, there is no significant effect on sales ($g(t|\theta)$), whereas the bottom graph ($k(t|\nu)$) shows that for the group of former buyers of delisted items in these stores, there is a strong and significant decrease in sales a few weeks after the delisting.

Table 4.5: Estimated parameters for log weekly category sales split into former buyers of delisted items and former nonbuyers (Equation 3)

	Estimate	Standard Error
Store Dummies and Regressors		
Test store 1	7.466	(0.036)
Control store 1	7.151	(0.039)
Test store 2	6.982	(0.040)
Control store 2	7.811	(0.038)
Promotion	0.388	(0.032)
Dummy former buyers (δ)	-0.435	(0.023)
Outlier dummy	-0.654	(0.215)
Baseline Sales Change all Stores $f(t \gamma)$		
2002:46	-0.053	(0.143)
2002:52	-0.410	(0.093)
2003:06	-0.460	(0.092)
2003:12	-0.691	(0.089)
2003:19	-0.309	(0.137)
Additional Change in Test Stores $g(t \theta)$		
2002:46	-0.095	(0.191)
2002:52	-0.019	(0.122)
2003:06	0.111	(0.121)
2003:12	0.012	(0.117)
2003:19	-0.039	(0.183)
Additional Change: Former Buyers all Stores $h(t \phi)$		
2002:46	0.039	(0.129)
2002:52	0.082	(0.083)
2003:06	0.100	(0.082)
2003:12	0.113	(0.080)
2003:19	-0.057	(0.125)
Additional Change: Former Buyers in Test Stores $k(t \nu)$		
2002:46	-0.172	(0.168)
2002:52	-0.247	(0.105)
2003:06	-0.293	(0.104)
2003:12	-0.175	(0.101)
2003:19	-0.221	(0.162)

At the end of our sample, the effect of the delisting remains rather negative, though again only significant at a .10 level. Thus, we only find weak evidence for a long-term sales effect of the assortment reduction among former category buyers of delisted items.¹⁸

Figure 4.4: Effect of the size of delisting on detergent category sales, split into sales change due to delisting for former buyers and former nonbuyers (95% confidence bounds)



4.5.3 Analysis 3: Sales of new category buyers

In this analysis, we only consider new category buyers, those who purchased detergents only after the assortment reduction and not in the weeks before the assortment reduction. We note, however, that the term “new category buyer” is not totally justified, in that our observation period before the assortment reduction on which we base our grouping is only 26 weeks. Thus, our subsample of new buyers may also include some households that buy detergent very

¹⁸ Following Boatwright and Nunes (2001), we performed a further decomposition by investigating sales effect differences between former category buyers of delisted brands and former category buyers of delisted items. Our results do not show any significant differences between these two groups of former category buyers, in contrast with the findings of Boatwright and Nunes (2001), who report different effects.

infrequently in the sample stores and therefore did not make a purchase before the delisting in the studied time period.

Because the detergent sales of new buyers equal 0 before the delisting, we cannot apply the same methodology as we did previously. Instead, we consider the detergent sales generated by the new buyers relative to the total detergent sales. For all stores, we expect this percentage to increase over time, because some households that bought detergent before the delisting may stop purchasing detergents at the store but more and more new households will enter. The stores in which the assortment reduction actually took place may attract more new buyers relative to the control stores, which will lead to a larger percentage of purchases made by new buyers.

Figure 4.5: Sales effect due to entrance of new buyers

To quantify the difference, we again perform a regression analysis using spline functions (see

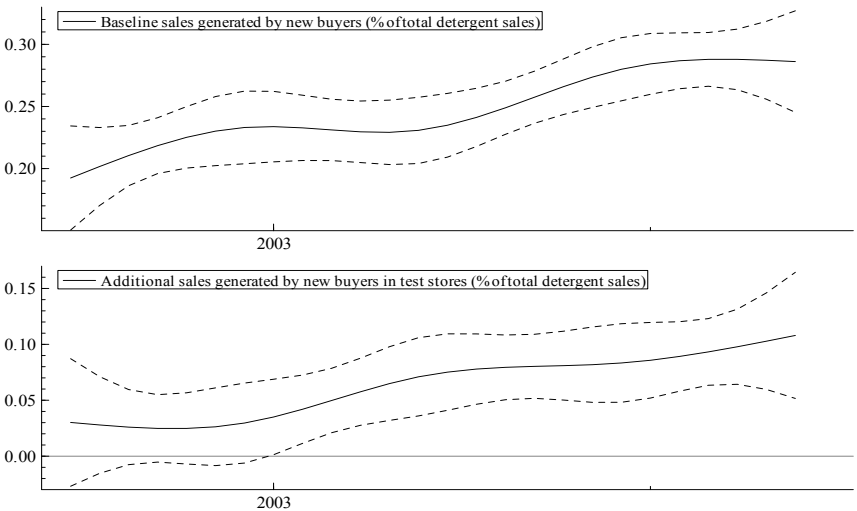


Figure 4.5). We initiate our analysis two weeks after the start of the delisting. In Figure 4.5, the top graph shows the estimated baseline effect, which demonstrates that, regardless of the delisting, the percentage of sales attributed to new buyers tends to increase over time. The bottom graph shows the additional effect in the test stores, namely, the additional share of sales of the new buyers in the test store. Immediately following the delisting, there is no significant difference between the control and the test stores. However, at the conclusion of our sample, the

new buyers generate 28% of the sales in the control store and 38% in the test stores, which is a significant difference ($p < 0.01$). A possible explanation for this finding is that the reduced assortment enhanced search efficiency and thereby attracted more new buyers than did the nonreduced assortment. In an additional study executed within the test stores, we verify if the reduced assortment created more search efficiency.

4.6 Additional study

To further understand the sales effects we uncovered, we conducted an additional study in which we investigated whether perceived assortment variety, perceived search efficiency, assortment satisfaction, and actual search time change due to assortment reductions. Search efficiency in particular might be increased, whereas search time might be decreased. These changes may in turn explain why we find a significant increase in category sales from new buyers in the test stores.

4.6.1. Research methodology

Data collection. In the two test stores, we collected data one week before and twelve weeks after the assortment reduction.¹⁹ Customers were observed by experienced interviewers from a research agency as they made their detergent purchases. Directly after the customer bought the detergent, the interviewer contacted this buyer to determine whether he or she would participate in this study. In total, 333 respondents participated in the in-store survey (before purchase: 179, after purchase: 154; total response percentage 65%).

To assess whether the participants in the before and after surveys had the same background, we collected demographic variables such as gender, age, and household size, as well as buying behavior variables such as primary buyer, store loyalty, store visit frequency, and detergent buying frequency. Using pairwise t-tests and chi-square tests, we did not find any significant differences between the two samples for these variables.

¹⁹ Given an interpurchase time of approximately four weeks for detergents, we conduct the after-purchase survey twelve weeks after the delisting took place to give consumers enough time to get used to the new shelf.

Measurement. Following Hoch, Bradlow, and Wansink (1999) and Van Herpen and Pieters (2002), we measure perceived assortment variety with a four-item, five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The items include “This assortment offers a wide variety of detergent,” “I definitely miss some detergent items on this shelf,” “This shelf offers the full range of detergent items,” and “There are no important detergent items missing in this shelf.” The coefficient alpha of the scale was 0.79. In addition, we define perceived search efficiency as the ease customers perceive in finding the preferred item (Broniarczyk, Hoyer, and McAlister 1998). We again used a four-item, five-point Likert scale, with a coefficient alpha of 0.67. The items we used include “In this product assortment it is easy to find the detergent item I prefer,” “This is an orderly organized assortment,” “Some items are difficult to find in this assortment,” and “This shelf offers the detergent items in a logical order.”

We conducted a confirmatory factor analysis to assess whether both factors are unidimensional and find sufficient scores for the fit parameters. The fit parameters are as follows: root mean squared error of approximation (RMSEA) = 0.06, goodness-of-fit index (GFI) = 0.96, and confirmatory fit index (CFI) = .95 (Bagozzi and Yi 1988; Baumgartner and Homburg 1996). The factor loadings were all significant and greater than 0.5. Therefore, we formed composites of the underlying items of perceived variety and perceived search efficiency. Finally, we used a single item to measure assortment satisfaction, in which we asked consumers to evaluate the detergent shelf with a grade of 1 to 10.

We also collected the actual time (in seconds) consumers spent searching for an item in front of the detergent shelf. The interviewer started the time measurement when the detergent buyer entered the aisle and started looking at the detergent shelf, then stopped the clock when the customer picked the first detergent item off the shelf.

4.6.2 Results

The perceived assortment variety does not change after the assortment reduction occurred (3.9 before versus 3.9 after; $p > 0.10$), which indicates that even the large cut of 25% of the items did not lead to lower choice perceptions among detergent buyers. However, in line with Broniarczyk, Hoyer, and McAlister (1998), detergent buyers in the after-reduction group evaluated the detergent shelf significantly better in terms of perceived search efficiency than did the before-reduction group (4.1. versus 3.7; $p < 0.01$). This finding is confirmed by the results for actual

search time in front of the detergent shelf, which demonstrate that the after group used significantly less time to buy the first detergent item than did the before group (14 seconds versus 20 seconds; $p < 0.05$). Therefore, a “cleaned-up” shelf appears to lower search costs among buyers. Because the perceived assortment variety did not change and perceived shelf efficiency increased, we also might expect an increase in the assortment evaluation, which our results confirm. Assortment evaluation significantly increased from 7.4 before the reduction to 7.6 after the assortment reduction ($p < 0.05$)²⁰.

Thus, the main results of this additional study are that the assortment reduction increases search efficiency (both perceived and actual search time) without lowering assortment variety among detergent buyers. As a consequence, assortment satisfaction increases. This result fits our finding that more new buyers are attracted to the stores where the assortment reduction was implemented.

We do need to offer one cautionary note however. Because this experiment only pertains to buyers of detergents, we do not include any evaluations of nonbuyers either before or after the assortment reduction, which could have two potential effects. First, former buyers of delisted items who switched stores or postponed their purchase because their detergent product was not available do not appear in the after-reduction sample. Therefore, evaluations measured after the reduction could be overstated, because the dissatisfaction of these former buyers is not included. Second, because of the reduced complexity of the assortment, new detergent buyers could be attracted to the category, even though these buyers were not included in the before-reduction survey. Because this group should have a lower assortment satisfaction, evaluations in the before-reduction survey could be inflated as well.

²⁰ We also conducted a regression analysis in which assortment satisfaction was the dependent variable and perceived assortment variety, perceived search efficiency, and actual search time were explanatory variables. This analysis reveals significant effects of assortment variety ($p < 0.10$), perceived search efficiency ($p < 0.01$), and actual search time ($p < 0.05$).

4.7 Discussion

In this collaborative research project, we investigate the short- and long-term sales effects of an assortment reduction. Although this study only pertains to a single category, it clearly contributes to the literature on assortment reductions, in that we (1) investigate the short- and long-term sales effects of this reduction, (2) decompose the short- and long-term sales effects between former buyers and nonbuyers of the delisted items, and (3) consider the entrance of new buyers as an explanation for the finding of neutral or positive sales effects in prior studies. We additionally execute a more qualitative study, which shows that increases in search efficiency might explain increased sales from new buyers.

The main conclusions of our study are as follows: First, on an aggregate level, we find a short-term negative sales effect and no strong significant long-term negative sales effect. Thus, reducing an assortment by delisting mainly low-selling items and brands has a negative sales effect in the short-run. Second, extending the findings of Boatwright and Nunes (2001), we find that strong short-term negative sales effects occur mainly among former buyers of delisted items, probably due to their initial postponement and store switching. In the long term, the negative sales effect dissipates very slowly. Within the timeframe of our database, the results indicate some evidence (though not strong) of a long-term negative sales effect among former buyers of delisted items. Third, our study reveals that the assortment reduction may induce non-category buyers to start buying within the category. We assume that the improved search efficiency, as shown in the additional study and reflected in increases in perceived search efficiency and decreased search time, induces non-category buyers to start purchasing detergents in this store.

This finding provides an important empirical confirmation, in a natural experiment, of the findings by several experimental studies in consumer research and psychology that an overly large assortment may keep retail customers from buying products because of the high search complexity (Botti and Iyengar 2004; Gourville and Soman 2005). Of course, we provide only a single study in one category; more research clearly is required to generalize our finding. Finally, another methodological contribution of this research is that, to our knowledge, it represents the first application of a cubic spline methodology in marketing. It is a very useful model for researchers attempting to study the effect of a single event, such as an assortment reduction, on sales over time, for example.

4.8 Management implications

On the basis of this study, our partner retailer decided to roll out the assortment reduction on a nationwide level. The results of our study provided it with confidence that the assortment reduction would not significantly harm its detergent category sales in the long run. On the basis of consumer complaints in the pilot study, the retailer made some small adaptations in the number of items to delist, so that in total, 32 of the 37 tested items were delisted in the final rollout. The results from this rollout indicate that detergent sales, measured as a percentage of total store sales, were not significantly affected by the assortment reduction in the long term.

The collaborative research project also provides some information for the retailer regarding the execution of assortment reduction projects. One key lesson was that a sole focus on short-term sales effects leads to incorrect conclusions. Instead, the time span for analyzing these effects must be long enough to include long-run effects. Another key lesson was that assortment satisfaction apparently could be improved through assortment reduction and that new category buyers can be attracted. Therefore, the retailer continued its assortment reduction projects in other categories in which customers might find overly large assortments.

4.9. Research limitations and further research

Our study has some limitations that may provide interesting opportunities for further research. First, our study is based on a single product category. Obviously, assortment reduction effects may differ across categories, as has been shown by Borle et al. (2005). Therefore, additional studies should include more categories to determine if our findings can be generalized to other product categories. For example, researchers could study hedonic categories, non-stockpileable product categories, impulse categories, and so forth (Narasimhan, Neslin, and Sen 1996). Second, because each store has its own unique characteristics and each store environment is different, further research should be based on data collected from more than four stores. Third, this study considers the effects of an assortment reduction at the aggregate category level, whereas other studies have investigated the consequences of an assortment reduction at the disaggregated customer level. For example, Borle et al. (2005) consider how assortment reductions affect shopping frequency and purchase quantity and thereby provide deeper insight

into consequences at the customer level. More research thus is required both at the aggregate and the disaggregated level; the number of studies on the effects of assortment reductions remains limited. Fourth, in practice, assortment reductions mainly imply delistings of low-selling items and brands, but delistings also may include high-equity brands, such as when the retailer has a conflict with a national brand manufacturer. Additional research should study the short- and long-run effects of these delistings. A related possibility is that the manufacturer decides to delist a particular item, and this type of delisting will likely have a different effect. Fifth, consumers may be confronted with multiple delistings in one or more categories. Future research efforts could focus on how multiple delistings affect category and store sales.

CHAPTER 5: GENERAL DISCUSSION

5.1 Summary and conclusions

The main objective of this thesis has been to provide a better understanding of consumers' reactions to assortment unavailability, whether temporary (out-of-stock) or permanent (assortment reduction). Assortment unavailability continues to be an important topic for retailers and retailing. Both forms of assortment unavailability rate high on the list of the main annoyances suffered by grocery shoppers, and assortment unavailability can harm both category and store sales. Therefore, retailers must understand the impact of assortment unavailability on their customers' satisfaction and behavior.

Whereas out-of-stock situations only seem to have negative effects, reducing an assortment may have positive effects as well, for several reasons. First, a wide assortment may prove cost inefficient for a retailer. In many cases, an activity-based cost analysis will show that 10–20% of the slowest moving items within a category lead to lower profits for the retailer. Furthermore, floor space is scarce and should be used, from a business perspective, to stock those products that enhance sales and profit growth. Therefore, cutting assortments in traditional grocery groups may be a wise step if it opens up floor space for new or very profitable product groups, such as convenience food or non-food products.

Second, an assortment with too many items may cause lower assortment satisfaction and/or fewer category sales. With the rapid growth of floor space and the economic boom of the 1990s, the number of items offered in many traditional grocery categories was extended to a level that might seem “overdone” if the goal is simply to cover the regular demand levels of consumers. For example, offerings of 150–200 items in a utilitarian category such as detergent appears normal for service supermarkets. In many cases, these assortments offer a range of obvious me-too products. And there is likely no need to point out that these types of assortments may cause lower search efficiency for consumers, which in turn can lead to lower assortment satisfaction.

Because assortment reduction can have both positive and negative effects, it is important for retailers to gain insight into the variables that influence the effects of an assortment reduction—including the type of brand that is delisted, the type of product group in which the

reduction occurs, and the type of store that reduces its assortment. Furthermore, retailers may wonder if the short-term effects of assortment reductions differ from their long-term effects. With these three essays, as presented in Chapters 2, 3 and 4, we hope to solve, at least partly, the puzzle of assortment reduction effects.

5.1.1 Summary of Chapter 2

In the first study, we focus on measuring consumers' reactions to out-of-stock events for the consumers' preferred brand, which can be considered a temporary assortment unavailability. Furthermore, we test a conceptual model that may explain some of the consumer reactions observed. We selected eight product groups for which we measured consumer reactions to stock-outs: four utilitarian product groups (detergent, milk, margarine, and eggs) and four hedonic product groups (beer, salty snacks, cigarettes, and cola). We used a survey to interview 749 grocery shoppers at 13 different supermarkets. The main consumer reactions observed were (1) brand switching (34%), (2) postponement of purchase (27%), (3) store switching (19%), and (4) item switching (e.g., switch within the brand) (18%). Whereas brand and item switching may have neutral effects on category sales, store switching and postponement decrease the retailer's category sales and might even harm sales in related categories, especially in the case of store switching

We also researched the antecedents of stock-out reactions. The brand equity of the brand that is out of stock, the hedonic level of the product category, the ability to stockpile the product, the number of brands within the category, and the impulse level of purchases of the product are important antecedents for several reactions. For example, consumers tend to switch stores more easily if a high-equity brand is out of stock than if a low-equity brand is. Note that, in many cases, high-equity brands are also large market share brands, which might as much as double the impact of a stock-out of a high-equity brand. Furthermore, consumers are more brand loyal (e.g., lower brand switching intentions) in product categories that have a high hedonic level, such as cola, beer, or cigarettes. In these categories, retailers should be cautious about delisting even low-equity brands.

5.1.2 Summary of Chapter 3

For the second essay, we conducted two separate studies to research the impact of a brand delisting. A single brand delisting within a category sometimes occurs, for example, when a

retailer boycotts a brand. Due to the growth of hard discounters like Aldi and Lidl and the lower margins caused by price erosion (e.g., price war in the Netherlands since 2003, rollback of prices in the United Kingdom since 2000), service retailers have put pressure on manufacturers to improve their buying conditions. In some cases, this pressure can even lead to a temporary or permanent brand boycott. For example, in the Netherlands, market leader Albert Heijn delisted the wine category market leader J.P. Chenet because the manufacturer did not want to improve its buying conditions. Similarly, buying organization Superunie boycotted the brands Fanta and Sprite for a while to put pressure on their parent company Coca-Cola. A brand delisting also might occur if a retailer decides to delist a weak performing brand or changes the role of the product group. In the latter case, a retailer might decide to reduce the product category assortment by one or more brands.

In the first study, we used a laboratory experiment to measure the effects of the brand equity of the delisted brand, the assortment size, and the assortment structure on assortment evaluations and store-switching intentions. We apply the study to the beer category and find, in line with Chapter 2, that the equity level of the brand that is delisted is strongly correlated with assortment evaluations (negative) and store-switching intentions (positive). Furthermore, we conclude that the assortment size and the percentage of high-equity brands within the product category assortment lower the negative effects of a brand delisting.

In the second study, we conducted a survey to measure store-switching and complaining intentions. We also developed and tested a conceptual model with a variety of antecedents to find factors related to those intentions. We selected ten product groups to measure consumer reactions: five utilitarian product groups (detergent, margarine, rice, toilet paper, and frozen vegetables) and five hedonic product groups (beer, cigarettes, cola, sauces, and coffee). Using a survey to interview 1,213 grocery shoppers in 16 stores, which we classified as either service (four Albert Heijn and four Super de Boer stores) or price (four Edah and four C1000 stores) oriented, we find that brand equity and product type (e.g., hedonic level) are both important variables. The equity level of the delisted brand and the hedonic level of the category are both positively related to store-switching and complaining intentions. Furthermore, the concentration level (positive), the number of brands (positive), and the percentage of high-equity brands (negative) are all related to store-switching and complaining intentions.

Both retailers and manufacturers can use these results to assess their risks in situations in which a boycott is a possible outcome of negotiations between the retailer and a manufacturer.

Manufacturers in hedonic product groups with a brand that possesses a high equity level (e.g., Coca-Cola, Douwe Egberts coffee) can be more confident in their negotiations than can manufacturers with low-equity brands in utilitarian categories (e.g., Remia margarine, Witte Reus detergent). Retailers should be selective in which cases they will or will not use the threat of a brand boycott in the negotiation process. Choosing the wrong brand to boycott could severely damage category sales and store loyalty.

5.1.3 Summary of Chapter 4

Similar to that in Chapter 3, the essay in Chapter 4 focuses on the impact of a permanent assortment reduction. However, whereas we researched the impact of a single brand delisting previously, with this essay, we research the effect of a multi-item reduction within a product category assortment. In close cooperation with a major Dutch retailer, we researched the short- and long-term effects of a cut of 37 out of a total of 150 detergent items (25%). This assortment cut was tested in two stores, and two control stores were used to estimate its category sales effects. The retailer provided us with 52 weeks (26 weeks before the reduction and 26 weeks after) of customer loyalty card data for over 25,000 households across the two test and two control stores.

The main results indicate that the assortment cut caused a loss of category sales, mainly among the group of former buyers of the delisted items. Furthermore, we find that short-term sales losses are significantly higher than long-term sales losses. This effect can be explained partially by the higher percentage of new category buyers in the test stores; that is, we found a higher influx of new buyers in the detergent category in the test stores than in the control stores. A possible explanation for this effect is that the reduced assortment provides greater benefits for certain groups of customers than does the nonreduced assortment. Indeed, an additional before-and-after survey of detergent buyers in the two test stores indicated that the reduced assortment received a higher overall evaluation and scored better in terms of search efficiency than did the old detergent assortment with all 150 items.

An important limitation of this study is that we have data in only one category. However, if these results were to be replicated in controlled and/or natural experiments that included more product categories, they would have very important implications for retailers' decision making about assortment reductions. First, the study shows that an initial negative impact on category sales might diminish over time. Second, it shows that a reduced, "cleaned-up" assortment may be

more attractive than a full assortment for groups of customers that formerly had neglected to buy in several categories.

5.2 Relationships among studies

The three essays presented in this thesis are closely related, in that they all pertain to the impact of assortment reductions on consumer reactions. This link gives us the opportunity to elaborate on the question of whether consumer reactions to a temporary assortment unavailability signal consumer reactions to a permanent assortment unavailability (see also Campo, Gijsbrechts, and Nisol 2004). If this were the case, retailers should carefully study consumer reactions to out-of-stock events (a natural phenomenon for supermarkets) and use those insights in situations in which they must decide to cut assortments permanently. On the basis of the results presented in these chapters, we cautiously conclude that the two types of reactions are related.

We find that consumers tend to react in the same manner when confronted with a (hypothetical) stock-out, brand delisting, or multiproduct reduction. In the majority of cases, assortment unavailability, whether temporary or permanent, will lead to category sales losses. These losses will be caused mainly by former buyers of the absent brands. We have confidence in this notion because both Chapter 2 (temporary assortment unavailability) and Chapter 3 (permanent assortment unavailability) show that consumers' intentions to switch stores are related to the same kinds of antecedents. In both situations, brand equity, the hedonic level, the number of brands, and the percentage of low-equity brands are all positively related to the intention of consumers to switch stores.

5.3 Managerial implications

Based on the studies presented in this thesis, we consider the next managerial implications on assortment unavailability as most important:

1. An extended assortment is an important variable for grocery shoppers when they are making decisions about which supermarket to visit. Therefore, retailers need to prioritize the reduction of out-of-stocks and be careful when reducing assortments.

2. When retailers set priorities for reducing stock-outs, they should pay extra attention to preventing stock-outs of market leader brands. Furthermore, retailers should focus on preventing out-of-stocks for impulse products (e.g., salty snacks) and hedonic product categories (e.g., beer, cigarettes, ice cream).

3. In general consumers will be more loyal to a specific store than to a specific brand in case of a brand reduction. Therefore, retailers have a strong position in comparison with suppliers when they negotiate better buying conditions. However, boycotting a high-equity brand by a retailer might not be a smart move when a supplier does not lower its buying price. In many cases, a brand boycott will lead to lower category sales, and it may also lead to the loss of (part of) the consumers' shopping basket as consumers may decide to switch stores.

4. Reducing assortment by eliminating low-selling items with clear me-too alternatives is in general a good business decision because it leads to a lower complexity and saves supply chain costs. Furthermore, research shows that eliminating redundant items increases the perceived assortment efficiency and decreases search time. In addition to that, "cleaned up" assortments may attract new buyers to the category.

5. Because reducing assortments may cause a loss of category sales, retailers should test major assortment reductions (e.g., 10% or more of the category items) in advance of the decision to roll out the assortment reduction nationally. Our research shows that long-term effects differ from short-term effects, so these pilot studies should be carried out in a time period that is long enough to measure both short-term and long-term effects. As a rule of thumb, we suggest pilot studies on assortment reduction span four to six times the average interpurchase time of the product group of interest.

5.4 Limitations and suggestions for further research

Our studies have some important limitations that may provide interesting opportunities for further research. First, the essays in Chapters 2 and 3 use survey data to study the impact of a hypothetical assortment unavailability. Using retail scanner or household panel data could enhance the validity of their results.

Second, though Chapter 4 uses household panel data, the number of product groups (i.e., one) is not appropriate for generalizing the findings to other product groups. Therefore, replica studies should include more categories to determine if our findings can be generalized.

Furthermore, Chapter 4 is based on results obtained from only four stores. Because every store has its own unique characteristics and each store environment is different, further research should be based on data collected from more stores and, preferably, multiple retail chains.

Third, in the highly competitive retailing environment, retailers must constantly renew their concepts to remain successful or become successful again. For example, Edah changed its concept to Edah Lekker & Laag by lowering the average price of its assortment by 8% while delisting 2,000 national-brand items and introducing 1,000 store-brand items. Another example is the Albert Heijn Operation Pitstop in 2005, during which the retailer reduced its assortment by almost 1,500 items. In these situations, assortment reductions occur in multiple product groups at the same time. Such scenarios enable researchers to study (1) cross-category effects and (2) the effect of multiple (experienced) delistings of preferred items on category sales and store loyalty.

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NEDERLANDSE SAMENVATTING (Summary in Dutch)

Iedere klant maakt het wel eens mee in de supermarkt: misgrijpen. In sommige gevallen is een product tijdelijk niet beschikbaar, bijvoorbeeld doordat de supermarkt de vraag naar een bepaald artikel onderschat heeft. Hierdoor ontstaan out-of-stock situaties. Deze zijn vaak duidelijk herkenbaar voor de consument doordat het schap leeg is. Out-of-stock staat hoog op de ergernissenlijst van supermarktklanten. Dat is niet vreemd, want metingen van onderzoeksbureau AC Nielsen wijzen uit dat de meeste supermarkten in Nederland te kampen hebben met out-of-stock percentages van 5-7%. Het is de vraag welke gevolgen dit heeft. Consumenten die worden geconfronteerd met een out-of-stock kunnen een alternatief artikel kopen, naar een andere supermarkt gaan of de aankoop uitstellen. Ondanks dat out-of-stock tot omzetverlies en ontevreden klanten kan leiden lijkt ‘misgrijpen’ echter geen onoverkomelijk probleem. Meestal is het ontbrekende product één of twee dagen later weer aanwezig.

Anders ligt dit bij assortimentssaneringen. De retailer heeft in dat geval besloten om een product uit het assortiment te verwijderen. Bijvoorbeeld doordat het product niet goed loopt, de retailer zijn assortiment wil inkrimpen of omdat er onenigheid is met een leverancier. Dit kan ertoe leiden dat consumenten van de ene op de andere dag hun gewenste artikel niet meer kunnen kopen. Het gevolg is dat consumenten die dit artikel toch willen blijven kopen dit voortaan moeten doen in een andere supermarkt.

In dit proefschrift zijn drie studies opgenomen, waarin onderzocht is hoe consumenten reageren op assortimentsafwezigheid. Deze afwezigheid kan tijdelijk zijn, zoals bij een out-of-stock, of voor langere tijd, zoals bij een assortimentssanering. In het inleidende hoofdstuk wordt ingegaan op de oorzaken van out-of-stock en op de redenen waarom retailers assortimenten saneren. Out-of-stock's ontstaan vooral door fouten in het winkelbestelproces. Automatische bestelsystemen, zoals het Orion-systeem dat Albert Heijn in 2005 heeft uitgerold, moeten in staat zijn om het out-of-stock percentage met enkele procenten terug te dringen. Anders ligt dit bij assortimentssaneringen. Doordat sommige artikelen niet succesvol schonen retailers hun assortiment zo nu en dan op. Daarnaast hebben retailers vaak te maken met een situatie waarin zij een min of meer gelijkwaardig artikel bij een andere leverancier kunnen inkopen voor een lagere inkoopprijs. In die gevallen kan het verstandig zijn om van leverancier te wisselen. Kortom, waar out-of-stock in theorie (deels) valt te vermijden, daar zullen assortimentssaneringen altijd blijven bestaan. In het inleidende hoofdstuk wordt ook ingegaan op

de rol van het assortiment bij het supermarktkeuzeproces van consumenten. Met name voor primaire klanten van service supermarkten blijkt een ruim assortiment een belangrijk criterium te zijn voor de keuze van een supermarkt. Service supermarkten moeten daarom extra kritisch kijken naar het aspect productbeschikbaarheid.

In hoofdstuk 2 wordt een studie gepresenteerd, waarin is onderzocht hoe consumenten reageren op een out-of-stock situatie. Diverse reacties worden onderscheiden: merk switch, item switch, store switch, categorie switch, uitstel en afstel van de aankoop. In acht productgroepen wordt de proef op de som genomen en worden consumenten geconfronteerd met een fictieve out-of-stock situatie van het zojuist gekochte artikel. Het blijkt dat 'merk switch' de meest voorkomende reactie is, gevolgd door 'item switch' (ander artikel van hetzelfde merk), 'uitstel' van de aankoop en 'winkel switch'. Tevens wordt onderzocht welke variabelen samenhangen met deze consumentenreacties. Het blijken vooral merk- en productgerelateerde variabelen samen te hangen met het out-of-stock gedrag van de consument. Zo speelt brand equity, een maatstaf die de kracht van het merk weergeeft, een belangrijke rol bij de wijze waarop consumenten reageren. Bij een sterk merk wisselen consumenten eerder van supermarkt dan bij een minder sterk merk, terwijl consumenten bij producten met een hoog utilistisch gehalte (bijvoorbeeld toiletpapier, melk of wasmiddel) eerder wisselen van merk, dan van supermarkt.

In hoofdstuk 3 wordt via een gecontroleerd experiment onder bierkopers en een enquête onder boodschappers onderzocht hoe consumenten reageren op een assortimentssanering. Beide studies richten zich specifiek op de situatie dat een retailer besluit om één merk te verwijderen uit een productgroep (merksanering). In het experiment testen we de effecten van een merksanering in de biercategorie op de assortimentsbeoordeling en de intentie van bierkopers om bij een sanering van supermarkt te wisselen. Het blijkt dat kopers van high-equity merken (A-merken) meer teleurgesteld zijn over de afwezigheid van hun merk, dan kopers van low-equity merken (veelal B- en C-merken en huismerken). Verder stellen we vast dat de omvang van het assortiment en de samenstelling (percentage high-equity merken) van invloed zijn op de assortimentsperceptie. Het blijkt dat een groter assortiment en een hoger aandeel high-equity merken de negatieve effecten van een merksanering op de assortimentsperceptie kunnen temperen. Met de data uit de enquête onder boodschappers wordt een conceptueel model getest met daarin variabelen die consumentenreacties bij merksaneringen kunnen verklaren. Analooq aan de resultaten van de out-of-stock studie (hoofdstuk 2) blijkt dat de intentie van consumenten om van supermarkt te wisselen bij een merksanering vooral samenhangt met merk- en

productgerelateerde factoren. Factoren die te maken hebben met de winkel, zoals het type formule en de aanwezigheid van andere supermarkten in de buurt, spelen een ondergeschikte rol bij de reactie van de consument. Met name de sterkte van het merk (brand equity) en het hedonische gehalte van het product blijken cruciale factoren te zijn voor de wijze waarop consumenten reageren op een merksanering. Praktisch gezien concluderen we dat het saneren van merken in hoog-hedonische productgroepen, zoals Coca Cola, Heineken, Douwe Egberts en Marlboro, retailers veel schade kan berokkenen. Het is daarom voor retailers essentieel om in de situatie van een mogelijke merkboycot de variabelen te kennen die leiden tot meer of minder klaaggedrag van consumenten en meer of minder omzetverlies.

In hoofdstuk 4 worden, net als in hoofdstuk 3, de effecten van een assortimentssanering onderzocht. In deze studie staat de situatie centraal dat een retailer besluit om het assortiment van een productgroep in te krimpen met 25% van het aantal artikelen. Via een natuurlijk experiment bij een grote landelijke supermarktketen testen we het effect van een sanering van 37 van de 150 aanwezige artikelen in het wasmiddelenassortiment. Deze test vindt plaats bij twee test-supermarkten en twee controle supermarkten. Aan de hand van analyses van klantenkaartdata van de vier participerende supermarkten (> 25.000 huishoudens) stellen we vast dat de sanering tot een significant verlies aan categorieomzet leidt. Dit omzetverlies wordt voornamelijk veroorzaakt door de groep voormalige kopers van gesaneerde artikelen. Op korte termijn blijkt het omzetverlies echter significant groter te zijn dan op lange termijn. Het lange termijn omzetverlies wordt deels getemperd doordat in de testwinkels relatief veel nieuwe kopers instromen. Dit zijn kopers die al wel klant waren van de betreffende supermarkt, maar hun aankopen in de betreffende categorie (wasmiddelen) voorheen bij een andere supermarkt of drogist deden. Een aanvullende studie onder wasmiddelenkopers in de testsupermarkten brengt een mogelijke verklaring voor deze bevinding naar voren. Het blijkt namelijk dat het schap met het gesaneerde assortiment, in vergelijking met het oude schap, beter wordt gewaardeerd in termen van assortimentstevredenheid en overzichtelijkheid, zonder dat de gepercipieerde assortimentsvariëteit lager wordt gewaardeerd. Kortom, de 'wasmiddelencase' toont aan dat het saneren van artikelen daadwerkelijk kan leiden tot een situatie waarin groepen kopers het schap beter beoordelen dan voorheen.

Wat kunnen we, gegeven de resultaten van de drie gepresenteerde studies, leren over het effect van assortimentsafwezigheid? Ten eerste, dat retailers zoveel mogelijk moeten proberen te voorkomen dat consumenten misgrijpen. Dit betekent dat moet worden nagedacht over systemen

die het out-of-stock niveau binnen aanvaardbare grenzen houden. Met de toenemende beschikbaarheid van real-time verkoopdata op artikelniveau moet het mogelijk zijn om systemen te ontwikkelen die signaleren wanneer een artikel out-of-stock dreigt te raken. Daarnaast moeten retailers niet te licht omspringen met het verwijderen van artikelen uit het assortiment. Onze studies wijzen uit dat vrijwel iedere sanering – dus ook de sanering van minder bekende merken – leidt tot een bepaald percentage ontevreden klanten. Dit impliceert tevens dat retailers extra kritisch moeten zijn bij het opnemen van nieuwe producten. Veel productintroductions blijken namelijk niet succesvol, met als gevolg dat veel artikelen al na een half jaar weer van het schap worden gehaald. Ondanks het gebrek aan succes is er altijd wel een percentage kopers dat teleurgesteld zal zijn over de saneringsbeslissing van de retailer.

Ten tweede hebben we uit de diverse studies geleerd dat het in sommige gevallen mogelijk is om de assortimentstevredenheid van consumenten te verhogen door de keuze enigszins te beperken. Veel retailers zijn doorgeschoten in hun aanbod en moeten zich afvragen in hoeverre het bijvoorbeeld verstandig is om vijf merken aardbeienjam of acht soorten ham aan te bieden. Toekomstig onderzoek zou zich kunnen richten op het signaleren van productgroepen waarin een retailer een te omvangrijk assortiment aanbiedt. Vanuit een bedrijfseconomisch perspectief kan het beter zijn om in die gevallen het assortiment te beperken.

Ten derde kunnen we een aantal conclusies trekken over factoren die de reactie van consumenten bij de afwezigheid van assortiment beïnvloeden. Op basis van ons onderzoek adviseren we retailers extra terughoudend te zijn bij de sanering van (1) hele merken in plaats van één of enkele items van een merk; (2) merken met een hoge brand equity; (3) artikelen in hedonische productgroepen en (4) merken in productgroepen die al relatief weinig sterke merken bevatten. Daarnaast wijzen wij erop dat klanten van service supermarkten, zoals Albert Heijn en Super de Boer, eerder geneigd zijn om te klagen bij een assortimentssanering dan klanten supermarkten die zich voornamelijk onderscheiden door lage prijzen. Tenslotte laten de resultaten van het wasmiddelenexperiment (hoofdstuk 4) zien dat de korte termijn negatieve effecten van een sanering groter zijn dan de lange termijn effecten. Dit effect moet echter ook in andere productgroepen worden vastgesteld voordat we deze bevinding kunnen generaliseren.

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Understanding Consumer Reactions to Assortment Unavailability

Any regular grocery shopper will be familiar with the annoying situation in which his or her preferred product is not available at the moment (s)he wants to buy it. Assortment unavailability can be temporary (e.g., out-of-stock) or permanent in nature (e.g., assortment reduction). Shopper research shows that the unavailability of products is one of the most significant annoyances for grocery shoppers. This dissertation presents three empirical studies that research consumer reactions to out-of-stock and assortment reduction. Both out-of-stock and assortment reduction lead to consumer complaining behavior, category sales losses and store switching behavior. It is found that consumer reactions to assortment unavailability are mainly related to brand- and product-related antecedents of the item that is not available. Furthermore, the long-term impact of an assortment reduction on category sales differs from the short-term impact. In summary, this dissertation concludes that retailers should be very careful reducing assortments and boycotting brands.

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