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## **Brand Reputation and Product Recall**

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BRAND REPUTATION AND PRODUCT RECALL

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## DEDICATION

I dedicate this dissertation to my parents, Jutta and Jürgen, for their unconditional support and encouragement throughout my career as a student.

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This endeavor of successfully completing a Ph.D. program would not have been possible and certainly less enjoyable without the support and companionship of many individuals. First of all, I would like to thank my advisor Satish Jayachandran who, after working with me for over five years, deserves the title for best dissertation chair/mentor ever. Thank you for your guidance, encouragement, and patience! I am also grateful to Sonia Monga, Subhash Sharma, and Jayanth Jayaram for their valuable input in my dissertation. I could not have asked for a better dissertation committee. I would also like to express my gratitude to Kartik Kalaignanam for sharing his marketing strategy wisdom and being a tremendous help when I was trying to figure out the specifics of the research process.

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## ABSTRACT

Every year, firms make numerous announcements to recall products that are deemed unsafe or defective. These recalls pose a significant threat to a firm's brand reputation. The strong, negative reactions of consumers and the media to the recalls initiated by Toyota in 2010 show how fragile brands are in the wake of a recall. Firms spend a great amount of resources on building strong brands and it is unclear how such brands influence the firm's decision to announce a recall and the consumer's decision to return the recalled product. The objective of this dissertation is to shed some light on these subjects through two essays. The first essay focuses on the role of brands on the firm's recall timing decision whereas the second essay focuses on the role of brands on the consumer's product return decision. The findings from both studies have important implications for managers and policy makers regarding the management of product recalls.

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## CHAPTER 1

### INTRODUCTION

Whether it is a toy containing lead paint, a car with malfunctioning brakes, or meat contaminated with E.coli, defective products pose a hazard to consumers' health and property. Recalls of defective products mitigate these dangers and reduce the economic burden of injuries and deaths associated with their consumption. Recent high profile recalls, such as those of Mattel toys (2007), Peanut Corporation of America's peanut butter (2008), and Toyota cars (2010), demonstrate how frequently recalls occur (Table 1.1 shows the number of recalls for different product categories in the past decade). Even though there is some variation of the number of recalls across years, the overall trend points to an increase in the frequency of recalls. Given the increasing complexity of organizations, stakeholder awareness of firm actions, and stricter regulation, it is likely that most firms will face product recalls in their lifetime (Berman 1999).

In this dissertation, I present two essays that examine salient aspects of product recall that have not received much attention: recall delay and recall effectiveness from the perspective of the brand being recalled.

**Table 1.1 Number of Recalls between 2001-2010<sup>1</sup>**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Consumer products	342	387	280	354	397	471	472	563	465	427
Vehicles	451	434	526	600	562	490	587	684	492	648
Medical devices <sup>a</sup>	NA	NA	878	1451	1331	1331	1217	2217	2220	2692
FDA (Overall) <sup>b</sup>	4563	5025	4627	4670	5338	4266	5585	5778	8065	9361

<sup>a</sup> only Class I & II recalls, <sup>b</sup> Number of recalled products

## 1.1 MOTIVATION FOR DISSERTATION ESSAYS

Prior studies on product recalls have largely focused on the consequences of product recall announcements on consumer attitudes and behavior (e.g., Siomkos and Kurzbard 1994; Dawar and Pillutla 2000; Klein and Dawar 2004; Cleeren, Dekimpe, and Helsen 2008; Dawar and Lei 2009), associated product and financial market penalties (e.g., Jarrell and Peltzman 1985; Davidson and Worrell 1992; Chen, Ganesan, and Liu 2009; Van Heerde, Dekimpe, and Helsen 2007; Cleeren, van Heerde, and Dekimpe 2013), and organizational learning (Haunschild and Rhee 2004; Thirumalai and Sinha 2011; Kalaignanam, Kushwaha, and Eilert 2013). Even though many of these studies investigate how a firm's recall behavior influences the degree of reputational and financial penalties, little is known about the drivers of a firm's recall strategy. Especially, with a few notable exceptions (Chen et al. 2009; Teratanavat, Salin, and Hooker 2005; Hora, Bapuji, and Roth 2011), the timing of product recalls and the firm's response to reports of product safety issues have not received much attention. Prior research in consumer and investor behavior shows that recall delay can determine reputational and

<sup>1</sup> Sources: [www.odi-nhtsa.gov](http://www.odi-nhtsa.gov), [www.fda.gov](http://www.fda.gov), FDA Enforcement Story/Enforcement Statistics FY2001-FY2010, CPSC Annual Performance Reports FY2001-2003, CPSC Performance and Accountability Reports FY2004-2010.

financial losses (e.g., Siomkos and Kurzbard 1994; Dawar and Pillutla 2000; Chen et al. 2009). Therefore, it is important to understand how firms time recalls given the influence of the recall strategy on losses associated with a recall. I investigate the timing of product recall in the first essay.

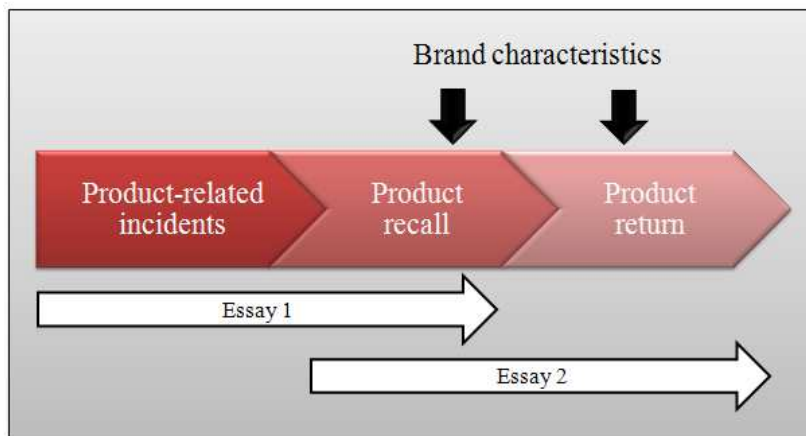
As with recall delay, very few empirical studies address the effectiveness of recalls in terms of recall completion - the degree to which products under recall are brought in for repair or replacement. Recent studies using data from the automotive industry show that recalls can reduce harm to consumers (Bae and Benitez-Silva 2010, 2011; Kalaighnam et al. 2013). However, for this to happen, it is important that the response rate to the recall be high. The factors that influence recall response rates have received some attention over the years (Hoffer, Pruitt, and Reilly 1994; Rupp and Taylor 2002; Murphy and Rubin 1988). Ineffective and long drawn out recalls mean that firms have to invest resources to manage recalls and be under the supervision of governmental agencies responsible for monitoring product recalls for a longer time. Ineffective recalls also leave the firm open to liability issues.

In short, even though numerous studies have focused on product recalls, areas that have received little attention are related to the management of unsafe products, namely the timing of a product recall and the implementation of an effective recall. Next, I provide more details on the specific focus of the dissertation.

## 1.2 FOCUS OF DISSERTATION

In this dissertation, I focus on the impact that brands have on recall delay and effectiveness (Figure 1.1). Recall delay is the time taken to announce a recall once a

product problem is suspected and an investigation is opened. Recall effectiveness refers to the extent to which consumers respond to the recall by getting the products repaired or replaced. It has been well established that brands are assets and increase the chance of long-term survival of the firm by accelerating and enhancing cash flows, reducing their variability and vulnerability, and enhance the residual value of the firm (Srivastava, Shervani, and Fahey 1998). There are two aspects of brands that are particularly interesting in the context of product recalls and the recall management process.



**Figure 1.1 Overview of Essays**

First, because brands are valuable assets (for an overview of studies refer to Srinivasan and Hanssens 2009), managers have a vested interest in protecting the equity of brands. Therefore, in the case of product recalls, managers should be interested in minimizing the degree of damage to the brand. Since the likelihood of reputational damage from a recall depends on recall strategy (Table 1.2), a brand's reputation should influence the speed with which firm's announce a recall after a safety investigation is

ordered by regulatory agencies. Therefore, the research question that the first dissertation essay addresses is:

1. How do brands influence the firm's responsiveness to product safety investigations?

Second, brands can influence how consumers respond to recall information. Recall effectiveness depends on whether consumers heed the recall announcement and get the recalled product repaired or replaced. Consumer response to a recall, however, may be influenced by the brand's reputation. The reputation of a brand creates consumer expectations about its performance, and depending on conditions, could lead to consumers downplaying the negative information or giving it more attention (Table 1.2). Therefore, brand reputation could shape consumer response to recalls. Consequently, the research question for the second essay is:

2. How do brands influence the likelihood that consumers respond to a product recall and return the recalled product?

### 1.3 BACKGROUND: PRODUCT RECALLS

A product recall is "any attempt to remedy or correct products that are defective or hazardous or that do not comply with the agencies' safety standards" (Tobin 1982, p. 278). Recalls can result in product harm crises - low probability events that affect a specific firm (Toyota's sudden acceleration issue) or a product category (Lead paint in toys, contaminated peanut butter) and receive wide publicity (Dawar and Pillutla 2000). However, not all recalls turn into a crisis situation. Given the frequency of recalls, particularly in the medical device and automotive industry (Thirumalai and Sinha 2011), not all recalls receive the same attention from stakeholders. Table 1.3 lists examples of recalls within the past five years that have received much media attention.

**Table 1.2 Studies on Brands (Reputation) and Product Recalls**

<b>Authors</b>	<b>Key variables</b>	<b>Findings</b>
Rhee (2009)	Organizational learning	Firms have the greatest motivation to learn from recalls when the quality reputation of the recalled brand is either high or low.
Rhee and Haunschild (2006)	Market performance	The market share of a brand drops more after a recall when the brand has a high quality reputation.
Cleeren, Dekimpe, and Helsen (2008)	Purchase behavior	Brand loyalty increases the likelihood of a trial after a product recall. This effect erodes over time.
Dawar and Pillutla (2000)	Brand evaluations	Brands with strong expectations are less likely to be affected by a recall than other brands. Depending on the response strategy implemented, the firm can reduce the likelihood of reputational losses.
Klein and Dawar (2004)	Brand evaluations and purchase intentions	Firm's perceptions of corporate social responsibility efforts reduce the likelihood that the manufacturer is blamed for the crisis which, in turn, reduces the likelihood that the recalled brand is adversely affected.
Chen, Ganesan, and Liu (2009)	Choice of recall strategy	A high reputation of the firm reduces the likelihood that the firm chooses a proactive recall strategy. A proactive recall is a recall occurring before any product incidents are reported in the marketplace.
Siomkos and Kurzbard (1994)	Brand evaluations and purchase intentions	Consumers perceive the product defect to be less dangerous when the recall involves a firm that they are familiar with. They also show higher purchase intentions after a recall for brands of a high reputation firm.
Dawar and Lei (2009)	Perceived crisis seriousness and brand evaluations	The authors find no differences in the extent to which familiar and unfamiliar consumers perceive a product-harm crisis to be serious. Both consumers also lower their brand evaluations.
Cleeren, van Heerde, and Dekimpe (2013)	Market performance	High loyalty brands experience a greater downturn in performance than other brands.
Zhao, Zhao, and Helsen (2011)	Market performance	Simulation suggests that recalls influence high quality brands by reducing quality evaluations and increasing product quality uncertainty.
Lei, Dawar, and Gürhan-Canli (2012)	Brand evaluations	Consumers blame a high equity brand less for a crisis when others in the same industry experience similar crises. When there is no information about crisis similarity, consumers react less negative to a recall for such a brand when low base-rate information of crises is available.
Kalaiganam, Kushwaha, and Eilert (2013)	Organizational learning	Brands influence the extent to which organizations learn after a recall. Specifically, organizations learn less from recalls of high quality brands.



**Table 1.3 List of Recent Well-Publicized Product Recalls**

<b>Firm/Product</b>	<b>Year</b>	<b>Problem</b>
Toyota / Cars	2010	Toyota initiates three major recalls in late 2009 and early 2010 related to unintended acceleration and braking. The recalls involved approximately 8.5 million cars.
Mattel / Toys	2007	Mattel recalls approximately 19 million toys that were manufactured in China. Concerns revolve around lead paint for some products, small magnets which could pose a choking hazard for others.
Johnson & Johnson / Drugs	2010	J&J recalls over 225 million bottles of over-the-counter drugs including well-known brands such as Tylenol, Benadryl, and Motrin. The firm temporarily shuts down a factory operated by McNeil which is associated with the quality problems in these products.
Maytag / Dishwashers	2010	Maytag recalls over 1.7 million dishwashers due to the potential of electrical failure that can pose a fire hazard. The firm received 12 reports of fires including one extensive kitchen fire.
Fisher-Price / Toys & high chairs	2010	Fisher-Price recalls over 11 million tricycles, toys, and high chairs after reports of injuries.
McDonald's / Promotional glasses	2010	McDonald's recalls 12 million Shrek promotional glasses as the paint contains cadmium.
Multiple / Eggs	2010	Wright Country Eggs and Hillandale Farm Eggs recall approximately 550 million eggs due to salmonella.
Sony / Batteries	2006/2008	Sony recalls approximately (over 9 million in 2006 batteries in both 2006 and 2008. Consumers reported that batteries can overheat and cause burns. The recall affected firms using Sony batteries in their products, such as Dell, Apple, Panasonic, Toshiba, Acer, and IBM.
Peanut Corporation of America / Peanuts	2009	Peanut Corporation of America recalls all peanuts and peanut-containing products due to salmonella. Over 350 companies consequently have to recall their products. PCA files for Chapter 7 bankruptcy as a result of the recall.
Multiple / Roman shades & roll-up blinds	2009	The CPSC recalls over 50 million roman shades and roll-up blinds due to a strangulation hazard. The agency has received multiple reports of infant deaths and injuries. Numerous retailers are involved in this recall.
Multiple / Drop side cribs	2007	Since 2007, over 11 million drop-side cribs have been recalled due to suffocation and strangulation hazards. The CPSC received reports of at least 32 infant deaths associated with this type of cribs. In 2011, new industry standards were implemented making it illegal to sell and re-sell drop-side cribs.

Products are recalled because they pose a threat to consumers and their property. The overall economic impact of defective products has been estimated to be \$700 billion a year (CPSC 2005). Based on data from the CPSC's *National Electronic Injury Surveillance System* (NEISS), a statistically representative sample of hospitals, it has been estimated that over 184,000 consumers were treated in emergency rooms regarding injuries associated with toys and over 2.7 million were treated for injuries associated with home furnishings and fixtures between October 2008 and September 2009<sup>2</sup>. Hence, consumers are injured by products every day and recalls occur when either the government or the manufacturer decide that the product failures and associated injuries are substantial enough to warrant remediation.

Reasons why products cause such damage are flaws in design or manufacturing process, use of inferior materials, product tampering, contamination, unforeseen misuse and failure to comply with safety standards (Berman 1999). Also, products are recalled when new information regarding a product's safety becomes available. Table 1.4 provides some examples of each of these factors and firms recalling products for that reason.

Recalls can be initiated by the firm or a government agency. In the United States, these agencies include the Consumer Products Safety Commission (CPSC) for consumer products, the National Highway Traffic Safety Administration (NHTSA) for automotive products, and the Food and Drug Administration (FDA) for drugs, cosmetics, and medical devices. In recent years, most recalls are conducted voluntarily which means that firms initiate a recall before one of the agencies has to step in and mandate a removal and

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<sup>2</sup> <http://www.cpsc.gov/PageFiles/122060/2010rpt.pdf>

repair of a defective product. Regardless of the source of initiation, recalls are conducted under the supervision of one of these agencies.

**Table 1.4 Examples of Product Flaws Leading to Recalls**

<b>Firm / Product</b>	<b>Hazard</b>	<b>Description</b>
Nautilus / Home gym	Design flaw	Recall of about 78,000 home gyms whose seat rail can fall and injure consumers when not manually latched.
Multiple / Cribs	Design flaw	The design and construction of drop-side cribs poses the risk of entrapment and suffocation. As result, numerous recalls were issued and the CPSC issued new regulation on crib safety, making the sale or resale of these cribs illegal.
DEWALT / Framing nailers	Manufacturing flaw	Recall of about 9,000 framing nailers that have been incorrectly assembled during production.
Simpson Dura-Vent / Fireplace damper	Manufacturing flaw	Recall of about 500 fireplace dampers that were assembled backwards and pose a risk of carbon monoxide poisoning to the consumer.
Unilever / Food	Contamination	Recall of Slim-Fast® Ready-to-Drink products to possible contamination with <i>Bacillus cereus</i> .
Kellogg / Food	Contamination	Recall of Eggo Waffles manufactured at an Atlanta plant due to the possibility of contamination with <i>Listeria monocytogenes</i> .
Kompan Inc / BigToys Inc	Inferior materials	Recall of about 700 swing sets due to fall hazard as the support system can crack and break.
Dynacraft / Bicycles	Inferior materials	Recall of 32,000 bicycles due to frame failure.
IKEA / Mattresses	Failure to comply with safety standard	Recall of about 1,900 mattresses that violated Federal Mattress Flammability Standards.
Bauer / Hockey sticks	Failure to comply with safety standard	Recall of about 67,000 hockey sticks due to violations of the Federal Lead Paint Standard.
Volkswagen / Car	Mislabeled	Recall of 256 hybrid vehicles with labels incorrectly stating tire pressure.
Tri-Union Seafoods / Food	Mislabeled	Recall due to mislabeling of chopped clams, which can contain undeclared shrimp.

### Other Concepts Related to Product Recalls

There are several other concepts, such as product returns, service recovery, or negative publicity that are related but in important ways different from product recalls. Tables 1.5 and 1.6 summarize key similarities and differences between product recalls and related literature streams. The characteristics in which product recalls differ from these concepts are:

- *Timing of the warning*: During consumption vs. before consumption (Product warning)
- *Timing of the product return*: During consumption vs. before consumption (Product returns) vs. after consumption (Product recovery)
- *Type of recovery efforts*: Mostly preventive vs. reactive (Product/service recovery)
- *Scope of recovery efforts*: All products that could fail vs. only products that fail (Product/service recovery)
- *Amount of negative publicity*: Varies depending on recall vs. high (Negative product publicity/product crises)

### Conclusion

The issue of recall management is of high importance to both managers and policy makers as evidenced by recent examples of recalls that have received much attention (and scrutiny) for not being implemented effectively. This dissertation provides some novel insights into not only how recalls are managed but also the role that market-based assets play in determining the responsiveness of both firms and consumers in this context. The first novel insight is that brands influence the speed with which firms initiate recalls despite (or even because of) the risk that a recall can pose to the high reputation of the

brand being recalled. By speeding up their decision to initiate a recall of a brand with a high quality reputation, firms may not only be able to prevent product-related accidents in the marketplace but also limit the loss in brand equity by demonstrating the responsiveness of the brand to safety problems. The second key insight of this dissertation is that implementing an effective recall may be a challenge for high reputation brands. Consumers may perceive a recall for such a brand less threatening, lowering their responsiveness to the recall. The structure of this dissertation is as follows: In the following chapter (2) I introduce my first essay on brand reputation and recall delay. Chapter 3 deals with the second dissertation essay on brand reputation and consumer responsiveness to a recall.

**Table 1.5 Comparison of Product Recalls with Other Related Concepts**

Concept	Illustrative articles	Comparison with product recalls	
		Similarities	Differences
Service recovery	Smith, Bolton, and Wagner (1999) Kelley and Davis (1994) Maxham and Netemeyer (2002)	Service recovery refers to any action “that an organization takes in response to a service failure” (Gronroos 1988). Examples of service failure are, for instance, overbooked flights, poor service at restaurants, or delayed trains. The efforts implemented to mitigate the service failure are similar to the ones investigated in a product recall context (apology, explanation, refund etc.). Attribution theory has been a popular framework in the product/service failure and product recall literature to explain when consumers blame the manufacturer for the failure (Folkes 1984; Folkes and Kotsos 1986).	Even though many of the actions part of service recovery efforts are also applicable in a product recall context, there are some notable differences between these two concepts. Since services are intangible and the experience is highly individualized, each recovery effort is unique to the situation in which the failure occurs. Also, services cannot be recalled as there are consumed while being produced. Moreover, recovery efforts can only occur after a consumer has experienced a service failure whereas a product recall seeks to eliminate the probability of product failure before it occurs to the majority of consumers. Recalls are usually a consequence of product failures but product failures in many cases do not lead to product recalls.
Product recovery	Thierry et al. (1995) Jayaraman, Patterson, and Rolland (2003) Fleischmann et al. (2000)	Product recovery is concerned with moving a product from the hands of the consumer back to the manufacturer (reverse supply chain). The reverse logistic systems that are key to product recovery play an important role in product recalls where the objective is to remove the recalled product from the marketplace.	The scope of product recovery is broader than just the retrieval of recalled products. According to Thierry et al. (1995), the objective of product recovery management is to “recover as much of the economic (and ecological) value as reasonable as possible, thereby reducing the ultimate quantities of waste” (p. 114). Product recovery therefore includes the repair, refurbishment, remanufacturing, and recycling of products. The focus is on the logistics behind moving the product up the supply chain as efficiently as possible and not as much on the effective retrieval of the product.
Product returns	Petersen and Kumar (2009) Hess, Chu and Gerstner (1996) Bechwati and Siegal (2005)	The literature on product returns usually investigates when consumers return a product within the scope of the firm’s return policy. Product returns are related to product recalls because they involve a post-purchase interaction between the consumer and the firm in which the consumer returns the product to the point of purchase or manufacturer.	The type of product returns that this literature is concerned with usually stems from the problem that in certain contexts consumers are unable to see or try out the actual product (e.g., catalogs, online shopping). Therefore, the product returns under investigation occur when consumers change their mind about a purchase (Bechwati and Siegal 2005), whereas the product return behavior that is the focus of the recall literature occurs during product consumption after the consumer has made up his or her mind about keeping the product.

**Table 1.6 Comparison of Product Recalls with Other Related Concepts (continued)**

Concept	Illustrative articles	Comparison with product recalls	
		Similarities	Differences
Product warnings	Argo and Main (2004)	The two main objectives of warning labels are the prevention of unsafe behaviors and promotion of appropriate behaviors during the consumption of the product (Wolgalter, Kalsher, and Racicot 1993, cf. Argo and Main 2004). A recall announcement is a warning for consumers regarding a product hazard and it outlines actions the consumer can take to eliminate the hazard.	Product warnings studied in prior literature are often known to consumers at the time of purchase and occur in the form of labels or manuals. Therefore, consumers are aware of the risks of using the product when making the purchase and can anticipate potential hazards (Griffin, Babin, and Attaway 1996) whereas the information about the defect that leads to the recall is distributed to consumers after the recall. Since it is difficult in certain industries to locate all consumers of a particular product, not everyone may receive the warning.
Negative product publicity	Monga and John (2008) Ahluwalia, Burnkrant, and Rao (2000) Ahluwalia (2002) Einwiller et al. (2006) Dean (2004) Pullig, Netemeyer, and Biswas (2006) Dutta and Pullig (2011)	Firms face the risk that product recalls garner media attention and substantial negative publicity. Negative publicity can have a long-term damaging impact on the brand's performance and even affect other products in the firm's portfolio (Sullivan 1990). Product recalls that are well publicized induce a crisis situation for the firm ("product-harm crisis") in which the outward management of the recall becomes extremely important to handle stakeholder concerns. Factors that are likely to increase the likelihood of negative publicity are the size of the recall, the severity of the product hazard, and the recalled brand (Rupp 2001; Rhee and Haunschild 2006).	The scope of the literature on negative product publicity is broader in scope than the product recall literature, because it includes events such as manufacturing problems, unethical sourcing, human rights violations, and environmental violations.

## CHAPTER 2

### RECALL NOW OR RECALL LATER: INVESTIGATING THE INFLUENCE OF BRAND QUALITY REPUTATION ON TIME TO RECALL

Defective products cause financial loss to consumers and could even affect their physical safety. Faulty products also expose manufacturers to liability claims, fines, and loss of reputation. Consequently, defective products are often recalled to limit damage to consumers and firms. Product recalls can be voluntary or mandated by regulatory agencies, and are not rare events. For instance, in the United States, the Consumer Products Safety Commission reported in their 2010 annual report that a total of 427 consumer products, ranging from dishwashers to toys and cribs, were recalled that year. In the automobile industry the National Highway Transportation and Safety Agency (NHTSA), since its inception in 1966, has overseen recalls involving hundreds of millions of vehicles in the United States (Rupp and Taylor 2002).

When a product is suspected of defects, a government agency can start an investigation. Firms respond to the investigation by voluntarily initiating a recall or waiting to see the outcome. Recalls are costly; announcing and implementing a recall is associated with both direct costs (communication, logistics, repair or refund), and indirect costs (losses in both reputation and market performance, such as sales and market share). For instance, Toyota's sales in the U.S. dropped by 5.2% from 2009 to 2010 after the firm issued several major recalls in the first half of the year (Toyota Annual Report 2010). Recalls can often have a devastating impact on a firm's performance, sometimes



even threatening its survival.<sup>3</sup> Furthermore, many product defect investigations end with the product being cleared of suspected defects. Thus, a firm has reasons to avoid a proactive recall and instead wait for the investigation to conclude. However, delaying a product recall may lead to higher direct and indirect costs through fines, liability costs, and most importantly, diminished reputation (e.g., Maynard 2010). Hence, there are benefits to having an early recall as well as delaying the recall once a product is suspected of being defective and an investigation is launched.

Correspondingly, there is considerable variation in the time taken by firms to announce recalls once a product is under investigation (Wieder 2011). The timing of a product recall has implications for the firm and society alike. Though an early recall can reduce harm to consumers, the firm will have to bear the costs associated with the recall that it could potentially postpone or avoid. Therefore, the objective of this research is to seek a better understanding of the factors that can help explain the time to recall a product once a defect investigation is announced. I investigate why there is variation in the time to recall once an investigation into a potential product defect has started. Time to recall is defined as the time lag between the opening of an external, formal defect investigation and the announcement of a recall by the firm.

Quite intuitively, time to recall is likely to be influenced by factors such as the degree of harm caused by defective products or the firm's resource position. I move beyond these factors and examine the relationship between the reputation of the brand that is under investigation and time to recall. Brands play a central role in negative events

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<sup>3</sup> As a result of the 2007 salmonella scare associated with peanuts, the Peanut Corp. filed for bankruptcy in 2009. It was estimated that the firm's products affected over 600 people and resulted in more than 2000 related recalls of products using Peanut Corp's peanuts.

targeting the firm, such as product recalls. Firms spend a tremendous amount of resources on building strong brands but the negativity of the recall information can be potentially damaging to the brand. A study conducted by Ernst and Young<sup>4</sup> suggests that brand concerns rank only after safety concerns when firms announce recalls. Even though firms are clearly concerned about their marketing assets when facing the prospect of a recall, little is known about the influence of brands on the recall management process.

The current literature suggests two competing arguments. According to the first stream of research, firms should speed up the recall when high equity brands are involved because the recall constitutes negative information that violates marketplace expectations (e.g., Rhee and Haunschild 2006). Hence, firms will be motivated to appear responsive in order to reduce the disconfirmation of expectation and adverse impact of a recall on the brand. The second stream of research would suggest that firms should delay the recall when high equity brands are involved because they do not want to signal that something is wrong with the brand. Also, evidence suggests that high equity brands can be, under certain circumstances, “immune” to negative publicity and the firm can therefore afford to wait longer in order to make a better-informed recall decision (e.g., Dawar and Pillutla 2000). Thus, the questions that I am seeking out to answer are: How do brands that have a high reputation for being reliable influence the firm’s decision to time a recall? Will firms announce a recall faster? If so, are there conditions under which firms will try to delay a recall for a high equity brand?

From the time the investigation is launched, stakeholders can observe the behavior of the firm. Because information about the investigation and the responsiveness

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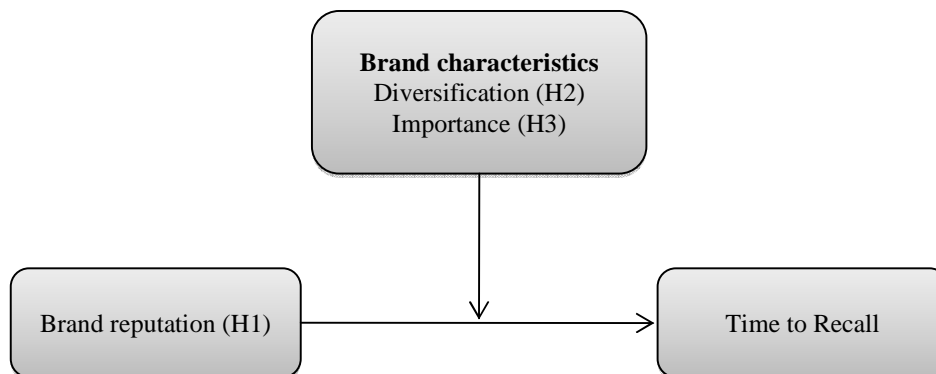
<sup>4</sup> [http://www.ey.com/Publication/vwLUAssets/Capturing\\_Recall\\_Costs/\\$FILE/Capturing\\_recall\\_costs.pdf](http://www.ey.com/Publication/vwLUAssets/Capturing_Recall_Costs/$FILE/Capturing_recall_costs.pdf)

of the firm is public, firms may exhibit different behavior to protect their brands. In my study, I show that both arguments are valid and that there are instances in which firms will speed up a recall for a high equity brand and others in which firms will be more inclined to wait. Namely, firms will announce a recall faster when a brand is of high reliability and a recall could result in strong negative reactions from consumers and other stakeholders. Still, they will only do so if they anticipate damage to the positive associations that consumers have about the brand and related losses to performance. Hence, I not only extend the currently evolving literature on recall timing but also integrate the two arguments that are currently present in the brand management literature on how brands fare in the wake of negative publicity.

I specifically examine whether brand quality reputation (hereafter, brand reputation in this paper), a brand's status as a provider of reliable products, influences time to recall. I further assess whether other brand characteristics – brand importance and brand diversification – influence the relationship between brand reputation and time to recall. Brand importance is defined in this study as the significance of the brand to the firm's revenues, while brand diversification reflects the number and variety of the products that are marketed under its umbrella.

My basic premise is that when a brand is investigated for defects, the potential impact of time to recall on the brand's reputation influences recall behavior. For a brand of high reputation, information about product defects runs contrary to consumer expectations, implying a possible downgrade of consumer assessment of the brand's quality (Rhee and Haunschild 2006). In such circumstances, an early recall might limit the damage to the brand's reputation because the action is consistent with consumer

expectations from a high quality brand and can signal the firm’s concern with providing a high quality product. The degree to which such a downgrading influences the firm’s performance depends on how important the brand is to the firm’s performance in the market. Therefore, when a high reputation brand is of high importance, the recall is likely to be announced even faster (Figure 2.1). For brands of high reputation that are highly diversified, information about product defects may not result in consumers updating their overall perceptions of the brand. This is due to the confidence that consumers have in the brand’s quality given that there is more information available about the brand’s ability to produce high quality products in multiple categories. In this instance, the firm may take longer to announce a recall for a brand of high reputation because a delay in recall is less likely to lead to downgrading of the brand’s reputation compared to a more focused brand of strong reputation.



**Figure 2.1 Conceptual Framework (Essay 1)**

The study context is the U.S. automotive industry and the defect investigations that involve all major automakers from 1999 to 2008. Specifically, I examine the time it takes to announce a recall after an investigation into a potentially defective product is

launched by the NHTSA. I analyze the data using a Tobit model in conjunction with a Probit estimation of a selection model, as time to recall is observed only when the investigation ends in a recall. In line with the predictions, the results show that a recall is announced faster for a brand of high reputation. The level of diversification of a high reputation brand delays the recall while its importance to the firm's revenues accelerates the recall. To isolate these effects, I control for other factors that might affect time to recall, such as reports of product harm and the firm's resource position.

The contributions of this manuscript are twofold. *First*, this study adds to the brand management literature by investigating the impact of brands on an action that is associated with negative consequences for the firm – announcing a product recall. The focus on the firm's motivation to protect a brand when it is faced with a potential crisis helps answer questions about how brand considerations influence recall decisions. Prior research has largely examined the impact of the firm's response strategy on the perceptions of the brand being recalled (e.g., Dawar and Pillutla 2000; Siomkos and Kurzbard 1994). These studies do not account for the fact that firms select strategies that are likely to limit the adverse impact of the recall on the brand in the first place. More importantly, the contrasting findings from prior literature do not clearly indicate which recall strategy ought to implement. I therefore examine multiple conditions under which the firm's response to a defect investigation for a high quality brand varies. *Second*, the present study extends our knowledge of how firms manage product recalls. The product recall literature stream has predominantly focused on the consequences of the recall for the firm's bottom line and reputation (Jarrell and Peltzman 1985; Van Heerde, Helsen, and Dekimpe 2007; Klein and Dawar 2004; Dawar and Pillutla 2000; Rhee and

Haunschild 2006), while little attention has been paid to the actual recall behavior of the firm<sup>5</sup>. Still, understanding recall behavior is important because product failures and recalls have significant repercussions for the public's safety and the firm's going concern. The timing of recalls cannot only influence legal consequences but also the losses that a firm incurs as the result of the recall. This manuscript provides insights into the competing pressures that managers face and the trade-offs involved when a brand is under investigation for potential defects. Based on the contrasting findings from prior literature it is unclear whether firms will speed up or delay a recall during an investigation based on the type of brand involved. The results also enhance understanding of how various brand-related criteria allow managers flexibility in terms of responses to market-related problems.

## 2.1 BACKGROUND: PRODUCT RECALLS AND COSTS

Products are recalled when defects undermine their performance. Recalls are offered to all consumers of a product, including those who have not experienced any problem associated with the defect. To complete a recall, firms repair the product or allow customers to return the product for a refund. Recalls are often supervised by governmental agencies that, among other activities, inform the public about a recall and monitor its completion. In the United States, these agencies include the Consumer

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<sup>5</sup> Notable exceptions are Chen, Ganesan, and Liu (2009) and Hora, Bapuji, and Roth (2011). Chen and colleagues estimate a model to predict whether a firm's recall is proactive (occurring before any product incidences are reported) or reactive. However, the focus of their study is on the stock market response to different recall strategies. Hora and colleagues (2011) investigate factors that influence the duration that a product was on the market before being recalled. This present study differs from these two studies by examining a firm's response to defect investigations, hence measuring the timing of a recall decision after there is reasonable suspicion of a product defect (i.e., due to the occurrence of product failures in the market). A key point of distinction is the focus on characteristics of the brand that is part of the investigation.

Product Safety Commission, Food and Drug Administration, and National Highway Traffic Safety Administration, among others. These agencies also investigate product defects, as their primary goal is to protect the public interest. For the firm, the opening of such an investigation means that there is public acknowledgment that the product is being investigated for potential defects.

Product recalls are often undertaken before the investigation has concluded. A straightforward explanation for such an early recall is that there is enough evidence of harm from the product that the firm decides to expedite what would be an inevitable recall. However, I demonstrate that after these factors are accounted for, brand reputation plays a role in determining recall timing. The underlying logic for the influence of brand reputation on recall timing is that brands with stronger reputations bear a higher cost in terms of damage to reputation if a recall is not handled expeditiously.

#### Direct and Indirect Recall Costs

Recall costs can be classified as either direct or indirect costs and are the reason why firms incur financial losses when announcing a product recall. *Direct costs* include all expenditures of managing the recall process - expenses for repair, refund, or replacement, including costs associated with retrieving the defective product (Jayaraman, Patterson, and Rolland 2003). The magnitude of these costs depends on the nature of the problem, the type of remedy provided, the size of the product population to be recalled, and the response rate to the product recall. Even though one can argue that lower costs from a low response rate might motivate firms to implement an ineffective recall (i.e., reducing the response rate), there are certain threshold levels regarding the response rate that firms have to achieve for a recall to avoid follow-up requirements imposed by the

agency that supervises the recall (e.g., 65% after six recall quarters for automotive recalls, U.S. Government Accountability Office 2011). Implementation costs also include those related to communicating with various stakeholder groups throughout and after the recall. This communication can include the dissemination of information about the product defect and recall but also efforts targeted towards repairing the damage to the brand's reputation.

In addition to direct costs, recalls can also result in *indirect costs* associated with declines in reputation and market performance. Brand reputation depends on the perceptions that consumers have about the brand's safety and quality (Keller 1993). Therefore, brand reputation can be influenced by the information conveyed in a product recall announcement. Recall announcement constitutes negative information about a brand's performance. Therefore, firms risk damage to the reputation of the brand that is involved in a recall if consumers update their beliefs about the brand. Apart from the damage to the reputation of a brand, recalls can lead to a downturn in the firm's market performance (Van Heerde et al. 2007; Rhee and Haunschild 2006). This decline can occur for several reasons. Firms may withdraw a recalled product from the market completely. For example, Johnson & Johnson withdrew numerous over-the-counter drugs in 2010, including well-known brands such as Benadryl and Tylenol. Moreover, consumers may be inclined to stay away from a product category entirely or switch, at least temporarily, to competitive products.

Given that recalls impose substantial costs on a firm, it is not surprising that the stock market tends to react negatively to a recall as shareholders seem to incorporate both direct and indirect costs in their evaluation of the firm's long-term prospects (Barber and



Darrough 1996; Davidson and Worrell 1992; Jarrell and Peltzman 1985; Thomsen and McKenzie 2001). Since not all recalls are likely to impose the same degree of direct and indirect costs on the firm, the magnitude of the reaction from the stock market to a recall announcement is influenced by recall and firm characteristics (Chen et al. 2009; Thirumalai and Sinha 2011).

### Recall Costs and Recall Timing

Recall costs can be influenced by the timing of a recall (Table 1). The seriousness of the financial costs and losses in reputation that firms incur if they make the choice to announce a recall increases a manager's motivation to avoid a recall. Combined with the fact that an investigation does not necessarily lead to a recall – about half of investigations are closed by the NHTSA without a recall (Rupp and Taylor 2002; this study) – managers have little incentive to announce a recall quickly and not to wait out the investigation. Investigations can end without a recall because product-related incidences in the marketplace can occur for a variety of reasons. For instance, though some complaints about product failures can arise from a legitimate product defect (e.g., design flaw, production defect), others could be the result of misuse of a product or even sabotage (Berman 1999). As a Ford spokesperson noted during an investigation into a defect causing a fire hazard involving the Ford F-150 series: “Fires happen for a variety of reasons from faulty repair, improper modification to the vehicle with aftermarket parts and wiring, prior accident damage, and even arson. This is why each complaint or allegation must be reviewed on a case-by-case basis” (Thomas 2005). Therefore, “a recall made too soon could give credibility to an unsubstantiated claim” (Smith, Thomas, and Quelch 1996, p. 106). In addition, the investigation could show that the product is safe,

thus eliminating the need for a recall. If a recall does become necessary, the firm hopes to save money by delaying the recall and pushing the direct costs of recall into future time periods. In essence, considering the direct costs of a recall reduces the firm's motivation to announce a recall soon into an investigation.

However, announcing a recall long after an investigation was started might also prove costly for a firm when considering the indirect costs of a recall. Indirect costs associated with losses in the recalled brand's reputation, in contrast to the direct costs of a recall, are unlikely to be constant during the time period that the investigation is open. That is, if a recall becomes inevitable, losses in reputation are likely to increase with the delay in recall because consumers punish firms less by when they display responsive and proactive recall behavior (Siomkos and Kurzbard 1994). That is, proactive response strategies lead to lower losses in brand reputation than a stonewalling or defensive response, especially if consumers expect the brand to act responsibly (Dawar and Pillutla 2000). Since the indirect costs of a recall can often exceed the direct costs of a recall (Rupp 2004), firms could be more willing to implement a recall and face the direct costs soon into a defect investigation if this means that reputation-related losses are minimized.

In summary, product recalls are costly endeavors and an expedited recall is unlikely unless there are extenuating circumstances, such as potential loss to brand-related assets if a recall is issued late rather than early. Before I develop hypotheses regarding the brand characteristics that influence recall timing, some background on the recall process in the automobile industry, the context of the study, is provided.

### Recalls in the Auto Industry in the United States

The NHTSA was created in response to the National Traffic and Motor Vehicle Safety Act of 1966.<sup>6</sup> The NHTSA's responsibilities include establishing minimum performance standards for automobiles, verifying whether these standards are met, investigating noncompliance, and directing recall campaigns if required (Rupp and Taylor 2002). The NHTSA has overseen thousands of recalls involving hundreds of millions of vehicles since its inception in 1966. Most of the recalls are voluntary as the manufacturer agrees to carry out a recall supervised by the NHTSA. Once a product defect is suspected, the NHTSA can open a preliminary investigation. This investigation is closed if there is no violation of expected product safety standards. If further review is required, NHTSA can escalate the investigation to engineering analysis. The average time between the start of the initial investigation and escalation is 140 days. The engineering analysis, the second stage, takes about a year to complete (Rupp and Taylor 2002). The manufacturer can issue a recall at any stage of the investigation. Once a recall is announced, manufacturers are given time to find an appropriate solution to the problem and organize the recall. Hence, the recall announcement is unlikely to be delayed to identify a solution or prepare for the recall.

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(<http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/MVDefectsandRecall.pdf>).

## 2.2 HYPOTHESES DEVELOPMENT

### Brand Reputation and Motivation to Recall Quickly

As noted previously, firms have incentives to wait and monitor the progress of the investigation, although there are circumstances under which they might consider a quick recall. I hypothesize that - other things remaining the same - a brand's reputation influences a firm's decision to initiate a recall quickly instead of waiting out the defect investigation process in the hope that a recall would not become necessary.

Generally speaking, brands derive their value from a variety of factors, such as consumer awareness and attitudes such as desirability, perceptions of quality, and trust (Keller 1993). In this study, I focus on brand associations pertaining to quality because of its direct connection to product defects and recall. Reputation - whether for a brand or for the firm itself - is a critical asset that firms strive to protect. For instance, Warren Buffet, CEO of Berkshire Hathaway, in a July 2010 letter, exhorted his managers to zealously guard Berkshire's reputation: "We can afford to lose money – even a lot of money, but we can't afford to lose reputation – even a shred of reputation" (Protess, Rusli, and Craig 2011). A strong reputation for quality products or services confers several advantages on a brand. It attracts and retains customers, reduces their price sensitivity, and enhances revenues (Keller 1993).

Brand reputation may be harmed by a recall because consumers and other stakeholders may react strongly to the negative information. A brand with a reputation for being a provider of high quality products has an implicit contract with its customers regarding the performance of the product. The higher the quality reputation, the more likely it is that consumers expect the consumption of the product to be safe. Moreover,

consumers of such brands are very sensitive to information that could violate these expectations of high quality (Heath and Chatterjee 1995). A recall for a brand that has a reputation for being reliable hurts the foundation of the consumer-brand relationship which results in strong negative reactions on the side of the consumer (Aaker, Fournier, and Brasel 2004). A recall for a high quality brand could therefore result in a downturn in market performance (Rhee and Haunschild 2006). Thus, brands with a high reputation may suffer greater damage compared to those with a low reputation where a recall does not disconfirm the expectations of consumers.

An alternative perspective proposes that a strong brand can withstand negative information such as a product recall announcement as consumers resist counterattitudinal information even when it targets core beliefs about the brand (Ahluwalia et al. 2000; Dawar and Pillutla 2000; Cleeren et al. 2008; Pullig et al. 2006). However, these studies find that this “buffering” effect tends to hold only for consumers who have a strong relationship with the brand. Stakeholders, including shareholders and future consumers, who do not share the same intense allegiance to the brand may use the recall information to downgrade the reputation of the brand.

It is, however, possible to reduce the degree of disconfirmation and limit erosion of reputation of the brand. Managers can influence the extent to which a recall disconfirms consumer expectations about a high quality brand through the firm’s response strategy to a product defect. Dawar and Pillutla’s (2000) findings suggest that the losses in reputation that a firm faces in a recall are a function of prior expectations and the firm’s recall strategy. A quick recall effort would be more consistent with the expected response from a brand of high reputation than it would be for a brand of low

reputation. Firms should thus be able to mitigate the disconfirming information about product defects to some degree by issuing a recall quickly after a safety investigation is issued. Therefore, I expect that firms initiate recalls faster when a brand of high reputation is under investigation in order to protect the brand.

In summary, if the investigated brand has a high reputation for being reliable, managers will perceive a sense of urgency of responding to the investigation quickly. The option of waiting out the investigation becomes less attractive in light of the potential losses in brand reputation and subsequent market performance. Brands that do not have such a reputation will not increase a firm's motivation to speed up the recall announcement because consumers do not expect a fast response from these brands and because the risk of losing brand equity is comparably low. Hence:

**H1:** Brand reputation has a negative effect on time to recall such that recalls are announced sooner for brands of high reputation.

#### Moderating Influence of Brand Diversification

However, there may be instances in which a manager may not perceive a quick response to reduce the degree of disconfirmation as important which will lead to a delay in recall even for a brand of high reliability. Such a circumstance will occur when managers do not expect consumers to react strongly to a recall even if it disconfirms their expectations. I propose that the level of brand diversification provides a context for this process to occur. Diversified brands sell a variety of products under the brand name. Even though products under a diverse brand may be targeted at different market segments, all are anchored around a shared reputation.

First, diversification will increase confidence that consumers have in the reliability of the brand's products because they have more information to make an assessment. People are more confident of their judgments based on a large sample of instances than on a relatively small sample, and hence, diversification increases the confidence that consumers have in their perceptions of the high quality brand (Dacin and Smith 1994). The greater confidence that consumer have in the quality reputation of diversified brands makes it more likely that they will not incorporate information about a recall in their evaluations of the brand. Pullig et al. (2006) find that when consumers are confident in their attitudes, they do not adjust their evaluations of a brand when negative, performance-related information (i.e., information about a recall) targets a brand on a performance (i.e., quality) positioning.

Second, diversification decreases the similarity between products marketed underneath the same brand. Hence, the intra-portfolio relationships will be weaker for a highly diversified brand than a less diversified brand. These weak bonds between brands should limit the extent of intra-brand spillovers (Lei, Dawar, and Lemmink 2008) which, in turn, decreases the overall risk associated with the (wrong) timing of a recall. Therefore managers will be more likely to wait out the investigation because the benefits of responding quickly are less pronounced as the diversification level of the high reputation brand increases. Therefore, I propose:

**H2:** Brand diversification reduces the negative effect of brand reputation on time to recall such that recalls are announced later for high reputation brands that are more diversified.

### Moderating Influence of Brand Importance

A firm's motivation to issue a fast response to a safety investigation should also be influenced by whether any loss in the reputation of the brand under investigation has a substantial impact on future firm performance. If a firm relies heavily on the sales of the investigated brand for its overall performance in the market, it has more at stake when brand expectations are violated. Since product defects affect the core of the brand's reputation for producing highly reliable products, an appropriate response that minimizes the degree to which consumers' update their beliefs about the brand becomes critical to the firm's survival when the brand is critically important to the firm.

In essence, when a brand has a high reputation for quality and also contributes substantially to the firm's performance by accounting for a large part of its sales, declines in reputation can be catastrophic. As noted earlier, if the products are suspected to be defective, high reputation brands are likely to be downgraded to a larger degree by consumers than low reputation brands because of greater violation of expectations for the former. When these high reputation brands are also of great significance to the firm's sales, the firm can ill afford the loss of reputation and consequent negative impact on future revenues. For such brands, a quicker recall after a safety investigation is opened is likely as an effort to limit the potential loss of reputation.

For a low reputation brand, the loss in reputation from delayed recalls will not be substantial even if the brand is important to the firm. Therefore, for such brands the actual recall costs may be seen as more significant, limiting the likelihood of an early recall. For high reputation brands of low importance, a quick recall may not happen due to the lower attention to the brand's fortunes. Firms only have limited resources available to focus on



strategic issues (Ocasio 1997). Therefore, firms will be more likely to attend to the investigation and announce a recall when any loss in reputation has significant consequences for their performance.

**H3:** Brand importance enhances the negative effect of brand reputation on time to recall such that recalls are announced sooner for high reputation brands that are more important.

### 2.3 RESEARCH METHODOLOGY

To test the hypotheses, I collected information on safety investigations initiated by a government agency, the NHTSA, whose objective it is to assess whether automobile products pose a safety risk to consumers. The automotive industry has been the subject of several studies in the recall area (Haunschild and Rhee 2004; Rhee and Haunschild 2006; Jarrell and Peltzman 1985; Hartman 1987; Kalaiganam et al. 2013). It provides a great context due to the comprehensiveness of the data available. The dataset is limited to investigations involving single brands because including recalls with multiple brands will not allow the use of precise measures for brand-related constructs. I collected data on all safety investigations that were closed between 1999 and 2008 in the U.S. automotive industry. The final dataset includes a total of 274 investigations out of which 130 ended in a recall. Table 2.1 provides an overview of the manufacturers and the number of investigations included in the sample. The data shows that more investigations end in a recall when the investigation is in a later stage (58% vs. 39%).

## Data Sources and Measures

Data for the constructs in this study were collected from various sources, such as the investigation reports issued by the NHTSA, *Ward's Automotive Yearbook*, *Automotive News Market Data Book*, and *Consumer Reports* (see Table 2.2 for an overview). Time to recall is the time period between the opening of an investigation, which is a public acknowledgment that there could be a potential problem, and the time of announcement of a recall, if it happens. To measure time to recall (*TIME*), I collected information on the investigation opening date and the firm's recall announcement date. The difference in months between these two dates measures time to recall. Both dates were obtained from the investigation and recall reports filed by NHTSA.

**Table 2.1 Overview of Manufacturers Included in Sample**

Firm	Makes*	Number of investigations	Number of recalls
<b><u>U.S.-based nameplates</u></b>			
Chrysler	Chrysler, Dodge, Eagle, Plymouth, Jeep	43	24
Ford	Ford, Lincoln, Mercury, Jaguar, Land Rover, Volvo	66	31
General Motors	Buick, Chevrolet, Cadillac, GMC, Hummer, Oldsmobile, Saab, Saturn, Pontiac	46	15
<b><u>Asia-based nameplates</u></b>			
Honda	Honda, Acura	11	5
Hyundai	Hyundai, Kia	25	13
Mitsubishi	Mitsubishi	5	1
Nissan	Nissan, Infiniti	15	11
Mazda	Mazda	6	4
Subaru	Subaru	3	1
Toyota	Toyota, Lexus	14	5
<b><u>Europe-based nameplates</u></b>			
BMW	BMW	4	3
Daimler	Mercedes	11	5
VW	VW, Audi	23	12
Porsche	Porsche	2	0
<b>TOTAL</b>		<b>274</b>	<b>130</b>

\*associated with firm between 1999 and 2008

The information to measure the key independent variables, brand reputation, importance, and diversification was obtained from various data sources. The measure for brand reputation (*RELIABLE*) was obtained using *Consumer Reports*' assessment of vehicle quality. The quality ratings distributed by *Consumer Reports* greatly influence a consumer's perceptions of brand reliability (Rhee and Haunschild 2006). *Consumer Reports* surveys consumers regarding problems with a particular model and aggregates the information into problem rates. From this data, brand reputation is measured using the five-point scale of problem rates, with higher scores reflecting higher reputation (Rhee 2009). Scores for each brand are averaged over five years because brand reliability reputation could be influenced by reputation from prior time periods (Rhee and Haunschild 2006).

To measure brand importance (*IMPORTANT*), I calculated the proportion of the firm's sales in the U.S. associated with the brand of interest. A higher value indicates greater importance of the brand to the firm's sales performance. Brand diversification (*DIVERSE*) is the variation in the range of products sold using the brand's name. Similar to Rhee and Haunschild (2006), I calculated the brand's level of diversification using the number of product lines and range of engine capacities of the models produced under the specific brand. Principal component analysis was used to retrieve a score indicating brand diversification. The correlation between the number of product lines and engine capacities is .72 and the extracted component explains 87.9% of the total variance. For all independent variables, the scores from the year corresponding to the decision to recall or close the investigation were used.

**Table 2.2 Data Sources and Variable Operationalization**

Measure	Operationalization	Data Sources
Time to recall (TIMERECALL)	Month <sub>investigation</sub> - Month <sub>recall</sub>	– NHTSA
Brand reliability reputation (RELIABLE) (Rhee 2009)	$R_{brand} = \sum_{T=5}^{T-1} \frac{1}{N} \sum_{k=1}^{k=N} \sum_{t=3}^{t-1} \frac{I_k}{3}$ <p>where  <i>T</i> is the current year  <i>N</i> is the number of car models  <i>k</i> is the car model  <i>I<sub>k</sub></i> is the overall problem score</p>	– Consumer Reports
Brand diversification (DIVERSE) (Rhee and Haunschild 2006)	Principal component score including information about <ul style="list-style-type: none"> <li>• number of models</li> <li>• variation in models</li> </ul>	– Ward’s Automotive Yearbook – Automotive News Market Data Book – Consumer Reports
Brand importance (IMPORTANT)	$\frac{Sales_{brand}}{Sales_{firm}}$ (U.S. market)	– Ward’s Automotive Yearbook
Product harm (HARM)	$\frac{Number\ of\ crash\ and\ fire\ reports}{Duration\ of\ investigation}$	– NHTSA
Recall scope (SCOPE)	1 = recall is geographically restricted	– NHTSA
Market importance (MARKET)	$\frac{Sales\ or\ revenues\ (U.S.\ market)}{Sales\ or\ revenues\ (Total)}$	– Annual Reports
Investigation size (INVSIZE)	Log(Number of vehicles under investigation)	– NHTSA
Firm size (SIZE)	Log(U.S. sales)	– Ward’s Automotive Yearbook
Investigation stage (STAGE)	1 = investigation ends in engineering stage	– NHTSA

Modeling the Probability of a Recall

Before I estimate the time-to-recall model, I need to take into account that not all investigations end in a recall. In my sample, only 130 out of the 274 investigations end in a recall which can raise endogeneity concerns if factors that influence the recall decision are correlated with the factors that influence time to recall. To reduce the bias in the

estimates in the time-to-recall model, I estimate the probability of a recall and use the inverse mills ratio (Heckman two-stage procedure; Kennedy 1998) in the time-to-recall model. Using the inverse Mills ratio (IMR) to address for sample selection and endogeneity problems is an approach that is commonly used in marketing (e.g., Chen et al. 2009).

I model the firm's decision to initiate a recall as a function of factors that reflect the ambiguity associated with the product defect, the firm's ability to implement a recall and influence the firm's motivation to avoid a product harm crisis. Factors that reduce the ambiguity that a product defect exists are the presence of product failure reports, the upgrading of the investigation to an engineering analysis stage, the start of the investigation, and the level of brand diversification. The more reports of severe product failure a firm receives, the more likely it is that the firm will announce a recall as part of the investigation because it reduces the likelihood that the product failure is not systematic. Also, firms will be more motivated to announce a recall for product liability reasons. Investigations that are escalated to the engineering analysis stage should also positively influence the probability of a recall because this escalation sends a strong signal that NHTSA has a sufficient reason to believe that a product defect exists to demand a thorough investigation of the problem. In addition, how the investigation was triggered could be associated with the ambiguity of the defect. An investigation started based on consumer complaints is associated with more ambiguity about the defect than an investigation that is the result of a technical service bulletin or a recall that has been previously issued by the company. Finally, brand diversification influences the uncertainty that the firm has regarding the existence of a product defect that warrants a

recall because the products underneath the brand are likely to differ in various components.

In addition, the firm's motivation and ability to initiate a recall can have an influence on whether the investigation is likely to end in a recall. I expect that profitability could predict the probability of an investigation ending in a recall. Even though higher profitability increases the firm's ability to respond, I cannot predict its association with the probability of a recall *ex ante* since it may also reduce the firm's motivation to respond (Jayachandran and Varadarajan 2006). Firm size should generally reduce a firm's motivation to recall because larger firms tend to be more visible to stakeholders and therefore receive more scrutiny. Hence, larger firms are more likely to face the threat of a product harm crisis once they announce a recall whereas smaller firms should be more likely to announce a recall and not get as much media coverage. A similar argument should hold for investigation size. The larger the size of the investigated product population, the more likely it is that a recall would be deemed newsworthy. Moreover, the larger the investigation, the more expensive a recall becomes, thus decreasing the firms motivation to respond. Further, I control for the firm- and year-specific effects by including respective dummies.

The following Probit model was used to predict the conditional probability of a recall given the set of explanatory variables listed above. To estimate this model, I used a dataset comprising of all defect investigations that were closed between 1999 and 2008 (274 observations). Formally, for each investigation  $i$ :

$$(1) P(\text{Recall} = 1) = \alpha_0 + \alpha_1 DIVERSE_i + \alpha_2 HARM_i + \alpha_3 PROFITABILITY_i + \alpha_4 INVSIZE_i + \alpha_5 FIRMSIZE_i + \alpha_6 STAGE_i + \alpha_{7-8} START_i + \alpha_{9-20} MANUFACTURER_i + \alpha_{21-29} YEAR_i + \mu_i$$

Based on the results of this model, I estimate the IMR which is used as a covariate in the time-to-recall model.

### Modeling the Time to Recall

I choose to estimate the time-to-recall model using a Tobit model specification. My dependent variable can take on positive values and it is likely that there are recalls occurring soon after an investigation<sup>7</sup>. Therefore, assumptions of the ordinary least squares regression model are likely to be violated and can therefore cause bias and inconsistency in the estimates (Tobin 1958). Tobit models have been previously used in duration analysis to address these concerns<sup>8</sup> (Thomas 2001). In addition to the relationships predicted in H1-H3, I also include several control variables to rule out alternative explanations for variations in a firm's recall timing behavior.

### Control Variables

I first address the main effects of brand importance and brand diversification. I expect brand importance to have a positive main effect on time to recall because, in the event of a safety investigation, the main reason for a brand that is important to a firm to be recalled early is the potential loss of reputation, a matter of concern only for high reputation brands. However, in general, firms should be more motivated to delay the recall as much as possible to wait out the investigation to maybe be able to avoid a recall

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<sup>7</sup> Note that the mean of time to recall in our sample is around 9.1 months with a standard deviation of 7.3 months.

<sup>8</sup> An alternative estimation method for duration models is a hazard model specification. Hazard models are used in situations when the exact time of duration is not available, for example, when observations are left- or right-censored. In our sample, we can observe the exact time to recall for all observation. Hence, we do not have censoring because we always know the outcome of an investigation. Once an investigation is closed it is either closed with or without a recall. Therefore, we can use limited dependent variable methods to estimate our model. From a practical standpoint, we cannot integrate investigations that did not end in a recall in the Time to Recall model, because some of our predictors in this model are only observed for observations that end in a recall. Investigations without a recall would be dropped from the analysis.

altogether. Brand diversification, apart from moderating effect on the brand reputation-time to recall relationship, may delay recall directly because many products under the brand may not be affected by the recall. It also decreases the firm's motivation to expose the brand to negative publicity but, moreover, diversification can increase the ambiguity of the product defect that is present since the products marketed underneath the brand are highly different from each other. Besides the main effects of brand importance and diversification, I control for other factors that could influence a firm's motivation to speed up the recall. These factors are related to the ambiguity of the product defect, the motivation to avoid negative publicity, and the likelihood that the recall will draw publicity or is costly to implement. These control variables and the rationale for including them in the model is presented in Table 2.3.

**Table 2.3 Rationale behind Control Variables**

Variable	Motivation to avoid negative publicity	Defect ambiguity	Anticipated recall costs	Likelihood of crisis	Expected sign
Brand diversification DIVERSE	+	+			+
Brand importance IMPORTANT	+				+
Product harm HARM		-		+	-
Recall scope SCOPE		-	-		-
Market importance MARKET	+				+
Investigation size INVSIZE			+	+	?
Firm size FIRMSIZE				+	-



In addition, firm-specific dummies were used to account for idiosyncratic factors that may compel a firm to recall faster or slower than its competitors even when they are faced with identical circumstances. For instance, one firm may have a culture of quick and proactive responses compared to its rivals, resulting in faster recalls when it is faced with a product safety concern.

I account for year-effects by entering dummy variables for the year in which the investigation was closed (in the case of no recall) or the year of the recall announcement to account for any factors in that particular year that might influence the timing of the recall decision for all manufacturers. Lastly, I include the IMR estimated from the Probit model.

Therefore, a Tobit model was employed to test the hypotheses regarding the determinants of time to recall, where  $y_i^*$  denotes the latent time to recall for each investigation  $i$ .

$$(2) \quad y_i^* = \beta_0 + \beta_1 RELIABLE_i + \beta_2 DIVERSE_i + \beta_3 IMPORTANT_i + \beta_4 RELIABLE_i * DIVERSE_i + \beta_5 RELIABLE_i * IMPORTANT_i + \beta_6 HARM_i + \beta_7 SCOPE_i + \beta_8 MARKET_i + \beta_9 INVSIZE_i + \beta_{10} FIRMSIZE_i + \beta_{11} IMR_i + \beta_{12-22} MANUFACTURER_i + \beta_{23-31} YEAR_i + \varepsilon_i$$

Since the dependent variable (*TIME RECALL*) is censored at 0, I account for censoring by specifying the observed time to recall as following.

$$(3) \quad \begin{array}{ll} y_i = 0 & \text{if } y_i^* \leq 0 \\ y_i = y_i^* & \text{if } y_i^* > 0 \end{array}$$

## 2.4 RESULTS

I first present the results for the Probit model (Probability of a recall), followed by the results of the Tobit model (Timing of a recall). Tables 2.4 and 2.5 present the descriptive statistics and correlation matrices for the Probit and the Tobit models. All focal variables were mean-centered before the models were estimated. I checked the models for multicollinearity and did not find any reason for concern as variance inflation factors were below the commonly used benchmark value of 10 (Kennedy 1998).

**Table 2.4 Correlation Matrix (First Stage)**

	Variable	Mean	S.D.	1	2	3	4	5	6
1	RECALL*	.47	.50	1.00					
2	DIV	.65	1.19	-.17	1.00				
3	HARM	1.00	3.44	.10	-.02	1.00			
4	PROFIT	.00	.06	.13	-.08	.04	1.00		
5	SIZE	14.21	1.11	-.07	.36	.00	-.13	1.00	
6	STAGE*	.45	.50	.19	.13	.00	-.05	.21	1.00

\*Indicator variable, either 0 or 1

**Table 2.5 Correlation Matrix (Second Stage)**

	Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1	TIMERECALL	9.10	7.30	1.00								
2	P(RECALL)	.57	.19	.22	1.00							
3	REP	4.21	.26	-.16	-.02	1.00						
4	IMP	.54	.35	-.10	-.15	.31	1.00					
5	DIV	.44	1.13	.11	-.28	.05	.46	1.00				
6	HARM	1.39	4.29	-.09	.27	-.05	-.08	.00	1.00			
7	PROFIT	.01	.04	-.11	.10	.29	.16	.18	.02	1.00		
8	RESTRICT*	.08	.27	-.01	-.09	.03	-.04	-.04	-.09	.09	1.00	
9	DEALERS	.00	.00	.08	-.01	-.49	-.43	-.01	.13	-.33	-.02	1.00

\*Indicator variable, either 0 or 1

Analysis of the Probit Model: Probability of a Recall

Table 2.6 shows the results of the Probit model, which estimated the probability of recall. The overall model was significant (LR  $\chi^2(11) = 54.66, p < .01$ ). Product harm ( $p < .05$ ) and investigation stage ( $p < .01$ ) increase the probability that a safety investigation ends in a recall. Brand diversification is associated with a lower probability that an investigation ends in a recall ( $p < .01$ ). None of the dummies for how the investigation was started are significant at  $p < .05$ .

**Table 2.6 Impact of Firm and Investigation Characteristics on the Probability of Recall**

Dependent variable	Model 1 Recall = 1
Independent variables	
DIVERSE ( $\alpha_1$ )	-.280*** (.078)
HARM ( $\alpha_2$ )	.051** (.026)
PROFIT ( $\alpha_3$ )	5.327*** (.1473)
INVSIZE ( $\alpha_4$ )	-.073** (.032)
FIRMSIZE ( $\alpha_5$ )	-1.100 (.731)
STAGE ( $\alpha_6$ )	.728*** (.206)
Observations	254
Pseudo R <sup>2</sup>	.32
LR $\chi^2$	54.66***

\*\*\* $p < .05, p < .01$ , Clustered standard errors, investigation start, manufacturer and year dummies included

Firm profitability has a positive influence on recall probability ( $p < .01$ ). This finding supports the argument that highly profitable firms are in a better position to respond to a safety investigation than those that are financially constrained. The beta

coefficient for firm size is negative but not statistically significant ( $p > .10$ ). Five firm dummies and one year dummy are statistically significant ( $p < .05$ ).

#### Analysis of Tobit Model: Timing of a Recall

Table 2.7 provides the results of the Tobit model (Model 1). H1 stated that investigations end in a recall sooner when the involved brand has a high reputation. This hypothesis is supported as the beta-coefficient for reputation is negative ( $\beta_1 = -10.784$ ) and significant at  $p < .05$ . In line with H2, I find that recall decisions are made later when a high reliability brand is also highly diversified ( $\beta_4 = 12.419$ ,  $p < .01$ ). I also find evidence for a positive main effect of brand diversification on time to recall ( $p < .01$ ). According to H3, the time to recall is shorter for high quality brands when the brand is also important to the firm's performance. The results support this hypothesis ( $\beta_5 = -42.414$ ,  $p < .01$ ). In addition, the results show a significant, positive main effect for brand importance ( $p < .10$ ), indicating that brands are recalled later the more they contribute to the firm's bottom line.

The results for the control variables in the Tobit model show that both firm- and investigation-specific factors are significantly associated with time to recall. As expected, product harm reduces time to recall ( $p < .01$ ). The coefficient for recall scope is negative and significant ( $p < .05$ ). The results further suggest that recalls are initiated at a later point in time as the importance of the U.S. market to a firm increases ( $p < .05$ ). The coefficients for investigation size and firm size are not statistically significant. Two out of eleven firm-specific dummies and four out of nine year dummies are statistically significant at  $p < .10$ .

**Table 2.7 Impact of Brand Reliability on Time to Recall**

Model description	Model 1 Baseline model	Model 2 Log specification of DV	Model 3 Endogeneous reliability	Model 4 No 2-stage Heckman
<b>Independent variables</b>				
<b>H1: RELIABLE</b> ( $\beta_1$ )	-10.784** (4.133)	-1.254*** (.470)	-12.000** (4.136)	-9.390** (3.953)
DIVERSE ( $\beta_2$ )	2.355*** (.603)	.306*** (.075)	1.941* (.918)	.786 (.816)
IMPORTANT ( $\beta_3$ )	2.701* (1.359)	.260 (.235)	2.394 (2.166)	.426 (2.370)
<b>H2: RELIABLE *</b> DIVERSE (H2) ( $\beta_4$ )	12.419*** (4.314)	1.083*** (.340)	5.524 (2.952)	18.673*** (5.424)
<b>H3: RELIABLE *</b> IMPORTANT (H3) ( $\beta_5$ )	-42.414*** (15.776)	-3.981*** (1.486)	-28.840** (10.068)	-50.926*** (17.534)
HARM ( $\beta_6$ )	-.674*** (.175)	-.091*** (.019)	-.685** (.168)	-.358*** (.087)
SCOPE ( $\beta_7$ )	-2.498** (.993)	-.065 (.159)	-3.619* (1.698)	-3.091*** (.969)
INVSZ ( $\beta_8$ )	.907 (.564)	.211*** (.065)	1.274* (.505)	.376 (.397)
MARKET ( $\beta_9$ )	23.397* (11.108)	1.209 (1.752)	31.959* (12.982)	15.210* (10.398)
FIRMSZ ( $\beta_{10}$ )	-7.152 (6.029)	-.389 (.692)	-2.478 (4.534)	-11.521** (6.200)
IMR ( $\beta_{11}$ )	-16.079** (6.709)	-2.275*** (.663)	-17.087* (6.756)	
Observations	114	114	112	114
Pseudo R <sup>2</sup>	.54	.65	.53	.39
LR $\chi^2$	87.783 ***	104.902***	83.627**	56.284***

\* $p < .10$ , \*\* $p < .05$ ,  $p < .01$ , Clustered standard errors, investigation start, manufacturer and year dummies included

### Robustness Checks

I conduct several robustness checks to see whether my results are consistent with different model specifications. First, I estimate a model using the log transformation of time to recall as the dependent variable, which is used in duration models. The results in Table 2.7 (Model 2) demonstrate that my results are robust to this transformation of the dependent variable. Second, I estimate a model using an endogenized brand reputation variable. One might argue that brand reputation is endogeneous and already determined by the firm's recall behavior. I therefore address these concerns by endogenizing brand

reputation using a two-stage least squares approach (Dhar and Hoch 1997). I find support for all of my hypotheses when using an endogenized brand reputation variable. Last, I address the assumption of selection bias in my model. I estimate a model without accounting for the probability of a recall. I still find support for all of my hypotheses. However, it should be noted that some of the independent variables that are found to be significant in the two-stage Heckman model are insignificant in the model where selection is not modeled. Hence, even though selection bias might not directly impact the coefficients pertaining to my hypotheses, it appears to influence other predictors in the model.

## 2.5 GENERAL DISCUSSION

The purpose of this study is to address the role that brand reliability reputation has on a firm's recall timing decision when one or more of the brand's products is under investigation for a safety defect. In general, I find that brands influence time to recall even after other investigation-, recall-, and firm-related factors are accounted for. Specifically, I sought out to answer to key questions: Will firms announce a recall faster when the brand under investigation has a strong reputation for being reliable? Are there conditions under which firms will still try to delay a recall for those brands? I discuss my findings in greater detail next.

*Do Firms Recall Faster when the Brand as a High Reliability Reputation?* I find evidence that brand reputation is negatively associated with time to recall. That is, the time until the firm notifies NHTSA of a recall is shorter as brand reputation increases. This result shows that brand reputation motivates a firm to expedite the recall

announcement, even though it has numerous incentives to delay a recall as much as possible. Given that more than half of all investigations into product defects result in no recall, firms have incentives to wait and assess the outcome of the investigation to avoid the costs and negative publicity associated with a recall. Therefore, a firm will only make a recall decision quickly when it believes that a quick response can mitigate the damage from recall. For high reliability brands suspected of defects, consumers are likely to expect proactive responses from the firm in the nature of quick recalls as part of the implicit contract between a consumer and the brand. In this instance, should a recall be delayed, consumers may consider the response inconsistent with their expectations for the brand. I further find that recall happens even faster when such brands are also strong contributors to the firm's revenues. In this instance, the consequent downgrading of the reputation of a brand that is critical to the firm's performance may considerably constrain the ability of the firm to compete in the future. In essence, when a high quality brand is under investigation, firms risk strong reactions from the marketplace if the resulting recall is not handled properly. Therefore, the results imply that firms are more likely to choose a recall strategy that reduces the degree to which expectations of the brand's behavior are violated by initiating recalls faster when the brand has a reputation for high quality and is significant to the firm's revenues.

*When Will Firms Delay a Recall for a Reliable Brand?* My findings suggest that firms indeed delay the recall decision for a high reputation brand under certain circumstances. As I pointed out, there are advantages to delaying the recall and waiting out the investigation. In line with my prediction that recalls will occur later when firms are less concerned with the reactions of the marketplace to the recall, I find that recalls

for a high reputation brand are less likely to be expedited when the brand is diverse. I hypothesized that brand diversification acts as a buffer, thus reducing the extent to which consumers react strongly to the recall, which gives the firm more leeway in their response. To further confirm the underlying assumption that consumers are less likely to react to a recall of a diversified brand that is investigated, I conducted a follow-up experimental investigation using a sample of 143 undergraduate students at a major university in the Southeast who participated in the study for partial course credit<sup>9</sup>. The findings from this experiment show that consumers are less likely in the event of a recall to downgrade their perceptions of a high diversity brand. Therefore, announcing a recall at a later point in time is less risky for a firm and it will be less concerned about reacting to the defect investigation in a manner that reduces the degree of disconfirmation that stakeholders experience for a recall of a high reputation brand.

### Theoretical Contribution

My study makes contributions to two literature streams, namely the brand management and the recall management literature. I extend the branding literature by examining how firms make decisions in a context where the brand is likely to face negative publicity. The brand can be subject to negative reactions at the time of the recall

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<sup>9</sup> The study used a 2 (high diversification, low diversification) x 2 (control, recall) design. Respondents read information about a fictitious company in the automotive industry, Omega, and answered a series of questions regarding their perceptions about Omega. To check whether the manipulation of diversification had the desired effect, I asked subjects to indicate whether the number of vehicles marketed by Omega was very high (1) or very low (7) and whether Omega markets many different types of vehicles (1 = Strongly agree, 7 = Strongly disagree). The results show that respondents perceived Omega to be less diversified in the low diversification condition than in the high diversification condition ( $mean_{low} = 2.587$  (standard error = .093) vs.  $mean_{high} = 2.183$  (.090),  $F(1, 139) = 9.68, p < .01$ ). As expected, I find support for an interaction effect between low and high portfolio diversification, control and recall condition ( $F(1, 136) = 5.69, p < .05$ ). I asked respondents about their overall impression of Omega (1 = Very positive, 7 = Very negative). The results show that respondents downgrade their perceptions of Omega more after a recall in the low diversification condition ( $mean_{control, low} = 2.923$  (.149) vs.  $mean_{recall, low} = 4.276$  (.162)) than in the high diversification condition ( $mean_{control, high} = 3.113$  (.148) vs.  $mean_{recall, high} = 3.731$  (.156)).



but negative sentiment can already accumulate once the defect investigation is opened because this information is available to the public. Hence, the firm's recall behavior is easily observed which increases the pressures of responding in a way that reduces the risk of damage to the brand. Interestingly, I find that firms make a risky decision and recall a brand of high reputation relatively early into an investigation. That is, the firm is willing to forgo the opportunity to gather more information on the product defect and actual need of a recall to announce the recall early, which is more likely to be perceived as responsive and in line with stakeholder expectations. Moreover, I find that even if a brand has a high reputation, firms will make the recall timing decision depending on other brand characteristics. Even though brand reliability reputation is strongly associated with the recall timing decision, this relationship varies greatly with other brand characteristics. In my case, I examine brand diversification and importance because these characteristics may influence the expectations that managers form about the losses in the event of a recall. Therefore, protecting a brand's reputation is important under certain conditions.

Next, I add to the recall management literature by examining the decision-making process leading up to the recall decision. To date, most studies have focused on examining the post-recall process, such as communication strategies or stakeholder reactions to the recall (Cleeren et al. 2008; Dawar and Pillutla 2000; Marcus and Goodman 1991; Rhee and Haunschild 2006). To the best of my knowledge, only three studies have investigated timing issues with regards to product recalls (Chen et al. 2009; Teratanavat et al. 2005; Hora et al. 2011). Teratanavat et al. (2005) examine the time it takes meat and poultry managers to discover and respond to food safety problems. Hora et al. (2011) investigate the time a consumer product is on the market before it is recalled.

Even though the primary focus of Chen et al.'s study (2009) is on the stock market reaction to different firm response strategies, the authors estimate a selection model explaining why some firms choose a proactive (announcing a recall before market incidents are recorded) or a reactive recall strategy (announcing a recall after-market incidents are recorded). The research presented in this manuscript extends this sparse literature by showing why firms choose different response strategies when facing product investigations. Besides examining factors that influence time to recall, the findings from this study also increases our understanding of when recalls are initiated after defect investigations are opened. Since I focus on the time to recall, I do not advance hypotheses regarding the drivers of the firm's decision to announce a recall; still the results from the Probit model demonstrate that firm's also exhibit great variation when it comes to recall initiation.

#### Managerial and Policy Implications

The findings from this study have implications for both managers and policy makers. First, this study demonstrates that marketing has an influence on the pre-recall decision making process. Whether and when firms should announce and implement a recall has been mostly looked at from a product safety perspective. Clearly, it is imperative that firms respond to significant product safety concerns and I do find evidence that the more product failure reports a firm receives the more likely and faster it is to announce a recall. However, even when these concerns are considered, marketing-related assets play a role in influencing the time to recall. The findings from my study show that brand-related concerns influence the recall timing decision when the brand has a high reputation but only when the brand is of low diversification or high importance to

the firm's revenues. This behavior suggests that marketing only becomes involved in the recall process if the recall can cause significant damage in the firm's ability to generate cash flows if it is managed improperly.

Further, the present study highlights the complex nature of the recall decision. Firms are subjected to competing pulls when they determine their response to investigation into potential product defects. They do not wish to undertake a premature recall because of the costs, direct and indirect, involved. But they should also ensure that the response to the investigation is consistent with stakeholder expectations, lest it leads to downgrading of the firm's brand assets. The decision to delay a recall has advantages and disadvantages for the firm with respect to the direct and indirect costs. I show that the expected losses in the brand's reputation hasten recalls. Interestingly, I find differences in how firms react to a reliable brand being under investigation for possible safety problems. More importantly, I find that there is great variation in the degree to which high reputation brands speed up the recall decision suggesting that firms take into consideration multiple brand characteristics when making a recall timing decision. Managers recognize that a brand's reputation is an implicit contract with stakeholders, and respond accordingly. The study provides guidelines to managers in terms of how brand-related considerations influence decision-making when products are being investigated. The results also provide guidance regarding how response to consumers varies based on a brand's reputation, as well as its portfolio characteristics as well as importance to the firm. The results indicate when managers have more or less leeway in their responses based on potential impact on the brand's reputation.

Moreover, the findings from my study in conjunction with findings reported by Chen et al. (2009) suggest that firms may respond differently to product defects when the information about the defect is public as compared to private. The authors show that firms with a high reputation are less likely to announce a proactive recall. In contrast, my study examines a context in which there is public information about the firm and its responsiveness available: public investigations. From the time the investigation is launched, stakeholders can observe the behavior of the firm. Because information about the investigation and the responsiveness of the firm is public, firms may exhibit different behavior to protect their brands. I complement Chen et al.'s findings by showing that, depending on the privacy of product safety-related information, firms may respond completely different when a high equity brand faces the threat of a recall.

Furthermore, the study has implications for policy makers. To date, research on recall effectiveness has focused on the impact of recall on the return of defective products and the reduction of product-associated injuries and accidents. Since recalls are a means to reduce product harm, recalls could be interpreted as more effective when initiated early in order to reduce the number of anticipated safety failures. The longer the recall is delayed, the more likely it is that the product causes additional injuries, increasing costs to the firm and society. I discuss how firms do not always have incentives to initiate a recall fast. Even though I find that firms react more quickly to investigations when the product failure incidents are severe, they are less responsive when they are unlikely to face negative consequences influencing their brand-related assets and performance. To overcome this resistance, policy makers can, for instance, try to put more pressure on

firms by communicating their activities related to safety investigations with greater clarity.

### Limitations and Future Directions

While the manuscript provides interesting insights into product recalls, the fact that the study is industry-specific might limit the generalizability of the results. The automotive industry is characterized by a higher frequency of recalls compared to other industries. Therefore, firms may face the challenge of managing multiple recalls in such industries, which might not be true of other industries. Still, focusing on a single industry allows for better control given the heterogeneity in products and safety expectations if multiple industries were to be included in the data. Perhaps because of this, studies on product recalls tend to focus on a single rather than multiple industries (e.g., Rhee and Haunschild 2006; Van Heerde et al. 2007; Hora et al. 2011; Thirumalai and Sinha 2011; Thomsen and McKenzie 2001). Thus, my approach is consistent with prior research into product recalls in this regard. The legal and other aspects that drive product investigations have substantial industry-specific idiosyncrasy that clear empirical assessments are potentially possible only using within-industry samples. Furthermore, it is important to note that the automotive industry is a highly relevant industry from an economic perspective, representing 4% of the GDP in the U.S. (Mergent 2011). Regardless, one avenue for future research is to investigate firms' recall behavior in other industries to assess the generalizability of the results.

Furthermore, the reliance on secondary data limits the research to a context for which information about the time to recall and other variables of interest is available. The arguments are based on the notion that time to recall varies with the anticipated losses in

a brand's reputation and firm performance. The use of secondary data, unfortunately, does not allow us to obtain such process evidence. I conducted an experiment to examine how brand diversification may influence the extent to consumers downgrade their perceptions. The results support the argument that diversification may be able to shield high quality brands from negative news. However, a wider assessment of the process that underlies consumer and other stakeholder responses to product investigations through survey and experimental research will provide rich insights.

Future research may be able to address the stock market valuation of different recall timing strategies. Since the stock market incorporates the recalled brand's ability to generate cash flows for the firm, addressing how the different brand characteristics examined in this study influence the reaction of shareholders to government-influenced recalls could provide additional insights into whether firms are able to maintain the reputation of the brand.

## CHAPTER 3

### WHEN DO BRANDS HELP OR HURT A FIRM'S EFFORT TO IMPLEMENT AN EFFECTIVE RECALL?

Product recalls to address the problem of defective products are a fairly frequent occurrence. Recalls are expected to remedy the safety and performance problems likely to arise from defective products. In response to the recall announcement, consumers are expected to return the product for repair, replacement, or refund. However, despite the importance of responding to recalls, consumers often do not comply. A recent inquiry by the U.S. Government Accountability Office (GAO) into auto safety revealed that recall completion rates vary substantially, ranging from as low as 20-30% to over 90%. The problem of low compliance rates is not restricted to the automotive industry. Recalls of consumer products such as toys, furniture or appliances face similar problems<sup>10</sup>. Low recall compliance is not merely because consumers are unaware of the recall or they decide to just get rid of the defective product. A recent study by *Consumer Reports* finds that a third of consumers that are aware of owning a recalled product do not respond to the recall nor stop using the product (Consumer Reports 2011). Non-compliance to recalls has significant consequences for consumer safety. Harm to consumers from continued use of recalled products could damage the reputation of firms due to the negative publicity and salience of such information even though the firm may have undertaken a recall.

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<sup>10</sup> <http://www.cpsc.gov/PageFiles/101932/recalleffectiveness.pdf>

The question is: why would consumers not comply with a recall and seek the remedy provided by the manufacturer? It could merely be that they do not consider it worth their while to seek the remedy offered by the recall – the product might be too inexpensive or the consequence of the product defect may not be perceived as serious enough. Apart from these reasons, the characteristics of the product may influence consumer decision to participate in the recall. In this study, I investigate one such characteristic - the role of brands as a key antecedent of consumer motivation to comply with product recall. Brands play a dominant role in the consumer's purchase decision and marketers spend substantial resources to create and maintain strong brands. Yet, it is unclear whether these investments help or hurt firms and policy makers that are trying to get consumers to respond to a recall. The studies on recall effectiveness, to date, do not consider the potential impact of brands on a consumer's motivation to comply with a recall (Hoffer et al. 1994; Laufer and Jung 2010; Murphy and Rubin 1988; Rupp and Taylor 2002). Research on recall effectiveness has largely examined the firm's ability to learn from a recall (Haunschild and Rhee 2004; Kalaigian et al. 2013; Thirumalai and Sinha 2011). Efforts to examine consumer compliance with recall have been rare, especially from a strong theoretical perspective.

Findings from the brand management literature do not give clear indications on whether brand strength will enhance or diminish consumer response to recalls. Studies find that the influence of brand strength on consumer response to negative information, as reflected in a recall announcement, is complex. Negative information regarding strong brands might invoke a strong response due to expectancy violation or a weak effect due to buffering (Aaker et al. 2004; Ahluwalia et al. 2000; Dawar and Pillutla 2000), resulting



in higher or lower compliance to recalls. Given the uncertainty, the research questions that I address are:

1. Do brands influence the likelihood that consumers comply with a recall request?
2. Under what conditions do brands increase or decrease recall compliance?

The theoretical underpinnings for this study come from the branding literature, specifically the stream of research focusing on brands and negative publicity. Brands face negative publicity during product failures, recalls and withdrawals. In general, negative information is highly diagnostic; it is perceived to be more credible than positive information and usually receives more weight in the consumer decision-making process (Herr, Kardes, and Kim 1991; Skowronski and Carlston 1987). Hence, negative information can be damaging to brands if consumers update their brand beliefs. However, brands can have an effect on the way in which consumers and other stakeholders process information. Particularly brands can influence the attention and distortion of negative information (e.g., Dawar and Pillutla 2000). Using the argument underlying motivated reasoning, brands can influence whether consumers want to come to a particularly desired or a correct conclusion (Kunda 1990) regarding the negative information.

Employing these theoretical ideas, my research makes several contributions to theory and practice. *First*, this study contributes to the branding literature. This study examines conditions under which brands can help the firm increase recall effectiveness. Given that brand equity is a multi-dimensional construct (Keller 1993; 2003), I examine multiple brand dimensions and how they relate to recall compliance. *Second*, I contribute to the recall effectiveness literature by examining the role of marketing assets on recall

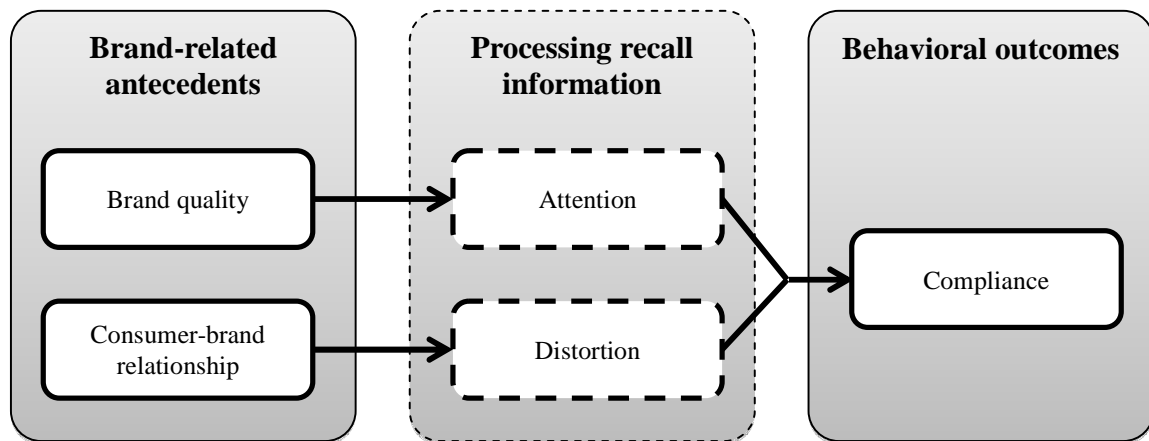
compliance. The impact of brands on different aspects of recall effectiveness is relatively unexplored even though their role on post-crisis brand evaluations and firm performance has received a lot of attention.

*Third*, this study contributes to the literature on product warnings, which focuses on the effective communication of dangers associated with product consumption. This literature includes studies on injurious product consumption, warning labels, and safety instructions (Andrews, Netemeyer, and Durvasula 1991; Celuch, Lust, and Showers 1998; Griffin et al. 1991; Patterson, Hunnicutt, and Stutts 1992; Pechmann et al. 2003). While I examine when brands increase or decrease compliance, I also investigate how policy makers and managers can shape communication to enhance compliance. Lastly, this study increases our general understanding of how consumers respond to a recall.

I hypothesize that consumers are generally more likely to comply with a recall when the recalled brand has a high quality reputation, but that this relationship varies depending on the strength of the consumer-brand relationship. Study 1A examines these hypotheses using a unique secondary data set of 359 recalls from the automotive industry. The results show that the compliance rate for recalls increase with the brand's reputation for quality, but this result does not hold for consumers who are very loyal. These findings are supported using an experimental study (Study 1B). Lastly, in Study 2, I address how managers and policy makers can overcome the dampening effect of the consumer-brand relationship on recall compliance.

This paper is structured as follows. In the next section, I review the current literature on consumer reactions to brands when negative information is present, and the implications of those findings for recall compliance. Given the characteristics of the

recall context, I argue that consumer compliance with a recall depends on whether they attend to and distort the recall information (Figure 3.1). I then advance hypotheses and test them in Studies 1 and 2. I then discuss my findings and their implications for theory and practice.



**Figure 3.1 Conceptual Framework (Essay 2)**

### 3.1 BACKGROUND: BRANDS AND RECALL COMPLIANCE

Recall compliance refers to consumers following the instructions of manufacturers as stated in a recall announcement, and seeking out the remedy that is provided. Remedies typically are repairs, returns, and refunds. Compliance can be influenced by a variety of factors, such as product and threat characteristics (Hoffer et al. 1994; Murphy and Rubin 1988; Rupp and Taylor 2002). Ensuring recall compliance should be important to firms for a variety of reasons. Even though one may argue that firms benefit from low compliance because it reduces the costs of repairing or replacing the recalled product, low compliance is undesirable for several reasons. If firms fail to retrieve and remedy recalled products, those products can still pose a threat to consumers

and their property. In case of a failure, it is likely that consumers will blame the firm for the failure (Folkes 1984). In addition, the accumulation of product failures can have an adverse impact on the firm's reputation and it may be blamed for an ineffective recall effort. Moreover, recalls are supervised by government agencies such as the FDA, CPSC or NHTSA who monitor recall effectiveness. If recall compliance is poor, these agencies can request a recall to be re-announced, which would result in additional negative publicity. Also, firms have to report the progress of the recall to these agencies for a longer time period, tying up resources in product recall management. Thus, there are many reasons why firms ought to be concerned with recall compliance.

A variety of factors influence whether consumers comply with a recall. Prior research has dealt with how threat and product characteristics influence recall compliance. I propose that brand characteristics can also explain some of the variation in consumer compliance behavior. The branding literature shows that brands can alter the way in which consumers' process negative information, such as information about a product recall. Specifically, studies have shown that consumers might react more or less strongly to a recall for strong brands - brands that have high equity in the minds of the consumers (Keller 1993).

Brands influence whether consumers pay attention to recall information. Brands set expectations in the marketplace. Brands can act as a signal for unobservable quality (Rao, Qu, and Ruekert 1999) and can reduce the risk consumers' associate with a purchase (Erdem and Swait 1998). A recall, however, contrasts with the expectations that consumers might have if the brand is of high quality. It informs consumers that a product that they currently own can fail and harm them or their property. Consumers tend to be

sensitive to information that conflicts with their expectations (Heath and Chatterjee 1995; Dawar and Pillutla 2000) and negative information, such as information about a recall, tends to be highly credible and diagnostic (Skowronski and Carlston 1987; Herr et al. 1991). If consumers feel like they were let down by a brand's actions that are inconsistent with its promise, they will blame the brand for the failure (Folkes 1984). Moreover, under these circumstances, consumers will expect the firm to provide restitution for the broken promise (Folkes 1984). Hence, a recall provides information that a brand falls short of the expectations that consumers have, and this expectancy violation should motivate them to comply with the recall.

But brands also influence whether consumers distort negative information that conflicts with their prior attitudes toward the brand. Consumers may rely more heavily on their positive attitudes when faced with negative brand-related information, which alleviates the negativity effect (Ahluwalia 2002). As negative information becomes less salient, consumers may not experience disconfirmation to the same degree, as do consumers who process the recall information without counter-arguing its seriousness. Since the level of disconfirmation influences the motivation of a consumer to respond to a recall, their level of compliance to a recall should also vary depending on whether they will process the recall information without downplaying its gravity.

In short, brands influence how consumers process information, which has consequences for their motivation to comply with a recall. Depending on the brand that is involved in the recall, consumers may be more or less likely to return a recalled product. In the following section, I advance hypotheses regarding the influence of brand quality on recall compliance.

### 3.2 HYPOTHESES DEVELOPMENT

The reputation that a brand has for its quality sets expectations in the marketplace. More specifically, the higher a brand's quality reputation, the higher the expectations that consumers have about the brand's performance. Consumers do not expect such a brand to fail and if information about potential failures, such as a recall, becomes available, their expectations about the product are disconfirmed. In contrast, if consumers receive a recall notification for a low quality brand, their expectations are not disconfirmed to the same degree as they would be more a high quality brand.

A recall for a high quality brand violates the implicit norms in the relationship between the brand and the consumer. Aaker and colleagues (2004) suggest in their study on brand transgressions that consumers may feel betrayed by such a transgression, thinking that "this is not the brand I thought it was" (p. 13). Consumers are thus more likely to pay attention to the recall because it contrasts with their expectations of high quality. Moreover, consumers do not expect the brand to fail and they may be more likely to subsequently blame the manufacturer for the failure (Griffin et al. 1996; Folkes 1984). As a result, they expect to be compensated for the faulty product (Kelley and Davis 1994). In essence, consumers should be more likely to seek out the remedy when the brand has a high quality reputation than when it has a low quality reputation.

However, the extent to which consumers experience disconfirmation may vary depending on their relationship with the brand. There are instances in which consumers are less responsive to a recall, even if the recall provides information that violates their strongly held assumptions about the brand's performance. Prior research has shown that consumer-brand relationship can influence the way in which consumers process

information that is inconsistent with prior attitudes. Specifically, consumers who have strong attitudes towards a brand are more likely to fall back on their positive attitudes when receiving negative information about the brand (Ahluwalia 2002). Consumers therefore effectively counterargue information that contrasts with their attitudes (Ahluwalia et al. 2000) and as a consequence consumers are able to resist negative information even when it contradicts a central promise made by the brand (Pullig et al. 2006). This means that even if a recall targets a high quality brand, consumers are able to bias this information in such a manner that they do not experience a high degree of disconfirmation. This is particularly likely if the information is seen as not too negative (Einwiller et al. 2006; Liu, Wang, and Wu 2010). Given that there is a possibility that a recalled product might or might not fail, consumers can discount the recall information because there is a chance that the product that they own works properly, especially if they have strong attachment to the brand. Brand characteristics that enable the distorting of negative information are reflected in different dimensions of the consumer-brand relationship, such as familiarity, identification, commitment, or attachment (Einwiller et al. 2006; Liu, Wang, and Wu 2010; Schmalz and Orth 2012; Brady et al. 2008). Therefore, I expect that consumers will be less likely to react to a recall of a high quality brand if they have a strong relationship (and strong prior attitudes) with the brand because their expectations of the brand's performance are disconfirmed to a lesser degree than if they have a weak relationship with the brand.

**H1:** The higher the quality reputation of the recalled brand, the more likely it is that consumers comply with a product recall.

**H2:** The association between brand quality reputation and recall compliance will be weaker as the strength of the consumer-brand relationship increases.

### 3.3 STUDY 1A: BRANDS AND RECALL COMPLIANCE - AUTOMOTIVE INDUSTRY

#### Sample and Data Sources

The purpose of Study 1A is to test H1 and H2 using real-world data from the automotive industry. Automotive industry serves as an effective context to test the hypotheses for a variety of reasons. Using the automotive industry as my sampling frame allows us to collect detailed information about the return rates after a recall. The National Highway Traffic Safety Administration (NHTSA), the agency overseeing the initiation and completion of recalls for vehicles, tires, and vehicle-related equipment, publishes information on the effectiveness of a recall. In accordance with Federal Regulation 573.6, firms that initiate a recall have to provide quarterly progress reports for at least six quarters, starting with the quarter in which vehicle owners were notified of the recall. These quarterly progress reports include information about the recalled product population, the number of products remedied, and the number of consumers that could not be reached. The NHTSA may require the manufacturer to extend the reporting period if the percentage of product returned after the recall initiation is deemed insufficient. Apart from data availability, the focus on the automobile industry also enhances the internal validity of my findings.

For reasons of data availability, I limit the sample to vehicle recalls of major automakers from January 2006 to March 2010. Since I am interested in the impact of product quality on recall compliance, I restrict the data to recalls that include only one brand to separate out the brand effect. Furthermore, recalls are excluded if they are label



recalls<sup>11</sup>, involve a remedy at the consumer-level, or include medium- and heavy-duty trucks, motorcycles, or commercial vehicles. Recalls are also excluded if they target fewer than 1000 units, since manufacturers may pursue different notification strategies for smaller recalls (i.e., calling consumers) that could alter return behavior in general, whereas these notification strategies would not be feasible for larger recalls. In total, 359 recalls are included in the final sample.

#### Dependent Variable: Recall compliance

An overview of the variables used in this study, their operationalization, and data sources can be found in Table 1. Recall compliance was measured using *return rate*, collected from the quarterly progress report that each manufacturer submits to the NHTSA to monitor recall progress. The return rate is measured at the end of the sixth quarter after recall information is disseminated to consumers by the firm via recall notification letters. The quarter in which the firm sends out notification letters to consumers is the first out of six quarters for which it has to report information about product returns. If the recall notification was sent out in January of any given year, the first progress report would be due the end of the first quarter (March) in that year. Hence, the return rate reflects the proportion of recalled products returned and repaired approximately 1.5 years after vehicle owners were notified of the recall. The measure used in this study adjusts for the number of products for which notifications could not be delivered to consumers.

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<sup>11</sup> Label recalls are recalls where parts of the product are incorrectly labeled, such as tires or information in manuals. Manufacturers can remedy this product error by sending out new labels or new manuals to consumers with the recall notification. Consumers can install these labels themselves and therefore it is not possible to track recall effectiveness through compiling information about product returns to dealerships.

### Independent Variables

*Brand quality reputation* (BQR) was measured with data from *Consumer Reports* using a method outlined by Rhee and Haunschild (2006) and Rhee (2009). Brand quality reputation can range from 0 to 5 with higher scores indicating higher perceptions of quality. The *consumer-brand relationship strength* (C-B Relationship) was measured using brand loyalty. The more loyal consumers are, the more likely it is that they have a strong relationship with the brand. A measure for brand loyalty was obtained from a survey conducted by J.D. Power Associates on customer retention. This annual survey indicates how many consumers of a specific brand decided to purchase a vehicle of the same brand when considering a new car. The resulting measure, therefore, is the percentage of consumers that decide to purchase a car of the same brand that they currently own.

I control for several factors that are likely to influence a consumer's return behavior. Whether a recall was publicized using consumer-centric publications could influence the level of compliance. To capture this, I include a dummy that indicates whether the product recall was published in *Consumer Reports*. I also include a dummy to signify whether the recalled brand is targeted towards the luxury segment or the mass market. Consumers may purchase luxury brands for their symbolic value and information about a product defect may decrease the perceived value of product. Thus, these consumers may be more motivated to return a vehicle soon after the recall notification to maintain the product's value. In addition, prior studies on recall effectiveness have shown that recalls including inaugural models are more effective and ones including older models are less effective. Not only does it get increasingly difficult for firms to contact

consumers but also the relationship that consumers have with the product gets stronger as they accumulate experience with the product. Hence, a recall may not motivate a consumer who has had years of positive product experiences to return the product fast. I include a dummy variable for *inaugural models* and one for *4+ year-old models* included in the recall. These two variables may not be mutually exclusive since the product population included in recalls may span multiple years.

I control for *repair time* since the length of the time period that the consumer has to allocate for repair should impact their motivation to seek out a remedy fast. Specifically, I expect that the longer the repair takes the less motivated the consumer is to return the product because it is inconvenient for a consumer to remain without a car for a long time-period. I collected information about the length of the repair process from the owner notification letters sent out by a manufacturer. If a time range is listed, I use the maximum repair time stated in the letter. If a manufacturer stated that a repair would take half a day, I assumed that the consumer would remain without a car for four hours.

The dataset includes observations from various automakers in the U.S. market. Due to the fact that there are multiple observations for each firm, I use dummies for other firm-specific factors that might influence recall compliance. I also control for types of components involved in the recall to account for different perceptions of threat severity. Finally, I control for year effects in the final model.

### Model

Since the product return rate reflects the percentage of products that have been returned and repaired, the non-normal distribution of the dependent variable is likely to violate assumptions of the ordinary least squares regression model. Therefore, I estimate

a generalized linear model using maximum likelihood for each recall  $i$  that can account for the distribution of the dependent variable with the logit link (Papke and Wooldridge 1996, Table 3.1). The model is estimated using cluster-robust standard errors.

**Table 3.1 Regression Model for Recall Compliance**

$\ln\left(\frac{\text{Recall compliance}_i}{(1-\text{Recall compliance}_i)}\right) = \beta_0 + \beta_1 * BQ \text{ Reputation}_i + \beta_2 * C - B \text{ Relationship}_i + \beta_3 * BQ \text{ Reputation}_i * C - B \text{ Relationship}_i + \Sigma \text{Controls}_i$		
Variable	Operationalization	Data source
Recall compliance	Number of vehicles repaired/(Recall population-Unavailable vehicles)	Quarterly Progress Reports
BQ Reputation	Brand quality rating on a scaled of 1-5 (Rhee 2009; Rhee and Haunschild 2006)	Consumer Reports
C-B Relationship	Percentage of consumers replacing vehicle with a vehicle of the same brand	J.D. Power Associates
Control variables	Operationalization	Data source
Publicity	1 if recall was publicized in Consumer Reports	Consumer Reports
Inaugural model	1 if recall involves an inaugural model, 0 otherwise	NHTSA
4+ year old model	1 if recall involves a model at least 4 years old at the time of the recall, 0 otherwise	NHTSA
Luxury brand	1 if vehicle is marketed in the luxury segment, 0 otherwise	J.D. Power Associates
Repair time	Log(Time needed for the repair (in minutes))	Notification letter

**Table 3.2 Correlation Matrix and Descriptive Statistics**

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Recall compliance	.77	.18	1.00							
(2) BQ Reputation	4.21	.34	-.25	1.00						
(3) C-B Relationship	.44	.12	-.15	.33	1.00					
(4) Publicity	.09	.29	-.11	.07	.09	1.00				
(5) Inaugural	.67	.47	.38	.07	.02	-.19	1.00			
(6) 4+ Years	.23	.42	-.45	-.04	-.01	.14	-.61	1.00		
(7) Luxury	.30	.46	.31	-.42	-.12	-.15	-.07	.07	1.00	
(8) Repair Time	91.40	80.05	-.03	.18	.26	.12	-.16	.12	.01	1.00

## Results

The summary statistics and correlation matrix can be found in Table 3.2. Since some variables show relatively high intercorrelation, I mean-center all continuous variables to reduce issues with multicollinearity. The variance inflation factors (Table 3.3) for both the reduced and the full model are below commonly used benchmarks indicating that multicollinearity is of little concern when interpreting the results of the GLM model.

In H1, I hypothesized that brand quality has a positive association with recall compliance. In line with this hypothesis, I find evidence that brand quality is positively associated with product return rates ( $p < .05$ ). H2 posits that the relationship between brand quality and compliance is weaker as the strength of the consumer-brand relationship increases. The beta-coefficient for the interaction effect between brand quality and loyalty is negative and significant ( $p < .05$ ) in support of H2. I further find evidence for a strong main effect of brand loyalty (negative,  $p < .01$ ) on return rates.

*Control variables.* Regarding the influence of publicity, the results show that recalls that were announced in *Consumer Reports* have a higher completion rate than those that were not ( $p < .05$ ). The results further show that product age has a significant impact on the return and repair rate of recalled products. As expected, recalls involving newer (older) models are associated with higher (lower) return rates respectively ( $p < .01$ ). The coefficient for the dummy indicating a luxury brand is in the expected direction (positive) and significant ( $p < .01$ ). The coefficient for repair time is opposite to my expectations but insignificant. Finally, I find that 8 out of 17 firm dummies are significant which suggests that there is variation between firms with regards to the return rates they

achieve six quarters after initiating a recall. Also, 8 out of 19 component dummies and 2 out of 5 year dummies are significant.

**Table 3.3 Brand Quality, Loyalty, and Recall Compliance**

DV = Recall Compliance	Coeff.	S.E.
BQ Reputation	.914 **	.536
C-B Relationship	-1.224 ***	.515
BQ Reputation*C-B Relationship	-2.744 **	1.336
Publicity	.233 **	.133
Inaugural Model	.479 ***	.094
4+Years Model	-.941 ***	.126
Luxury Brand	.746 **	.345
Repair Time	.000	.001
Constant	1.151 ***	.400
Firm Dummies	8 out of 17 significant	
Year Dummies	2 out of 5 significant	
Component Dummies	8 out of 19 significant	
Log pseudolikelihood	-96.804	
BIC	-1330.45	
Observations	288	
Highest VIF	1.56	

\* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ , one-tailed tests, standard errors adjusted for firm clusters.

### Discussion

The automotive study supports my hypotheses that brand characteristics influence consumer compliance with a recall. Specifically, I find evidence that compliance is greater for high quality brands but only if consumers are not too strongly attached to the brand. This study demonstrates the external validity of the impact of brands on consumer compliance. To test the internal validity of the results, I use an experimental study.

### 3.4 STUDY 1B: BRANDS AND RECALL COMPLIANCE - EXPERIMENTAL STUDY

A total of 152 undergraduate students were recruited to participate in the experiment from an introductory marketing class at a large public university in the Southeast. Participants received partial course credit in exchange for their participation.

*Design.* To test H1 and H2, I implemented a 2 (brand quality: high and moderate) x 2 (commitment of consumer toward the target brand: present and control) between-subjects design. In this study, I focus on commitment of the consumer to the brand as a reflection of the strength of the consumer-brand relationship. Even though the strength of consumer-brand relationship is reflected in many variables, a public commitment to the brand indicates that consumers are willing to signal to others that they have chosen this particular brand over others. Recall compliance was measured by asking respondents the likelihood with which they would return the recalled product to the manufacturer (7-point Likert scale, anchors: Strongly disagree – Strongly agree).

*Brand quality manipulation.* To manipulate brand quality, consumers received additional background information about the focal product, including ratings of the product's performance and examples of consumer reviews (Figure 3.2). In the high quality condition, participants were told that the product received a rating of 4.5 out of 5 stars from consumers (Figure 3.3). Two reviews indicated that consumers thought that the product was of good quality and that they loved using it. In the moderate quality conditions, participants were told that the product was rated 2.5 out of 5 stars. The reviews indicated that consumers were unsure of the quality of the product and did not expect the product to last very long (refer to Appendix A for the full survey).

## LUMINIX “Powermat” Wireless Charger



### Product details

- A simple, fast and efficient way to keep all of your personal electronic devices charged
- Portable Powermat folds up for easy travel
- Four charging positions--three wireless, and one wired USB connector for charging a fourth device
- Individual tone and light controls; auto power-off for each device when charging is complete

### **Figure 3.2 Product Description**

*Consumer-brand relationship strength manipulation.* To manipulate the strength of the consumer-brand relationship, I focused on the commitment of the consumer to the brand. Brand commitment is one dimension that reflects the strength of the consumer-brand relationship (Fournier 1998). In Study 1A, the strength of the consumer-brand relationship was measured using a behavioral loyalty measure. Brand commitment, in contrast, reflects attitudinal loyalty to the brand and has been shown to influence the use of proattitudinal arguments when negative information targets the brand (Ahluwalia et al. 2000).





### Product Reviews

According to online reviews, consumers gave the Powermat the following rating:



*“I LOVE my Powermat. My parents got me one for Christmas and it is so easy to use. Now I can charge my iPod, iPad and Nintendo at the same time!!! Very sturdy, dropped it once already and it still works perfectly.”*

*“I use the Powermat every day. I travel a lot and it’s super convenient. It seems to be of good quality, I have not yet had any problems with the charger. Thumbs up!”*

### **Figure 3.3 Brand Quality Manipulation (High Quality Example)**

The brand commitment manipulation was adapted from prior research (Ahluwalia et al. 2000) to fit the context of this study. In the brand commitment condition, consumers were asked to rate the product and come up with a slogan that the manufacturer could use for their promotional materials. Consumers then filled in a release form to allow Luminix to use their rating and slogan for promotional purposes. Hence, consumers made a public commitment to the brand by allowing the company to freely use their ratings and slogans. In the control condition, consumers did not receive the brand commitment manipulation. They rated the product, but they did not create a slogan or fill out the release form.

LUMINIX would like to use a statement from you in their promotional materials for their product launch in South Carolina.

**Please write down a slogan that you would suggest LUMINIX use to market their product in South Carolina**

### **Release Form**

I hereby release the statements or the slogans above, that I am voluntarily submitting, to LUMINIX to use it as they see fit, for their promotional materials.

I HAVE READ, UNDERSTAND, AND AGREE TO THE POLICIES AS STATED ABOVE.

### **Figure 3.4 Brand Commitment Manipulation**

*Procedure.* Consumers received background information about a fictitious company called Luminix that produces wireless charging systems among other products. The product category was chosen because the product (charger) is expensive enough for consumers to be motivated to return the recalled product rather than discard it. Also, it is a newer product category where many small companies operate, which reduces the likelihood that respondents are very familiar with the brands in this product category. Respondents were told that Luminix was planning on selling their product line of wireless chargers nationwide. Respondents then received either the high or moderate quality manipulation, followed by the public commitment manipulation. Thereafter, they

answered questions about the product’s quality, and were subsequently given the target stimulus, the recall notification. After they read the recall notification, respondents were asked whether they would be likely to return the product to the manufacturer. They also provided responses to demographic questions.

### Results

After cleaning the data, which included removing respondents that 1) did not complete the entire experiment 2) did not sign the release waiver 3) failed manipulation checks and could not correctly remember the type of product that was used in the study or 4) whose responses constituted extreme observations (based on assumptions of a normal distribution), I ended up with a final sample of 137 respondents (Table 3.4).

**Table 3.4 Final Sample Study 1B**

Initial sample	152
- Failed manipulation checks	2
- Unsigned waivers	6
- Removed outliers	1
- Incomplete observations	6
<b>FINAL SAMPLE</b>	<b>137</b>

*Brand quality manipulation.* Respondents answered four questions about the quality of the Luminix brand to check the success of the quality manipulation (please refer to Appendix A). The one-way ANOVA for brand quality is significant ( $F(1, 136) = 40.94, p < .01$ ), indicating that the quality manipulation was successful. Respondents rated Luminix higher in the high quality condition ( $M=5.07$ ) than in the moderate quality condition ( $M=4.14$ ).



## NEWS from CPSC

U.S. Consumer Product Safety Commission  
Office of Communications

Washington, D.C.

FOR IMMEDIATE RELEASE

December 21, 2011

Release #12-063

Firm's Recall Hotline: (877) 856-3232

CPSC Recall Hotline: (800) 638-2772

CPSC Media Contact: (301) 504-7908

### LUMINIX Recalls Wireless Charger Mat Due to Explosion Hazard

WASHINGTON, D.C. – The U.S. Consumer Product Safety Commission, in cooperation with LUMINIX, today announced a voluntary recall of the following consumer product. Consumers should stop using recalled products immediately unless otherwise instructed. It is illegal to resell or attempt to resell a recalled consumer product.

**Name of Product:** LUMINIX “Powermat” Wireless Charger

**Units:** About 20,000

**Manufacturer:** LUMINIX Inc, of Seattle, WA

**Hazard:** The charger mat contains a defect which can cause overheating, posing a fire hazard.

**Incidents/Injuries:** LUMINIX has received three reports of smoke and one report of fire.

**Description:** This recall involves the LUMINIX-branded charger mat part of the LUMINIX “Powermat” Wireless Charger system. LUMINIX and a part number beginning with “CTL” are printed in white lettering on the product.

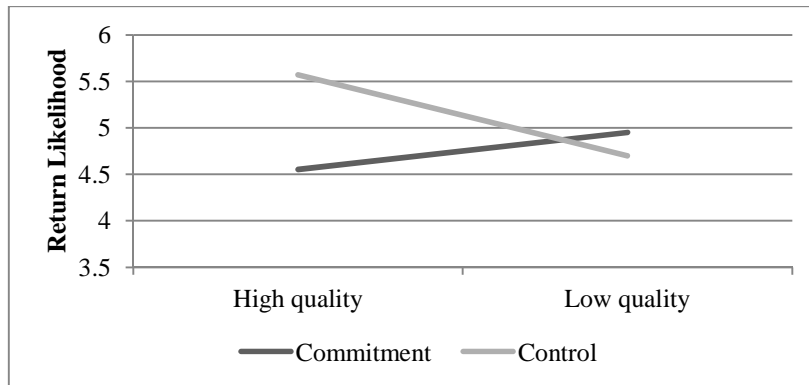
**Sold exclusively at:** Retail stores in WA, OR, CA, NV, and AZ and online at [www.luminix.com](http://www.luminix.com) between February 2011 and October 2011 for about \$50.

**Remedy:** Consumers should immediately stop using the charger mat. Consumers can contact LUMINIX for instructions on how to return the product for a repair.

**Customer contact:** For more information, contact LUMINIX toll-free at (877) 856-3232 between 9 a.m. and 4:30 p.m. CT Monday through Friday, or visit the firm's website at [www.luminix.com](http://www.luminix.com)

### Figure 3.5 Recall Notification Manipulation

*Recall compliance.* The two-way ANOVA for return likelihood, with gender as a covariate, is significant ( $F(4, 136) = 2.41, p = .05$ ). Gender was included since prior research on health-related communication has shown strong gender effects (Keller and Lehmann 2008). I do not find evidence of main effects for either brand quality or public commitment, but their interaction is significant ( $F(1, 136) = 3.38, p = .07$ , Figure 3.6). Contrasts show that in the control condition, where respondents did not receive the commitment manipulation, return likelihood is higher in the high quality than in the low quality condition ( $M_{\text{high, control}} = 5.57$  vs.  $M_{\text{low, control}} = 4.70, p = .05$ ). This finding supports H1 that, in general, consumers are more likely to comply with a recall and return the product when the recalled brand is of high quality. However, when respondents completed the commitment manipulation, their likelihood of returning the recalled product in the high quality condition dropped significantly ( $M_{\text{high, commit}} = 4.55$  vs.  $M_{\text{high, control}} = 5.57, p = .06$ ). This finding supports H2, which posits that consumers are more likely to respond to a recall of a high quality brand when they have a weak relationship with the brand compared to a strong relationship. Also, the results support a significant main effect for the covariate gender ( $F(1, 136) = 3.57, p = .06$ ) in that females are more likely to return the recalled product than male respondents.



**Figure 3.6 Brand Quality, Commitment and Return Likelihood**

Discussion Studies 1A and 1B

The findings from Study 1A and 1B support the hypothesis that consumers are more likely to comply with a recall when the quality reputation of the recalled brand is high, but this propensity declines when they are loyal to the brand. Thus, the brand has an influence on how consumers respond to a recall.

I hypothesized that the reason why consumers are less likely to comply with the recall of a high quality brand with which they have a strong relationship is because they resist negative information (e.g., Ahluwalia et al. 2000). It should be feasible to mitigate the insulating effect of brand relationship if the recall information is more salient, and it becomes difficult for consumers to dismiss this information. One way to do so would be to increase the relevance of the recall information to consumers, thereby reducing the likelihood that they will downplay the seriousness of the recall notification. Self-referencing makes information more relevant to consumers and has been shown to increase memory and recall (Symons and Johnson 1997; Burnkrant and Unnava 1989). As the relevance of the recall information increases, it should become more difficult for consumers to effectively counterargue the negative information. In contrast, if the recall

information does not specifically reference the consumer, they might resist it more easily and come up with more counterarguments. Consequently, this processing of recall information in conditions where the recall information is not self-referenced should result in lower compliance. Therefore, I expect that

**H3:** For high quality brands, self-referencing of the recall information increases compliance to a recall when consumers have a strong relationship with the recalled brand (compared to other-referencing or no referencing).

### 3.5 STUDY 2: MODERATING EFFECT OF SELF-REFERENCING

A total of 185 undergraduate students were recruited to participate in the experiment from an introductory marketing class at a large public university in the Southeast. Participants received partial course credit in exchange for their participation.

*Design.* The design of Study 2 was a 2 (commitment of consumer toward the target brand: present and control) x 3 (type of referencing: self-referencing, other-referencing, and no referencing) between-subjects design. Recall compliance was measured the same way as the consumer's likelihood to return the recalled product. The brand commitment manipulation was identical to the one in Study 1B.

*Type of referencing manipulation.* I varied the recall information such that the product hazard could occur to the respondent directly (self-referencing) or to others (other-referencing). These manipulations are in line with those used in other studies (Burnkrant and Unnava 1989; Keller and Block 1996). The "no referencing" condition did not specify whether the hazard could occur to the consumer or others, similar to the recall notification used in Study 1B (refer to Appendix B for the full survey).

*Procedure.* Study 2 used the same company and background information as Study 1B for the high brand quality condition. After reading the background information, respondents then either completed the brand commitment manipulation or proceeded with the study without completing it. After the brand commitment manipulation, respondents answered whether they would be likely to purchase the product once it becomes available. Respondents then received the recall notification in which the type of referencing manipulation was embedded. After they read the recall notification, respondents were asked whether they would be likely to return the product to the manufacturer as well as a few demographic questions.

### Results

The data was cleaned using the same procedures as in Study 1B. The final sample included 153 observations (Table 3.5).

**Table 3.5 Final Sample Study 2**

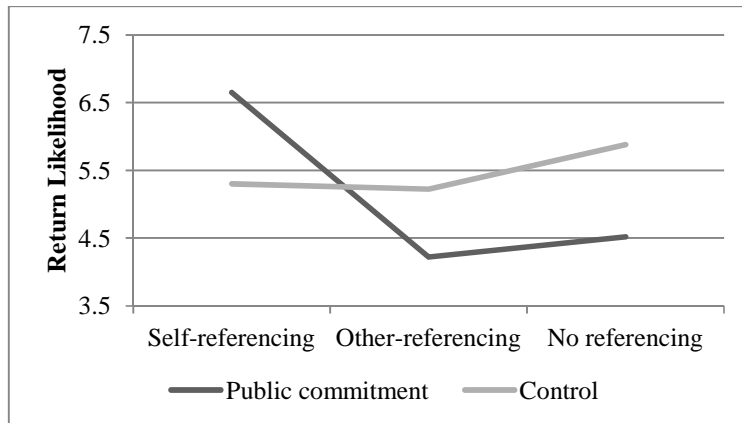
Initial sample	185
- Failed manipulation checks	3
- Unsigned waivers	3
- Removed outliers	10
- Incomplete observations	16
<b>FINAL SAMPLE</b>	<b>153</b>

*Brand commitment manipulation.* A one-way ANOVA with gender as a covariate reveals that the manipulation of public commitment has a significant impact on whether consumers are likely to purchase the product ( $F(2, 152) = 4.92, p < .01$ ). The main effects for commitment ( $F(1, 152) = 3.41, p = .07$ ) and the covariate gender ( $F(1, 152) = 6.27, p < .05$ ) are significant. Specifically, participants in the high commitment condition are more likely to purchase the product once it becomes available ( $M_{\text{high}} = 4.93$ ) compared to



participants in the low commitment condition ( $M_{\text{low}} = 4.41$ ). Also female respondents are more likely to purchase the product than male respondents.

*Recall compliance.* The two-way ANOVA for return likelihood with gender as a covariate is significant ( $F(6, 152) = 5.44, p < .01$ ). The main effect of type of referencing is statistically significant ( $F(2, 152) = 5.80, p < .01$ ). Respondents are more likely to return the product in the self-referencing than in the other-referencing and no referencing conditions ( $M_{\text{self}} = 5.97$  vs.  $M_{\text{other}} = 4.72$  vs.  $M_{\text{noref}} = 5.20, p < .05$ ). Further, the interaction between commitment and type of referencing is significant ( $F(2, 152) = 7.80, p < .01$ , Figure 3.7). As predicted in H3, consumers in the public commitment condition are more likely to respond to the recall notification when the information is self-referenced ( $M_{\text{high, self}} = 6.65$ ) compared to when it is other-referenced ( $M_{\text{high, other}} = 4.22$ ) or not referenced ( $M_{\text{high, noref}} = 4.52, p < .01$ ). Also, self-referencing is more effective when consumers have a strong relationship with the brand than when they do not ( $p < .05$ ), whereas other-referencing and no referencing increase compliance when consumers do not have a strong relationship with the brand (both  $p < .05$ ). This finding of a consumer's differential response to a recall depending on the strength of their relationship with the recalled brand replicates the results from the high quality condition in Study 1B.



**Figure 3.7 Commitment, Type of Referencing and Return Likelihood**

### 3.6 GENERAL DISCUSSION

The objective of this study is to investigate the role of brands in the recall return process. Given that previous literature finds that brands could potentially increase or decrease consumer response to a recall, I investigated following research questions:

*Do brands influence the likelihood that consumers comply with a recall request and under which conditions do brands increase or decrease recall compliance?*

In this manuscript, I demonstrate how brands influence the likelihood that consumers comply with a recall notification. The focus of this study is on high quality brands and conditions under which consumers' respond to recalls of these brands. In Studies 1A and 1B, I find that, in general, high quality brands increase recall compliance but that the strength of this association differs depending on whether consumers have a strong relationship with the brand. Specifically, a stronger consumer-brand relationship reduces the likelihood that consumers would comply with a recall for a high quality brand.

Whether a strong brand relationship leads to discounting of the recall message depends on how the consequences of the product defect are communicated. The findings from Study 2 suggest that making the recall notification relevant to the consumer through self-referencing can attenuate the “buffering” effect of a strong consumer-brand relationship. This finding is in line with findings from previous literature that brands are less likely to lead to biased information processing if consumers have a reason to arrive at a correct rather than a desired conclusion (Ahluwalia 2002).

### Theoretical Contributions

This study makes several theoretical contributions. The first contribution is to the branding literature. Given the conflicting findings as to whether strong brands hurt or help the recall process, I demonstrate that one has to consider brand-related information processing biases to understand how consumers respond to negative information about a brand that is conveyed by recall announcements. There are certain brand characteristics that increase attention to negative information. I show that brand quality increases the likelihood that consumers will attend to negative information involving a product recall because it is inconsistent with prior expectations. Although attention to negative information is a prerequisite for a strong reaction, consumers still can bias the negative information even if they attend to it. Certain brand dimensions can increase the likelihood that consumers place less weight on negative information and engage in defensive information processing. I show that the strength of the consumer-brand relationship gives consumers incentives to discount negative information. Hence, different brand dimensions can have different influences on how consumers process negative information which, taken together, might be able to reconcile the conflicting findings as some studies

only examine the brand expectations and others only examine consumer-brand relationships.

The manuscript demonstrates how important it is to consider brands when investigating recall effectiveness. Brands can influence compliance beyond other product characteristics and threat characteristics. Even though researchers have examined differences in recall response behavior (Hoffer et al. 1994; Murphy and Rubin 1988; Rupp and Taylor 2002), they did not focus on the type of brand that is being recalled even though brands play a central role in consumption decisions. Moreover, I show that the effectiveness of different health communication strategies can be influenced by brands. Prior research has shown that other-referencing is influential when communicating health protective behavior (Keller and Block 1996; Keller and Lehmann 2008; Pechmann et al. 2003), but I find that when brands are taken into consideration, self-referencing should be preferred over other-referencing.

#### Managerial and Policy Implications

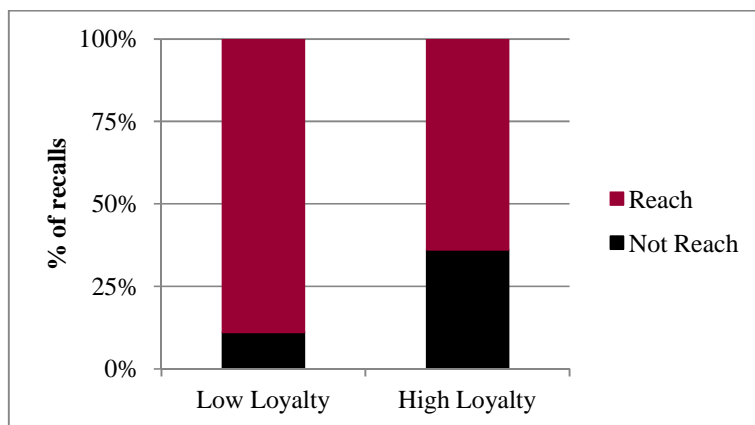
The finding that brands influence how consumers respond to product recalls has several implications for managers and policy makers. The most important implication for both managers and policy makers is that one has to take into account the brand of the recalled product when developing a strategy for recall implementation. To date, the focus of studies on recall compliance has been on tangible product and threat characteristics. Particularly in the health communication literature, researchers and policy makers are concerned with how to better communicate the threat of a recalled product to consumers, not taking into consideration that brands also influence how consumers respond to a recall. One reason why the role of brands may be understudied in this context is because

consumers may not be able to voice that they respond differently to recalls based on the brands involved. The GAO conducted focus groups into what motivates consumers to respond to recall notifications and according to their results consumers want to be able to better understand the severity of the defect and the convenience of getting the remedy (Albright 2011). They may not be aware that the recalled brand and their relationship with the brand influence their response. Nevertheless, the investments that marketing strategy makes into building and maintaining strong brands influence consumers' motivation to the product recall as well.

Specifically, I find evidence that brands can help firms implement an effective recall. Studies 1A and 1B show that brand quality reputation is positively associated with recall return rates. Hence, brand quality can help in increasing recall effectiveness. Researchers have provided some evidence that awareness of a recall is higher and the media is more likely to report recalls of high quality brands (Dawar and Pillutla 2000; Rhee and Haunschild 2006). Consumers in the automotive industry should generally be aware of a recall because firms have access to owner records and send out personalized recall notifications, so my results could suggest differences in whether consumers attend to this information. The positive association between brand quality and recall return rates is in line with my assumption that consumers are more likely to attend to information that conflicts with their prior expectations. However, this association is contingent on the brand-consumer relationship.

Achieving a certain level of compliance is further relevant from a recall management perspective. The progress of a recall is monitored by the government agency responsible for the product category. In the case of the auto industry, the NHTSA can

require that firms re-announce a recall to increase compliance. If the NHTSA determines that recall compliance is too low, a firm not only has to send out additional notifications but also has to report the progress of the recall beyond the mandated six quarters. According to a 2011 GAO report, the minimum completion requirement after six reporting quarters is 65%. If the firm at this point has remedied less than this proportion of vehicles, then the NHTSA can recommend that the firm send out additional recall notifications. Post-hoc, I analyzed the proportion of recalls involving a high quality brand that either reached or failed to reach this minimum requirement. If consumers of the high quality brand are very loyal, 36% of recalls do not reach the 65% completion rate compared to 11% of recalls when consumers are less loyal (Figure 3.8). Therefore, the strength of the consumer-brand relationship has significant implications on the extent to which recalls may be subject to supervision by a governmental agency in the long run.



**Figure 3.8 Proportion of Recalls of High Quality Brands Reaching Minimum Recall Completion Rates after 18 Months**

Managing the product return process is important not only from the perspective of complying with the requirements of a regulatory agency. Research on product and service

failure shows that a well-managed recovery process is key to ensuring continued customer satisfaction and repeated patronage (Maxham and Netemeyer 2002). Given that some of the consumers of such brands do not readily respond to recall notification, it becomes increasingly likely that the recalled product will fail as consumers continue to use it. As the number of product failures stack up, it becomes increasingly likely that this information is incorporated in the brand evaluations of not only current but also prospective consumers. High quality brands with highly loyal consumers, paradoxically, could risk losing their value proposition as it becomes more difficult for them to remove the product and remedy the defect. Moreover, consumers of high quality products also have higher expectations regarding the resolution of a product failure (Kelley and Davis 1994), and may also be more likely to blame the company when the product is deemed unreliable, especially if they do not have a strong relationship with the brand.

Since a high quality brand can theoretically help a company gain recall compliance, it is important to understand how firms might be able to break through the buffer of the consumer-brand relationship. In Study 2, I examined how different types of referencing can influence compliance with a recall. The findings suggest that the buffering effect of a strong brand relationship is attenuated when the recall notification highlights that the product can cause damage to the consumer directly. The buffering effect is present, however, if the product is listed as causing damage to others. Hence, managers should stress the risk that the product presents to the consumer when announcing a recall, at least for consumers with a strong relationship with the brand. However, given that health communication literature generally points out that other-referencing is more effective than self-referencing when communicating threats to

consumers (e.g., Keller and Lehmann 2008), further research should investigate the conditions under which brands increase the effectiveness of self-referenced messages. Keller and Block (1996) find that self-referencing can result in defensive information processing when fear appeals are used. Other-referencing reduces defensive information processing which results in a greater likelihood that consumers will respond to the message. One explanation of why I do not find evidence that self-referencing is less effective than other-referencing is that the recall notification may not be considered as a fear appeal even when it is self-referenced. A post-hoc analysis of the data used in Study 2 reveals that there are no differences in reported fear across the six conditions. The overall mean for perceived fear is 3.18 on a 7-point Likert scale where higher values indicated higher levels of perceived fear. Hence, the levels of fear are fairly low, which supports the argument that a recall notification should not be considered a fear appeal when brands are present. I cannot say whether or not the same would hold when no information about the recalled brand is given, but since recall notifications always include product and brand information, this scenario – even though interesting – is not practical.

This study also has important implications for policy makers. Policy makers are extremely concerned with improving recall effectiveness. In 2011, the GAO inquired into recall effectiveness in the automotive industry. In addition, for consumer products, the CPSC has compiled information on how to improve consumer response to recalls. Besides the three identified studies on product return rates, there is a large body of research on the effectiveness of product warnings and labels. I show that policy makers need to factor in the brand of the recalled product in addition to warning and consumer



characteristics. Managers spend a lot of effort in building up strong brands that influence how consumers process brand-related information. Brands can help in increasing compliance because they can increase the awareness of a recall (Dawar and Pillutla 2000). Increased awareness is particularly important in industries in which individualized recall notifications are currently not possible because consumers cannot be identified. In the context of Study 1, I make the assumption that consumers are aware of the recall because they received a personalized recall letter from the company. The findings from this study suggest that consumers are more attentive to this information if the recall is for a high quality brand than if it is for a low quality brand. The positive association of the high quality brand with recall compliance, however, is attenuated by the strength of the consumer-brand relationship.

Policy makers have to be aware of the strong, negative effect of loyalty since it biases the way consumers process information. Not only does a strong consumer-brand relationship erode the advantage that a high quality brand has in increasing compliance rates, it also has a negative main effect on compliance. Hence, policy interventions do have to take into consideration that recalled products are branded because brands influence consumer behavior. In addition, Study 2 shows that the buffering effect of a brand is exacerbated when a communication strategy is utilized that highlights that the product defect can pose a threat to others. Even though this strategy has been found to be effective – and I also find that it is for consumers not committed to a brand – it strengthens the buffering effect for high commitment consumers because it allows them to engage in defensive processing.

It is not always the case that consumers that receive a recall notification are also the users of this product. Toys, furniture, or household items are examples of product categories where more than just one person is using the product and the user of the product may not be the one receiving the notification (e.g., parent receives recall notification for a toy that children play with). This shared product experience may make it more likely that consumers perceive themselves to be invulnerable to the defect. Given the findings of this present research, policy makers might benefit from clearly outlining how the product does not only impact others but also the consumer directly to improve compliance.

#### Limitations and Future Studies

The present studies have some limitations that could be addressed in future studies. First, the experiments rely on manipulations of the consumer-brand relationship whereas I am able to measure the consumer-brand relationship in the field study. Since I use a fictitious brand, consumers do not have a previously established relationship with the brand. Therefore, I cannot measure the strength of the consumer-brand relationship in the same manner across all studies. Moreover, given the use of scenarios, participants in the experiments have not had any actual experience with the recalled product. Even though I still find different reactions to recalls depending on brand quality and commitment, future research can utilize real brands in experiments to test consumer reactions to product recalls. Given that the consumer-brand relationship is a multidimensional construct (Fournier 1998), additional research can examine other brand relationship dimensions beyond those tested in the field study and the experiments that can impact consumer response to negative information.

Second, future studies can address specifically how consumers cope with receiving a recall notification depending on the recalled brand. In the field study, I observe whether consumers return a recalled product to the manufacturer for a repair and I try to control for as many alternative explanations as possible. However, I am unable to observe exactly how consumers cope with receiving recall notifications. While consumers do bias the negative information about the product recall for high quality brands that they are committed to, it could be the case that they do not even open recall notifications for such brands or discard them immediately afterwards. Qualitative research could provide some additional insights into how consumers deal with recall information in their home.

Third, additional research can examine the process through which brand quality and the consumer-brand relationship influences return likelihood. There are multiple explanations as to why consumers might be motivated to comply with a recall. The product/service failure literature would suggest that consumers return the recalled product because they experience a state of dissonance when they receive information about a product recall for a high quality brand. Alternatively, consumers can feel let down by the brand and comply with the recall in order to achieve justice for the potentially defective brand. Moreover, consumers could be motivated to return the recalled product because they feel that the product poses a threat to themselves and others. Hence, there are different reasons that can motivate consumers to return a recalled product and future studies can investigate which process best explains their responses to a product recall.

## REFERENCES

- Aaker, Jennifer, Susan Fournier, and S. Adam Brasel (2004), "When Good Brands Do Bad," *Journal of Consumer Research*, 31 (June), 1-16.
- Ahluwalia, Rohini (2002), "How Prevalent Is the Negativity Effect in Consumer Environments," *Journal of Consumer Research*, 29 (2), 270-79.
- Ahluwalia, Rohini, Robert E. Burnkrant, and H. Rao Unnava (2000), "Consumer Response to Negative Publicity: The Moderating Role of Commitment," *Journal of Marketing Research*, 37 (2), 203-14.
- Albright, Brian (2011), "GAO Critical of Automotive Recall Processes," *Aftermarket Business World*, September 27.
- Andrews, J. Craig, Richard G. Netemeyer, and Srinivas Durvasula (1991), "Effects of Consumption Frequency on Believability and Attitudes Toward Alcohol Warning Labels," *Journal of Consumer Affairs*, 25 (2), 323-38.
- Argo, Jennifer J. and Kelley J. Main (2004), "Meta-Analyses of the Effectiveness of Warning Labels," *Journal of Public Policy & Marketing*, 23 (2), 193-208.
- Bae, Yong-Kyun and Hugo Benitez-Silva (2011), "Do Vehicle Recalls Reduce the Number of Accidents? The Case of the U.S. Car Market," *Journal of Policy Analysis and Management*, 30 (4), 821-62.
- Bae, Yong-Kyun and Hugo Benitez-Silva (2010), "The Effects of Automobile Recalls on the Severity of Accidents," *Economic Inquiry*, accepted.
- Barber, Brad M. and Masako N. Darrough (1996), "Product Reliability and Firm Value: The Experience of American and Japanese Automakers, 1979-1992," *Journal of Political Economy*, 104 (5), 1084-1099.
- Bechwati, Nada Nasr and Wendy Schneier Siegal (2005), "The Impact of the Prechoice Process on Product Returns," *Journal of Marketing Research*, 42 (3), 358-67.
- Berman, Barry (1999), "Planning for the Inevitable Product Recall," *Business Horizons*, 42 (2) 69-78.
- Brady, Michael K., J. Joseph Cronin Jr., Gavin L. Fox, and Michelle L. Roehm (2008), "Strategies to Offset Performance Failures: The Role of Brand Equity," *Journal of Retailing*, 84 (2), 151-64.
- Burnkrant, Robert E., and H. Rao Unnava (1989), "Self-Referencing: A Strategy for Increasing Processing of Message Content," *Personality and Social Psychology Bulletin*, 15 (4), 628-38.

- Celuch, Kevin, John Lust, and Linda Showers (1998), "A Test of a Model of Consumers' Responses to Product Manual Safety Information," *Journal of Applied Social Psychology*, 28 (5), 377-394.
- Chen, Yubo, Shankar Ganesan, and Yong Liu (2009), "Does a Firm's Product-Recall Strategy Affect Its Financial Value? An Examination of Strategic Alternatives During Product-Harm Crises," *Journal of Marketing*, 73 (6), 214-26.
- Cleeren, Kathleen, Marnik G. Dekimpe, and Kristiaan Helsen (2008), "Weathering Product-Harm Crises," *Journal of the Academy of Marketing Science*, 36 (2), 262-70.
- Cleeren, Kathleen, Harald J. van Heerde, and Marnik G. Dekimpe (2013), "Rising From the Ashes: How Brands and Categories Can Overcome Product-Harm Crises," *Journal of Marketing*, 77 (2), 58-77.
- CPSC (2005), "2005 Performance and Accountability Report," U.S. Consumer Product Safety Commission (November).
- Consumer Reports (2011), "Trouble With Recalls," February, 14-17
- Dacin, Peter A. and Daniel C. Smith (1994), "The Effect of Brand Portfolio Characteristics on Consumer Evaluations of Brand Extensions," *Journal of Marketing Research*, 31 (2), 229-42.
- Davidson, Wallace N. and Dan L. Worrell (1992), "The Effect of Product Recall Announcement on Shareholder Wealth," *Strategic Management Journal*, 13 (6), 467-73.
- Dawar, Niraj, and Madan M. Pillutla (2000), "Impact of Product-Harm Crises on Brand Equity: The Moderating Role of Consumer Expectations," *Journal of Marketing Research*, 37 (2), 215-26.
- Dawar, Niraj and Jing Lei (2009), "Brand Crises: The Roles of Brand Familiarity and Crisis Relevance in Determining the Impact of Brand Evaluations," *Journal of Business Research*, 62 (4), 509-16.
- Dean, Dwane Hal (2004), "Consumer Reaction to Negative Publicity," *Journal of Business Communication*, 41 (2), 192-211.
- Dhar, Sanjay K. and Stephen J. Hoch (1997), "Why Store Brand Penetration Varies by Retailer," *Marketing Science*, 16 (3), 208-227.

- Dutta, Sujay and Chris Pullig (2011), "Effectiveness of Corporate Responses to Brand Crises: The Role of Crisis Type and Response Strategies," *Journal of Business Research*, 64 (12), 1281-87.
- Einwiller, Sabine A., Alexander Fedorikhin, Allison R. Johnson, and Michael A. Kamins (2006), "Enough Is Enough! When Identification No Longer Prevents Negative Corporate Associations," *Journal of the Academy of Marketing Science*, 34 (2), 185-94.
- Erdem, Tuelin and Joffre Swait (1998), "Brand Equity as a Signaling Phenomenon," *Journal of Consumer Psychology*, 7 (2), 131-57.
- Fleischmann, Moritz, Hans Ronald Krikke, Rommert Dekker, and Simme Douwe P. Flapper (2000), "A Characterisation of Logistics Networks for Product Recovery," *Omega*, 28 (6), 653-66.
- Folkes, Valerie S. (1984), "Consumer Reactions to Product Failure: An Attributional Approach," *Journal of Consumer Research*, 10 (4), 398-409.
- Folkes, Valerie S. and Barbara Kotsos (1986), "Buyers' and Sellers' Explanations for Product Failure: Who Done It?," *Journal of Marketing*, 50 (2), 74-80.
- Fournier, Susan (1998), "Consumers and Their Brands: Developing Relationship Theory in Consumer Research," *Journal of Consumer Research*, 24 (4), 343-53.
- Griffin, Mitch, Barry J. Babin, and Jill S. Attaway (1996), "Anticipation of Injurious Consumption Outcomes and Its Impact on Consumer Attributions of Blame," *Journal of the Academy of Marketing Science*, 24 (4), 314-27.
- Gronroos, Christian (1988), "Service Quality: The Six Criteria of Good Perceived Service Quality," *Review of Business*, 9 (Winter), 10-13.
- Hartman, Raymond S. (1987), "Product Quality and Market Efficiency: The Effect of Product Recalls on Resale Prices and Firm Valuation," *Review of Economics and Statistics*, 69 (2), 367-72.
- Haunschild, Pamela R. and Mooweon Rhee (2004), "The Role of Volition in Organizational Learning: The Case of Automotive Product Recalls," *Management Science*, 50 (11), 1545-60.
- Heath, Timothy B. and Subimal Chatterjee (1995), "Asymmetric Decoy Effects on Lower-Quality versus Higher-Quality Brands: Meta-analytic and Experimental Evidence," *Journal of Consumer Research*, 22 (3), 268-84.

- Herr, Paul M., Frank R. Kardes, and John Kim (1991), "Effects of Word-of-Mouth and Product-Attribute Information on Persuasion: An Accessibility-Diagnosticity Perspective," *Journal of Consumer Research*, 17 (4), 454-62.
- Hess, James D., Wujin Chu, and Eitan Gerstner (1996), "Controlling Product Returns in Direct Marketing," *Marketing Letters*, 7 (4), 307-17.
- Hoffer, George E., Stephen W. Pruitt, and Robert J. Reilly (1994), "When Recalls Matter: Factors Affecting Owner Response to Automotive Recalls," *Journal of Consumer Affairs*, 28 (1), 96-106.
- Hora, Manpreet, Hari. Bapuji, and A. Roth (2011), "Safety Hazard and Time to Recall: The Role of Recall Strategy, Product Defect Type, and Supply Chain Player in the U.S. Toy Industry," *Journal of Operations Management*, 29 (7/8), 766-77.
- Jarrell, Gregg and Sam Peltzman (1985), "The Impact of Product Recalls on the Wealth of Sellers," *Journal of Political Economy*, 93 (3), 512-36.
- Jayachandran, Satish, and Rajan Varadarajan (2006), "Does Success Diminish Competitive Responsiveness? Reconciling Conflicting Perspectives," *Journal of the Academy of Marketing Science*, 34 (4), 284-94.
- Jayaraman, Vaidyanathan, Raymond A. Patterson, and Erik Rolland (2003), "The Design of Reverse Distribution Networks: Models and Solution Procedures," *European Journal of Operational Research*, 150 (1), 128-49.
- Kalaigianam, Kartik, Tarun Kushwaha, and Meike Eilert (2013), "The Impact of Product Recalls on Future Product Reliability and Future Accidents: Evidence from the Automobile Industry," *Journal of Marketing*, 77 (2), 41-57.
- Keller, Kevin Lane (1993), "Conceptualizing, Measuring, and Managing Customer-Based Brand Equity," *Journal of Marketing*, 57 (1), 1-22.
- , --- (2003), "Brand Synthesis: The Multidimensionality of Brand Knowledge," *Journal of Consumer Research*, 29 (4), 595-600.
- Keller, Punam Anand and Lauren G. Block (1996), "Increasing the Persuasiveness of Fear Appeals: The Effect of Arousal and Elaboration," *Journal of Consumer Research*, 22, 448-59.
- , --- and Donald R. Lehmann (2008), "Designing Effective Health Communications: A Meta-Analysis," *Journal of Public Policy & Marketing*, 27 (2), 117-30.
- Kelley, Scott and Mark Davis (1994), "Antecedents to Customer Expectations for Service Recovery," *Journal of the Academy of Marketing Science*, 22 (1), 52-61.

- Kennedy, Peter (1998). *A Guide to Econometrics – Fourth Edition*. The MIT Press: Cambridge, MA.
- Klein, Jill, and Niraj Dawar (2004), “Corporate Social Responsibility and Consumers’ Attributions and Brand Evaluations in a Product-Harm Crisis,” *International Journal of Research in Marketing*, 21 (3), 203-217.
- Kunda, Ziva (1990), “The Case for Motivated Reasoning,” *Psychological Bulletin*, 108 (3), 480-98.
- Laufer, Daniel and Jae Min Jung (2010), „Incorporating Regulatory Focus Theory in Product Recall Communications to Increase Compliance with a Product Recall,” *Public Relations Review*, 36 (2), 147-151.
- Liu, Tsung-Chi, Chung-Yu Wang, and Li-Wei Wu (2010), “Moderators of the Negativity Effect: Commitment, Identification, and Consumer Sensitivity to Corporate Social Performance,” *Psychology & Marketing*, 27 (1), 54-70.
- Lei, Jing, Niraj Dawar, and Zeynep Gürhan-Canli (2012), “Base-Rate Information in Consumer Attributions of Product-Harm Crises,” *Journal of Marketing Research*, 49 (3), 336-48.
- Lei, Jing, Niraj Dawar, and Jos Lemmink (2008), “Negative Spillover in Brand Portfolios: Exploring the Antecedents of Asymmetric Effects,” *Journal of Marketing*, 72 (3), 111-23.
- Marcus, Alfred A., and Robert S. Goodman (1991), “Victims and Shareholders: The Dilemmas of Presenting Corporate Policy during a Crisis,” *Academy of Management Journal*, 34 (2), 281-305.
- Maxham III, James G. and Richard G. Netemeyer (2002), “A Longitudinal Study of Complaining Customers’ Evaluations of Multiple Service Failures and Recovery Efforts,” *Journal of Marketing*, 66 (4), 57-71.
- Maynard, Micheline (2010), “U.S. Is Seeking a Fine of \$16.4 Million Against Toyota,” *New York Times*, April 5.
- Mergent (2011), “North America Automotive Sectors,” Report, April 2011.
- Monga, Alokparna Basu and Deborah Roedder John (2008), “When Does Negative Brand Publicity Hurt? The Moderating Influence of Analytic versus Holistic Thinking,” *Journal of Consumer Psychology*, 18 (4), 320-32.
- Murphy, R. Dennis and Paul H. Rubin (1988), “Determinants of Recall Success Rates,” *Journal of Products Liability*, 11, 17-28.



- Ocasio, William (1997), "Towards an Attention-based View of the Firm," *Strategic Management Journal*, 18 (Summer Special Issue), 187-206.
- Papke, Leslie E. And Jeffrey M. Wooldridge (1996), "Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates," *Journal of Applied Econometrics*, 11 (6), 619-32.
- Patterson, Larry T., Garland G. Hunnicutt, and Mary Ann Stutts (1992), "Young Adults' Perceptions of Warnings and Risks Associated with Alcohol Consumption," *Journal of Public Policy & Marketing*, 11 (1), 96-103.
- Pechmann, Cornelia, Guangzhi Zhao, Marvin E. Goldberg, and Ellen Thomas Reibling (2003), "What to Convey in Antismoking Advertisements for Adolescents: The Use of Protection Motivation Theory to Identify Effective Message Themes," *Journal of Marketing*, 67 (2), 1-18.
- Petersen, J. Andres and V. Kumar (2009), "Are Product Returns a Necessary Evil? Antecedents and Consequences," *Journal of Marketing*, 73 (May), 35-51.
- Protess, Ben, Evelyn M. Nusli, and Susanne Craig (2011), "Buffet's Handling of Deputy Baffles Some Experts," <http://dealbook.nytimes.com/2011/03/31/buffetts-handling-of-deputy-baffles-some-experts/?ref=global> (accessed on June 10, 2011).
- Pullig, Chris, Richard G. Netemeyer, and Abhijit Biswas (2006), "Attitude Basis, Certainty, and Challenge Alignment: A Case of Negative Brand Publicity," *Journal of the Academy of Marketing Science*, 34 (4), 528-42.
- Rao, A., L. Qu, R. W. Ruekert (1999), "Signaling Unobservable Product Quality Through a Brand Ally," *Journal of Marketing Research*, 36, 258-68.
- Rhee, Mooweon (2009), "Does Reputation Contribute to Reducing Organizational Errors? A Learning Approach," *Journal of Management Studies*, 46 (4), 676-703.
- Rhee, Mooweon and Pamela R. Haunschild (2006), "The Liability of a Good Reputation: A Study of Product Recalls in the U.S. Automotive Industry," *Organization Science*, 17 (1), 101-17.
- Rupp, Nicholas G. (2001), "Newspaper Coverage of Automotive Safety Recalls," East Carolina University, working paper.
- Rupp, Nicholas G. (2004), "The Attributes of a Costly Recall: Evidence from the Automotive Industry," *Review of Industrial Organization*, 25 (1), 21-44.
- Rupp, Nicholas G. and Curtis R. Taylor (2002), "Who Initiates Recalls and Who Cares? Evidence from the Automobile Industry," *Journal of Industrial Economics*, 50 (2), 123-49.

- Schmalz, Sebastian and Ulrich R. Orth (2012), "Brand Attachment and Consumer Emotional Response to Unethical Firm Behavior," *Psychology & Marketing*, 29 (11), 869-84.
- Siomkos, George J. and Gary Kurzbard (1994), "The Hidden Crisis in Product-Harm Crisis Management," *European Journal of Marketing*, 28 (2), 30-41.
- Skowronski, John J. and Donal E. Carlston (1987), "Social Judgment and Social Memory: The Role of Cue Diagnosticity in Negativity, Positivity, and Extremity Bias," *Journal of Personality and Social Psychology*, 52 (4), 689-99.
- Smith, Amy K., Ruth N. Bolton, and Janet Wagner (1999), "A Model of Customer Satisfaction with Service Encounters Involving Failure and Recovery," *Journal of Marketing Research*, 36 (3), 356-72.
- Smith, N. Craig, Robert J. Thomas, and John A. Quelch (1996), "A Strategic Approach to Managing Product Recalls," *Harvard Business Review*, 74 (5), 102-12.
- Srinivasan, Shuba and Dominique M. Hanssens (2009), "Marketing and Firm Value: Metrics, Methods, Findings, and Future Directions," *Journal of Marketing Research*, 46 (3), 293-312.
- Srivastava, Rajendra K., Tasadduq A. Shervani, and Liam Fahey (1998), "Market-Based Assets and Shareholder Value: A Framework for Analysis," *Journal of Marketing*, 62 (1), 2-18.
- Sullivan, Mary (1990), "Measuring Image Spillovers in Umbrella-Branded Products," *Journal of Business*, 63 (3), 309-21.
- Symons, Cynthia and Blair T. Johnson (1997), "The Self-Reference Effect in Memory: A Meta-Analysis," *Psychological Bulletin*, 121 (3), 371-94.
- Teratanavat, Ratapol, Victoria Salin, and Neal H. Hooker (2005), "Recall Event Timing: Measures of Managerial Performance in U.S. Meat and Poultry Plants," *Agribusiness*, 21 (3), 351-373.
- Thierry, Martijn, Marc Salomon, Jo Van Nunen, and Luk Van Wassenhove (1995), "Strategic Issues in Product Recovery Management," *California Management Review*, 37 (2), 114-35.
- Thirumalai, Sriram, and Kingshuk K. Sinha (2011), "Product Recalls in the Medical Device Industry: An Empirical Exploration of the Sources and Financial Consequences," *Management Science*, 57 (2), 376-92.

- Thomas, Jacquelyn S. (2001), "A Methodology for Linking Customer Acquisition to Customer Retention," *Journal of Marketing Research*, 38 (2), 262-68.
- Thomas, Ken (2005), "Government to investigate 3.7 million Ford Motor Co. pickups and SUVs," The Associated Press, March 23, 2005.
- Thomsen, Michael R., and Andrew M. McKenzie (2001), "Market Incentives for Safe Foods: An Examination of Shareholder Losses from Meat and Poultry Recalls," *American Journal of Agricultural Economics*, 83 (3), 526-538.
- Tobin, James (1958), "Estimation of Relationships for Limited Dependent Variables," *Econometrica*, 26 (1), 24-36.
- Tobin, Richard J. (1982), "Recalls and the Remediation of Hazardous or Defective Consumer Products: The Experiences of the Consumer Product Safety Commission and the National Highway Traffic Safety Administration," *Journal of Consumer Affairs*, 16 (2), 278-306.
- U.S. Government Accountability Office (2011), "Auto Safety – NHTSA Has Options to Improve the Safety Defect Recall Process," Report to Congressional Requesters #11-603, June.
- Van Heerde, Harald, Kristiaan Helsen, and Marnik G. Dekimpe (2007), "The Impact of a Product-Harm Crisis on Marketing Effectiveness," *Marketing Science*, 26 (2), 230-43.
- Wieder, Ben (2011), "NHTSA doesn't analyze its recall data to ID worst car manufacturers, GAO says," [www.iwatchnews.org/node/4925](http://www.iwatchnews.org/node/4925) (accessed on December 9, 2011).
- Zhao, Yi, Ying Zhao, and Kristiaan Helsen (2011), "Consumer Learning in a Turbulent Market Environment: Modeling Consumer Choice Dynamics After a Product-Harm Crisis," *Journal of Marketing Research*, 48 (2), 255-67.

## APPENDIX A - SURVEY STUDY 1B (ESSAY 2)

### **Consumer Survey**

#### General Instructions

We are interested in your opinion about a product that is already available for sale in some parts of the United States and may also be available nationwide in the future. We are interested in your first impression of this product even though you haven't had an opportunity to try it yet. There are no right or wrong answers; we just want your opinion.

#### Company Background

LUMINIX is a medium-sized, privately owned company with headquarters in Seattle, WA. Recently, the company has introduced a series of charging systems for cell phones and other hand-held devices, such as the iPad, Kindle, or Nintendo DS, in states in the western United States. Now, the company is considering expanding to locations nationwide, including South Carolina.

#### Product Description

LUMINIX Powermat Wireless Charger



## Product Details



- A simple, fast and efficient way to keep all of your personal electronic devices charged
- Portable powermat folds up for easy travel
- Four charging positions - three wireless, and one wired USB connector for charging a fourth device
- Individual tone and light controls; auto power-off for each device when charging is complete

[High quality condition]

## Product Reviews

According to online reviews, consumers gave the Powermat the following rating:



*“I LOVE my Powermat. My parents got me one for Christmas and it is so easy to use. Now I can charge my iPod, iPad and Nintendo at the same time!!! Very sturdy, dropped it once already and it still works perfectly.”*

*“I use the Powermat every day. I travel a lot and it’s super convenient. It seems to be of good quality, I have not yet had any problems with the charger. Thumbs up!”*

[Moderate quality condition]

### Product Reviews

According to online reviews, consumers gave the Powermat the following rating:



*“My parents got me one for Christmas and it is very easy to use but I’m not quite sure about the quality. The plastic seems to be of low quality and you can see every scratch. Already dropped it once so hopefully it continues to work.”*

*“I use the Powermat every day. I travel a lot and it’s convenient but I don’t expect the charger to last for another 3 months.”*

**Please indicate your perceptions of LUMINIX’s brand.**

Good	1	2	3	4	5	6	7	Bad
Beneficial	1	2	3	4	5	6	7	Harmful
Desirable	1	2	3	4	5	6	7	Undesirable
Nice	1	2	3	4	5	6	7	Awful

[High commitment condition]

Please write down a slogan that you would suggest LUMINIX use to market their product in South Carolina

**Release Form**

I hereby release the statements or the slogans above, that I am voluntarily submitting, to LUMINIX to use it as they see fit, for their promotional materials.

I HAVE READ, UNDERSTAND, AND AGREE TO THE POLICIES AS STATED ABOVE.

- I agree
- I disagree

LUMINIX offers high quality products.  
LUMINIX is a strong, reliable company.  
LUMINIX stands behind the product that it offers.  
LUMINIX develops innovative products.

Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7



NEWS from CPSC

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FOR IMMEDIATE RELEASE

December 21, 2011

Release #12-063

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WASHINGTON, D.C. – The U.S. Consumer Product Safety Commission, in cooperation with LUMINIX, today announced a voluntary recall of the following consumer product. Consumers should stop using recalled products immediately unless otherwise instructed. It is illegal to resell or attempt to resell a recalled consumer product.

**Name of Product:** LUMINIX "Powermat" Wireless Charger

**Units:** About 20,000

**Manufacturer:** LUMINIX Inc, of Seattle, WA

**Hazard:** The charger mat contains a defect which can cause overheating, posing a fire hazard.

**Incidents/Injuries:** LUMINIX has received three reports of smoke and one report of fire.

**Description:** This recall involves the LUMINIX-branded charger mat part of the LUMINIX "Powermat" Wireless Charger system. LUMINIX and a part number beginning with "CTL" are printed in white lettering on the product.

**Sold exclusively at:** Retail stores in WA, OR, CA, NV, and AZ and online at [www.luminix.com](http://www.luminix.com) between February 2011 and October 2011 for about \$50.

**Remedy:** Consumers should immediately stop using the charger mat. Consumers can contact LUMINIX for instructions on how to return the product for a repair.

**Customer contact:** For more information, contact LUMINIX toll-free at (877) 856-3232 between 9 a.m. and 4:30 p.m. CT Monday through Friday, or visit the firm's website at [www.luminix.com](http://www.luminix.com)



The following questions refer to the remedy that the company provides for the recalled product.

Please keep this information in mind when answering the next questions.

If my LUMINIX charger is among those involved in the recall, I would...

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
... stop using the recalled charging mat.	1	2	3	4	5	6	7
... return the recalled charging mat to LUMINIX for a repair.	1	2	3	4	5	6	7
... replace the recalled charging mat with another product.	1	2	3	4	5	6	7
... discard the recalled charging mat.	1	2	3	4	5	6	7

**When you read the previous press release about the product recall, to what extent did you feel**

Fearful

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Nervous

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Scared

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Nauseated

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Uncomfortable

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Which product does LUMINIX sell?

- MP3 players
- Cell phones
- Laptops
- Cell phone chargers
- I don't know/remember

Please answer the following questions about yourself.

**How knowledgeable are you about cell phones?**

Not knowledgeable at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very knowledgeable

**How familiar are you with cell phones?**

Not familiar at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very familiar

**How often do you use cell phones?**

Never 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Daily

**How knowledgeable are you about cell phone chargers?**

Not knowledgeable at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very knowledgeable

**How familiar are you with cell phone chargers?**

Not familiar at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very familiar

**How often do you use cell phone chargers?**

Never 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Daily

Your gender:      \_\_\_ Male                      \_\_\_ Female

Ethnicity:                      \_\_\_\_\_

Age:                              \_\_\_ years

Primary language:            \_\_\_\_\_

**THANK YOU FOR YOUR PARTICIPATION.**

## APPENDIX B - SURVEY STUDY 2 (ESSAY 2)

### **Consumer Survey**

#### General Instructions

We are interested in your opinion about a product that is already available for sale in some parts of the United States and may also be available nationwide in the future. We are interested in your first impression of this product even though you haven't had an opportunity to try it yet. There are no right or wrong answers; we just want your opinion.

#### Company Background

LUMINIX is a medium-sized, privately owned company with headquarters in Seattle, WA. Recently, the company has introduced a series of charging systems for cell phones and other hand-held devices, such as the iPad, Kindle, or Nintendo DS, in states in the western United States. Now, the company is considering expanding to locations nationwide, including South Carolina.

#### Product Description

LUMINIX Powermat Wireless Charger



## Product Details



- A simple, fast and efficient way to keep all of your personal electronic devices charged
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*“I LOVE my Powermat. My parents got me one for Christmas and it is so easy to use. Now I can charge my iPod, iPad and Nintendo at the same time!!! Very sturdy, dropped it once already and it still works perfectly.”*

*“I use the Powermat every day. I travel a lot and it's super convenient. It seems to be of good quality, I have not yet had any problems with the charger. Thumbs up!”*

**Please indicate your perceptions of LUMINIX's brand.**

Good	1	2	3	4	5	6	7	Bad
Beneficial	1	2	3	4	5	6	7	Harmful
Desirable	1	2	3	4	5	6	7	Undesirable
Nice	1	2	3	4	5	6	7	Awful

[High commitment condition]

**Please write down a slogan that you would suggest LUMINIX use to market their product in South Carolina**

**Release Form**

I hereby release the statements or the slogans above, that I am voluntarily submitting, to LUMINIX to use it as they see fit, for their promotional materials.

I HAVE READ, UNDERSTAND, AND AGREE TO THE POLICIES AS STATED ABOVE.

- I agree
- I disagree

I would purchase a LUMINIX charger if it becomes available.

Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

LUMINIX offers high quality products.  
 LUMINIX is a strong, reliable company.  
 LUMINIX stands behind the product that it offers.  
 LUMINIX develops innovative products.

Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7

[Other-referencing condition]



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**Name of Product:** LUMINIX "Powermat" Wireless Charger

**Units:** About 20,000

**Manufacturer:** LUMINIX Inc, of Seattle, WA

**Hazard:** The charger mat contains a defect which can cause overheating, posing a fire hazard that can hurt others (e.g., your friends, family).

**Incidents/Injuries:** LUMINIX has received three reports of smoke and one report of fire.

**Description:** This recall involves the LUMINIX-branded charger mat part of the LUMINIX "Powermat" Wireless Charger system. LUMINIX and a part number beginning with "CTL" are printed in white lettering on the product.

**Sold exclusively at:** Retail stores in WA, OR, CA, NV, and AZ and online at [www.luminix.com](http://www.luminix.com) between February 2011 and October 2011 for about \$50.

**Remedy:** Consumers should immediately stop using the charger mat. Consumers can contact LUMINIX for instructions on how to return the product for a repair.

**Customer contact:** For more information, contact LUMINIX toll-free at (877) 856-3232 between 9 a.m. and 4:30 p.m. CT Monday through Friday, or visit the firm's website at [www.luminix.com](http://www.luminix.com)

[Self-referencing condition]



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[No referencing condition]



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The following questions refer to the remedy that the company provides for the recalled product.

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If my LUMINIX charger is among those involved in the recall, I would...

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
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... return the recalled charging mat to LUMINIX for a repair.	1	2	3	4	5	6	7
... replace the recalled charging mat with another product.	1	2	3	4	5	6	7
... discard the recalled charging mat.	1	2	3	4	5	6	7

**When you read the previous press release about the product recall, to what extent did you feel**

Fearful

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Nervous

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Scared

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Nauseated

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Uncomfortable

Not at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very much

Which product does LUMINIX sell?

- MP3 players
- Cell phones
- Laptops
- Cell phone chargers
- I don't know/remember

Please answer the following questions about yourself.

**How knowledgeable are you about cell phones?**

Not knowledgeable at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very knowledgeable

**How familiar are you with cell phones?**

Not familiar at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very familiar

**How often do you use cell phones?**

Never 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Daily

**How knowledgeable are you about cell phone chargers?**

Not knowledgeable at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very knowledgeable

**How familiar are you with cell phone chargers?**

Not familiar at all 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Very familiar

**How often do you use cell phone chargers?**

Never 

1	2	3	4	5	6	7
---	---	---	---	---	---	---

 Daily

Your gender:      \_\_\_ Male                      \_\_\_ Female

Ethnicity:                      \_\_\_\_\_

Age:                              \_\_\_ years

Primary language:            \_\_\_\_\_

**THANK YOU FOR YOUR PARTICIPATION.**