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Weathering product-harm crises

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WEATHERING PRODUCT-HARM CRISES

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WEATHERING PRODUCT-HARM CRISES

Abstract

Product-harm crises can seriously imperil a brand's performance. Consumers tend to weigh negative publicity heavily in product judgments, customer preferences may shift towards competing products during the recall period, and competitors often increase their advertising spending in the wake of a brand's misfortune. To counter these negative effects, brands hope to capitalize on their equity, and often use advertising as a communication device to regain customers' lost trust.

We develop a multiple-event hazard model to study how consumer characteristics and advertising influence consumers' first-purchase decisions for two affected brands of peanut butter following a severe Australian product-harm crisis. Buying a recently affected brand is perceived as highly risky, making the trial purchase a first hurdle to be taken in the brand's recovery. Both pre-crisis loyalty and familiarity are found to form an important buffer against the product-harm crisis, supporting the idea that a brand's equity prior to the crisis offers resilience in the face of misfortune. Also heavy users tend to purchase the affected brands sooner, unless their usage rate decreased significantly during the crisis. Brand advertising was found to be effective for the stronger brand, but not for the weaker brand, while competitive advertising delayed the first-purchase decision for both brands affected by the crisis.

INTRODUCTION

Product-harm incidents are prevalent in the marketplace. Notable examples include traces of benzene in Perrier (Kurzbard and Siomkos 1992) and Bridgestone/Firestone's malfunctioning tires (Advertising Age 2000). Such crises can be devastating to a company and harmful for society. According to the U.S. Consumer Product Safety Commission, injuries, deaths, and property damages related to consumer products cost the American public over $700 billion annually. An average of about 25,100 deaths and 33.3 million injuries was associated with defective consumer products in recent years (U.S. Consumer Product Safety Commission 2005). Obviously, the financial losses incurred by the firm involved tend to be huge as well. Apart from the enormous costs directly linked to a product recall, the often prolonged out-of-stock situation that goes with it may cause substantial future revenue losses (Goldfarb 2006), especially in combination with the negative information surrounding the event (Ahluwalia, Burnkrant, and Unnava 2000). Estimates for the direct costs of Perrier's 1990 crisis are around $30 million (Berman 1999), while one year later sales had only reached 60 percent of their pre-recall level (Hartley 1995). Likewise, the Snow Brand Milk food-poisoning scandal in Japan had a devastating impact on the company's bottom line: it incurred a loss of 51.6 billion yen in fiscal 2001, compared to a net profit of 3.3 billion yen in fiscal 1999 (Finkelstein 2005).

Because of the increasing complexity of products, more stringent product-safety legislation, and more demanding customers, product-harm crises tend to occur ever more frequently (Dawar and Pillutla 2000). The U.S. Consumer Product Safety Commission, for example, completed 397 cooperative recalls in 2005, involving 67 million consumer products (U.S. Consumer Product Safety Commission 2005), compared to only 221 recalls affecting 8 million product units in 1988 (Berman 1999). Consumer recalls are also on the rise in Europe.

A recent PWC study found that the weekly number of product recalls notified to the European Commission has risen from an average of 6 in 2004 to 14 in 2005.[1] Moreover, a product crisis can have a significant effect on consumers' purchase behavior. One industry study ranked a company's handling of a crisis as third most important criterion for consumers to decide which product to purchase (Marketing News 1995).[2] In spite of their increasing occurrence, the huge risks for the affected companies and society, and their often profound impact on consumer behavior, research on product crises remains scant (Klein and Dawar 2004).

Previous research has often focused on providing a check-list on how to deal with a product crisis, usually based on particular case studies (e.g., Kurzbard and Siomkos 1992; Smith, Thomas, and Quelch 1996). Another research stream has concentrated on estimating the effect of a product crisis on aggregate performance measures, such as stock prices (e.g., Davidson and Worrell 1992; Salin and Hooker 2001) and category or brand sales (e.g., Smith, van Ravenswaay, and Thompson 1988; van Heerde, Helsen, and Dekimpe 2006). While this research provides valuable insights, it does not examine individual differences in how consumers react to a product-harm crisis.

Individual-level differences have been looked at in several lab experiments examining the impact of hypothetical brand crises on brand evaluations and purchase intentions. In these studies, negative news is consistently found to have a devastating impact on companies, as it is perceived to be more diagnostic and informative, and weighed more heavily in consumer judgments (Herr, Kardes, and Kim, 1991). However, this negativity bias is found to be moderated by some consumer characteristics, such as commitment to the brand (Ahluwalia, Burnkrant, and Unnava 2000), brand familiarity (Ahluwalia 2002), and consumers' identification with the company (Einwiller et al. 2006). Although these laboratory studies

have established the moderating effect of certain consumer characteristics, a number of external-validity issues can be raised. First, the experimental setting might attract artificial attention to the product crisis (Mowen, Jolly, and Nickell 1981). Furthermore, reported intentions and behavior are known to not always coincide (Chandon, Morwitz, and Reinartz 2005). In addition, these studies offer limited insight into the moderating effect of marketing decision variables such as advertising, an instrument companies often use to restore their brands' tarnished image. Finally, marketplace dynamics, such as spontaneous information sharing among consumers and competitive activity, are typically not accounted for (Dawar and Pillutla 2000). In this study, we use scanner data from a *natural* experiment, and shed light on the impact of own and competitive advertising, while accounting for individual-level differences in how consumers react to the crisis. We hereby respond to Winer's (1999) call for more scanner studies supporting results found in lab studies to enhance external validity.

Specifically, we use real-life household-scanner data that record consumer purchases, before, during and after a severe product-harm crisis. In June 1996, Kraft Foods, Australia's largest peanut-butter manufacturer, recalled its two peanut-butter products, Eta and Kraft, because they were linked to more than 100 cases of salmonella poisoning (Sydney Morning Herald 1996a). The bacterial infection was traced to a batch of contaminated peanuts, supplied to the group by an outside manufacturer. Kraft Foods Australia was engulfed in the worst crisis in its 70-year history. In the meantime, its main competitor Sanitarium took advantage of the crisis situation by stressing in several advertising campaigns that it had been roasting its own peanuts. Sanitarium's market share increased from 15 to 70 percent during the crisis period (Sydney Morning Herald 1996a). Despite this spectacular performance boost for Sanitarium, overall demand for peanut-butter products was down by 30 percent (Sydney Morning Herald 1996b).[3]

Within this setting, we focus on the first-purchase decision after the product-harm crisis, as it is typically associated with higher risk in the diffusion literature (Rogers 1995). Especially in case of a product-harm crisis, buying a recently affected brand is perceived as highly risky (Pennings, Wansink, and Meulenberg 2002), making the trial purchase a first hurdle to be taken in order to regain a consumer's trust. Indeed, repeat purchases are contingent on a trial purchase to have taken place, while trial is not contingent on repeat (Steenkamp and Gielens 2003). We study the effect of consumer characteristics, such as pre-crisis brand loyalty, brand familiarity, and category usage on the timing of the trial purchase of the affected brands after the crisis. In addition, we focus on the effectiveness of Kraft Foods' post-crisis advertising campaign, as well as the impact of advertising expenditures by non-affected competitors. Devising a proper communication strategy is a key challenge for companies faced with a crisis situation (e.g., Hale, Dulek, and Hale 2005; Coombs 2000). As we consider the trial of two affected brands, we specify a multi-event hazard model, and use the clustered error-correction approach advocated by Lin (1994) to correct for unobserved dependence between a given household's purchase decisions of the two brands.

The remainder of the paper is organized as follows. We first present our conceptual framework. Next, we discuss our modeling approach, describe the operationalization of the various constructs, and report the results. The final section summarizes the findings, draws managerial implications, and provides suggestions for future research.

CONCEPTUAL FRAMEWORK

Product-harm crises can seriously hurt a firm's performance. Often, a crisis is followed by a product recall, either voluntary or mandated by a government regulatory body. During the prolonged out-of-stock situation associated with the product recall, customers may switch to competing brands, or even decide to quit buying the category. Apart from this immediate

impact, product unavailability may also influence future brand choices because of a changed opinion on the unavailable brand, or because of a lock-in to a rival brand (Goldfarb 2006). Moreover, the company is likely to face a damaged image and a substantial drop in consumer trust (Dawar and Pillutla 2000). Apart from the apparent impact on the affected brands/companies, a product-harm crisis may also corrode trust in the product category as a whole, as the inadequacy of the production process can be perceived to be an industry-wide problem (De Alessi and Staaf 1994; Jarrell and Peltzman 1985).[4]

The bad publicity surrounding the crisis tends to be weighed heavily when making product judgments - a phenomenon referred to as negativity bias - as it is perceived both as diagnostic and surprising (Herr, Kardes, and Kim 1991). In addition, negative news is reported more frequently and more vividly, as it is against the norm (Weinberger and Lepkowska-White 2000), and considered more credible than positive news spread by the company itself (Ahluwalia, Burnkrant, and Unnava 2000). However, negativity effects can be moderated by several consumer characteristics, such as brand loyalty, brand familiarity and category usage. In addition, advertising may be used to counter the negative news, and be instrumental to re-establish trust in the category and/or brand.

Consumer Characteristics

Pre-crisis Brand Loyalty. Even though loyal consumers tend to be more aware of the crisis (Dawar and Pillutla 2000), they are also more likely to engage in biased processing (Ahluwalia, Burnkrant, and Unnava 2000). They tend to resist or discount information that is disconfirmatory or counterattitudinal, and to counter-argue negative news about their preferred brands more often in order to minimize cognitive dissonance (Dawar and Pillutla 2000). As a consequence, loyal consumers have been found to show more sympathy for the

brand, and believe the company deserves their help (Stockmeyer 1996).

Loyal customers have also been found to be less likely to switch brands during out-of-stock situations: because of their limited experience with competing items, their search costs tend to be higher (Campo, Gijsbrechts, and Nisol, 2000), while they also incur higher substitution costs if they have to buy non-preferred items (Corstjens and Corstjens 1995).

The presence of a loyal customer base is a key indicator of brand equity (Aaker 1996), which may offer resilience in the face of misfortune (Hoeffler and Keller 2003). As such, we expect a positive impact of customers' *pre*-crisis loyalty on their *post*-crisis trial rate, in line with the idea that a strong pre-crisis equity will give the brand a head start on its way to recovery, even after a prolonged recall period.

*Pre-crisis Brand Loyalty*Time*. Because of the product recall, people no longer have the opportunity to increase their personal experience with the affected brand, while companies are not inclined to advertise a product that is not available (van Heerde, Helsen, and Dekimpe 2006). As personal experience and advertising are instrumental in maintaining brand equity (Aaker and Biel 1993), the protection offered by the pre-crisis loyalty of the customer base is expected to erode over time.

Pre-crisis Brand Familiarity. People exposed to new information on a familiar brand perceive positive news to be as diagnostic as negative information, as opposed to unfamiliar customers who tend to weigh negative news more heavily (Ahluwalia 2002). Jolly and Mowen (1985), for example, found that news of a product recall influenced evaluations of a company more negatively when the company was unknown. Furthermore, familiar brands are often perceived to be less responsible for a crisis (Mowen 1980). As such, we expect a higher repurchase rate after the crisis for customers familiar with the affected products.[5] On the other hand, one could argue that pre-crisis brand familiarity could also be a liability for the firm.

Brands familiar to a large fraction of the population are likely to receive more scrutiny from the media than less familiar ones (Rhee and Haunschild 2006), making their crisis more salient to more customers.

Pre-crisis Category Usage. Heavy users are likely to be more appreciative of the benefits of the product (Lim, Currim, and Andrews 2005), making them less likely to fully defect from the category. Given their extensive experience with the category, they are also in a better position to make product judgments, and are expected to have lower perceived risks than light to medium users (Goering 1985). We therefore expect a positive impact of pre-crisis category usage on post-crisis trial rates.

Change in Category Usage. As indicated earlier, a product-harm crisis may influence consumption in the category as a whole (De Alessi and Staaf 1994). Consumers who do not reduce category consumption, however, seem to have sustained trust in the category. It should be easier to convince these consumers to try the affected products once they become available again. Indeed, a first hurdle (i.e., buying in the category) has already been taken. On the other hand, as category consumption during the crisis can only occur through the purchase of competing (non-affected) brands, these customers' familiarity and behavioral loyalty will increasingly shift towards those brands, making it harder to convince them to switch back to the affected products. Because of these countervailing forces, we do not advance a directional hypothesis on the impact of a change in category usage.

Advertising

Own Advertising. Brand advertising is usually assumed to have a persuasive impact on brand purchase (Doganuglu and Klapper 2006). However, the size of the effects tends to be fairly small in mature markets (Lodish et al. 1995), and one could perceive the effectiveness

of post-crisis investments to be even smaller, as the crisis may have damaged the firm's credibility (Aaker, Fournier, and Brasel 2004; Goldberg and Hartwick 1990). On the other hand, it has been argued that the heightened brand awareness and media attention during a crisis period could actually result in a higher return on advertising investments than if they were part of routine equity-building activities (Dawar 1998).

Cross and Competitive Advertising. Apart from the own advertising, two kinds of "competing" advertising may have an impact: by other affected brands (which we label as cross advertising) and by non-affected competitors (referred to as competitive advertising). Their impact on the trial rate of an affected brand may be two-fold. On the one hand, this advertising could primarily serve an informational role, trying to resolve some of the uncertainty and risks associated with buying any product in the affected category (Byzalov and Shachar 2004). Because of the resulting primary-demand effect, also the trial rate of directly affected products could be influenced positively (Lancaster 1984). On the other hand, cross and competitive advertising can primarily have a persuasive role, emphasizing the differential advantages of the specific brand being advertised, thereby delaying the purchase of all other brands. It remains an empirical question which effect dominates.

Cross and Competitive Purchases

If consumers buy another brand after the crisis, the resulting purchase-feedback effects (Ailawadi, Gedenk, and Neslin 1999; Givon and Horsky 1990; Goldfarb 2006) may adversely impact the likelihood of trial of the affected brand under investigation. We control for two such effects: from non-affected brands (labeled as competitive purchase), and from the other affected brand (referred to as cross purchase).

We summarize the hypothesized effects in Table 1.

[Insert Table 1 about here]

MODEL

Our focus is on the timing of the first purchase ("trial") of the affected brands in the wake of their reintroduction in the marketplace. A hazard model is developed to study when each affected brand will be purchased again once it is back on the shelves after the product recall.[6] Hazard models account for right-censored observations, an important feature as not all households have bought the affected brands by the end of the observation period. These models also easily accommodate time-varying covariates (Allison 1984). A semi-parametric proportional hazard model is adopted (Cox 1972). For Eta, the hazard rate is given by:[7]

$$\lambda_{Eta,i}(t) = \lambda_{0,Eta}(t)\,\exp\left[\beta_{Eta} X_{Eta,i}(t)\right]\exp\left[\alpha_{Eta}\; Z_{Eta,i}(t)\,(t+t^{c})\right] \quad . \qquad (1)$$

$\lambda_{0,Eta}(t)$ is the baseline hazard, which corresponds to the trial rate of the base group, i.e. households for which all covariates are zero, and $X_{Eta,i}(t)$ is a vector of covariates for consumer *i* that cause an up- or downward adjustment in that baseline (Helsen and Schmittlein 1993). Both time-varying (e.g., advertising support) and time-invariant (e.g., pre-crisis category usage) covariates are considered. The final term in the expression captures the effect of covariates (e.g., pre-crisis brand loyalty) for which the effect is allowed to gradually increase/decrease over time. In line with Wedel et al. (1995), we do this by including an interaction term of these covariates, $Z_{Eta,i}(t)$, with the time elapsed since the start of the crisis, $t+t^{c}$. This time component consists of the length of the recall period (t^{c}) and the time elapsed since the product is available again (t).

Estimation is done by maximizing the partial likelihood, which can be written as:[8]

$$L = \prod_{i=1}^{N} \left[\frac{\exp\left[\beta_{Eta} X_{Eta,i}(t_i)\right] \exp\left[\alpha_{Eta}\ Z_{Eta,i}(t_i)\,(t_i + t^c)\right]}{\sum_{j=1}^{N} r_{Eta,ij} \exp\left[\beta_{Eta} X_{Eta,j}(t_i)\right] \exp\left[\alpha_{Eta}\ Z_{Eta,j}(t_i)\,(t_i + t^c)\right]} \right]^{d_{Eta,i}} . \qquad (2)$$

The dummy variable $d_{Eta,i}$ indicates whether the observation for consumer *i* is completed ($d_{Eta,i}$ = 1) or not ($d_{Eta,i}$ = 0). It excludes from the numerator all right-censored households, i.e. those who did not purchase Eta during the observation period. For households who made a purchase at a specific time t_i, one considers the likelihood that the purchase was made by household *i* rather than by any of the other households still "at risk" (i.e. who have not yet purchased the product at an earlier point in time). To determine the relevant risk set, a set of indicator variables $r_{Eta,ij}$ is created, with $r_{Eta,ij}$ = 1 if household *j* has not yet bought Eta before t_i, and zero otherwise. Even though right-censored observations are excluded from the numerator in (2), they appear in the risk-set composition of the denominator. Note that the baseline hazard cancels out from the partial likelihood function. As a result, no distributional specification for the baseline hazard is needed.

As two brands, Eta and Kraft, were affected by the product-harm crisis under consideration, we extend the single-event model specified in (2) to a multiple-failure model, by considering both partial likelihoods:[9]

$$L = \prod_{i=1}^{N} \left[\frac{\exp\left[\beta_{Eta} X_{Eta,i}(t_i)\right] \exp\left[\alpha_{Eta}\ Z_{Eta,i}(t_i)\,(t_i + t^c)\right]}{\sum_{j=1}^{N} r_{ETA,ij} \exp\left[\beta_{Eta} X_{Eta,j}(t_i)\right] \exp\left[\alpha_{Eta}\ Z_{Eta,j}(t_i)\,(t_i + t^c)\right]} \right]^{d_{Eta,i}} \qquad (3)$$

$$\times \prod_{i=1}^{N} \left[\frac{\exp\left[\beta_{Kraft} X_{Kraft,i}(t_i)\right] \exp\left[\alpha_{Kraft}\ Z_{Kraft,i}(t_i)\,(t_i + t^c)\right]}{\sum_{j=1}^{N} r_{Kraft,ij} \exp\left[\beta_{Kraft} X_{Kraft,j}(t_i)\right] \exp\left[\alpha_{Kraft}\ Z_{Kraft,j}(t_i)\,(t_i + t^c)\right]} \right]^{d_{Kraft,i}} .$$

At any point in time, the risk set for a specific event (i.e. buying, respectively, Eta or Kraft)

consists of those households who have not yet bought that brand. As such, the risk-set composition is brand specific, which corresponds to the marginal risk-set approach of Wei, Lin, and Weissfeld (1989). Moreover, we allow for different covariate effects for the two considered events. Our multiple-event specification differs from the repeated-event model used in Helsen and Schmittlein (1994), where subjects can only appear in the risk set of the second event after they have experienced the first event, and from the cause-specific competing-risk model in Seetharaman and Chintagunta (2003), which would require households to be assigned to one of the events at the start of the observation period. It also differs from the destination-specific competing-risk approach adopted in Gönül and Srinivasan (1993), where households would disappear from the second risk set once they have purchased the other brand. In our specification, households can buy either of the two brands as soon as they become available again after the product recall, and buying one of the brands does not preclude them from also buying the other brand, either at an earlier or later point in time. Another way to approach the problem would be to model the timing of the first purchase in the category, along with a choice model to indicate which brand was purchased at that occasion (see Chintagunta and Prasad 1998 for a similar approach). However, in so doing, one would not consider all first purchases of the affected brands, as one would exclude the first Eta (Kraft) purchases that took place after either Kraft (Eta) or a non-affected competing brand was purchased.

A household's purchase decisions for the two affected brands are unlikely to be independent of one another. We account for this dependence in two ways. First, in $X_{\text{Eta}}(t)$ $(X_{Kraft}(t))$, we include (in a time-varying way) both the post-crisis volume purchased of Kraft (Eta) and the advertising support given to Kraft (Eta). However, even after accounting for a potential dependence through observable covariates (see e.g. Dekimpe, Parker, and Sarvary

2000 for a similar approach), there may still be some unobserved correlation left between the two hazard rates. While a failure to appropriately control for this unobserved dependence does not have an impact on the consistency of the parameter estimates, it does affect the estimated variance-covariance matrix (Lin and Wei 1989). We therefore adopt the robust, "clustered" approach advocated in Lin (1994) to estimate the variance-covariance matrix. This approach accounts for the within-household (i.e. within-cluster) correlation in the two timing decisions, while still assuming independence across households (clusters).

DATA

Household scanner data describing the peanut-butter purchases of 615 households in two major Australian cities (Melbourne and Sydney) were obtained from ACNielsen Australia. The data covered five years (1996-2000). These were split in two initialization periods (01/01/1996 until 06/26/1996, the start of the crisis, and 06/27/1996 until 11/24/1996, the end of the crisis), used to quantify consumer purchase characteristics, respectively, before and during the crisis, and an estimation period (11/25/1996 until 31/12/2000). All households made at least one purchase in the peanut-butter category in the pre-crisis period.

In this crisis setting, we consider two affected brands of different strength. Before the crisis, Eta had a market share of 13 percent, while the stronger Kraft had a market share of 40 percent. After its five month recall period, Kraft was able to recuperate rather quickly, reaching 70 percent of pre-crisis sales levels within one quarter of its reintroduction. Eta, on the other hand, had a much harder time to recover from the negative events, reaching less than half of its pre-crisis sales levels after one quarter. These differences are reflected in the observed trial decisions. Of the households in the panel, 123 (20%) made a post-crisis purchase of Eta, while 299 (49%) bought Kraft again. The median (completed) time to repurchase Eta after the crisis is 341 days, as opposed to only 196 days for Kraft. Weekly

advertising spending (in AU$) by the major brands in the two areas was also provided by ACNielsen Australia. Contrary to brand prices, advertising was heavily used as a competitive weapon by Kraft's competitors during the product recall, and by Kraft Foods following the reintroduction of its affected brands (The Sydney Morning Herald 1996c).

Explanatory variables

We now turn to the operationalization of the explanatory variables included. Table 2 shows key descriptive statistics.

[Insert Table 2 about here]

In line with Bucklin, Gupta, and Siddarth (1998), we specify pre-crisis loyalty to an affected brand as its within-household market share before the crisis (*Pre-crisis Brand Loyalty)*. Following Ackerberg (2001), we operationalize pre-crisis brand familiarity as the number of days since the last purchase before the start of the crisis (*Pre-crisis Brand Familiarity*).[10] In contrast to a simpler 0/1 operationalization, this measure takes into account the decreasing impact over time of a previous purchase experience with the brand (Mehta, Rajiv, and Srinivasan 2004). As with the brand loyalty measure, we again focus on how the recency of the last purchase *prior* to the crisis affects a customer's *post*-crisis trial rate, which is consistent with our interest in investigating the impact of a brand's pre-crisis equity on its speed of recovery after the crisis. Similar to Campo, Gijsbrechts, and Nisol (2003), we measure category usage as the average daily purchase quantity. We consider both average category consumption before the crisis (*Pre-crisis Category Usage*), and the difference (in percentage terms) between average category usage during and before the crisis (*Change in Category Usage*). *Cross* and *Competitive Purchases* are specified as two weekly time-varying variables measuring the total volume purchased by the household of, respectively, the other

affected brand and the non-affected competitors since the end of the crisis.

With regard to advertising, we include in each marginal model three weekly time-varying covariates measuring advertising of, respectively, the affected brand (*Own Advertising)*, the other affected brand (*Cross Advertising*), and the non-affected competitors (*Competitive Advertising*). To also capture potential carry-over effects of advertising, we estimate the stock of advertising effort available to the brand as an exponentially weighted average of current and past advertising expenditures (see e.g., Dutta, Narasimhan, and Rajiv 1999):

$$ADSTOCK_t = \alpha ADV_t + (1-\alpha) ADSTOCK_{t-1} \quad , \tag{4}$$

where ADV_t is the advertising expenditure in week t, and $ADSTOCK_t$ the corresponding advertising stock. The parameter α reflects the decay in advertising effectiveness. We allow for different decay parameters for advertising expenditures by the three brands (Eta, Kraft and non-affected competitors), and determine the respective α-values through a grid search (see Tellis and Weiss 1995 for a similar practice).

As control variables, we also add the *area* of residence (Melbourne or Sydney), the *household size* (as in Jain and Vilcassim 1991), as well as the volume purchased in the category on the previous purchase occasion. The latter variable is included to control for potential *inventory* effects (see Chintagunta and Prasad 1998 for a similar practice).

RESULTS

Table 3 shows the parameter estimates for the model outlined in Section 4. The first column presents the results for Eta, while the second column shows the estimates for Kraft.

[Insert Table 3 here]

Pre-crisis loyalty has a significant ($p < 0.01$) positive impact on trial for both Eta and Kraft. This supports earlier arguments that loyal customers are less sensitive to negative news

(Ahluwalia, Burnkrant, and Unnava 2000), and is in line with the findings of Campo, Gijsbrechts, and Nisol (2000) that loyal customers switch less in an out-of-stock situation due to higher substitution and search cost. This protection is found to gradually erode, however, as indicated by the negative *interaction between loyalty and time* ($p < 0.01$).

The parameter estimates for *pre-crisis brand familiarity* are significantly negative ($p < 0.01$ and $p < 0.05$ for Eta and Kraft, respectively).[11] This finding confirms our prediction that product experience can trigger defensive strategies against negative information on the brand (Ahluwalia, Burnkrant, and Unnava 2001), although this applies mostly for recent purchases because of forgetting (Mehta, Rajiv, and Srinivasan 2004). The effect of *pre-crisis category usage* on the probability of trial is significantly positive ($p <$ 0.05) for both Eta and Kraft. Heavy users are less inclined to cancel their purchases, as they are more familiar with the benefits of the product (Lim, Currim, and Andrews 2005), and have lower perceived risks than light or medium users (Goering 1985). Apart from the category usage before the crisis, also the *change in category usage* during the crisis is important. A reduction is indicative of the extent to which trust in the category as a whole is lost. A positive effect (causing a delayed trial if the usage rate is reduced) is obtained for both brands, even though statistical significance is only obtained for Kraft ($p < 0.05$).

Our grid search on the decay parameters for the adstock variables resulted in α-values ranging from 0.1 (Eta) to 0.2 (non-affected competitors), which are in line with the retention rates reported in Fader, Lattin, and Little (1992) and George, Mercer, and Wilson (1996). While *own advertising* has a significant positive effect on the trial probability of Kraft ($p < 0.05$)[12], advertising expenditures for Eta are not effective in stimulating Eta's post-crisis trial rate ($p > 0.10$). Using aggregate analyses, and focusing on the total sales impact rather than trial, van Heerde, Helsen, and Dekimpe (2006) also obtained a non-significant own

advertising effect for Eta, and a positive post-crisis advertising effectiveness for Kraft. Not surprisingly,[13] Eta was not helped by Kraft's advertising either, while it also did not have enough clout to create a positive spill-over to Kraft. With regard to *competitive advertising* from non-affected competitors, we find a negative effect for both affected brands ($p < 0.05$ and $p < 0.10$ for Kraft and Eta, respectively), implying that competitive advertising was more persuasive than informational. In terms of the *cross-purchase* effects, an interesting asymmetry is observed. While a purchase for the stronger brand (Kraft) delays ($p < 0.01$) the subsequent trial of the smaller brand (Eta), no such effect is observed when Eta was first purchased. Strong brands are known to impact competitors extensively, while their vulnerability is typically low (Kamakura and Russell, 1989). *Competitive purchases* did not ($p > 0.10$) delay the purchase of either brand.

Finally, two of the control variables turned out to be significant. *Inventory* has the expected negative sign (Campo, Gijsbrechts, and Nisol 2003) for Kraft, while the parameter estimate for *household size* is significantly positive for both brands, supporting the idea that larger households purchase more frequently (Chintagunta and Prasad, 1998). The place of residence (*area*), our third control variable, had no significant effect on either of the trial probabilities.

DISCUSSION

A product-harm crisis can be devastating for an affected brand. Consumers tend to weigh bad publicity heavily in product judgments, while purchases of competing brands during the recall period may shift preferences towards these brands. In addition, non-affected competitors often try to profit from the crisis situation by increasing their own advertising spending.

To overcome the negative crisis effects, companies hope (perhaps in vein) that their

brand equity will help them weather the storm, and tend to resort to advertising communications to rebuild their tarnished image. Our research, though limited to one case study, allows us to contrast along both dimensions the performance of a 'strong' (Kraft) and 'weaker' (Eta) brand owned by the same company (Kraft Foods). Both brands were recalled for more than five months, during which their market shares dropped from 13 (Eta) and 40 (Kraft) percent to zero. While Kraft was able to reach 70 percent of its pre-crisis sales level within one quarter of its reintroduction, Eta had a much harder time to recover, with less than half of its pre-crisis sales level recovered after one quarter. Our findings help put these differences in perspective.

First, we found that pre-crisis equity indeed provides an important protection against product-harm crises. Even after an out-of-stock situation of more than five months, both loyal and more familiar consumers (i.e. who bought the brand more recently) showed a significantly higher trial probability once the product was back on the shelves. Even though the parameter estimates were comparable for both brands, Kraft's pre-crisis loyalty (42% on average, see Table 2) and familiarity (119 days) were considerably higher than for Eta (13% and 159 days), giving the former considerably more resilience against the crisis. Moreover, strong brands have been found to be less vulnerable and to have more clout (Kamakura and Russel 1989). Our results indicate that these effects also apply in the context of a product crisis: households who bought the stronger Kraft brand became less likely to also buy Eta, while the reverse did not hold. Hence, apart from the well-documented benefits (see e.g., Aaker 1991) that accrue to the brand in prosperous times (such as an increased effectiveness of marketing programs, the possibility of premium pricing, and a higher success rate for brand extensions), we identify the creation of a buffer against negative events as another important reason to invest in brand equity. Although this function has been mentioned in the brand-

equity literature (see e.g., Hoeffler and Keller 2003), we are, to the best of our knowledge, the first to empirically demonstrate it in a non-laboratory setting.

However, this protection does not extend indefinitely. During the recall period, consumers cannot nurture their relationship with the brand through personal experiences, while companies are not inclined to advertise a brand that is not available. As a consequence, the loyalty effect tends to decrease over time. Moreover, the longer the time elapsed since the last purchase of the particular brand, the smaller its trial probability becomes. As such, one should try to keep the recall period as short as possible, and perhaps announce well ahead of time the products' renewed availability.

Also the intensity of category usage was found to be an important moderator. Usage increases the experience with the category and decreases the perceived risks of using the product (Goering 1985). However, not only pre-crisis category usage matters. A crisis can impact other –not directly affected- brands within the category, as the inadequacy of the production process may be perceived to be an industry-wide problem. Consumers who cancel all (or most) of their purchases during the recall period have lost trust in the category, and have switched to other categories. Bringing them back on board is hard, and may take a prolonged effort from all industry participants.

Finally, companies often resort to advertising to restore trust in their affected brands (Coombs 2000; Hale, Dulek, and Hale 2005). Brand advertising for Kraft turned out to be effective in convincing consumers to return to the brand, while Eta's advertising was not. This suggests an additional benefit of having a strong equity: not only does it offer a direct buffer against product crises, it also increases the effectiveness of post-recall communication efforts.

In this paper, we focused on the effect of consumer characteristics and advertising on

consumers' trial rates following a specific product-harm crisis. Different avenues for future research can therefore be formulated. In line with previous research on the impact of out-of-stock situations (Campo, Gijsbrechts, and Nisol 2003), future research could examine whether a crisis can also have an impact on other components of purchase behavior such as quantity and category-consumption decisions. Moreover, rather than just focusing on the trial decision, one could also consider the subsequent purchases. In addition, apart from discovering ways for affected brands to recover from a product-harm crisis, it would also be interesting to look at how non-affected brands can benefit from the opportunity. Future work could also look at the spillover effects of a product-harm crisis for the affected brand in other countries and other product categories. Finally, we focused on one particular product-harm crisis. It would be useful to replicate our analysis in other crisis settings. Not only would such studies enable empirical generalizations, they could also determine whether certain factors, such as the perceived locus of responsibility for the crisis (Folkes 1984) or competitive response strategies (Dawar and Pillutla 2000), moderate the effects we obtained.

TABLES

Table 1: Predicted effects on trial probability of affected brands

Variable	Predicted effect
Consumer Characteristics	
Pre-crisis Brand Loyalty	+
Pre-crisis Brand Loyalty * Time	-
Pre-crisis Brand Familiarity	+/-
Pre-crisis Category Usage	+
Change in Category Usage	+/-
Advertising	
Own Advertising	+
Cross Advertising	+/-
Competitive Advertising	+/-
Cross and Competitive Purchases	
Cross purchases	-
Competitive purchases	-

Table 2: Descriptive statistics for explanatory variables

Variable	Mean	Standard deviation	Minimum	Maximum
Pre-crisis Brand Loyalty				
Eta	13	31	0	100
Kraft	42	46	0	100
Pre-crisis Brand Familiarity				
Eta	159	45	3	178
Kraft	119	67	1	178
Category Usage				
Pre-crisis Category Usage (in grams per day)	6.83	6.58	1.12	56.88
Change in Category Usage (in percentage)	-15%	108%	-100%	1130%
Advertising (1,000,000 AU $)[(a)]				
Eta Advertising	1.95	3.20	0.00	13.73
Kraft Advertising	11.58	8.11	0.42	46.17
Competitive Advertising	2.46	5.93	0.00	35.26
Cross purchases (in 100 grams)				
Eta	9.57	23.04	0.00	252.50
Kraft	1.63	6.24	0.00	93.60
Competitive purchases (in 100 grams)				
Eta	17.42	49.73	0.00	798.75
Kraft	21.83	52.26	0.00	667.5
Area[(b)]	52%			
Household Size	3.43	1.46	1.00	8.00
Inventory (in 100 grams)				
Eta	3.27	2.30	0.00	27.50
Kraft	2.85	2.40	0.00	26.25

[(a)] To illustrate the variation over the analyzed 214-week period of the time-varying advertising measures, we report the mean and standard deviation of the adstock variables over the estimation period.
[(b)] Dummy variable indicating whether the household lives in Sydney (value 1) or Melbourne (value 0).We report the proportion of households having the value 1.

Table 3: Empirical results[(a)]

	Eta	Kraft
Consumer Characteristics		
Pre-crisis Brand Loyalty	0.015***	0.017***
	(0.005)	(0.004)
Pre-crisis Brand Loyalty * Time	-1.7e-05***	-1.8e-05***
	(7.6e-06)	(7.5e-06)
Pre-crisis Brand Familiarity	-0.007***	-0.003**
	(0.002)	(0.001)
Pre-crisis Category Usage	0.022**	0.027**
	(0.012)	(0.014)
Change in Category Usage	0.050	0.107**
	(0.108)	(0.052)
Advertising		
Own Advertising	-0.261	0.107**
	(0.178)	(0.055)
Cross Advertising	0.009	0.164
	(0.088)	(0.129)
Competitive Advertising	-0.090*	-0.063**
	(0.051)	(0.028)
Cross and Competitive Purchases		
Cross Purchases	-0.018***	0.011
	(0.008)	(0.012)
Competitive Purchases	-0.001	-0.003
	(0.002)	(0.005)
Control Variables		
Area	0.239	-0.210
	(0.470)	(0.349)
Household Size	0.099*	0.078**
	(0.066)	(0.044)
Inventory	0.013	-0.090***
	(0.039)	(0.032)

[(a)] Robust standard errors between brackets. *,** and *** indicate a significant result at, respectively, the 10%, 5% and 1% significance level. Reported significance tests are one-sided, except for Pre-crisis Brand Familiarity, Change in Category Usage, Cross and Competitive Advertising and Area, as no clear direction was specified for these covariates.

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ENDNOTES

[1] See http://www.pwcglobal.com/cz/eng/about/press-rm/2006/pressrm09_06.html.

[2] Product quality and handling of complaints were ranked as first and second, respectively.

[3] This crisis was also investigated in a recent study by van Heerde, Helsen, and Dekimpe (2006). However, their use of aggregate performance measures precluded the detection of any individual-level differences in how consumers react to the crisis.

[4] For instance, when Merck had to remove Vioxx, its arthritis painkiller, from the market after the drug was linked to increased heart-attack risks, many patients worried that other drugs in the Group of so-called COX-2 inhibitors might carry the same risks (International Herald Tribune 2004).

[5] We do not consider an interaction effect with time, as our operationalization of pre-crisis brand familiarity already accounts for a decreasing impact with time. We refer to section 4 for more details.

[6] A hazard approach was also used to model the adoption timing of new products in Chandrashekaran and Sinha (1995) and Steenkamp and Gielens (2003), among others.

[7] A comparable expression can be derived for Kraft.

[8] See Allison (1984) for an in-depth discussion.

[9] If one assumes independence between a household's purchase decisions of Eta and Kraft, Equation (3) is separable. As indicated below, we do not make this assumption, and use the clustered error-correction procedure advocated by Lin (1994) to explicitly account for possible within-household correlation across both decisions.

[10] Households that did not purchase the affected brand before the crisis were given the maximum value for pre-crisis familiarity (178 days). In unreported analyses, we increased this upper value by 10%. Our substantive results were not affected.

[11] Since the degree of pre-crisis familiarity decreases with the number of days since the last purchase before the crisis (Mehta, Rajiv, and Srinivasan 2004), we expect a negative sign.

[12] In unreported analyses, we checked for interaction effects between this advertising variable and the aforementioned individual-level characteristics. However, no such evidence was found.

[13] Indeed, cross effects of marketing programs are usually smaller than own elasticities (Steenkamp et al. 2002).