

When and Why does Promotional Stockpiling Accelerate Consumption?

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Abstract:

Many assume that promotion-driven consumer stockpiling only borrows from future purchases and cannot create primary demand. In this paper, we challenge this assumption by proposing an integrative framework of consumption decision making which suggests that promotional stockpiling can influence the consumption of substitutable and impulse products by raising their salience at the point of consumption, by decreasing their replacement costs, and by increasing their holding costs. In order to understand the causal impact of stockpiling, a field experiment was conducted which manipulated product stockpiling across six different product categories. The results shows that stockpiling accelerates product consumption by increasing product inventory salience. To further test the external validity of the framework and better understand the moderating impact of product characteristics, a second analysis was conducted using household-level scanner panel data. It showed that, when they stockpile cookies and fruit juice - but not detergent - consumers repurchase earlier than what a constant consumption rate would predict.

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Does household stockpiling influence consumption? Though deceptively simple, this question has led to disagreements among retailers, conflicting assumptions among researchers and inconsistent promotion strategies among manufacturers. At the center of these differences is the issue of whether sales promotions only influence purchase decisions or whether they can influence also consumption decisions. Whereas many retailers and manufacturers believe that promotional stockpiling* can accelerate product consumption, many researchers believe it does not and as a result there has been very little research on that topic. The scarcity of research on stockpiling is somewhat surprising given that this topic is related to the broader question of whether sales promotions can create primary demand instead of only displacing demand from one product to the other or from one purchase occasion to the other.

Why has this issue been so difficult to resolve? One reason is because scanner data does not include any measures of household inventory or consumption. As a result, most prior models of purchase incidence or interpurchase time chose to hold consumption rate constant and let inventory vary (Bucklin and Lattin 1991; Chiang 1991; Chintagunta 1993; Gupta 1988; Gupta 1991; Helsen and Schmittlein 1993; Krishnamurthi and Raj 1988; Vilcassim and Jain 1991). Similarly, most analytical models of consumers' optimal purchasing and inventory responses to sales promotions assume that consumption is independent of the amount of good held in inventory (Blattberg, Eppen and Lieberman 1981; Helsen and Schmittlein 1992; Krishna 1992; Krishna 1994; Meyer and Assunção 1990).

Although some researchers have challenged the assumption of constant consumption rates after a promotional stockpiling (e.g., Blattberg and Neslin 1990) there has been little empirical evidence to support their view. Indeed, the few studies involving actual product use showed either no support (Moore and Wirier 1978) or limited, inferential support (Ward and Davis 1978). In

¹We define promotional stockpiling as the incremental inventory caused by a response to a sales promotion. Promotional stockpiling occurs when consumers **buy** more or earlier than usual to **take** advantage of a promotion (Doyle and Saunders 1985; Neslin, Henderson and Quelch 1985) or when they postpone their purchase in the absence of a promotion.

more recent work, Ailawadi and Neslin's (1996) scanner data model allowed consumption to be a function of inventory and found a subsequent improvement in fit across two product categories. Unfortunately, the lack of direct measurement makes it difficult to assess the direction of causality: does inventory increase consumption or did external surges in demand such as guests, parties, holidays influence both product stockpiling and consumption?

The second reason why the relationship between stockpiling and consumption has been so difficult to resolve is because we have so far only a limited, normative, understanding of how consumers decide what to consume and no empirical study of in-home consumption behavior. The analytical model of Assunção and Meyer (1993) draws on micro-economic theory to show that promotional stockpiling should increase the consumption of the promoted product because it lowers its average unit price. As a result, they argue that rational consumers should take advantage of this lower price by decreasing their consumption of more expensive substitute products. Although this model has helped our understanding progress, it assumes that consumers have perfect knowledge of their inventory price and composition and that hunger and tastes are exogenous. It cannot, therefore, accommodate the mundane and impulsive consumption that often takes place for frequently consumed consumer goods (Wansink and Deshpande 1994).

This paper contributes to our understanding of the relationship between stockpiling and consumption in the following ways. First, we extend Assunção and Meyer's model by recognizing the existence of multiple stages in the consumption process: product consideration and product choice and by studying the factors that influence each stage. By doing that, we show three ways promotional stockpiling influences consumption: (1) by raising product inventory salience, which affects consideration and therefore consumption incidence, (2) by lowering product purchase and replacement cost and (3) by increasing holding costs, which both influence product choice. Second, we identify the boundary conditions of the model by discussing the moderating role of product substitutability and impulsiveness. We then test portions of this model in an empirical study of consumer in-home consumption patterns. In a field experiment, we manipulate promotional stockpiling across 6 different product categories and use recall measures of daily consumption. A mediation analysis shows that promotional stockpiling accelerates consumption by raising product salience at the point of consumption. In a second study, we assess

the external validity of our framework and the magnitude of the phenomenon by studying French household scanner data. We use data on three product categories frequently sold on promotional pack which “oblige” consumers to stockpile and enable us to avoid some of the confounds inherent in ecological data. Consistent with the framework, the results show that promotional stockpiling significantly accelerate the consumption of fruit juice and cookies but not of laundry detergent.

Our motivation for developing this model of consumption behavior and response to promotional stockpiling is that it provides some new insight into the following important issues:

How do consumers decide whether and what to consume? Economic theory and psychology offer two very different perspectives on how consumers choose to consume. On one hand, the law of demand suggests that consumers rationally substitute expensive goods for less expensive ones. On the other hand, folk and experimental psychology has long recognized that some products are able to create their own demand just by being salient. By integrating both perspectives, this research helps explain the consumption variance that has been left unexplained by each approach.

Which categories are more likely exhibit consumption acceleration? Obviously, we expect some product categories to exhibit more consumption variation than others. For instance, Ailawadi and Neslin (1996) reported larger consumption flexibility for yogurt than for ketchup. While these results have face validity, we show that two dimensions can be used to determine ex ante the consumption acceleration potential of each category.

Can sales promotions create primary demand? If promotional stockpiling does not accelerate consumption, then it merely subsidize loyal customers who forward buy and wait until the next deal (Helsen and Schmittlein 1992). Conversely, if promotional stockpiling does increase consumption, they can expand category sales even without attracting new customers. Answering those questions would help determine whether sales promotions only displace demand from one brand to another or from one week to another and cannot therefore have long-term positive effects (Blattberg, Briesch and Fox 1995; Dekimpe and Hanssens 1995; Papatla and Krishnarnurthi 1996).

What are the effects “of sales promotions on purchasing patterns?” While it is clear that sales promotions can have an impact on inventory and on purchase timing, there are still important unresolved issues. For instance, if promotional stockpiling can increase consumption, it could explain why it is so hard to find a post-promotion “dip” in aggregate sales data (Neslin and Schneider 1996). Similarly, it could explain the relatively low fit of scanner-based models of purchase incidence and purchase quantity (Gupta 1988). Our study suggest when we should expect such dips. Furthermore, our model also helps explain the inconclusive results of past studies (Moore and Wirier 1978).

Should marketers run promotions that encourage stockpiling? Marketers often encourage stockpiling through the use of sales promotions, quantity limits or volume discounts to get rid of obsolete inventory, to transfer inventory costs to the consumer, to pre-empt competitive new entries, to price discriminate, to avoid stock outs or simply to increase the brand's or store's share of total category requirements (Bhattacharya et al. 1996; Blattberg et al. 1981; Blattberg and Neslin 1990; Cote, McCullough and Reilly 1984; Jeuland and Narasimhan 1985; Robertson, Eliashberg and Rymon 1995; Wansink, Kent and Hoch 1996). Knowing whether promotional stockpiling can also increase total category consumption provides another element that should be taken into account in deciding whether to encourage stockpiling or not.

This paper is organized as follows. We first review prior research on the factors influencing consumption decisions. We then propose a framework of consumption decision making. Study 1 reports the results of a field experiment which examines the internal validity of our framework and which shows that product salience mediates the effects of promotional stockpiling on consumption. Study 2 replicates and extend study 1 by testing the external validity of our framework using real-world data. An analysis of scanner data in three product categories shows that promotional stockpiling induced by the purchase of a promotional pack leads to an acceleration in the consumption of substitutable products The last section discusses key findings and managerial implications.

Background: What Influences Consumption?

Ironically, most decision models in Consumer Behavior relate to buyer behavior, not consumption behavior². The few studies available on the different factors that influence consumption decisions and that may mediate or moderate the effects of promotional stockpiling come from two different perspectives: Scanner-based choice models and micro-economic theory.

Purchase Incidence Models

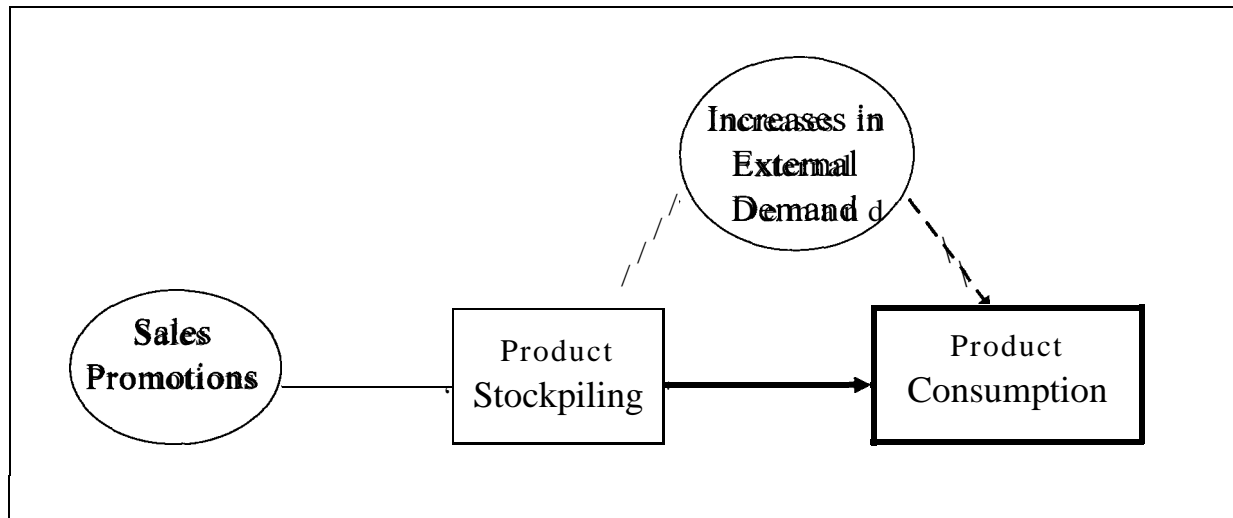
Following the work of Neslin, Henderson and Quelch (1985), several studies have shown that a high inventory decreases the probability of purchase and increases interpurchase time (Bucklin and Lattin 1991; Chiang 1991; Chintagunta 1993; Gupta 1988; Gupta 1991; Helsen and Schmittlein 1993; Krishnamurthi and Raj 1988; Vilcassim and Jain 1991). What these studies did

²Or usage decisions. In this paper, we use the two terms interchangeably.

not examine however, is whether this effect is as strong as a constant consumption rate would predict. If, say, consumers buy twice as much as they normally buy, do they wait twice as long, or just somewhat longer? The only research in this tradition that does not assume a constant, within-household, consumption rate is a recent model by Ailawadi and Neslin (1996). These authors relax this assumption by using an inventory model in which the consumption of the period is a function of the average consumption of the household and of the average inventory at hand during this period. By incorporating this new parameter into a traditional inventory model, and then into the purchase incidence and purchase quantity equations, they show a significant improvement in the overall fit and that the parameter capturing category flexibility has face validity in two product categories.

Unfortunately, a limitation of prior econometric studies based on actual purchases is that they cannot directly show causality because they did not examine the sources of household stockpiling. Do higher inventory levels increase consumption or are inventory levels and consumption correlated because they are both influenced by external (non-promotion driven) demand increases? For instance, Figure 1 shows how purchase and consumption would both increase if consumers forecast an increase in the demand for the product and therefore stockpile to meet this higher demand. Such external demand increases would occur if guests are visiting or if seasonality or satiation influence tastes. In summary, to better assess the causal relationship between stockpiling and consumption we need to distinguish between promotion-driven and demand-driven stockpiling and we need a better understanding of the mechanisms through which promotional stockpiling may influence consumption.

Figure 1
The Sources of Stockpiling and their Effects on Consumption

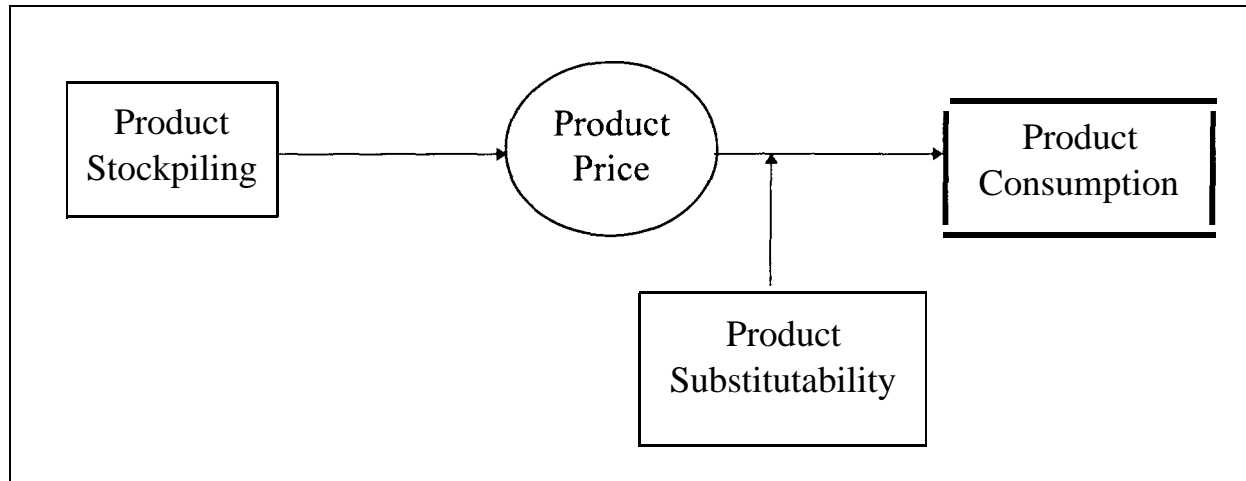


Economic Framework

Economic theory states that consumers try to maximize their total wealth by consuming the product with the highest utility. The “integration rule”, or utility function, which determines product utility, is based on a compensatory evaluation of each alternative on the basis of their price and of consumers’ intrinsic preferences (taste) for it. Therefore, when the price of a product decreases, individuals consume more of it by lowering their consumption of a more expensive substitute (Becker 1987). Assunção and Meyer draw on this model to show that promotional stockpiling “rationally lead to higher rates of consumption in a category” (p. 518,1993). They first replicate prior models that show that it is in the best interest of consumers to stockpile in response to a deal (Helsen and Schmittlein 1992; Meyer and Assunção 1990). They extend these models by showing that this promotional stockpiling enables consumers to wait until the next time the product is on sale and therefore to obtain lower average prices for the stockpiled product. These authors then argue that, as a result, consumers can indulge in consuming more of the less expensive product. On the other hand, when a product is not stockpiled, consumers should rationally reduce their consumption in order to be able to wait for the next deal and to avoid purchasing the product at its regular price. Interestingly, Assunção and Meyer provide a rational explanation for the stock pressure effect based only on average product purchase price. However,

these authors identify two moderating factors that increase the effects of promotional stockpiling: holding costs (the costs of storing the stockpiled product) and the discount rate of future consumption (the extent to which consumers prefer consuming now rather than wait). This model can be graphically represented in Figure 2.

Figure 2
Economic Perspective on Consumption



Numerous studies in Behavioral Economics have empirically demonstrated the validity of the demand law with humans and animals using a variety of food and non food products (Allison 1983; Degrandpre et al. 1994; Foltin 1994). Some empirical evidence for the mediating effect of price perception has also been found in studies of the effects of larger package sizes on consumption. Wansink (1996) showed that larger package sizes can increase the amount of product used per consumption occasion by lowering price perception. This is also supported by a series of experiments by Folkes, Martin and Gupta (1993) who noted that consumers use more of a product when the bottle is almost full but use less of it when it is almost empty. One of their explanation was that consumers try to conserve the product in low inventory in order to avoid making an additional shopping trip. While these studies tested some of the predictions of the economic model, they only looked at the amount of product used per consumption occasion. To date, there is no empirical data on the mediating effect of price on total product consumption.

Limitations and Alternative Frameworks

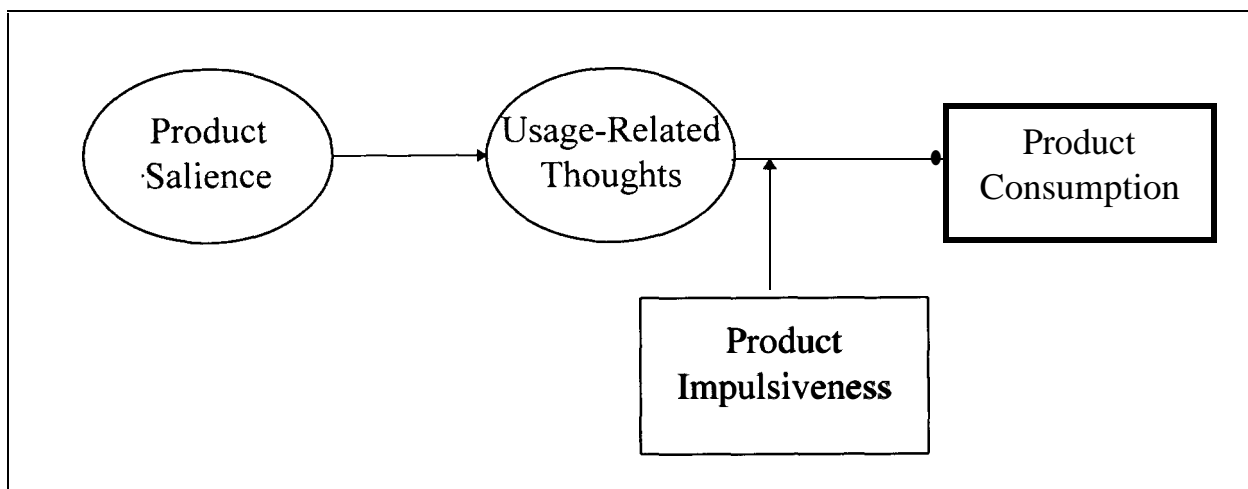
While the economic model provides us with a compelling normative rationale for why promotional stockpiling should lead to higher product consumption, it relies on specific normative assumptions about consumption behavior which are not descriptively accurate. More importantly, these assumptions obliterate some of other factors that influence consumption behavior and which may mediate the effects of promotional stockpiling. First, the economic framework assumes that consumers make consumption decisions by evaluating the costs of all the products alternative available. It therefore assumes that consumers have perfect price knowledge and are fully aware of all the consumption alternatives available. Second, in this framework, preferences and hunger are exogenous. For instance, consumers may be on a 2000 calorie diet and decide to consume salad instead of soup if they bought many lettuces on deal. However, their intrinsic taste for soup of their diet remain unchanged as a result of the promotional stockpiling.

First, some empirical studies challenge the assumption that consumers know how much product they have on inventory and at what price they purchased it. Dickson and Sawyer(1990) showed that most consumers have a very poor price recall just after the purchase. It is therefore unlikely that they can remember these price at the time of consumption, probably several days after the purchase. Further, recent behavioral studies on consumer mental accounting found that when purchase and consumption do not occur simultaneously, consumers have difficulty attaching a cost to the product they consume and often perceive the product as a free good (Gourville and Soman 1996; Shafir and Thaler 1996). These studies at least suggest that consumer may have a fuzzy perception of prices and that consumption may therefore not be sensitive to variation in unit prices. Similarly, other studies challenged the assumption of exact inventory knowledge indicating, instead, that consumers underestimate how much they have in inventory (Wansink 93). Numerous studies based on scanner data provide indirect support for these findings by showing that purchase incidence is little influenced by inventory level. Building from this premise, Neslin and Schneider (1996) show that inventory insensitivity is the best explanation for the absence of post-promotion 'dips'.

Second, some psychological studies relax the assumptions of exogenous hunger and product tastes and show that consumption incidence can be influenced by the mere salience of the

product. First, the literature on eating disorders, as well as abundant anecdotal evidence, show that an apparently physiological “need” such as hunger is actually largely a psychological construct and is context-dependent (Schachter and Gross 1968). Because of our physiological capacity of “making room for some more”, our hunger actually hinges on our motivation to consume and this motivation can be influenced by the mere availability of the food (Herman and Polivy 1984; Nisbett 1986). Compulsive eating for instance, occurs when not physically hungry in an attempt to regulate some inner sense of emotional emptiness or desired arousal (Faber et al. 1995). Second, consumers can experience a sudden increase in their taste for a product if they picture themselves consuming the product. Hoch and Loewenstein (1991) explain such consumer impatience by reference-point shifts which frame the non-consumption as a loss and therefore increase the desires to consume the product as quickly as possible in order to terminate the stream of deprivation. These sudden consumption impulses appear to be triggered by the contextual salience of the product and the easiness of its consumption (Loewenstein 1996; Rook 1987). Similarly, Wansink (1994; 1996) argues that consumers increase their total consumption of a product when new usage-related thoughts are created by advertising or by the presence of the product. The psychological perspective can be graphically represented by Figure 2 his.

Figure 2 bis
Psychological Model of Consumption



To summarize, prior research on the effects of promotional stockpiling on product consumption has so far provided either indirect evidence based on purchase data or conceptual evidence based on an economic framework. Overall, while we still know very little about in-home consumption decisions, it seems that the economic framework does not take into account all the factors that influence consumption and which may mediate or moderate the effects of promotional stockpiling. In the following section, we propose an integrative model of consumption that extend the economic framework by integrating the mediating role of product salience and product costs and by highlighting the moderating role of product characteristics.

A Framework of How Promotional Stockpiling Influences Consumption

The objective of this framework is to better understand the effects of promotional stockpiling on the consumption rate of a product category. The preceding section showed the shortcoming of the economic model in the context of low-involvement goods. In this section, we draw on studies of consumer decision-making for low-involvement, repeat-purchase products to suggest an integrative framework of how consumers make consumption decisions. We then show how promotional stockpiling and product characteristics can influence each stage of the consumption process.

The Multiple Stages of the Consumption Decision Process

Most researchers agree that when making low-involvement, repeated decisions, consumers use a phased decision process which includes a consideration and a choice stage (Alba, Hutchinson and Lynch 1991; Hauser and Wernerfelt 1990; Russo and Leclerc 1994; Shocker et al. 1991). Consumers first consider whether or not to consume and, if their consideration set includes more than one alternative, they choose which alternative to consume. As Figure 3 shows, the consideration stage therefore influences consumption incidence (i.e., “when to consume”) or the set of brands which will be considered given that external factors have already triggered need recognition (i.e., “what to consider consuming”). For instance, consumers may drink fruit juice on impulse just because it is salient on the table or, when deciding what to drink when they are thirsty, consider fruit juice instead of soft drink because the bottle of fruit juice “was prominently

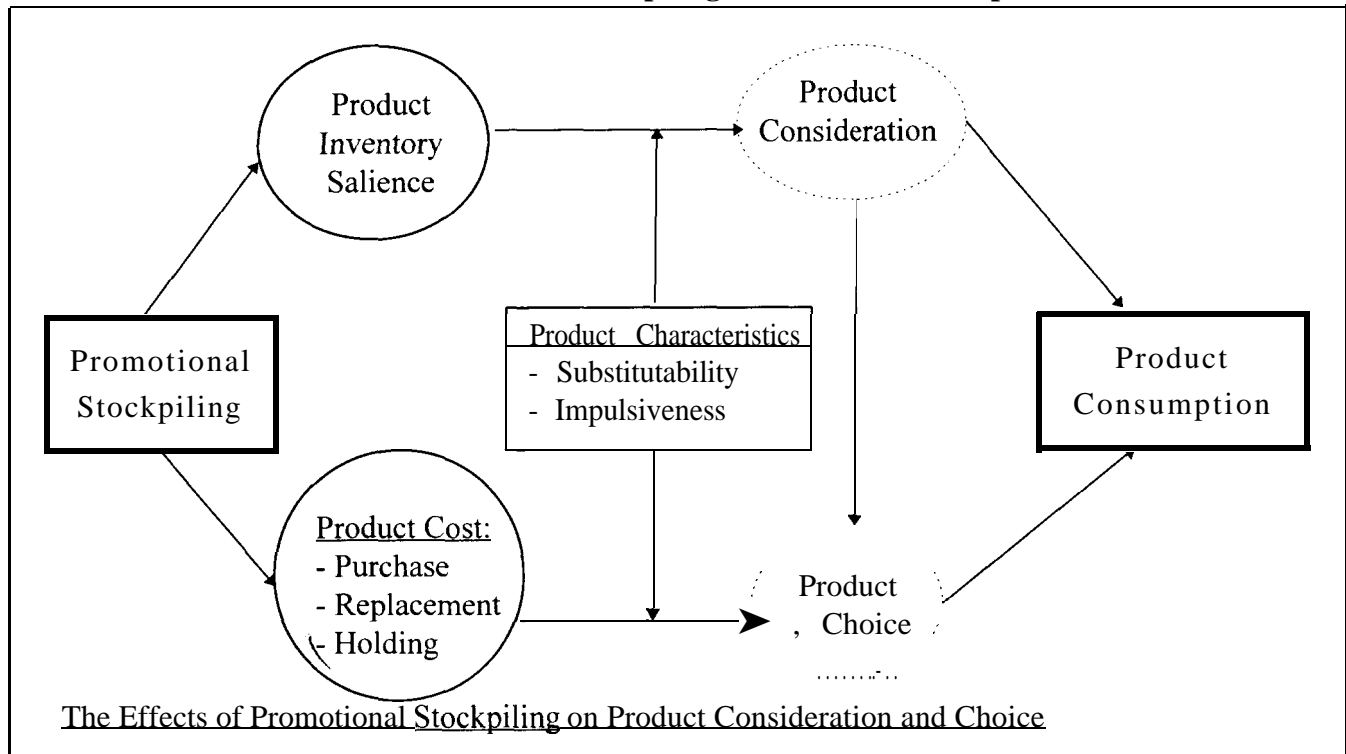
visible in the refrigerator. On the other hand, the choice stage influences which product will be consumed among the ones considered (i.e., “what to consume”). For instance, in deciding between fruit juice and soft drink, consumers may choose fruit juice because they bought is on sale and have a lot more packs left.

Further, the inputs of the two stages, as well as the decision rules used at each stage are different (Kardes et al. 1993; Nedungadi 1990; Shocker et al. 1991). On one hand, the consideration set includes “the goal-satisfying alternatives that are salient or accessible on a particular purchase occasion” (Shocker et al. 1991). Therefore, product consideration is a function of memory accessibility and contextual salience. On the other hand, product choice among the alternative in the consideration set follows a more comprehensive and careful evaluation of product’s utility. In this framework, there is a clear distinction between the factors that influence consideration and those that influence choice. For instance, the effects of product salience on consumption are mediated entirely by their effects on consideration: the choice decision among the brands in the consideration set is not influenced by the salience or the accessibility of each alternative. In other words, all the brands in the consideration set are salient or accessible. Similarly, product cost has an impact only if the brand is already in the consideration set. The cost of a product have no effect on its consideration because consumers must be aware that they have the product in inventory before they are influenced by its price or holding costs. These hypotheses are consistent with prior research which found that priming a brand (e.g., by displaying it) increases the probability of its consideration but has no effect on its utility (Nedungadi 1990).

In summary, we draw on widely accepted integrative models of consumer decision-making to represent how consumers make consumption decisions. This framework helps us, in turn, integrate the two mechanisms identified by prior research: product price and product salience by acknowledging that they influence two different stages in the consumption decision process: product consideration and product choice (see Figure 3).

Figure 3

How Promotional Stockpiling Influences Consumption



Our framework suggests that product inventory salience³ triggers product consideration. In turn, promotional stockpiling is one of the sources of product inventory salience. When consumers stockpile because of a promotion, they take more risk, spend more money and carry more product compared to when they buy their habitual brand/size. They may thus elaborate more on their purchase and product inventory may become more accessible in memory. Similarly, promotional packs are often more visible at the point of consumption because they take more space and because they usually have special shapes and colors.

There is some evidence for the impact of promotional stockpiling on product inventory salience. In a paper and pencil study, Wansink and Deshpande (1994) found that promotional stockpiling can create usage-related thoughts. Similarly, in a preliminary phase of this research, three focus groups of homemakers indicated that they are mindful of stockpiled products that has been recently purchased on promotion. This is partially because of the salient location in which

³We prefer to use product inventory salience rather than product salience in order to convey the meaning that consumers are aware, not only of the product, but also of how much they have in inventory.

they are stored and partially because of the recent experience of packing-unpacking so many of these items.

Second, expanding upon Assunção and Meyer (1993), we argue that promotional stockpiling has an impact, not only on the average purchase price of the product, but also on its replacement costs and on its holding costs. In turn, these three elements influence which consumption alternative is chosen.

First, the reduced purchase price of a product bought on promotion can reduce the frequency of stock-outs of the promoted product and create stock outs of other products. For instance, consumers may decide to spend the money otherwise assigned to a substitute product on the promoted product which becomes the only available alternative. Price promotions also enable consumers to buy a product they prefer but which is normally priced beyond their reservation price. Last, consumers may also prefer to consume more of the promoted product because it offers more utility for the money and therefore can be consumed in situations where it provides less overall utility. For instance, promotional packs of fruit juices often show the amount of free product which consumers may indulge in consuming at no cost in situations where they would have allowed themselves, say, only water.

Second, promotional stockpiling decrease replacement costs, that is, the purchasing price of the product at the time of the replacement and the transaction costs associated with this replacement. When a product is stockpiled, consumers do not have to make an additional shopping trip only to replenish their inventory and can therefore consume it more freely. When, on the other hand, there have little inventory, consumers may prefer to lower their consumption in order to avoid making an additional shopping trip and in order to preserve future consumption opportunities in the time period remaining before the next scheduled shopping trip.

Last, the costs of holding inventory include the depreciation costs due to the perishability of the product and the storage costs caused by the higher storage space required and the opportunity costs of the larger capital invested. Promotional stockpiling may also increase holding costs when retailers decide to promote a perishable product which is approaching the end of its optimal shelf life (e.g., fruits). As a result, consumers may want to get rid of their high inventory rapidly in order to avoid throw-outs and to make room for other products.

The Moderating Role of Product Characteristics

While the product inventory salience and product cost may influence consumption in all product categories, we expect that their effects are greatly moderated by some product characteristics. First, consumption is more or less flexible depending on the substitutability of the product. If the product can be consumed in place of a high number of other products or in a variety of different occasions, there is evidently more room for category acceleration. Alternatively, some products have no substitutes or must be used/consumed at a precise rate. For instance, most people use only laundry detergent to wash their clothes and do not dramatically increase or decrease their usage of it because it would decrease the performance of the product. Second, some products are consumed more on impulse than others because they are ready to eat or because they can trigger need recognition. This is the case of products containing sugar and ready-to-eat packaged products such as snacks. On the other hand, some products, (e.g., ingredients), cannot be consumed alone or require long preparation time, which allows self-control mechanisms to fight impulse consumption (Hoch and Loewenstein 1991). Similarly, the consumption of some products is more utilitarian than hedonic (e.g., cleaning products) and the salience of these products does not create consumption desires (Hirschman and Holbrook 1982).

In summary, this framework offers an integrative model of how consumers decide whether and what to consume and on the moderating effects of product characteristics. This framework helps us understand the mechanisms through which promotional stockpiling may influence consumption and lays the foundations for programmatic research on consumption decision making. It is beyond the scope of this paper to test this framework entirely. Rather, in the following sections, we test portions of this framework by means of a field experiment and then evaluate its external validity with an analysis of scanner data.

Study 1: How Promotional Stockpiling and Product Inventory Salience Increase Consumption

The first objective of study 1 was to examine the effects of promotional stockpiling in a field experiment in which promotional stockpiling was manipulated across six different product

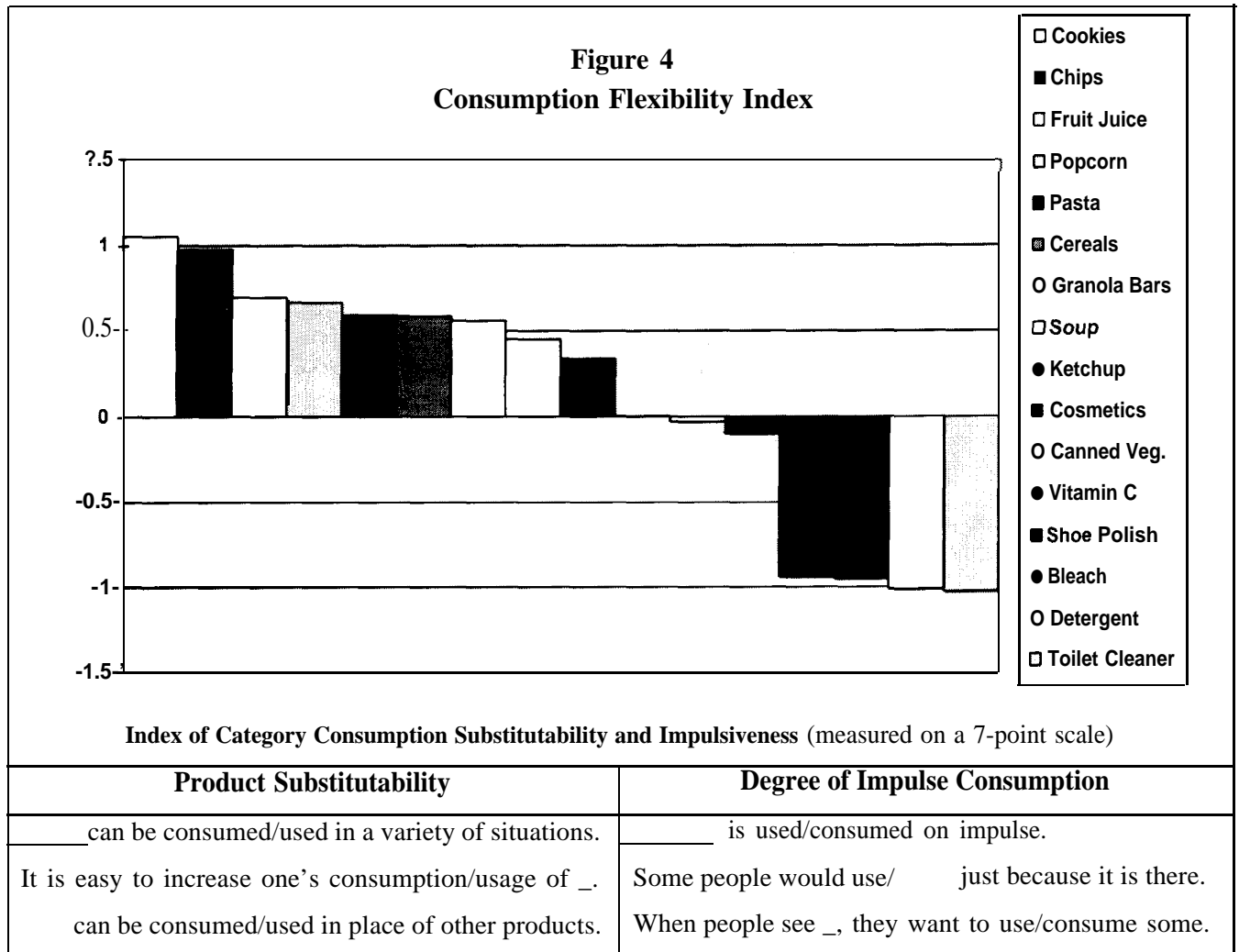
categories and direct measures of daily consumption were collected. In order to minimize demand effects due to the obvious manipulation of inventory levels, a distracter task was implemented by asking subjects to keep a diary inventory panel of two of the six products they received. The goal of this diary panel was to distract subjects' attention from the remaining four products. Daily consumption rates were finally measured after the experimental period with a typical recall measure of behavioral frequency (Menon 1993). The second objective of this study was to test the hypotheses of our framework concerning the role of product inventory salience. In order to do that, consumers' self-reports about product price and holding costs were collected. We begin by reporting the results of a preliminary study which was undertaken to measure product category differences in terms of substitutability and impulsiveness in order to be able to select appropriate categories for inclusion in the following two principal studies.

Preliminary Survey of Consumption Flexibility

Our framework predicts that promotional stockpiling accelerates the consumption of substitutable and impulse products only. To test this hypothesis, we developed a scale of consumption flexibility following Churchill's (1979) paradigm which measured both the substitutability and the degree of impulse consumption of the product category. After a series of consumer interviews, a dozen items were generated and further purified through a series of Principal Component analyses. The final 6-item index (Cronbach's alpha=0.89) was then administered to a convenience sample of 56 undergraduate and graduate students at a major Northeastern University who evaluated a total of 16 product categories including the ones used in the two following studies (see Figure 4).

Figure 4 shows that, with the exception of laundry detergent, which was chosen as a counter example, subjects perceived the consumption of all the product categories later used in study 1 and 2 (fruit juice, cookies, granola bars, soup, popcorn, cereals) to be very flexible. Interestingly, food products are, on average, perceived to be substantially more substitutable and more subject to impulse consumption than non-food products. Further, the very high correlation (.66) between the index and an item measuring consumption acceleration in response to stockpiling ("The more _____ one has, the more s/he uses/consumes") supports the moderating role of these product characteristics. Overall, studying these moderating factors enable us to

choose the categories used in later analyses and suggests some explanation to the category differences found by Ailawadi and Neslin (1996).



Subjects and Design

Subjects were recruited through two Parent Teacher Associations (PTAs). For each member participating in the study, \$6.50 was donated to their PTA. Of the 56 subjects, 55 were between the ages of 30 and 45, all were primary meal planners, and 15 were employed outside the home. Their educational background was heterogeneous.

Table 1
Design of Study 1

“Promotional Basket” of 6 products	Low Stockpiling (4 units)	High Stockpiling (12 units)
High Attention (Daily Panel)	1 Product (rotating among the 6 products)	1 Product (rotating among the 6 products)
Low Attention (Recall-measure of consumption)	2 Products (rotating among the 6 products)	2 Products (rotating among the 6 products)

The study used a two level (stockpiled and non-stockpiled inventory condition) by two level (high attention and low attention) by six (product category replication) between-subject Latin square design where each subject received a basket of six different products (see Table 1). Since our objective was to focus on the effects of promotional stockpiling on consumption and on its mediators, all six products (Crackers, granola, oatmeal, fruit juice, soup and microwave popcorn) were chosen because they were all highly substitutable and subject, to a varying degree, to impulse consumption (see Table 4). For each subject, two of these products were in the high attention condition and four in the low attention condition. Subjects were asked to monitor daily the inventory level of the two products in the high attention condition and were not asked anything special for the four products in the low attention condition. In addition, half of the products were given in quantities(12 units) previously determined to be perceived as a high inventory condition (stockpiling condition). The remaining three products were given in quantities (4 units) previously determined to be perceived as a low inventory condition (non-stockpiling condition). Subjects were randomly assigned to the four experimental conditions. The expectation was that the hypothesized effects would be robust across all four products, allowing the results to be pooled.

Procedure and Treatments

Subjects were met at the schools in which their PTA meetings were held. They were asked to take alternate seats in classrooms, and they were told that we were interested in a variety of questions dealing with issues ranging from home economics, and that it would entail them keeping a diary panel of certain foods (of which they would be given) for 14 days. Each subject

was given the choice between a grocery bag containing the six different types of foods noted earlier and an amount of money (approx. \$10) substantially lower than the retail value of the bag which ranged from \$24-30, depending on the mix of products. This procedure ensured that the food were acquired at a reduced cost, as it would be the case if they had purchased it on promotion. Each bag contained 48 packaged goods. This was comprised of either 4 units of each of the three products in the low stockpiling condition and 12 units of each of the three products in the high stockpiling condition. The choice of 4 units and 12 units was based on a pre-study which asked a group of similar subjects were asked how many units (of these products) represented a normal level of inventory and how many units represent a high level or stockpiled level. The typical response for the normal level of inventory was three to four units. For the stockpiled level it ranged from 10 to 16 depending on the product category.

Along with a bag of groceries, each person was given a inventory diary, and a stamped return envelope with instructions to mail it to us at the end of the two week period. They were asked to write down their daily inventory levels (for two weeks) for the two products in the high attention condition. They were not asked any questions about the other four products in their diary panel. They were simply told that they could “keep the remaining four foods if they wished.” Two weeks later the subjects were sent a booklet that asked questions about their attitudes toward the products on 9-point scales, their beliefs about various product attributes (1 = low; 9 = high), and questions regarding the stockpiling manipulations. They were also asked to recall their daily usage of each of the four brands in the low attention condition over the prior 12 days. It was these measures of recalled usage that were used in the analysis. Of the 58 people who began the study, 56 returned the diary panels in a timely enough manner to be included in the study.

Manipulation checks

The self-reports collected at the end of the two-week period were used to evaluate the effects of the stockpiling and attention manipulations on product evaluation, perceived substitutability, product inventory salience, perceived price and storage costs. One product (fruit juice) was dropped from the analysis reducing the total number of observation from 336 to 280. The data for fruit juice were dropped because subjects did not like it (average evaluation of 2.9

versus 7.0 for the other five products) and would therefore not have purchased it in the real world). There were no differences on perceived substitutability and evaluation of the remaining products across the four conditions. The stockpiling manipulation was successful in that subjects were more likely to say they believed themselves to be “stocked up” with the stockpiled products ($F_{1,278}=8.1$; $p<.01$) than the non-stockpiled ones. Furthermore, when asked if they had a good idea of how much they had in stock at any given time, subjects in the high attention condition were more confident than subjects in the low attention condition ($F_{1,278}=5.28$, $p<.05$). Nevertheless, the average awareness in the low attention condition was still 5.8 (1 = strongly disagree; 9 = strongly agree), which ensures that usage rates did not vary simply because some of the subjects “forgot about the product”. The remaining of the analysis will therefore focus on the four products in the low attention condition (1870 observations). Last, the recall measures of daily consumption rates proved to be a reliable measure since the canonical correlation with the measures coming from the diary panel was .82 for the two products in the high attention condition.

The Effects of Stockpiling on Consumption

The recall measures of consumption covered a full two weeks, but the first and last day were not included in the analysis. In nearly all cases, the first and last days were not complete 24 hour periods. Some subjects received their grocery box earlier in the day than others, and some subjects mailed their diary booklet in on the fourteenth day instead of waiting until the next day. In all, 12 days will be analyzed: The first full day to the last full day. Although we would expect the total number of units consumed to be higher for the stockpiled condition, it is important to note whether stockpiled products are consumed at a daily rate that would exceed normal inventory levels. The daily consumption rates of non-stockpiled products (i.e., normal inventory levels) offer the comparison point by which we can assess the impact of stockpiling on usage.

Our framework predicts that when products are stockpiled, they are consumed at a greater daily rate than non-stockpiled products. As can be seen in Table 2 and in Figure 5, the results support this hypothesis. The stockpiled products were consumed at greater rates ($p<.001$) for seven different days and were consumed at marginally greater rates ($p<.10$) for two different

days. The difference between the two conditions over the entire period was significant at the 1 % level. Interestingly, the differences were most dramatic in the first days.

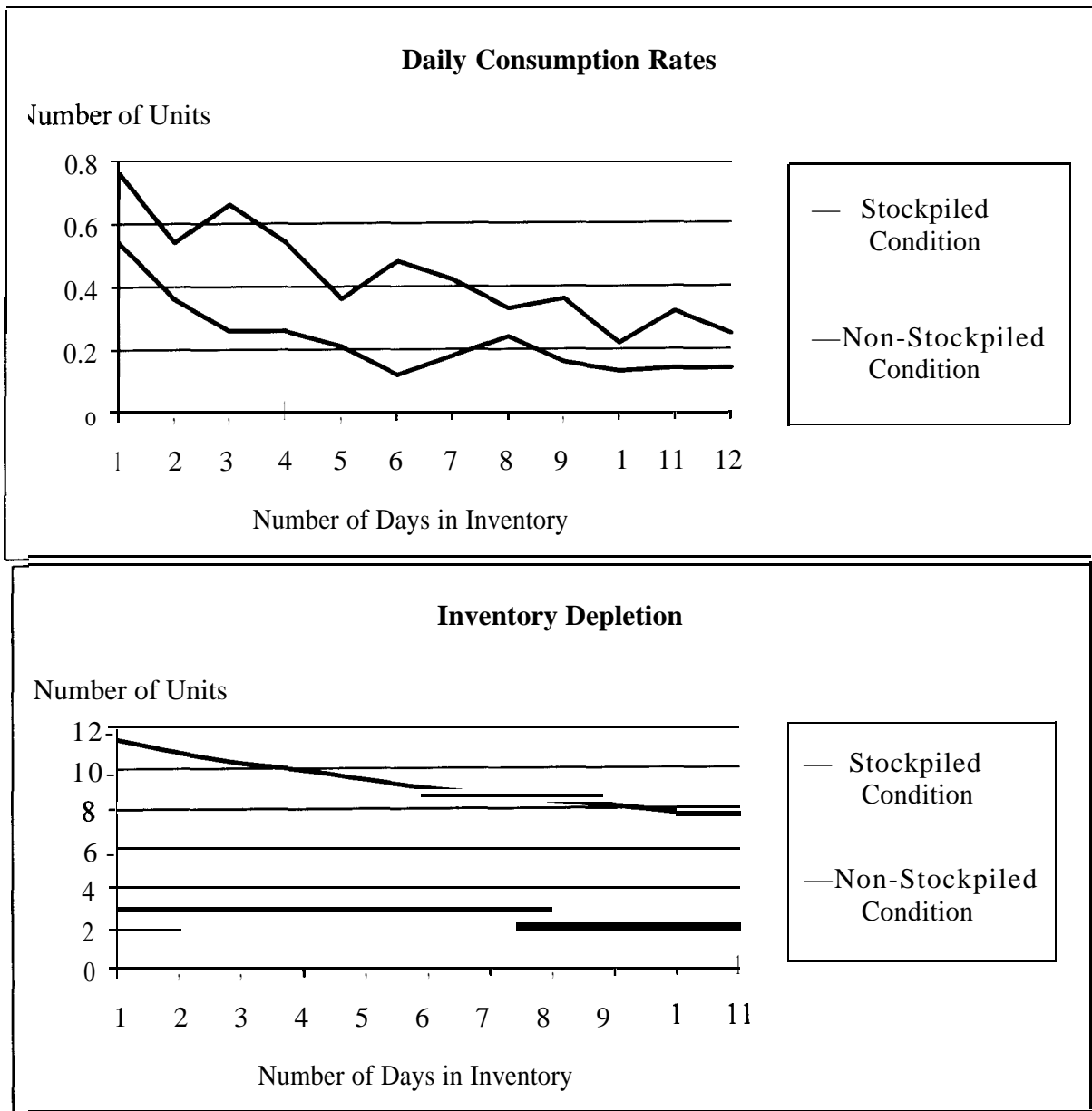
Table 2
The Impact of Promotional Stockpiling on the Daily Usage of a Product (in units)

Time period	Usage Rate		F-Value _(1,185)
	Non-Stockpiled Product	Stockpiled Product	
Day 1	0.54	0.76	2.73***
Day 2	0.36	0.54	2.3***
Day 3	0.26	0.66	10.6***
Day 4	0.26	0.54	5.3***
Day 5	0.21	0.36	2.2**
Day 6	0.12	0.48	12.2***
Day 7	0.18	0.42	6.5***
Day 8	0.24	0.33	0.9
Day 9	0.16	0.36	5.3***
Day 10	0.13	0.22	1.4
Day 11	0.14	0.32	2.5*
Day 12	0.14	0.25	1.1
Days 1-3	1.17	1.9	8.0***
Days 4-6	0.6	1.3	9.1***
Days 7-9	0.5	1.1	6.8***
Day 10-12	0.4	0.8	2.4*
Total (1-12)	2.8	5.3	11.6***

* p < .10. ** p < .05. *** p < .01.

Figure 5

Impact of Promotions! Stockpiling on Daily Consumption and Inventory Depletion



The Mediating Role of Product Inventory Salience

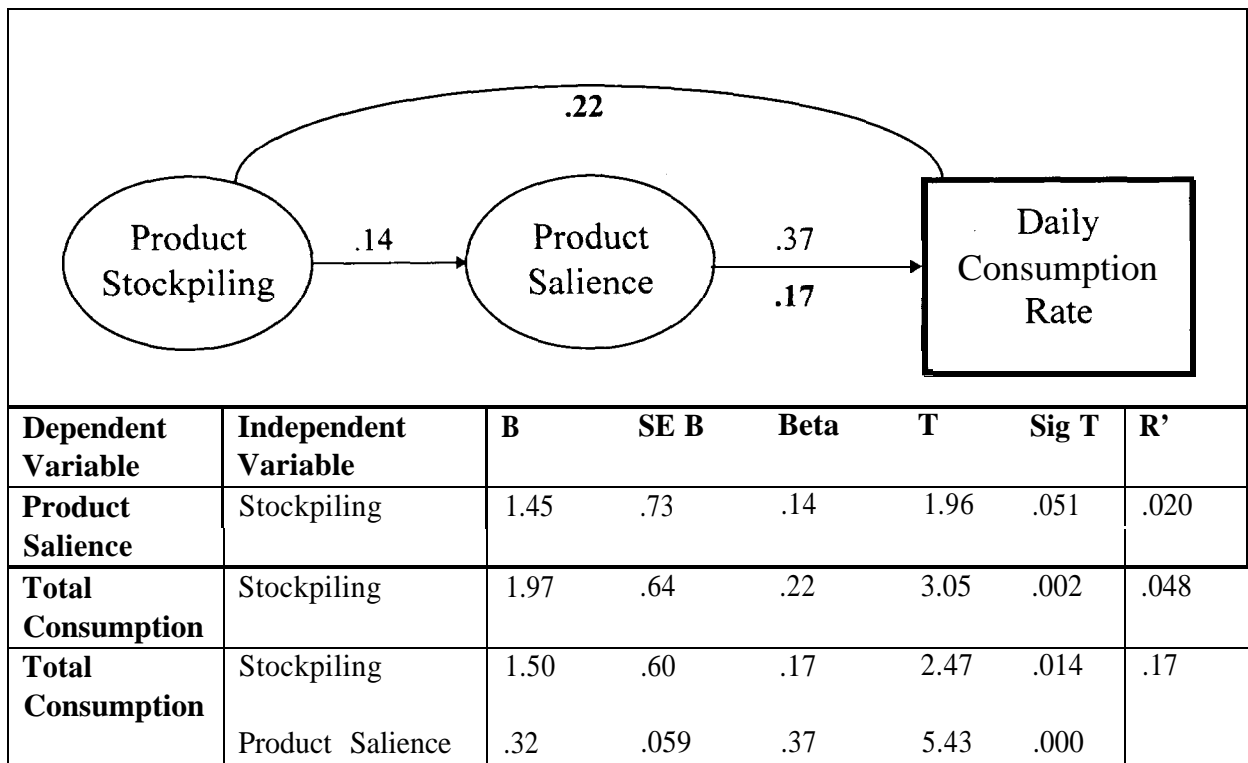
The results of study 1 provide evidence for the impact of promotional stockpiling on product consumption. To further test our framework, we collected self-reports on the mediators indicated in our framework: product price, holding costs and product salience. Interestingly, the stockpiling manipulation had no impact on the perceived price ($F_{1,185}=0.34; p=0.56$) Of the

product nor on the “storage space used” ($F_{1,185}=0.52, p=0.47$). On the other hand, subjects declared that they were “more aware” of the stockpiled food ($F_{1,185}=3.1, p<0.05$) and that they stored the stockpiled food “in a place where they often saw it” more ($F_{1,185}=2.5, p<0.05$) than the non-stockpiled food.

These results are consistent with our framework in that they show that stockpiling increases product inventory salience. To further examine the mediating role of product salience on product consumption, we followed the procedure recommended by Baron and Kenny (1986). We first regressed an index composed of the two salience measures on product stockpiling, then regressed the total consumption of the period on the stockpiling dummy variable, and finally regressed total consumption on both the salience index and the stockpiling dummy variable. As Table 3 shows, all the coefficients in these three regressions were significant and, in the regression of total consumption, the coefficient for stockpiling decreased from .22 to .17 after the introduction of the salience index. These results indicate that product salience is a mediator of the impact of stockpiling on consumption.

Figure 6 and Table 3

The Mediating Impact of Salience on Consumption



Finally, the self-reports were used to examine whether subjects had an explicit knowledge of their behavior. Interestingly, there were no differences across the stockpiling conditions on the item measuring whether consumers wanted to use the products “to make room for other food” ($m=2.2$; $F_{1,185}=.0008$, $p=.9776$). Similar results were obtained concerning whether subjects “looked for a chance to eat them” ($m=4$; $F_{1,185}=1.0057$, $p=.3173$), “consumed the food instead of other foods” or “in addition to other foods” (respectively $m=4.5$; $F_{1,185}=.0502$, $p=.8230$ and $m=3.8$; $F_{1,185}=.8469$, $p=.3586$). These results cast some doubts as to the validity of self-reports to measure in-home consumption and provides further support for the distraction manipulation was effective in avoiding demand effects.

Discussion

Study 1 manipulated promotional stockpiling across 5 different food products and measured daily consumption rates. The results are consistent with our framework since they show that promotional stockpiling accelerates daily product consumption. Interestingly, the results also showed that consumption rates drop in both stockpiled and on-stockpiled conditions. One possible reason for such consumption rates decreases may be because of product satiation due to a high consumption in the first days of the experiment. The procedure employed also permitted to minimize the variation of two of the mediators proposed by the economic literature - product price and holding costs - since the products were offered at the same “price” across all conditions and since the food was not perishable nor taking too much storage space. By doing that, we were able to monitor the impact of stockpiling on product salience and to show that some of the effects of stockpiling are mediated by the higher salience of the product.

This study has some limitations. Although demand effects were minimized by the distracter task which required consumers to record daily inventory levels for two of the four product categories, it is still possible that the unusual situation of the experiment increased the perceived free value of the food and created artificially high product salience. On the other hand, one could argue that this situation is somewhat similar to what happens when consumers purchase a promotional pack. In the same vein, it is unclear at this stage whether this effect would still be present if consumers had themselves decided whether and how much to stockpile the product instead of receiving pre-determined product quantities. Last, the present study cannot provide us

with any indication about the magnitude of the phenomenon in the real world. To answer all these questions, we need to use real-world data.

Study 2: When does Household Stockpiling Influence Consumption?

The objective of study 2 is to test the external validity of our framework by replicating study 1 using real-world data. As important, is the question of whether promotional stockpiling affects consumer purchasing patterns enough to be managerially relevant. To answer both questions, we need data that track consumer purchases unobtrusively and that are widely available to companies. Given these objectives, we were able to find French panel scanner data from the single-source market test zone Scannel. The second objective of study 1 is to test our predictions concerning the moderating influence of category characteristics. By looking at multiple product categories, we are also able to examine whether promotional stockpiling can be distinguished from non-promotion driven stockpiling. Specifically, we can test whether the consumption of categories such as laundry detergent is not influenced by promotional stockpiling but still exhibit consumption variation due to variation in external demand.

Design

As noted earlier, one concern with the use of scanner data is that it is usually difficult to demonstrate causal relations: does promotional stockpiling cause consumption or are they both the result of external demand increases? This issue is particularly important with real-world data since we cannot manipulate promotional stockpiling and always run the risk of confounding promotion-driven with demand-driven stockpiling. To deal with this issue, and without loss of generality, we concentrate on promotional stockpiling caused by the purchase of a promotional pack such as a multi-unit pack, a bonus pack, or any promotional offer that requires stockpiling in order to obtain the reduced price per unit. We then define all the other stockpiling “demand-driven” or “non-promotional stockpiling”. Table 4 shows the 2 (promotional stockpiling) by 2 (non-promotional stockpiling) design. Our rationale is that promotional packs are very infrequently available and, when they are, they simply offer more of one product at a discounted price. They therefore rarely offer the diversity in volume/flavors/brands consumers need when

they expect additional external demand. Two empirical studies found indeed that consumers buy more different flavors/brand/sizes when they buy more (Harlam and Lodish 1995; Kahn 1995). This argument is consistent with two analytical models which showed that, when expecting higher demand or longer interpurchase time, consumers should reduce the risk attached to the higher uncertainty in future tastes and consumption occasions by increasing the variety of products purchased (Simonson and Wirier 1990; Walsh 1995).

Table 4
Design of Study 2

Partition of each shopping trip	No Promotional Stockpiling	Promotional Stockpiling
No Demand-driven Stockpiling	Regular Purchase Quantity 1 Liter of Fruit Juice	Purchase of a promotional pack <u>only</u> 1 Promotional Pack of Fruit Juice (6 Liters together)
Demand-driven Stockpiling	Purchase of a higher product quantity <u>without</u> a promotion 3 Liters of Fruit Juice not sold in promotion	Purchase of a promotional pack <u>and</u> of other products 1 Promotional Pack of Fruit Juice along with another brand of non-promoted fruit juice

In summary, we assume that if we find consumption acceleration after the purchase of a promotional pack, it was caused by promotional stockpiling which “forced” consumers to stockpile and not by an external increase in demand. On the contrary, if we find consumption acceleration after any stockpiling not entirely caused by a promotional pack (e.g., the purchase of multiple non promoted products), both this demand-driven stockpiling and the accompanying consumption acceleration were due to an external increases in demand. Obviously, promotional stockpiling could occur because of a regular sales promotion, and by restricting our analysis only to the purchases of promotional packs we raise the difficulty of the test which should increase the confidence in our results.

Data and Variables

The dataset comes from SECODIP'S SCANNEL single-source scanner panel and includes all the purchases of fruit juice, cookies and laundry detergent made in the five supermarkets of a small isolated city in France in 1994. The first 6 months of data for fruit juice and cookies were used for calibration and the last 6 months for estimation. Given the lower purchase frequency of laundry detergent, we used 1992 purchases as the calibration sample. To keep the data manageable a random sample was selected among the households having made at least 4 purchases in each sample. The estimation sample includes 3286 purchases of fruit juice (from 789 households), 5168 purchases of cookies (from 693 households) and 5268 observations (from 1118 households) for laundry detergent.

A dummy variable for Promotional Stockpiling (PS) is set equal to 1 when at least one promotional pack was purchased during the shopping trip and "Non promotional stockpiling" is another dummy variable set equal to 1 when the household bought more units than the median number they buy during each shopping trip. Table 5 shows that there are important category differences in terms of the number and purchases involving promotional and non-promotional stockpiling. Fruit juices are bought in promotional packs of 6 liters bound together only 2% of the time but quite often in multiple non promoted units. People stockpile cookies quite often as the result of a promotional pack purchase (45%). Laundry detergent, both powder and liquid, are purchased in bonus packs offering between 10% and 50% more product free (10%).

Table 5
Descriptive Statistics

Variable	Stockpiling ^a	Unit Price Variation*	N (% of purchases)
Fruit Juice			
Promotional Stockpiling ^a	+ 126%	- 34%	70 (2%)
Non-Promotional Stockpiling	+ 11 20/0	- 3?40	1403 (42%)
Cookies			
Promotional Stockpiling ^a	† 1 090/0	- 10%	2347 (45%)
Non-Promotional Stockpiling	+ 1 030/0	+ 14%	2399 (46%)
Laundry Detergent**			
Promotional Stockpiling ^b	† 53%	- 25%	541 (1 0%)
Non-Promotional Stockpiling	+ 11 00/0	- 4?40	287 (6?40)

* Percent increase in purchase quantity compared to a shopping trip with no promotional pack or with the median purchase quantity.

** purchase quantity was converted into number of loads based on the instructions of the manufacturer.

^a Multi-unit packs binding 2 to 6 units together. ^b Bonus packs offering 10 to 30% more product free.

Since we have no data on consumption, we must rely on purchase quantity and purchase timing information to compute the dependent variable. Consumption is estimated for each spells between two consecutive purchases (hereafter called a “period”). A consumption Index (CI) is calculated for each purchase occasions of the estimation period made by household h :

$$CI_s^h = \ln\left(\frac{C_s^h}{\bar{C}^h}\right) \text{ with } C_s^h = \frac{vol_s^h}{D_{s+1}^h - D_s^h} \text{ and } \bar{C}^h = \frac{\sum_c^{N-1} vol_c^h}{D_N^h - D_1^h}$$

Where vol_c is the volume bought at purchase occasions and, $D_{s+1} - D_s$ the number of days between purchases and the next purchase of the estimation period. The index is computed as a deviation from each household’s average consumption rate \bar{C}^h . The multiplicative form ensures that the variation in CI is a percentage change rather than a fixed effect. \bar{C}^h is computed simply as the total volume purchased over the $N- 1$ purchases made during the calibration period divided by the number of days between the first and the last purchase of this period⁴. Since the series is

⁴We tried different estimations of the average consumption of the household, based on the calibration period only or on the total period, excluding or not the purchases on promotion from the average (in a

right-censored, we do not take into account the volume bought at the last purchase N of the calibration period. Further, to account for the high skewness of the estimated consumption rates within households, we take the natural log. As a result, the distribution of the dependent variable approaches normality in each cell of the design.

In words, the Consumption Index measures the duration, in days, of each unit purchased and its variation within each household. If consumption is constant, 1 liter of orange juice should last the same number of days no matter whether it was purchased alone or with 5 other liters in a promotional pack. A higher CI indicates consumption acceleration.

Results

The data were analyzed with a series of ANOVAs. The design is 2x2 with two levels of promotional stockpiling and two levels of non-promotional stockpiling. All interactions were introduced in all models. Given that consumer heterogeneity was partially accounted for by the centering procedure, and given that the high number of households precluded the use of traditional procedures to account for subject effects, the data were stacked and treated as if originating from a between-subject design. To further check the robustness of the findings, we performed ANOVAs on the ranks, used the different computations of the average discussed earlier and included \bar{C}^h as a covariate in an ANCOVA with C_x^h as the dependent variable. None of these analyses yielded qualitatively different results and we do not reproduce them here. More importantly, despite the unbalanced design, the assumptions of normality and of equal variance are satisfied (Bartlett-Box F).

“baseline” approach) and assigning or not an equal weight to all periods (e.g., taking the geometric average of the consumption rates following each purchase). Since all of these measures yielded similar results, we finally retained this simple measure because it is the more robust.

Table 6
ANOVA Results

	Fruit Juice	Cookies	Laundry Detergent
Variable	(1, 2939)	(1, 4226)	F(1,4322)
Promotional Stockpiling (PS)	13.8***	187.9***	2.3
Non-Promotional Stockpiling (NPS)	8.7***	289.2***	26.3***
PS x NPS	2.1	8.2***	0.11
R'	.08	.10	.02

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

Table 6 shows the result of the ANOVAs in the 3 product categories. Consistent with the model, promotional stockpiling increases the consumption of fruit juices ($F_{(1, 2939)}=13.8, p<0.01$) and of cookies ($F_{(1,4226)}=187.9, p<0.01$) but not of laundry detergents ($F_{(1,4322)}=2.3, p=.18$). Similarly, there is non-promotion driven consumption acceleration in all three product categories. The consumption rates of fruit juices ($F_{(1, 2939)}=8.7, p<0.01$), cookies ($F_{(1,4226)}=289.2, p<0.01$) and laundry detergents ($F_{(1,4322)}=26.3, p<0.01$) is higher when consumers have stockpiled in the absence of a promotion. The only significant interaction is for cookies ($F_{(1,4226)}=8.2, p<0.01$).

The Carry-over Effects of Promotional Stockpiling

So far, our framework has dealt with the effects of promotional stockpiling on the period lasting until the next purchase. We will test now the underlying hypothesis of this model which is that promotional stockpiling has no carry-over effects on the inventory and on the consumption of the following periods. The Consumption Index assumes that the inventory levels at the end of each period are independent from the volume purchased at the beginning of the period. Therefore, we do not assume that inventory levels at the end of each period are zero but that they are not influenced by promotional stockpiling.

The alternative hypothesis is that the higher CI after a promotional purchase are not due to consumption acceleration but to inventory build-up. That is, consumers bought again before having depleted their inventory to their habitual level probably in response to promotional

activity. It is unclear, though, why this would be more the case after a promotional stockpiling rather than after a non-promotional stockpiling or a normal purchase. It is also unclear why this would be the case when consumers buy fruit juice and cookies and not when they buy laundry detergent. On the contrary, one would expect this effect to be more frequent for laundry detergent which is not perishable and could be stockpiled for a longer period of time. In addition, note that the first purchase can also be anticipated because of the sudden availability of promotional packs. Given the relative infrequency of promotional packs relative to other sales promotions, this situation is probably very common. In that case, the Consumption Index underestimates the inventory because it should add the leftover from the previous period, which runs against our hypothesis, and therefore increases the confidence in our results.

However, in order to empirically test the alternative hypothesis of larger inventory shifts after promotional stockpiling, two lagged variables capturing the presence of promotional and non-promotional stockpiling in the period preceding the studied period were added in the ANOVA resulting in a 2^4 design. Our rationale is the following: If consumers simply repurchase fruit juice while they still have a lot remaining from the promotional pack, the Consumption Index of the following two periods is biased since it omitted the remaining inventory in the numerator and it should decrease. If, however, as we argue, the additional product has been completely consumed in the first period, CI should remain constant in the second period.

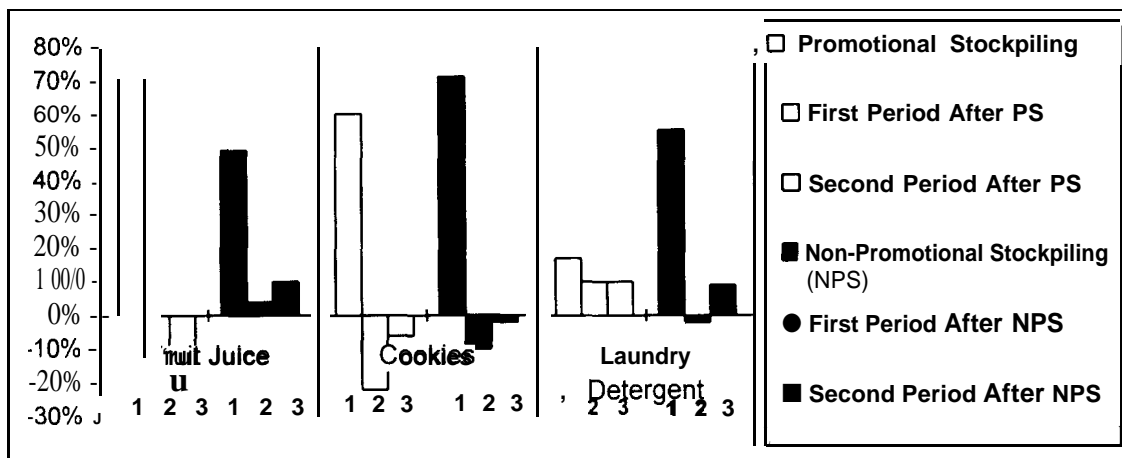
Table 7
ANOVA Results

	Fruit Juice	Cookies	Laundry Detergent
Variable	F(1, 2939)	(1, 4226)	(1,4322)
Promotional Stockpiling (PS)	14.95***	205.32***	1.8
Non-Promotional Stockpiling (NPS)	8.84***	285.39***	20.26***
PS x NPS	2.75	9.29***	0.11
Lag1 (PS)	0.80	34.61***	2.08
Lag2 (PS)	3.48*	2.08	2.56
Lag1 (NPS)	2.18	10.36***	1.29
Lag2 (NPS)	4.93**	0.47	0.61
R ²	.09	.11	.02

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

Figure 7

Impact of Promotional and Non-Promotional Stockpiling on Household Consumption Rate⁵



The results in Table 7 partially support for our framework. The lagged variable for Promotional Stockpiling and Non-Promotional Stockpiling are not significant, except for Cookies

⁵ Computed as the percent change in daily consumption (Vol/Interpurchase Time).

(respectively $F_{(1,4226)}=34.61, p<0.01$. and $F_{(1,4226)}=10.36, p<0.01$). The F-values for the other variables remain the same. Figure 7 reports the corresponding percent increases in the daily consumption of the period based on the regression coefficients. Even when CI decreases in the subsequent periods, the decrease is always substantially smaller than the original increases. To directly test whether the overall effect of stockpiling is still significant, the two consecutive periods following a promotional stockpiling were aggregated, reducing the number of observation for cookies to 2490. Consistent with the model, the impact of Promotional Stockpiling is still significant ($F_{(1,2490)}=17.94, p<0.01$), Non-Promotional Stockpiling and the interaction between the PS and NPS are also still significant (respectively $F_{(1,2490)}=37.85, p<0.01$ and $F_{(1,2490)}=23.48, p<0.01$) while the two lagged variables are not ($F_{(1,2490)}=2.037, p=.15$ and $F_{(1,2490)}=.245, p=.24$). The net impact of Promotional Stockpiling on the daily consumption of the two interpurchase period is +35%, compared to an increase by 54% in the first period only.

Discussion

Study 2 replicates and generalizes the findings of study 1 and provides further support for our framework. Specifically, this study showed that, after the purchase of a promotional pack, consumers purchase fruit juice and cookies -but not laundry detergent- earlier than a constant consumption rate would predict and that this effect is substantial. It also showed that non-promotion driven stockpiling exhibit different patterns since it is accompanied by higher consumption rates in all three product categories. Last, this study partially ruled out the alternative hypothesis of inventory shifts by showing that there were no, or little, consumption decreases in the following periods.

This study is not without limitations. First, we had of course no direct measure of consumption and inventory. It is therefore impossible to completely disentangle the effects of promotional stockpiling on consumption and on inventory. Second, and more importantly, promotional pack and non-promotional stockpiling are only proxy variables and cannot directly account for promotional and external factors. It is still possible that some consumers bought only one promotional pack to accommodate a higher demand due to the presence of guests. Last, this study did not enable to examine the role of the different mediators indicated in our framework.

However, it is also clear that study 1 addressed some of the limitations of study 2 and that, overall, there is a clear pattern of converging results supporting our framework.

Preliminary Discussion

This research started by challenging the assumption that sales promotions, and promotional stockpiling in particular, could not increase consumption rates. We first challenged this assumption by studying the factors that influence consumer consumption decisions and showed how promotional stockpiling could increase consumption by raising the salience of the product, by decreasing its purchase and replacement costs and by increasing its holding costs. We then found strong evidence supporting our framework across two studies using two different methodologies. First, scanner panel data showed that after consumers buy a promotional pack of fruit juice or of cookies, they purchase earlier than a constant consumption rate would predict. This study also showed that that this phenomenon is substantive for the two food products studied but that there are important category differences. These category differences appear consistent with our discussion of the role of product substitutability and product impulsiveness.

Another contribution of this research is its use of a field experiment to replicate the empirical results and to further explore the mechanisms responsible for this phenomenon. It is encouraging that we found similar results, although the procedures, the measures and the product categories differed across the two studies. And although a lot more research is needed before we have a clear understanding of consumer in-home consumption choices, the results of study 2 highlight the role of product salience. Consumers were more aware of the stockpiled product, probably because they stored it in a more visible location, and this higher salience had, in turn, a significant impact on consumption rates.

Future research

The most direct extension of this research would be to further test the links hypothesized in the framework. First, a study manipulating stockpiling along with each of the three mediating factors (product inventory salience, product price and holding costs) would help better understand their role and impact on consumption, the relative magnitude of their effects and their mediation

of promotional stockpiling. Similarly, further research is warranted to test the hypotheses pertaining to the two stages of the consumption process. Such studies would not have to be restricted to promotional stockpiling. An interesting question would be to study whether simple price promotions that do not inherently entail product stockpiling like coupons can lead to consumption acceleration. More generally, it would be interesting to look at consumption acceleration outside the context of purchase acceleration.

Another interesting extension would deal with the role of product characteristics. It is possible, for instance, that the relation between impulsiveness and consumption acceleration has an inverted U shape because of the presence of self-control mechanisms for “vice” products. Similarly, the role of brand preferences is unclear because consumers can seek to preserve future consumption occasions if they really like to product and to consume it as soon as possible to get rid of it if they do not like it. Alternatively, we could also extend our analysis to non-durable products which can be used without being destroyed.

From a methodological perspective, it would be interesting to use Ailawadi and Neslin’s (1996) methodology to examine the effects of promotional stockpiling with scanner data. A straightforward extension of their model would distinguish between the two sources of stockpiling by adding a new parameter capturing consumer’s consumption flexibility after the purchase of a promotional pack only. It would then be easy to compare this new parameter with Ailawadi and Neslin’s general flexibility parameter. From a managerial perspective, an interesting question is whether promotional stockpiling can have any long-term effects on consumer consumption rates. This is a difficult question since both learning and satiation can occur, which would have opposite effects. Future research could also look at the impact of promotional stockpiling on profitability, especially in the context of category management or product line extensions.

More generally, further research is needed to study the interplay between purchase and consumption behavior. What is the impact of purchase variety (say in the context of bundle pricing) and of purchase quantity (without promotion) on consumption? What is the impact of the duration time between purchase and consumption?

Implications for researchers and marketers

This study has many implications for the research on purchase acceleration. Consistent with this literature, we found that the acceleration of consumption (see Table 1, 2 and 3) is consistently lower than the increase in purchase quantity at the beginning of the period. Therefore, promotional stockpiling has two effects: It increases the time until the next purchase and it accelerates the consumption of the product. In other words, consumers wait longer, but not as long as a constant consumption rate would predict. This may help explain why it has been so difficult to observe a post-promotion trough (Neslin and Schneider 1996) and why the models of purchase incidence, purchase quantity and interpurchase time which assume a constant consumption rate have a relatively low explanatory power. Further research could estimate the magnitude of purchase acceleration and consumption acceleration in response to a deal. However, unlike Ailawadi and Neslin (1996), we recommend to separate exogenous from endogenous consumption acceleration in order to obtain a correct estimate of the impact of promotional packs on primary demand. As the case of laundry detergent clearly demonstrates, it is possible to have exogenous consumption acceleration and no endogenous (promotion-driven) consumption acceleration.

Given the high costs of attracting new buyers to the product category and the difficulty of converting the buyers of competitive brands (Dekimpe and Hanssens 1995; Uncles, Ehrenberg and Hammond 1995), increasing consumption among current users may be the best strategy for mature brands in mature markets. This strategy is also directly relevant when the objective is to increase total category sales, as it is the case for retailers or industry associations. Similarly, market leaders have a clear interest in encouraging the consumption of the product category because they are likely to benefit the most from category expansion. *On* the other hand, increasing consumption could be a key strategy for niche brands which tend to have lower repeat-purchase rates than their more undifferentiated competitors. In the following sections, we address the questions of which product category is most likely to exhibit consumption acceleration and of what strategy is most likely to induce consumption acceleration.

Conclusion

Managers and researchers often worry that sales promotions cannot increase primary demand and merely displaces sales from one brand to the other or from one time period to the other. In order to address this issue, we first developed a framework describing how consumers decide whether and what to consume. By extending the economic framework on the determinants of product consumption, we highlighted the mediating role of product inventory salience, product replacement and inventory holding costs as well as the moderating role of product substitutability and impulsiveness. The internal validity of the framework was tested in Study 1 in a field experiment in which promotional stockpiling was manipulated across five other food products and self-reported measures of daily consumption were used. The results showed higher daily consumption rates for the products that were stockpiled. By controlling the price of the product and its holding costs, this study also showed that product inventory salience at least partially mediates the effects of promotional stockpiling. A second study based on French scanner panel data was then conducted to analyse the external validity of the framework. Study 2 showed that consumers increase their consumption of substitutable products such as fruit juice and cookies when they buy them in promotional packs. Consistent with our preliminary survey of the flexibility of laundry detergent, we did not find this pattern for this product. In summary, this paper provides a set of converging results showing that, by inducing household stockpiling, sales promotions can represent a serious opportunity for retailers and manufacturers to conjointly expand some product categories.

References

- Ailawadi, Kusum and Scott A. Neslin (1996), "The Effects of Promotion on Consumption: Buying More and Consuming It Faster," Working paper Amost Tuck School of Business Administration, Dartmouth College, (March 12).
- Alba, Joseph W., J. Wesley Hutchinson and John G. Jr Lynch (1991), "Memory and Decision Making," In Handbook of Consumer Behavior, Thomas S. Robertson and Harold H. Kassarian, eds, Englewood Cliffs, New Jersey: Prentice-Hall.
- Allison, James (1983), Behavioral Economics. NY: Praeger.
- Assunção, Joao and Robert J. Meyer (1993), "The rational effect of price promotions on sales and consumption," Management Science, 39 (5), 517-535.
- Baron, Reuben M. and David A. Kenny (1986), "The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations, " Journal of Personality & Social Psychology, 51 (6), 1173-1182.
- Becker, Gary (1987), "Economic Analysis and Human Behavior," In Advances in Behavioral Economics, Leonard Green and John H. Kagel, eds, Norwood, NJ: Ablex Publishing Company.
- Bhattacharya, C. B., Peter S. Fader, Leonard M. Lodish and Wayne S. Desarbo (1996), "The Relationship Between the Marketing Mix and Share of Category Requirements," Marketing Letters, 7(1), 5-18.
- Blattberg, Robert C., Richard Briesch and Edward J. Fox (1995), "How Promotions Work," Marketing Science, 14 (3), G122-G131.
- Blattberg, Robert C., Gary D. Eppen and Joshua Lieberman (1981), "A Theoretical and Empirical Evaluation of Price Deals for Consumer Nondurable," Journal of Marketing, 3 (Winter), 116-129.
- Blattberg, Robert C. and Scott A. Neslin (1990), Sales Promotion: Concepts, Methods, and Strategies. Englewood Cliffs, New Jersey: Prentice Hall.
- Bucklin, Randolph E. and James M. Lattin (1991), "A Two-State Model of Purchase Incidence and Brand Choice," Marketing Science, 10 (1), 24-39.
- Chiang, Jeongwen (1991), "A simultaneous approach to the whether, what and how much to buy questions," Marketing Science, 10 (4), 297-315.
- Chintagunta, Pradeep K. (1993), "Investigating purchase incidence, brand choice and purchase quantity decisions of households," Marketing Science, 12 (2), 184-208.
- Churchill, G. A. Jr (1979), "A Paradigm for Developing Better Measures of Marketing Constructs," Journal of Marketing Research, 16 (February), 64-73.
- Cote, Joseph A., James McCullough and Michael Reilly (1984), "Effects of Unexpected Situations on Behavior-Intention Differences: A Garbology Analysis," Journal of Consumer Research, 12 (September), 188-194.

- Degradpre, R. J., Warren K. Bickel, Stephen T. Higgins and John R. Hugues (1 994), "A Behavioral Economic Analysis of Concurrently Available Money and Cigarettes," Journal of the Experimental Analysis of Behavior, 61 (2), 191-201.
- Dekimpe, Marnik G. and Dominique M. Hanssens (1995), "Empirical Generalizations about Market Evolution and Stationarity," Marketing Science, 14 (3/2),G109-G121.
- Dickson, Peter R. and Alan G. Sawyer (1990), "The Price Knowledge and Search of Supermarket Shoppers," Journal of Marketing, 54 (July), 42-53.
- Doyle, Peter and John Saunders (1985), "The Lead Effect of Marketing decisions," Journal of Marketing Research, 22 (1), 54-65.
- Faber, Ronarld J., Gary A. Christenson, Martina DeZwaan and James Mitchell (1 995), "Two Forms of Compulsive Consumption: Comorbidity of Compulsive Buying and Binge Eating," Journal of Consumer Research, 22 (December), 296-304.
- Folkes, Valerie S., Ingrid M. Martin and Kamal Gupta (1993), "When to Say When: Effects of Supply on Usage," Journal of Consumer Research, 20 (December), 467-477.
- Foltin, Richard W. (1994), "Does Package Size Matters? A Unit-Price Analysis of "Demand" for Food in Baboons," Journal of the Experimental Analysis of Behavior, 62 (2), 293-306.
- Gourville, John and Dilip Soman 1996. Transaction Decoupling: The Effect of Temporally Separating Payments from Benefits of Consumption. *ACR conference* Forthcoming.
- Gupta, Sunil (1988), "Impact of Sales Promotions on When, What and How Much to Buy," Journal of Marketing Research, 25 (4), 342-355.
- Gupta, Sunil (1991), "Stochastic models of interpurchase time with time-dependent covariates," Journal of Marketing Research, 28 (February), 1-15.
- Harlam, Bari A. and Leonard M. Lodish (1995), "Modeling Consumer's Choices of Multiple Items," Journal of Marketing Research, 32 (November), 404-418.
- Hauser, John R. and Birger Wernerfelt (1990), "An Evaluation Cost Model of Consideration Sets," Journal of Consumer Research, 16 (March), 393-408.
- Helsen, Kristiaan and David C. Schmittlein (1 992), "Some Characterizations of Stockpiling Behavior under Uncertainty," Marketing Letters, 3 (1), 5-17.
- Helsen, Kristiaan and David C. Schmittlein (1993), "Analyzing duration times in marketing: evidence for the effectiveness of hazard rate models," Marketing Science, 11 (4), 395-414.
- Herman, C. Peter and Janet Polivy (1984), "A Boundary Model for the Regulation of Eating," In Eating and its disorders, Stunkard A. B. and Stellar E., eds, New York: Raven.
- Hirschman, Elizabeth C. and Morris E. Holbrook (1 982), "Hedonic Consumption: Emerging Concepts, Methods and Propositions," Journal of Marketing, 46 (Summer), 92-101.
- Hoch, Stephen J. and George F. Loewenstein (1991), "Time-Inconsistent Preferences and Consumer Self-Control," Journal of Consumer Research, 17 (4), 492-507.

- Jeuland, Abel P. and Chakravarthi Narasimhan (1985), "Dealing-Temporary Price Cuts-by Seller as a Buyer Discrimination Mechanism," Journal of Business, 58 (3), 295-308.
- Kahn, Barbara E. (1995), "Consumer Variety-Seeking Among Goods & Services: An Integrative Review," Working paper University of Pennsylvania, (February).
- Kardes, Frank R., Gurumurthy Kalyanaram, Murali Chandrashekar and Ronald J. Dornoff (1993), "Brand Retrieval, Consideration Set Composition, Consumer Choice, and the Pioneering Advantage," Journal of Consumer Research, 20 (June), 62-75.
- Krishna, Aradhna (1992), "The Normative Impact of Consumer Price Expectations for Multiple Brands on Consumer Purchase Behavior," Marketing Science, 11 (3), 266-286.
- Krishna, Aradhna (1994), "The Impact of Dealing Patterns on Purchase Behavior," Marketing Science, 13 (4), 351-373.
- Krishnamurthi, Lakshman and S.P. Raj (1988), "A Model of Brand Choice and Purchase Quantity Price Sensitivity," 7(1), 1-20.
- Loewenstein, George (1996), "Out of Control: Visceral Influences on Behavior," Working paper Carnegie-Mellon University,
- Menon, Geeta (1993), "The Effects of Accessibility of Information in Memory on Judgments of Behavioral Frequencies," Journal of Consumer Research, 20 (December), 431-440.
- Meyer, Robert J. and Joao Assunção (1990), "The optimality of consumer stockpiling strategies," Marketing Science, 9(1), 18-41.
- Moore, William L. and Russell S. Wirier (1978), "An Experiment to Determine the Effects of Package Size on Consumption," Working paper Graduate School of Business, Columbia University,
- Nedungadi, Prakash (1990), "Recall and Consumer Consideration Sets: Influencing Choice without Altering Brand Evaluations," Journal of Consumer Research, 17 (December), 263-276.
- Neslin, Scott A., Caroline Henderson and John Quelch (1985), "Consumer Promotions and the Acceleration of Product Purchases," Marketing Science, 4 (Spring), 147-165.
- Neslin, Scott A. and Linda G. Schneider (1996), "Consumer Inventory Sensitivity and the Post-Promotion "Dip"," Marketing Letters, 7 (January), 77-94.
- Nisbett, Richard E. (1986), "Taste, Deprivation and Weight Determinants of Eating Behavior," Journal of Personality and Social Psychology, 10107-116.
- Papatla, Purushottam and Lakshman Krishnamurthi (1996), "Measuring the Dynamic Effects of Promotions on Brand Choice," Journal of Marketing Research, 33 (February), 20-35.
- Robertson, Thomas, Jehoshua Eliashberg and Talia Rymon (1995), "New Product Announcement Signals and Incumbent Reactions," Journal of Marketing Research, 59 (July), 1-15.
- Rook, Dennis W (1987), "The buying impulse," Journal of Consumer Research, 14 (September), 189-199.

- Russo, J. Edward and France Leclerc (1994), "An Eye-Fixation Analysis of Choice Processes for Consumer Nondurable," Journal of Consumer Research, 21 (September), 274-290.
- Schachter, Stanley and Louis Gross (1968), "Manipulated Time and Eating Behavior," Journal of Personality and Social Psychology, 1098-106.
- Shafir, Eldar and Richard Thaler 1996. Mental Accounting of Past Purchases: Invest Now, Consume Later, Spend Never. *ACR conference* Forthcoming.
- Shocker, Allan D., Moshe Ben-Akiva, Bruno Boccara and Prakash Nedungadi (1991), "Consideration Set Influences on Consumer Decision-Making and Choice: Issues, Models, and Suggestions," Marketing Letters, 2 (3), 181-197.
- Simonson, Itamar and Russell S. Winer (1990), "The Effects of Purchase Quantity and Timing on Variety Seeking Behavior," Journal of Marketing Research, 27150-162.
- Uncles, Mark, Andrew Ehrenberg and Kathy Hammond (1995), "Patterns of Buying Behavior: Regularities, Models, and Extensions," Marketing Science, 14 (3), G71-G79.
- Vilcassim, Naufel J. and Dipak C. Jain (1991), "Modeling Purchase-Timing and Brand Switching Behavior Incorporating Explanatory Variables and Unobserved Heterogeneity," Journal of Marketing Research, 28 (February), 29-41.
- Walsh, John W. (1995), "Flexibility in Consumer Purchasing for Uncertain Future Tastes," Marketing Science, 14 (2), 148-165.
- Wansink, Brian (1994), "Advertising's Impact on Category Substitution," Journal of Marketing Research, 31 (4), 505-515.
- Wansink, Brian (1996), "Does Package Size Accelerate Usage Volume?," Journal of Marketing, Forthcoming.
- Wansink, Brian and Rohit Deshpande (1994), "Out of Sight, Out of Mind: Pantry Stockpiling and Brand-Usage Frequency," Marketing Letters, 5 (1), 91-100.
- Wansink, Brian, Robert J. Kent and Stephen J. Hoch (1996), "How Internal and External Anchors Influence Purchase Quantity Decisions," Working paper Wharton, University of Pennsylvania, (September).
- Wansink, Brian and Michael L. Ray (1996), "Advertising Strategies to Increase Usage Frequency," Journal of Marketing, 60 (January), 31-46.
- Ward, Ronald W. and James E. Davis (1978), "A Pooled Cross-Section Time Series Model of Coupon Promotions," American Journal of Agricultural Economics, 60 (November), 393-401.