Unplanned Category Purchase Incidence:

Who Does It, How Often, and Why

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Abstract

Unplanned category purchase incidence is an important source of retailer volume and profits. We analyze this phenomenon in detail with a multi-level Poisson model calibrated on data from 434 households making over 18,000 purchases in 58 categories across 3,000 trips to 21 stores. We find that unplanned category purchase incidence is not proportional to the number of categories bought, and not a single shopping trip is completely unplanned. The majority of variation is across shoppers. Specifically, it is explained in part by demographic variables traditionally measured by marketers, but more by other "traits" that reflect long-run shopping habits such as level of planning and information gathering styles. Short term shopping goals (e.g., major trip, forgotten needs, etc.) also play an important role. We replicate classic results of time available (more unplanned purchasing) and high store knowledge (less unplanned purchasing); however we find that the overall occurrence of unplanned purchasing is significantly lower than that commonly reported.

KEY WORDS: *Consumer Behavior*, *Poisson Model*, *Retailing*, *Unplanned Purchasing*

"Supermarkets are places of high impulse buying … – fully 60 to 70 percent of purchases there were unplanned, grocery industry studies have shown us."

Paco Underhill[1]

Given this widespread belief, managers allocate significant resources to "in-store merchandizing" in order to stimulate unplanned purchasing. Wal-Mart CMO John Fleming notes: "The store is our number one media channel"; moreover, the in-store merchandizing industry, already significant in total dollar terms, has grown considerably both within the United States and elsewhere (a 2007 Grocery Marketing Association [GMA] study forecasts a compound annual growth rate for in-store marketing related budgets of 21 percent for manufacturers and 26 percent for retailers). The debate over the extent of unplanned purchasing and the underlying drivers has enormous practical significance. It dictates where marketing dollars are spent (in the store or outside the store) and in what amounts. On July 28, 2008 *Advertising Age* weighed in and reported "… the oft-quoted statistic that consumers make 70% of brand decisions in the store boosted shopper marketing and made other advertising seem almost pointless."

More than forty years have passed since Kollat and Willett (1967) published their finding that "50.5 percent of (category) purchases are unplanned" in the *Journal of Marketing Research*. Even though most industry studies conducted and supported by the Point of Purchase Advertising Institute [POPAI] and GMA reinforce the idea that "unplanned purchasing" in supermarkets is "significant", marketing academics have not really weighed in on the debate. In a recent article Inman, Winer, and Ferraro (2008)

[1] From the popular book, *Why We Buy: The Science of Shopping* by Paco Underhill.

point out that: "Given the amount of interest by practitioners in this topic, the *dearth* of understanding of the drivers of in-store decision making is *perplexing* (our emphasis)".[2]

We believe that there are two major reasons for the lack of academic research on this important and fundamental topic. The first is the relative absence of quality data. While scanner panel are widely available, data that include direct measures of unplanned purchasing are not. As such, researchers use relatively small-scale field experiments (e.g., Park, Iyer, and Smith 1989), or, in rarer cases, solicit assistance from a professional research firm able to provide more comprehensive data (e.g., Inman, Winer, and Ferraro 2008). We rely on the support of a multinational CPG company and the data gathering infrastructure of a professional market research organization to obtain appropriate data (details are in the Data and Measures section). We also expand our conceptualization and data beyond what occurs in the store—unplanned category purchases do of course take place in the store—yet we recognize that the full set of determinants (e.g., whether more stores are visited subsequently) may reflect a broader context.

The second reason is definitional as indicated by the quote excerpted from Paco Underhill's best-selling book. The terms "unplanned", "impulse", and "purchases" appear without precise demarcation. While the academic literature (e.g., Beatty and Ferrell 1998; Bucklin and Lattin 1991; Granbois 1968; Inman, Winer, and Ferraro 2008; Iyer 1989; Kollat and Willett 1967, 1968; Park, Iyer, and Smith 1989) uses these terms more precisely, there is no unanimity with respect to types of unplanned purchasing studied, and the level of aggregation (see also Kollat and Willett 1969). Here, we deliberately focus on *unplanned category purchase incidence* as prior research on shopping lists has

[2] The dearth of research is also unfortunate. A widespread managerial belief in the ubiquity of unplanned purchasing (e.g., Abratt and Goodey 1990), coupled with incomplete knowledge of the causal factors behind it, could impede practice.

found that consumer purchase planning occurs at the category level, rather than at the brand or stock keeping unit (SKU) level (Block and Morwitz 1999). Additional justification for this choice is given in the Literature Review section.

The objective of this paper is to: (1) revisit and challenge some common assumptions, (2) model variation in unplanned category purchase incidence at the level of the shopper, store, and trip, and (3) develop a conceptual framework to investigate the determinants of unplanned category purchase incidence across a broad set of variables. To do so, we examine naturally-occurring unplanned category purchase incidence decisions using a unique data set collected over shoppers, stores, and shopping trips.[3]

In the multi-level empirical model, the expected number of unplanned category purchases per shopping trip depends on shopper characteristics (*traits*), the shopper's perception of the *store* itself, and shopping trip factors (*states*). Following Beatty and Ferrell (1998) and Rook and Fisher (1995), our measures of shopper "traits" are not confined to demographics alone, but also include measures of the household's overall shopping habits. State variables, on the other hand, reflect trip-specific factors (Fox and Hoch 2005; Lee and Ariely 2006).

We further organize purchase drivers into three substantive categories that relate to the process of shopping. The categories are: (1) pre-store, which represents drivers of store choice (e.g., price image, distance), and is motivated by the store choice literature (Bell and Lattin 1998; Fox and Hoch 2005), (2) in-store, which represents known drivers of unplanned purchasing and in-store decisions (e.g., store knowledge, time spent in store) found in the literature (Kollat and Willet 1967; Park, Iyer and Smith 1989), and (3)

[3] While panel data (across households and within households over time) are the norm for studying brand choice and related problems, as far as we are aware all published studies on unplanned purchasing aside from Bucklin and Lattin (1991) use cross-sectional data.

shopping habits, which represent both shopper strategies (e.g., information gathering) and the shopping mission adopted on a particular shipping trip (e.g., major trip). Variables in the latter category are rarely collected and represent a unique feature of our conceptualization and data.

We make the following new empirical and substantive contributions to the literature on unplanned purchasing. First, the raw data reveal that (1) unplanned category purchase incidence is on average one-fifth of the total number of categories purchased on a given trip; (2) the rate of unplanned category purchase incidence is not proportional to the size of the market basket negating the value of unconditional statements such as "X% percent of purchases are unplanned" prevalent in managerially-oriented books; and (3) not a single shopping trip is "completely unplanned" where *all* category purchases are unplanned.

Second, a decomposition of the variation in the underlying rate of unplanned category purchase incidence across households, household-store combinations, and shopping trips, shows that the majority of the variation is across households. This suggests that there is much to gain from understanding shoppers themselves and measuring factors that define their shopping habits as opposed to focusing on just what happens in the store. Third, the empirical findings imply that shopping habits (e.g., information gathering, shopping trip mission), which have not been previously examined in the literature play an important role.

There are three caveats to the findings. First, our contributions are empirical. They have implications for theory but we do not offer a theoretical contribution per se. Second, our data are from Europe, whereas much of the literature is based on data collected in the

United States. (One could also take the view that data from an additional developed market is highly relevant to multinational firms and view this as a benefit rather than a limitation.) Third, our study is observational and not experimental.[4]

The next two sections define the conceptual framework and review the extant literature. We then describe our data and measures. The empirical model and descriptive analyses are presented next. Subsequently, we report the model-based findings, and conclude with implications for practice and research.

CONCEPTUAL FRAMEWORK

Several recent articles have developed conceptual frameworks for analyzing different in-store behaviors. These include Aliwadi, Neslin, and Gedenk (2001) who find, for example, that store brand buyers can be characterized by psychographics linked to economic costs and benefits, whereas those shoppers who rely on out-of-store promotions are more focused on hedonic costs and benefits. Chandon, Wansink and Laurent (2000) also explore the monetary and non-monetary benefits of promotions. Shoppers may respond more strongly to coupons than to price promotions because this allows a stronger display of "value expression." Urbany, Dickson, and Kalapural (1996) study price search and augment the traditional cost-benefit model with what they term "psychosocial returns" such as shopper enjoyment.

These studies focus on economic and non-economic benefits derived from choosing particular types of brands (store vs. national), responding to disparate promotions, and

[4] Shoppers themselves decided whether their category purchase incidence decisions were unplanned, however we benefit from the fact that shoppers are shopping naturally and with real money.

searching for low prices. We also assume that a shopper engaging in unplanned category purchasing is evaluating costs and benefits. Specifically, a shopper making unplanned purchases is deciding to take advantage of an opportunity to purchase *now*, rather than to forego it and make the category purchase at future point in time on a subsequent trip. One could therefore interpret our findings in terms of how the drivers of unplanned category purchase incidence change the costs and benefits of being unplanned. Exposure to in-store offers, for example, makes the benefit of purchasing now more salient, and raises the opportunity cost of foregoing purchase. Particular shopping strategies adopted in the long-run, such as searching for offers in the newspaper, may lower the opportunity cost of foregoing purchase.

The Unplanned Purchasing "Wedge"

Our conceptual framework reflects the idea of a "feasible space" for unplanned category purchasing and maps directly to our Poisson model of the number of unplanned categories bought on a shopping trip (outlined subsequently). Figure 1 plots the number of unplanned category purchases (*y*-axis) against total number of categories purchased (*x*-axis). The *x*-axis starts at 1, indicating that on any given shopping trip at least one product category will involve a purchase. The *y*-axis starts at 0, since it is possible that a shopping trip involves no unplanned category purchases.

[Figure 1 About Here]

Some extreme cases are worth noting. First, a shopper whose shopping behavior is "completely unplanned" is represented by the line that extends from the point (1,1)

through the point (*N*, *N*). That is, independent of the number of category purchases made, each is unplanned. Second, a shopper whose behavior is "completely planned" is represented by the line that extends from (1,0) through the point (*N*, 0). The interior of these two extremes represents the "feasible set" with respect to unplanned purchasing.

Conventional wisdom might suggest a third line (the dashed line), perhaps with a slope of .70, implying that, in aggregate, 70% of all product categories purchased are not planned in advance. How could one arrive at 70%? At one extreme imagine a world with 100 single-category shoppers, 30 of whom always plan (i.e., those at the point (1,0)) and 70 who never plan (i.e., those at the point (1,1)). At the other extreme, perhaps all shoppers always buy ten categories, seven of which are unplanned. The single-category example is less plausible than the ten category example, yet some weighted average of the two would need to yield 70%. The mix of consumer behavior in the population that would lead to an aggregate finding of 70% is not well understood. We therefore suggest that the analysis should take account of the factors in Table 1 and seek to "locate" a shopping trip on the *x*-axis—by controlling for the context within which the trip takes place—who is taking the trip, where, and for what reason(s), and then explain the conditional variation along the *y*-axis (number of unplanned category purchases).

A Categorization of Model Variables

The statistical model presented subsequently accounts for variation in unplanned category purchasing at the level of the shopper, shopper-store combination, and shopping trip. To this categorization based on the structure of the empirical model, we add a

substantive dimension (see columns of Table 1). Table 1 indicates in which of nine possible cells each variable in our study falls.

[Table 1 About Here]

Variables in the "out-of-store" category represent known drivers of store choice, such as shopper traits like demographics (Bell, Ho, and Tang 1998), shopper-store perceptions such as price and assortment image (Briesch, Chintagunta, and Fox 2008), and shopping trip state variables such as distance to the store or the time taken to get there (Fox and Hoch 2005). To this latter category we add less-often collected measures such as whether the trip to the store itself was planned, and whether the store visit was part of a multi-store trip. "In-store" variables cover what actually occurs in the store environment, again as a function of shopper traits, shopper-store perceptions and trip-specific state variables. Naturally these include contextual variables like time spent shopping, self-reported shopping ease, and whether there were special offers seen in store (e.g., Park, Iyer and Smith 1989; Inman, Winer and Ferraro 2008).

The final column of Table 1 covers "shopping habits," and we distinguish between two types. There are habits related to the overall shopping strategies that remain constant over shopping trips for a given shopper. These include information gathering tendencies and overall shopping efficiency goals. Second, there are variables related to shopping tactics or mission goals that change from trip to trip (e.g., major trip, immediate needs).

LITERATURE REVIEW

In the Introduction we quoted Inman, Winer, and Ferraro (2008) on the "perplexing dearth" of research on unplanned purchasing and offered two rationales: (1) it is hard to

obtain suitable data, and (2) "unplanned purchasing" can be defined and studied in many ways. Thus, we summarize extant literature by emphasizing data and methods used, and the level of aggregation at which unplanned purchasing is studied.

Data, Measures, and Methods

Table 2 summarizes the data, measures, methods, and key findings from past research and helps frame our literature review.

[Table 2 About Here]

Kollat and Willett (1967) use cross-sectional shopper intercept data from 596 shoppers who can make purchase decisions in up to 64 product categories. Prior to shopping, individuals in the "experimental condition" recorded their purchase intentions in an entrance interview and then turned over their receipts upon exit.[5] In Granbois (1968), 388 "shopping parties" were interviewed about their shopping plans and then discreetly followed as they shopped. The researcher traced out the shopper's travel pattern and also recorded shopper characteristics (e.g., "age under 30") while observing from a distance.

Park, Iyer, and Smith (1989) devise a field experiment involving 68 shoppers, and analyze the effect of situational factors on unplanned purchasing. "Store knowledge" was manipulated by forcing 34 of the 68 subjects to shop in stores where they had not

[5] Pollay (1968) critiques the Kollat and Willett (1967) methodology and argues that purchase intentions questioning could commit the shopper to these plans, and it may also cause shoppers to revaluate their shopping motives. A reply is given in Kollat and Willett (1968).

previously shopped.[6] "Time pressure" was manipulated by giving shoppers exactly one half of time they estimated they needed to complete the shopping trip. Iyer (1989) uses the same 68 shoppers but focuses on the degree of conformity between encoded and actual purchasing sequences, as a function of store knowledge and time available for shopping. Like Kollat and Willett (1967), Beatty and Ferrell (1998) also conduct pre- and post-shopping interviews with shoppers. Shoppers were questioned on the "level of impulsivity" of their purchases—the final sample included 533 shoppers, 153 of whom made purchases that could be considered "impulsive" (Beatty and Ferrell 1998, p. 178).

Rook and Fisher (1995) conduct two laboratory studies with 212 undergraduate students and gather field data from 104 shoppers in a large mall. Data from the undergraduates are used to examine the "impulsivity trait" and potential moderating factors including normative aspects of unplanned buying (e.g., impulsively buying a gift could be considered "good"; other types of impulsive buying could be considered "bad"). Inman, Winer, and Ferraro (2008) obtain field data from 2,300 shoppers in 14 cities in the United States. Consumer self control factors and category characteristics are found to be especially important in driving unplanned purchases.

In a departure from the dominant methodology, Bucklin and Lattin (1991) use scanner panel data. They treat the shopper's state—planned or opportunistic—as latent and relate it to three strictly behavioral measures, "deal loyalty", "inventory on hand", and "store loyalty" and then compute unplanned category purchase incidence probabilities two product categories—saltine crackers and ground coffee.

[6] These stores did however belong to a store chain with which shoppers were familiar. In this way the researchers can control for shopper knowledge of store brands, and general merchandizing conditions.

In summary, many studies use one-shot experiments which collect shopper interview data in the field. Aside from Bucklin and Lattin (1991) and our study, all use cross-sectional data thereby preventing examination of within-shopper across-trip effects. Moreover, in experimental studies the researcher determines whether a purchase is unplanned by directly questioning the shopper or unobtrusively tailing them in the store. In our study shoppers themselves decide whether a category purchase is planned (we elaborate more on our data collection procedure in the following section). The experimental approach (e.g., Park, Iyer and Smith 1989), is perhaps best at finding evidence of causal relationships, yet the typical set of variables considered is limited. Likewise, empirical studies often focus on particular types of variables (e.g., consumer traits in Kollat and Willett 1967 and store environments in Lee and Ariely 2006). By contrast, our study uses an extensive set of covariates and links them to unplanned category purchase incidence in the context of a household, store, and trip-level hierarchical model. Our study is also distinct in that unplanned category purchase incidence is analyzed relative to the total number of product categories purchased, not just one category at a time (e.g., Bucklin and Lattin 1991).

Definitions of "Unplanned Purchasing"

Kollat and Willett (1969, p. 81) note that "… definitions differ not only in degrees of precision but, more basically in the amount and type of decision making involved …" Twenty years later Abratt and Goodey (1990) note an enduring "lack of consensus." Attempts to achieve consensus are likely to be counterproductive. Rather, it is incumbent

upon researchers to define "unplanned purchasing" concisely within the bounds and objectives of a particular study. We briefly review key elements of various definitions and advocate our focus on *unplanned category purchase incidence.*

Kollat and Willett (1967) propose a five-level intentions typology ranging from "Product and brand—Before entering the store the shopper knows both the product and brand of product to be purchased" to "Need not recognized—Before entering the store the shopper does not recognize the existence of a need, or the need is latent until she is in the store and has been exposed to its stimuli" (Kollat and Willett 1967, p. 21). These intentions relate to three possible outcomes: (1) Product and brand purchased, (2) No purchase, and (3) Product purchased, but brand not purchased. "Unplanned purchasing" combines the intention "Need not recognized" and the outcome "Product and brand purchased." In Bucklin and Lattin (1991, p. 26), a shopper in the opportunistic state "…has not considered a purchase or, having considered a purchase, has not decided whether or what to buy". Inman, Winer, and Ferraro (2008) define specifically planned ("buy Pepsi"), generally planned ("buy soft drinks"), and unplanned purchasing. Finally, Rook and Fisher (1995) and Beatty and Ferrell (1998) draw a distinction between unplanned buying and impulse buying. The latter is precipitated by a spontaneous urge to buy (see also Strack, Werth, and Deutsch 2006; Vohs and Faber 2007).

We focus on *unplanned category purchase incidence* for three reasons. First, planning at the category level reflects the way most items are listed. Block and Morwitz (1999) found that only 9.4% of purchased items were written on a shopping list with a specific brand name. The only prior longitudinal study (Bucklin and Lattin 1991) also focuses on category purchase incidence. Second, category-level intentions can be

measured parsimoniously. (In our study shoppers indicate for each category purchase whether it was "planned in advance of the store visit and purchased" or simply "decided in store and purchased". Pre-tests revealed that this formulation was easily understood.) Third, unplanned category purchases are of interest to retailers. By modeling the number of unplanned category purchases per trip we can assess the implicit hypothesis from industry studies that unplanned purchasing is a "fixed proportion" of the basket size (e.g., the beginning quote from Paco Underhill).

Previous Empirical Findings and Variables in This Study

Household Traits. Unplanned purchasing is higher for couples married less than ten years (Kollat and Willett 1967), females, and larger households (Inman, Winer, and Ferraro 2008). Rook and Fisher (1995) and Beatty and Ferrell (1998) show unplanned buying is higher for individuals with a greater "impulsivity trait". This suggests we need to broaden our conceptualization of traits away from demographics alone.

Situational Factors. Unplanned purchasing is, in general, negatively related to use of shopping lists (Abratt and Goodey 1990; Kollat and Willett 1967; Inman, Winer, and Ferraro 2008) and positively related to "major shopping trips" (Kahn and Schmittlein 1989), in-store marketing activity (Abratt and Goodey 1990), and payment by check or credit card (Inman, Winer, and Ferraro 2008). Two prominent situational variables are "time spent shopping in the store" and "store knowledge" (e.g., Park, Iyer, and Smith 1989). More time spent in the store increases exposure to in-store information, and the ability to retrieve forgotten needs, which leads to more unplanned buying (Granbois

1968; Park, Iyer and Smith 1989). Shoppers in unfamiliar settings also engage in more unplanned buying (Bettman 1979; Bucklin and Lattin 1991; Iyer 1989; Park, Iyer, and Smith 1989). In the literature "familiarity / store knowledge" has been measured by putting shoppers in stores they had not previously visited (Park, Iyer, and Smith 1989), or by the proportion of times a shopper visited a store during an initialization period (Bell and Bucklin 1999; Bucklin and Lattin 1991).

DATA AND MEASURES

The panel data contain over 18,000 category purchases, and cover 58 product categories (see Appendix B). Participating households were screened to be representative of the market for the country in question, and according to the likelihood of full compliance with the study. They were paid 20 Euros for their cooperation. For each trip, households completed a short questionnaire and checked off for each category purchased (among 58 product categories) whether a purchase was "planned in advance of the store visit and purchased" or simply "decided in store and purchased."[7] The questionnaire included several other questions (to help populate Table 1). Households were instructed to complete a new questionnaire as soon as possible after completing each shopping trip, and to attach their grocery receipts to the questionnaire (this was done to ensure accurate reporting). After two weeks of observation, the research firm visited each household and collected the questionnaires.

[7] The stated goals of the survey did not include studying unplanned purchase behavior, but were to study shopping habits in general.

We focus on households that have at least 4 shopping trip observations. The usable data comprise 434 households; these households take 2,945 supermarket shopping trips during the two-week observation period in July 2006. The average number of trips taken per household is 6.8 (the range is 4 to 17). Trips can occur at of twenty-one distinct supermarkets and households visit on average 2.3 different supermarkets 3.0 times each. To this extensive panel data of trip-specific measures we added a second dataset containing household trait and household-store perception measures. These measures were obtained during 90 minute in-home interviews with shoppers. Details are provided in Table 3.

[Table 3 About Here]

Household Trait variables include household demographics (life stage and income bracket) as well as three trait measures that capture shopping habits that are part of long run shopping strategies. These latter variables are motivated by research on the importance of the "impulsiveness trait" to unplanned buying (e.g., Beatty and Ferrell 1998; Rook and Fisher 1995). We measure the propensity to: (1) become informed about prices and deals through newspapers, and (2) become informed in-store at the shelf, and (3) shop in a "fast and efficient" manner. *Shopper-Store Perceptions* vary across households and trips to *different* stores, but not trips to the *same* store. Three summated score measures—"Store Comfort and Knowledge" (Cronbach α = .854), "Price Image" (Cronbach α = .752), and "Assortment Quality" (Cronbach α = .807)—are developed

from multi-item scales (see Appendix A).[8] *Shopping Trip State* factors vary across households, stores, and trips. Correlations among all variables are in Appendix C.

MODEL AND DESCRIPTIVE ANALYSIS

We use a multi-level random effects Poisson model. We first motivate the model and then provide descriptive analysis of the data.

Consumer Shopping Behavior and Poisson Approach

Consider the behavior of $h = 1, 2, \ldots H$ households taking $t = 1, 2, \ldots T_h$ shopping trips $s = 1, 2, \ldots S$ supermarkets. Households sometimes make more than one shopping trip in a single time interval (day). On each individual shopping trip t household h shopping in store s makes a variety of category purchase decisions. For each household on each shopping trip, the total number of unplanned purchases, $UP_{hs}(t)$, is observed.

We assume the number of unplanned purchases made follows a Poisson distribution. Several arguments support this decision. First, the number of unplanned purchases is an integer count variable with no a priori upper bound.[9] Second, as shown in Ross (1996), the Poisson distribution can be derived as an approximation of the sum of independent Bernoulli random variables ($X_1, X_2, \ldots X_n$) with possibly different means. To see this, let

[8] Data collection for these measures was intensive. Each panel member was interviewed in the home and supermarkets were identified individually. The measures are properly customized to unique household-store pairs (see Appendix A for the statements). Individual scale items were also subjected to pre-testing.
[9] Technically, the total number of categories (58) in the consumer survey is an upper bound, but this is far away from the observed maximum number of unplanned category purchase decisions on a single trip (24). The list of the categories is given in Appendix B.

X_i, $i = 1, 2, \ldots N$ denote an indicator variable which equals 1 if the household makes an unplanned purchase in category i, and 0 otherwise. N denotes the total number of product categories. Now, dropping subscripts for households, stores, and time (for ease of exposition), let $UP = \sum_{i=1}^{N} X_i$. Unplanned purchase incidence probabilities will necessarily be heterogeneous across categories; specifically, $X_i|\theta_i \sim$ Bernoulli(θ_i). If we further assume that θ_i follows a Beta distribution $B(a, b)$ across categories, the marginal distribution of X_i is Bernoulli with probability p where $p = \frac{a}{a+b}$.[10] If p is small then the Poisson approximation states that $UP \sim$ Poisson(Np) which leads to equation (1) below with $Np = \mu$. The Poisson count of unplanned purchases summed over categories is an approximation of a category-by-category analysis.

Third, the Poisson process allows us to naturally accommodate variation in exposure time, i.e., the amount of time the shopper spends in the store, and interpret the parameter as a rate of unplanned purchasing per unit time spent shopping. An alternative approach counts the number of unplanned purchases or "successes" that can occur at a predetermined number of "trials". The response variable can then be expressed as a sample proportion of unplanned purchases (Rabe-Hesketh and Skrondal 2005). However, in contrast to an often implicit assumption in discussions of unplanned category purchases, we find they are not proportional to the overall size of the market basket (see Figure 1 and the related discussion); hence, we do not model the proportion of purchases

[10] See Knorr-Held and Besag (1998, p. 2050) and Ross (1996). This Poisson approximation also allows unplanned purchase incidence probabilities to be weakly positively correlated across categories. Ross (1996, p. 465) provides the error bound for the Poisson approximation when correlations are present.

that are unplanned on any given shopping trip. The number of unplanned purchases on shopping *t* in store *s* for household *h* $UP_{hs}(t)$, given parameter $\mu_{hs}(t)$ is therefore

$$(1) \qquad \Pr(UP_{hs}(t) \mid \mu_{hs}(t)) = \frac{e^{-\mu_{hs}(t)} \mu_{hs}(t)^{UP_{hs}(t)}}{UP_{hs}(t)!} \quad \text{where } \mu_{hs}(t) = \lambda_{hs}(t)\, g(\tau_{hs}(t)).$$

The mean of the Poisson-distributed variable, $\mu_{hs}(t)$, in equation (1) is a combination of the rate (sometimes called intensity) $\lambda_{hs}(t)$, and the time interval $\tau_{hs}(t)$ i.e., the amount of time spent in the store, and g(•) is a flexible function. $\lambda_{hs}(t)$ is related to the model variables using a hierarchical structure that we describe next.

Multilevel Random Effects Model

We adopt a two-way error components model (Baltagi 2005) since shopping trips, which are the unit of observation, belong to two overlapping categories: stores and households. Starting at the household level, we study the effect of traits that are trip and store invariant. Next, we control for household-store perceptions. Factors at the lowest level (shopping trip) vary from occasion to occasion.

The multi-level specification accounts for dependencies between, for example, different stores visited by the same household, or, different trips taken by the same household at the same store. Random effects also help correct for extra-Poisson variation, the phenomenon known as over-dispersion, since the marginal variance (integrated over the household and household-store random effect distributions) is now greater than the

marginal expectation (see Rabe-Hesketh and Skrondal 2005, p. 190).[11] A standard log-linear formulation relates model variables to the rate parameter, $\lambda_{hs}(t)$. Specifically,

$$
\begin{aligned}
\ln\left(\lambda_{hs}(t)\right) &= \beta\, x_{hs}(t) + \nu_h + \omega_{hs} + \phi_s \\
\nu_h &= \gamma\, z_h + \zeta^{(1)}{}_h \qquad \text{with } \zeta^{(1)}{}_h \sim N\left(0, \sigma_1^2\right) \text{ and } \zeta^{(2)}{}_{hs} \sim N\left(0, \sigma_2^2\right). \\
\omega_{hs} &= \delta\, w_{hs} + \zeta^{(2)}{}_{hs}
\end{aligned}
\tag{2}
$$

The log rate depends on household, store, and trip-specific trip specific variables $x_{hs}(t)$, and on higher level store-household (ω_{hs}), and household variables (ν_h) listed and defined in Table 2. Store effects that are shared across households are controlled with store-specific fixed effects, ϕ_s. Random intercepts ν_h and ω_{hs} are the outcomes of hierarchical regressions on observed household z_h and household-store variables w_{hs}, respectively. The terms $\zeta^{(1)}{}_h$ and $\zeta^{(2)}{}_{hs}$ are the errors in the household and household-store regressions.

Descriptive Analysis: Unplanned Category Purchase Incidence

Variation Across Households and Shopping Trips. Figure 2 presents the relationship between the number of unplanned categories purchases and the total number of products purchased, the empirical analog of the conceptual framework in Figure 1. The *x*-axis records the number of categories bought. The *y*-axis shows the *average* number of category-level unplanned purchases for a basket of a specific size, and the *maximum* number of observed unplanned category purchases across all households and shopping trips, for that same basket size. Figure 3 shows, for example, that baskets of two

[11] While we cannot estimate a third trip-level random effect, we nevertheless compared the Poisson model to a quasi-likelihood approach (see Rabe-Hesketh and Skrondal 2005, p. 188-89) that separately specifies an expectation and a variance scale parameter. The results were qualitatively identical and the estimated scale parameter was very close to one. Hence, our model with random effects at the household and household-store levels suitably controls for over-dispersion.

categories contain *at most* one unplanned category purchase, but on average about .20 unplanned category purchases. Baskets of three contain *at most* two unplanned purchases, and on average about .51 unplanned purchases, and so on.

[Figure 2 About Here]

Figure 2 reveals three important empirical regularities. First, when the shopping trip involves a *single* category, that purchase is *always* planned in advance. The maximum number of observed unplanned category purchases never exceeds the total basket size minus 1. In other words, there are no completely unplanned trips in the 2,945 shopping trips observed. Secondly, the overall of level of unplanned category purchase incidence, as measured by the average bars, is significantly lower than 70%. In fact, the overall average number of unplanned category purchases across all basket sizes is 1.13, and the average basket size is 6.4. Thus the average proportion of category purchases which are unplanned is approximately 18%. Figure 2, however, also reveals the difficulty with such statements, because *at the level of category purchase incidence*, the proportion of unplanned buying is *not* constant. In summary, the distribution of unplanned category purchases recorded in our data challenge common assumptions regarding the overall occurrence, and proportionality, of unplanned category purchasing. These results also have implications for theory, discussed in the Conclusion section.

[Figure 3 About Here]

To what extent is observed unplanned category purchase incidence driven by a few households as a fundamental part of their shopping strategy, versus a "semi-regular" aspect of shopping behavior for most households? Figure 3 addresses this. The *x*-axis records the *total* number of unplanned category purchases per household across *all*

shopping trips made by that household. One quarter of all households *never* make an unplanned category purchase. Among the other three quarters, there is considerable variation in the propensity to do so. We examine these large differences next.

MODEL-BASED FINDINGS

First, we estimate an intercepts-only model and decompose the variation in unplanned category purchase incidence due to each level of the model. Next, we report estimates and marginal effects for the full model with Household Traits (δ), Household-Store Perceptions (γ), and Shopping Trip Factors (β).

Decomposing the Variation due to Households, Household-Store Perceptions, and Trips

Our panel data are well-suited to variance decomposition since we have multiple observations from the same set of shoppers over shopping trips. Table 4 shows that the majority of the variation in unplanned category purchase incidence is attributable to households (the estimated variance of the household-level random effect is 1.879). This implies that about two-thirds of the households will have a total number of unplanned category purchase incidences per trip between .19 and 1.92.[12] Variation due to *different* trips to the same store is 1.027. Far less variation is due to the same household visiting other stores (.313) or to store effects (.027).

[Table 4 About Here]

[12] The overall intercept (not reported in Table 3) is -.720 and one standard deviation above and below is $= \exp(-.720 \pm \sqrt{1.879})$.

Intra-class correlations are shown below the estimated variance components. They reveal the proportion of total variance explained by each component, and are a measure of dependence between two observations in the same group (Rabe-Hesketh and Skrondal 2005, p. 261). For any two trips taken by the same household, the intra-class correlation is 0.579, indicating a high degree of *within*-household clustering. In contrast, for any two trips taken at the same store, the intra-class correlation is extremely low, at less than 0.01. For different trips taken by the *same* household at the *same* store, the intra-class correlation rises to 0.684, since, in addition to the household and store clustering, we add the household-store interaction clustering. Unplanned category purchase incidence seems to be largely a trait-driven phenomenon. Whether these large differences across households are due to the household-level demographics, other "traits" that describe the household's idiosyncratic shopping strategies, or trip-specific tactics and shopping missions is addressed next.

Household Traits, Household-Store Perceptions, and Trip Factors

To compute the baseline rate of unplanned purchase incidence we use the fact that the average-length shopping trip takes about 18 minutes. Marginal effects for continuous covariates are computed at one standard deviation above and below the mean and included in Table 5. We discuss the significant variables in each of the "squares" of Table 2 in order, starting with the household traits, out of store drivers, then moving from left to right, to household traits, in-store variables, and so on.

Household Traits (δ_1–δ_{12}). Traditional demographic effects (δ_1-δ_8) are consistent with prior research. Unplanned category purchasing is negatively correlated with age (δ_3 = -0.643, *t*-stat = -2.76) and family size (δ_5 = -1.050, *t*-stat = -3.75), and positively correlated with income (δ_7 = 0.374, *t*-stat = 2.18).

The sole trait and in-store driver, average time spent shopping, is added as a control in the household-level random intercept equation (the total effect depends on δ_9, β_{10}, β_{11}, and θ_1 and will be discussed in the next section).[13]

Coefficients on traits that reflect shopping habits (δ_{10}-δ_{12}) are all large in magnitude and significant. The propensity to be "fast and efficient" while shopping (δ_{12} = -1.711, *t*-stat = -8.49) induces a decline of 82% in the base rate. Households who typically use newspapers to obtain information about prices and offers *prior* to shopping do 25% *less* unplanned category buying (δ_{10} = -.290, *t*-stat = -2.16), whereas those collecting information at the shelf do 35% *more* (δ_{11} = .299, *t*-stat = 2.70).

[Table 5 About Here]

Household-Store Perceptions (γ_1–γ_3). The out of store, shopper-store perception variables of price image and assortment quality are not significant, however these perceptual elements may affect unplanned category buying indirectly via the store choice decision, which is not modelled. Second, store fixed effects (φ_s in equation 2) may crowd out effects of the observed perceptual factors if there is limited variation across households in their perceptions for a particular store. Households should be more similar in their price and assortment perceptions for a store than in their level of store comfort and

[13] Separation of mean (household average time spent shopping) and mean-centered (within household) components in variables that enter different levels of the multi-level model is necessary for efficiency and interpretability (Gelman and Hill 2007; Van den Bulte 2000).

knowledge—which results from unique shopper-store experiences. Consistent with prior research (e.g., Park, Iyer, and Smith 1989), there is a negative main effect of comfort and store knowledge (γ_3 = -.138, *t*-stat = -2.04).

Shopping Trip State Variables (β_1–β_{16}). The out of store, trip-level factors drive unplanned category purchase incidence in the expected direction. Travel time to the store is not significant, but this may reflect the fact that travel time is viewed as a sunk cost by the time the shopper sets foot in the store. The rate of unplanned category purchase incidence increases by 20% (β_2 = .185, *t*-stat = 2.22) and 44% (β_3 = .367, *t*-stat = 4.36) when trips are taken by bicycle or car, respectively (the base case is walking), and goes down by 18% when households shop on the "weekend" (stores are closed on Sunday).

Variables typically not studied in the literature also show interesting effects. When the household is on a multi-store shopping trip, stores visited either second or third see a 9% reduction unplanned category buying (β_5 = -1.02, *t*-stat = -2.01). Perhaps trips occurring later in the shopping sequence are taken for specific reasons such as cherry picking (e.g., Fox and Hoch 2005). If the trip itself is unplanned the rate of unplanned category buying goes up 23% (β_7 = .203, *t*-stat = 3.22). Consistent with prior work, time in the store has a positive effect (β_{10} = 0.762, *t*-stat = 7.71), even accounting for heterogeneity across individuals (δ_9 = -.032, *t*-stat = -3.32) and trip-specific deviations at the household level (β_{11} = -0.020, *t*-stat = -4.16). When products are "easy and quick to find" on a trip, unplanned category purchases increase (β_{12} = .050, *t*-stat = 3.34).[14]

[14] This positive trip-specific effect (β_{12}) is distinct from the overall negative effect of "comfort and knowledge" (γ_3) reported above and in Park, Iyer, and Smith (1989). The pair-wise correlation between the two variables is .220. One possible interpretation is that "easy and quick to find" is a function of the quality of in-store service on a specific trip, whereas "comfort and knowledge" is an overall gestalt. A regression of "easy and quick to find" on "comfort and knowledge" (plus all controls) reveals a significant positive

Similarly, exposure to special offers while shopping increases unplanned category purchase incidence by 53% (β_{13} = .426, *t*-stat = 8.41).

Shopping habit variables have some of the strongest effects. The level of planning for *specific trips* has important effects beyond those captured by overall tendencies of households to plan (γ_{10}-γ_{12}). Intuitively, when the stated goal of a particular shopping trip (as opposed to overall stated goal across shopping trips) is to be "fast and efficient" the rate of unplanned category purchase decreases by 53% (β_1 = -.745, *t*-stat = -13.42). Similarly, when the stated trip goal is "immediate needs or forgotten items", the rate of unplanned category purchase decreases by 17% (β_2 = -.183, *t*-stat = -2.11). Consistent with Kahn and Schmittlein (1989), but only marginally significant: If the trip is the major and weekly, the rate increases by 13% (β_3 = .123, *t*-stat = 1.90).

The overall fit of the model is very good (see Table 5): 75% of the variation in unplanned category purchasing is explained by the model, with 16% explained at the level of the household-store perceptions and 40% at the household trait level.

GENERAL DISCUSSION AND CONCLUSION

We study unplanned category purchase incidence, an under-researched phenomenon of considerable significance to retailers. In a departure from almost all prior studies, we measure household behavior over time and collect measures of long-run store perceptions and household shopping strategies, and shopping trip missions.

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effect: Shoppers give a higher rating on "easy and quick to find" to stores with which they have more comfort and knowledge. The implied overall effect of comfort and knowledge on unplanned category purchase incidence is however still negative, consistent with prior research.

New Implications for Retail Management and Academic Research

The Importance of Traits and Shopping Strategies. In Table 5, we showed the marginal effects (percentage change) for all the variables found to be significant. Unplanned category purchase incidence varies significantly with demographic traits including age, income, and household composition. This runs counter to a generally accepted finding that marketing mix responses *conditional* on category purchase incidence do not vary much with demographics (e.g. Hoch, Montgomery, and Rossi 1995). Hence, demographics may be thought of as predictors of shopping strategies, even though they may not be strong predictors of response to *marketing variables per se*. More importantly, we find that other household traits in the shopping habits category—such as the propensity to shop efficiently and information gathering styles—have large marginal effects. In fact, trait measures are collectively the most important group of variables. At the same time, our household level covariates explain only 40% of the variation. Researchers and managers may therefore wish to start uncovering and measuring other traits that influence household shopping behavior such as idiosyncratic proclivity for impulsivity (e.g., Rook and Fisher 1995), or the propensity to be a "spendthrift" or "tightwad" (Scott, Cryder, and Loewenstein 2007).

[Figure 4 About Here]

The Role of the Shopping Mission. Tactics which change from trip to trip (e.g., major trip, immediate needs) define the shopping mission. When the trip is major, and the focus of the shopping trip is broad, households engage in the most unplanned category purchasing. When the trip is for a forgotten item or immediate need, or the shopper

wants to be fast and efficient, shoppers engage in less unplanned category purchasing. Further study of these short term shopping goals, (e.g., Lee and Ariely 2006), and how they relate to unplanned purchasing could be fruitful. It also appears important to distinguish long-term shopping strategies from short term shopping goals.

Out of Store Factors, Store Perception and Trip Level. Several "out of store" factors influence unplanned category purchasing, but many of them (e.g., whether the shopper travels by car, whether the trip is planned or not) are not directly under the control of the retailer in the short run. The store may also be able to influence whether the store is shopped exclusively or, if not, at least first in a multi-store trip. Price and assortment image also have no direct effect, *conditional* upon the store being selected.

In Store Factors, Trip Level. Store managers can increase unplanned category buying by increasing the likelihood that households are exposed to in-store stimuli, and by making products easy to locate on a given trip through improvements in signage and service. As an illustration, we can compare the power of increasing exposure to in-store offers to that of the strongest effect at the trait level, attracting shoppers who are *less* fast and efficient.[15] The key result is that attracting customers who are less fast and efficient is four times as effective as increasing exposure to in-store deals. Hence, *traits* appear more important than *states* in stimulating unplanned category purchasing.

Corroborating Previous Findings: Time, Store Knowledge and Categories

Time and Store Knowledge. Two significant findings from the literature (Park, Iyer, and Smith 1989; see also Bettman 1979) are: (1) the negative effect of store comfort and

[15] Details of the simulation are available upon request.

knowledge, and (2) and the positive effect of time available for shopping. We replicate both despite significant differences in approach and data. In Park, Iyer and Smith (1989) "store knowledge" was manipulated by placing households in unfamiliar stores (where they had not previously shopped). There, time available for shopping was manipulated by telling households that their "usual shopping time" would be cut in half (time pressure condition). Figure 4 shows the percentage change in the rate of unplanned category buying as calculated from our parameter estimates. (The total time effect depends on δ_{12}, β_{15}, β_{16}, and θ_1 and increases (decreases) are computed one standard deviation above (below) the average of 18 minutes per trip. "High" ("low") knowledge evaluations are also computed at one standard deviation above (below) the standardized mean.)

[Figure 4 About Here]

Households with less time available make fewer unplanned category purchases—those with more make more. More unplanned buying is done in "low knowledge" environments in comparison to "high knowledge" environments. Interestingly, since the publication of Park, Iyer and Smith (1989) work by Inman, Winer, and Ferraro (2008) finds a significant *positive* effect of familiarity (store knowledge) on unplanned buying. The authors posit that households who are more familiar with a store—and thereby have greater expertise there—are more likely to make purchase decisions in the store. Our results suggest a reconciliation of these two findings. Like Park, Iyer, and Smith (1989), we find a negative main effect of knowledge, however, we also observe a positive and significant interaction between knowledge and time (θ_1 = 0.005, *t*-stat = 1.97). The strength of this interaction is however modest in comparison to the main effects. A household in a familiar store can do more unplanned buying, *provided more time is*

available on the trip in question. From a theoretical perspective (Rook and Fisher 1995), engaging in unplanned category purchase incidence at stores where one feels "comfortable" and has "knowledge" may be normatively acceptable for shoppers.

Unplanned Category Purchase Incidence by Category. Our data allow a preliminary investigation of variation across individual categories. In order to visualize the data better, we aggregate the 58 product categories to 13 "super-categories" in Figure 5 and calculate the proportion of category purchase incidences which are unplanned. The proportion ranges from .13 (pet category including food and pet care products), to .31 (sweets and salty snacks). Products belonging to a more "hedonic" category such as snacks and sweets, as well as frozen foods, are more often decided in the store than "utilitarian" categories such as pet food and essentials such as dairy, bread, cereal products (consistent with Kollat and Willett 1967, 1969).

[Figure 5 About Here]

Unplanned Category Purchase Incidence: How Much Occurs?

We calculate that 18% of the categories purchased in the shopping basket are unplanned. Our finding diverges sharply from previous work in regard to this overall rate of occurrence. One reason this number differs from those commonly reported is that it measures a different level of consumer choice. We argue for a category focus (for reasons cited earlier), whereas the oft-quoted statistic is either at the brand or SKU level (typically it is cited without precise attribution). Another reason is a difference in methodology. In our study, shoppers decide which product categories were bought

unplanned, whereas in previous studies a researcher decides (through interviews or by observation). Finally, since quality data on unplanned purchasing are lacking, there have been relatively few studies on the topic. Very recently, *Advertising Age* (July 28, 2008) reported the results from the shopper-marketing unit of the WPP Group, which found that "39.4% of U.S. consumers really wait until they're in the store to decide what brand to buy; about 10% change their minds about brands in the store; 29% buy from categories they didn't intend to buy from; and almost 20% leave a product they'd planned to buy on the shelf." This new finding (29% unplanned category purchases) is controversial as it is very different from that reported by POPAI and others, but interestingly, is close to ours.

Limitations and Future Research

A natural extension would consider additional countries and cultural factors. The much publicized pullout of Wal-Mart from Germany (*New York Times*, August 2, 2006) highlights the need to understand shopping behavior at the country level. Since Bucklin and Lattin (1991) find significant differences in the empirical distribution of the probability of unplanned category purchase incidence in two categories (saltine crackers and ground coffee) it would be worthwhile to study more categories. Perhaps most important, there is a significant need for more comprehensive theories of "shopping styles" and their normative relationship to unplanned category purchase incidence. Promising candidates are theories of shopping goals (e.g., Lee and Ariely 2006), shopping efficiency (e.g., Chandon, Wansink, and Laurent 2000), drivers of retailer-

shopper trust (Bart et al 2005), and normative differences in the “pain of payment” (Scott, Cryder, and Loewenstein 2007).

Table 1
Categorization of Variables Used in This Study

	Out of Store *(Store Choice Drivers)*	***In-store*** *(In-Store Behavior Drivers)*	***Shopping Habits*** *(Shopping strategies and tactics)*
Shopper Traits **(δ)**	<u>Demographics</u> 1. Household Composition and Lifestage 2. Income	1. Average Time Spent on Shopping Trips	<u>Shopping Strategies</u> 1. Information Gathering Style (at the shelf vs. via newspaper) 2. Propensity to be "fast and efficient" when shopping
Shopper-Store Perceptions **(γ)**	1. Store Price Image 2. Store Assortment Image	1. Store Knowledge	
Shopping Trip State Variables **(β)**	1. Travel Time 2. Travel Mode 3. Day 4. Multi-Store Shopping Trip 5. Special Offers Seen Before 6. Store Trip Planning (Planned vs. Unplanned)	1. Shopping Trip Completed Alone; 2. Primary Shopper Gender 3. Time Spent Shopping 4. Shopping Ease 5. Special Offers Seen In-Store	<u>Shopping Mission</u> 1. Fast and Efficient Shopping Trip 2. Immediate Needs or Forgotten Items 3. Trip Type (major vs. Fill-in)

Table 2
Summary of Selected Literature on Unplanned Purchasing

Research Study	Variables	Research Methods and Data	Key Finding
Kollat and Willett (1967) "Customer Impulse Purchasing Behavior"	Main dependent variable: Number of different products purchased Independent variables: *Shopper traits*, i.e., demographics, and *Shopping trip factors*, e.g., transaction size, major trip, purchase frequency, use of shopping list	Collection method: Shopper interviews on store entry and exit Amount and type of data: 596 shoppers, 64 categories, cross-sectional data	"Most unplanned purchases are a response to forgotten needs and out-of-stock"
Granbois (1968) "Improving the Study of Customer In-Store Behavior"	Main dependent variable: Number of different products purchased Independent variables: *Shopper traits*, e.g., demographics, and *Shopping trip factors*, e.g., time in store, number in shopping party	Collection method: Shopper interviews on store entry and exit, observation of shoppers while shopping Amount and type of data: 388 "shopping parties", 84 categories, cross-sectional data	"Study of unplanned purchasing can be improved by combining survey with observational methods"
Park, Iyer, and Smith (1989) "The Effects of Situational Factors on In-Store Grocery Shopping Behavior: The Role of Store Environment and Time Available for Shopping"	Dependent variable: Purchase of products to satisfy needs that we unrecognized Independent variables: *Shopping trip factors*, e.g., store knowledge, and time available for shopping	Collection method: Shoppers interviewed as in Kollat and Willett (1967) Amount and type of data: 68 shopping parties in four experimental conditions (high or low knowledge; no time pressure or time pressure), cross-sectional data	"Most unplanned purchasing done in the low store knowledge / no time pressure condition"
Beatty and Ferrell (1989) "Impulse Buying: Modeling Its Precursors"	Main dependent variable: Likelihood of an impulse purchase Independent variables: *Shopper traits*, i.e., demographics, "impulse buying tendency", *Shopping trip factors*, e.g., time, budget, enjoying	Collection method: Shoppers interviewed as in Kollat and Willett (1967) Amount and type of data: 533 shoppers, 153 who made "impulsive" purchases, cross-sectional data	"Individual differences in propensity for impulsiveness is a significant driver of unplanned buying"

Bucklin and Lattin (1991) "A Two-State Model of Purchase Incidence and Brand Choice"	Main dependent variable: Probability of category purchase incidence; latent shopping state (planned or opportunistic) Main independent variables: *Shopper "traits"*, i.e., deal loyalty, *Shopping trip factors*, e.g., inventory, store loyalty, marketing mix variables	Collection method: Purchase data collected from supermarket scanners Amount and type of data: 152 shoppers, 52 weeks of purchases, 2 categories, panel data structure	"Probability of unplanned state is higher in low loyalty stores, and for households who buy on deal"
Rook and Fisher (1995) "Normative Influences on Impulsive Buying Behavior"	Main dependent variable: alternative purchase scenarios that vary in level of "impulsiveness" Main independent variables: *Shopper "traits"*, i.e., buying impulsiveness, normative evaluations of impulsiveness as moderator	Collection method: Respondent evaluation of hypothetical buying scenarios (study 1), actual buying behavior (study 2) Amount and type of data: 212 undergraduate students (study 1), 104 mall shoppers (study 2), cross-sectional data	"Impulsive buyers (trait) do more impulsive buying but this is moderated by normative evaluation of acceptability of impulsive purchase"
Inman, Winer, and Ferraro (2008) "The Interplay Between Category Factors, Customer Characteristics, and Customer Activities on In-Store Decision Making"	Main dependent variable: Decision type classified as planned, generally planned, or completely unplanned, for each product category Main independent variables: *Shopper traits*, i.e., demographics, *Shopping trip factors*, e.g., time, use of shopping list, etc., *Category factors*, e.g., display, coupon availability, category hedonicity	Collection method: Shoppers interviewed as in Kollat and Willett (1967) Amount and type of data: 2,300 shoppers, 14 US cities, over 40,000 purchases, cross-sectional data	"Stable category factors and customer-self control factors exert the most influence on unplanned buying"
Our Study (2008) "Unplanned Category Purchase Incidence"	Main dependent variable: Number of unplanned category purchases per trip Main independent variables: *Shopper traits*, i.e., demographics, *Shopping trip factors*, e.g., time, major trip, exposure to in-store deals, etc., *Store perceptions*	Collection method: Shoppers interviews and self-reports Amount and type of data: 434 shoppers, 58 product categories, over 15,000 purchases, panel data	"Household *traits*, including preferred shopping styles matter more than shopping trip *states*"

Table 3
Model Variables and Summary Statistics

Household, Household-Store, and Shopping Trip Variables	Mean	Standard Deviation	Minimum	Maximum
Household Trait, Out of Store Variables				
Household Life Stage 1; Single adult $\leq$ 34 years old	0.075	0.263	0	1
Household Life Stage 2; Two adults, household manager $\leq$ 34 years old	0.086	0.281	0	1
Household Life Stage 3; Single adult > 35 years old	0.119	0.324	0	1
Household Life Stage 4; Two adults, household manager > 35 years old	0.249	0.432	0	1
Household Life Stage 5; Family, youngest $\leq$ 17 years old	0.371	0.483	0	1
Household Life Stage 6; Family, youngest > 18 years old	0.106	0.309	0	1
Income Bracket 1; Beneath modal income (< 28,500 EUR/yr)	0.250	0.433	0	1
Income Bracket 2; Modal income (28,500 – 34,000 EUR/yr)	0.259	0.438	0	1
Income Bracket 3; More than modal income (> 34,000 EUR/yr)	0.205	0.404	0	1
Income Not known or will not say	0.283	0.451	0	1
Household Trait, Shopping Habit Variables				
Stay informed about special offers and advertisements through the newspaper (1 = yes, 0 = no)	0.239	0.437	0	1
Stay informed about special offers and advertisements at the shelf itself (1 = yes, 0 = no)	0.457	0.498	0	1
Propensity to be "fast and efficient" when shopping	0.723	0.276	0	1
Household-Store Perception, Out of Store Variables				
Assortment Quality (standardized scale, see Appendix A)	0.00	0.794	-4.75	1.86
Price Image (standardized scale, see Appendix A)	0.00	0.817	-4.74	1.68
Household-Store Perception, In Store Variable				
Comfort and Store Knowledge (standardized scale, see Appendix A)	0.00	0.794	-4.87	1.52

Source: Proprietary survey panel data collected from 434 shoppers, taking 2,945 shopping trips at supermarkets in a Western European country. The data were collected in conjunction with a major multinational packaged goods manufacturer who wishes to remain anonymous and cover the period June 12 to July 10, 2006.

Table 3 (Continued)

Household, Household-Store, and Shopping Trip Variables	Mean	Standard Deviation	Minimum	Maximum
Shopping Trip State, Out of Store Variables				
Travel Time to Store (in minutes)	7.51	6.26	0	60
Travel to Store on Foot	0.232	0.422	0	1
Travel to Store by Bicycle or Scooter	0.353	0.478	0	1
Travel to Store by Car or Taxi	0.415	0.493	0	1
Trip on Friday or Saturday; Y = 1, N = 0 (stores closed Sunday)	0.368	0.482	0	1
Multi-Store Shopping Trip (At Least One Other Store Visited on this Trip Prior to Current Store Visit; Y = 1, N = 0	0.261	0.439	0	1
Unplanned Shopping Trip; Y = 1, N = 0	0.239	0.437	0	1
Shopping Trip State, In-Store Variables				
Shopping Trip Completed Alone; Y = 1, N = 0	0.712	0.453	0	1
Primary Shopper Female on Current Trip; Y = 1, N = 0	0.822	0.373	0	1
Time Spent Shopping (minutes)	17.8	11.8	1	90
Shopping Ease; ("Easy and Quick to Find My Products," 1 = "Completely Disagree", 10 = "Completely Agree")	7.17	2.26	1	10
Special Offers Seen Before This Trip; Y = 1, N = 0	0.239	0.437	0	1
Shopping Trip State, Shopping Habit Variables				
Fast and Efficient Shopping Trip; Y = 1, N = 0	0.723	0.448	0	1
Immediate Needs or Forgotten Items Trip; Y = 1, N = 0	0.107	0.309	0	1
Major Weekly Shopping Trip; Y = 1, N = 0	0.195	0.396	0	1
Dependent Variable				
Total Number of Unplanned Category Purchase Incidences	1.13	2.01	0	20

Table 4

Decomposition of Variance for Counts of Unplanned Category Purchases

Dependent Variable: Total Number of Unplanned Categories Purchased on Trip

Variance Component	Estimate
Households	1.879
Stores	0.027
Household x Stores	0.313
Shopping Trips (Residuals)	1.027
Intra-class Correlation[1]	
Households	0.579[2]
Stores	0.008[3]
Households Shopping at the Same Store	0.684[4]
Number of Observations	
Households	434
Stores	21
Household x Stores	997
Shopping Trips	2,945

[1] The intra-class correlation is the proportion of the total variance accounted for by each level of the model. See Rabe-Hesketh and Skrondal (2005, p. 261 for details).

[2] 0.579 = (1.879) / (1.879 + 0.027 + 0.313 + 1.027)

[3] 0.008 = (0.027) / (1.879 + 0.027 + 0.313 + 1.027)

[4] 0.684 = (1.879 + 0.027 + 0.313) / (1.879 + 0.027 + 0.313 + 1.027)

Table 5

The Effect of Household Traits, Household-Store Perceptions, and Shopping Trip Antecedents and In-Store Process on the Rate of Unplanned Category Purchasing —Unplanned Category Purchasing Poisson Regression Results

Dependent Variable: Total Number of Unplanned Category Purchase Incidences on Trip

Household, Household-Store, and Shopping Trip Variables	**Parameter Estimate**	**Marginal Effects (%)[2]**
Model Intercept[1]	-1.272***	
Household Trait, Out of Store Variables		
δ_1, Household Life Stage 2; Two adults, household manager $\leq$ 34 years old	0.330	14.2
δ_2, Household Life Stage 3; Single adult > 35 years old	-0.456	-36.6
δ_3, Household Life Stage 4; Two adults, household manager > 35 years old	-0.643**	-47.4
δ_4, Household Life Stage 5; Family, youngest $\leq$ 17 years old	-0.378	-31.4
δ_5, Household Life Stage 6; Family, youngest > 18 years old	-1.050***	-65.0
δ_6, Income Bracket 2; Modal income (28,500 – 34,000 EUR/yr)	0.192	21.2
δ_7, Income Bracket 3; More than modal income (> 34,000 EUR/yr)	0.374*	45.4
δ_8, Income Not known or will not say	-0.011	-1.1
Household Trait, In Store Variables		
δ_9, Average Time Spent Shopping	-0.032***	-22.9
Household Trait, Shopping Habit Variables		
δ_{10}, Informed through newspaper about special offers or advertisements	-0.290*	-25.2
δ_{11}, Informed at the shelf itself about special offers or advertisements	0.299**	34.9
δ_{12}, Propensity to be "fast and efficient" when shopping	-1.711***	-81.9
Household-Store Perception, Out of Store Variables		
γ_1, Price Image	-0.116	-9.1
γ_2, Assortment Quality	0.076	6.7
Household-Store Perception, In Store Variables		
γ_3, Comfort and Store Knowledge	-0.138*	-10.4
Shopping Trip State, Out of Store Variables		
β_1, Travel Time to Store (in minutes) x 10^{-2}	0.569	3.5
β_2, Travel to Store by Bicycle or Scooter	0.185*	20.3
β_3, Travel to Store by Car or Taxi	0.367***	44.3

Table 5 (Continued)

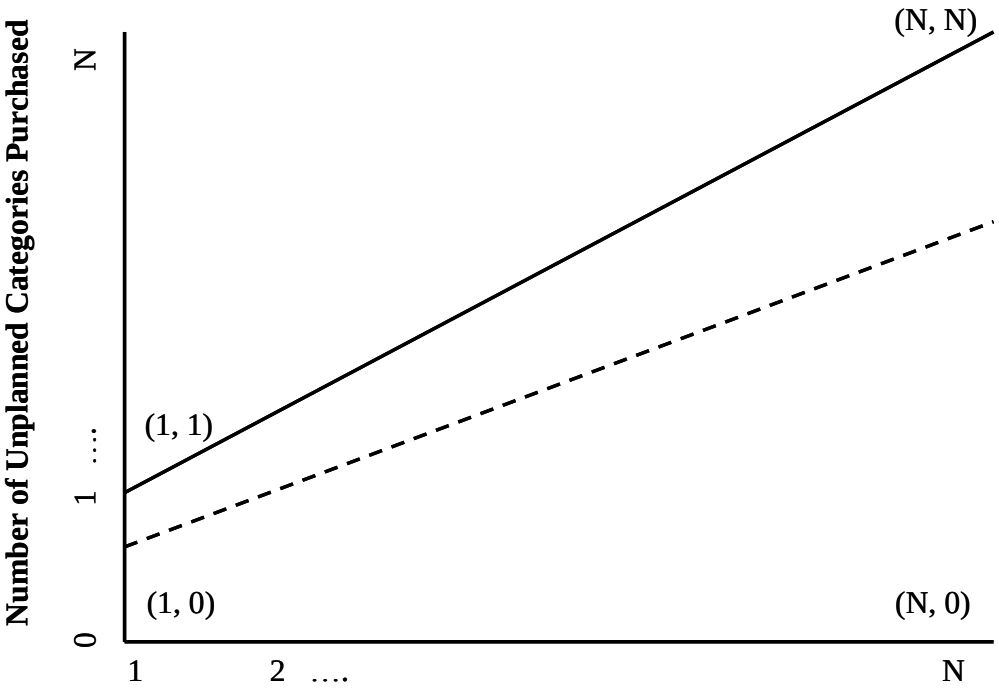
Household, Store, and Shopping Trip Variables	Parameter Estimate	Marginal Effects (%)
Shopping Trip State, Out of Store Variables, continued		
β_4, Trip on Friday or Saturday; Y = 1, N = 0 (stores closed Sunday)	-0.195***	-17.7
β_5, Multi-Store Shopping Trip (At Least One Other Store Visited on this Trip Prior to Current Store Visit; Y = 1, N = 0	-0.099*	-9.4
β_6, Special Offers Seen Before This Trip; Y = 1, N = 0	0.096	10.1
β_7, Unplanned Shopping Trip; Y = 1, N = 0	0.203**	22.5
Shopping Trip State, In Store Variables		
β_8, Shopping Trip Completed Alone; Y = 1, N = 0	-0.094	-9.0
β_9, Primary Shopper Female on Current Trip; Y = 1, N = 0	0.123	13.1
β_{10}, Time Spent Shopping (log of minutes)	0.762***	47.3
β_{11}, Household-Specific Deviation from Mean Time Spent Shopping x 10^{-1}	-0.198***	-36.3
β_{12}, Shopping Ease; ("Easy and Quick to Find My Products," 1 = "Completely Disagree", 10 = "Completely Agree")	0.050***	11.2
β_{13}, Special Offers Seen In-Store During Trip; 1 = Y, 0 = N	0.426***	53.1
Shopping Trip State, Shopping Habit Variables		
β_{14}, Fast and Efficient Shopping Trip; Y = 1, N = 0	-0.745***	-52.5
β_{15}, Immediate Needs or Forgotten Items Trip; Y = 1, N = 0	0.183*	-16.7
β_{16}, Major Weekly Shopping Trip; Y = 1, N = 0	0.123	13.1
Interaction		
θ_1, Overall Store Evaluation Time Interaction (Store Evaluation x Deviation from Household-Specific Mean Time Spent Shopping) 10^{-2}	0.458*	58.1
Random Effects		
Standard Deviation of Random Effect in Household-Store Combinations	0.393***	
Standard Deviation of Random Effect for Households	0.896***	
Observations	Households = 434; Household-Stores = 997; Shopping Trips = 2,945	
Model Fit (R^2)	R^2 = 0.747 (Trip level) R^2 = 0.162 (Household-Store Perception Level) R^2 = 0.404 (Household level) Deviance = 6,879; AIC = 6,989; BIC = 7,318	

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

[1] Store fixed effects suppressed to save space.

[2] Marginal effects for continuous covariates calculated at one standard deviation above and below the mean.

Figure 1
The Unplanned Purchasing "Wedge"



Dashed Line = 70% of Products Purchased are Unplanned
Point (1,0) to (N,0) = All Products Purchased are Planned
Point (1,1) to (N,N) = All Products Purchased are Unplanned

Figure 2

Average and Maximum Number of Unplanned Category Purchases by Total Basket Size

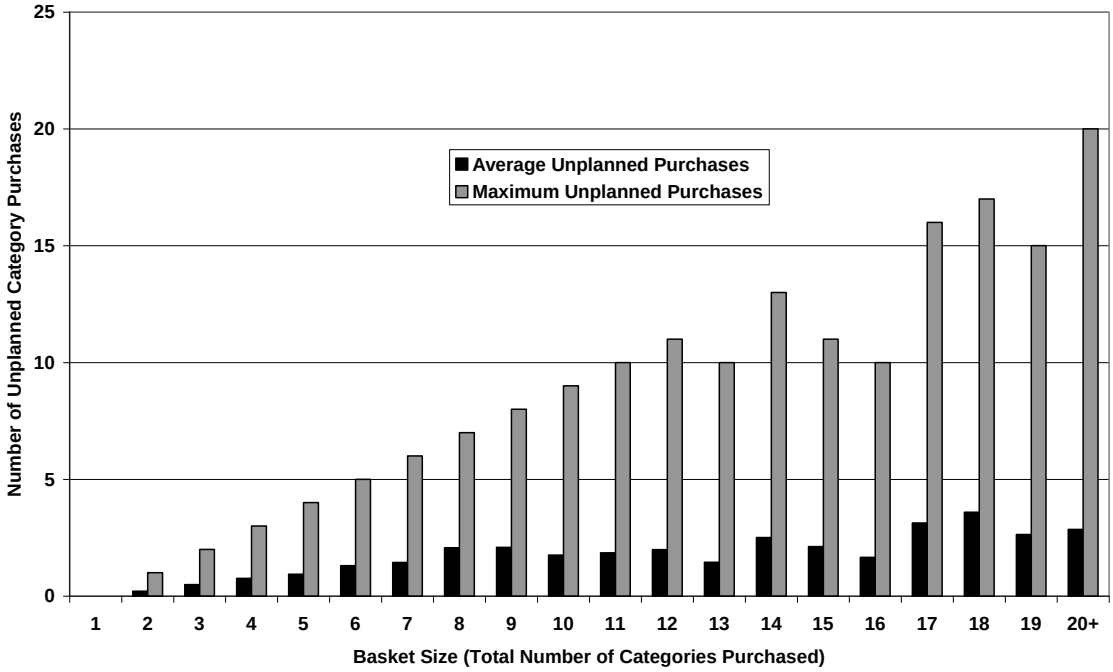


Figure 3

Distribution of Total Unplanned Purchasing Across Households

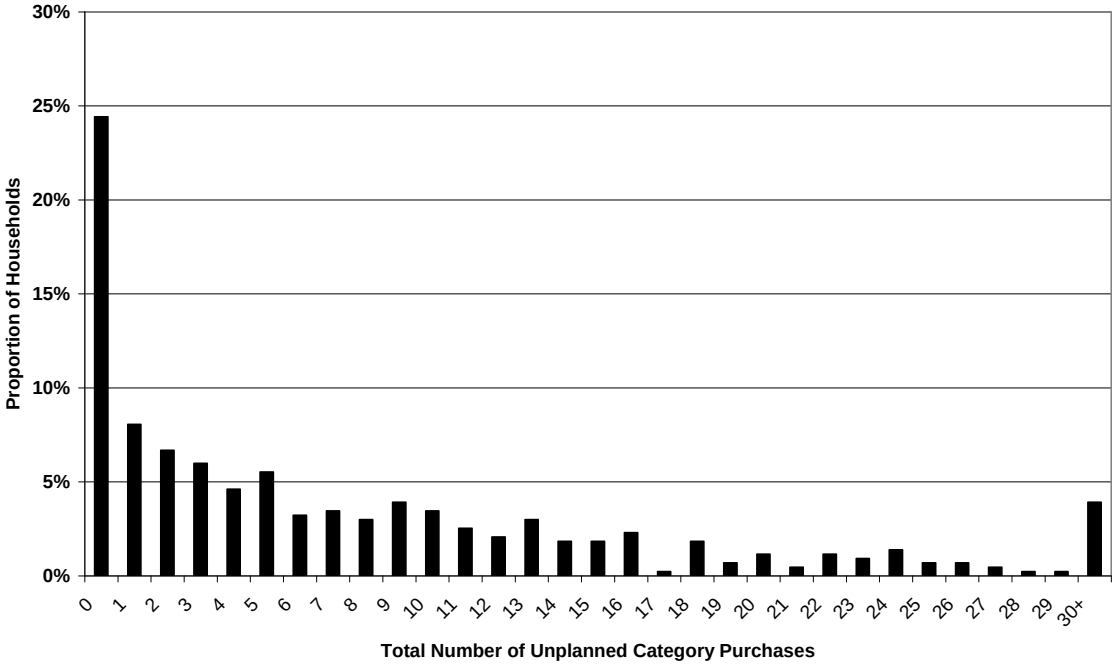


Figure 4

The Effect of Time and Knowledge on Unplanned Category Purchase Incidence

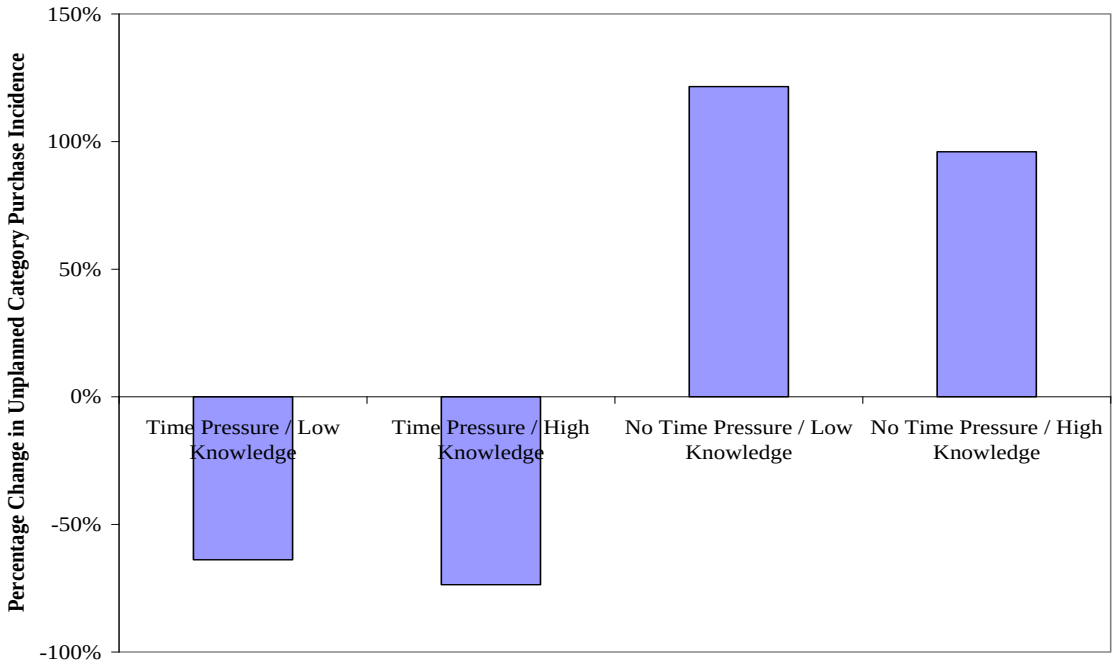
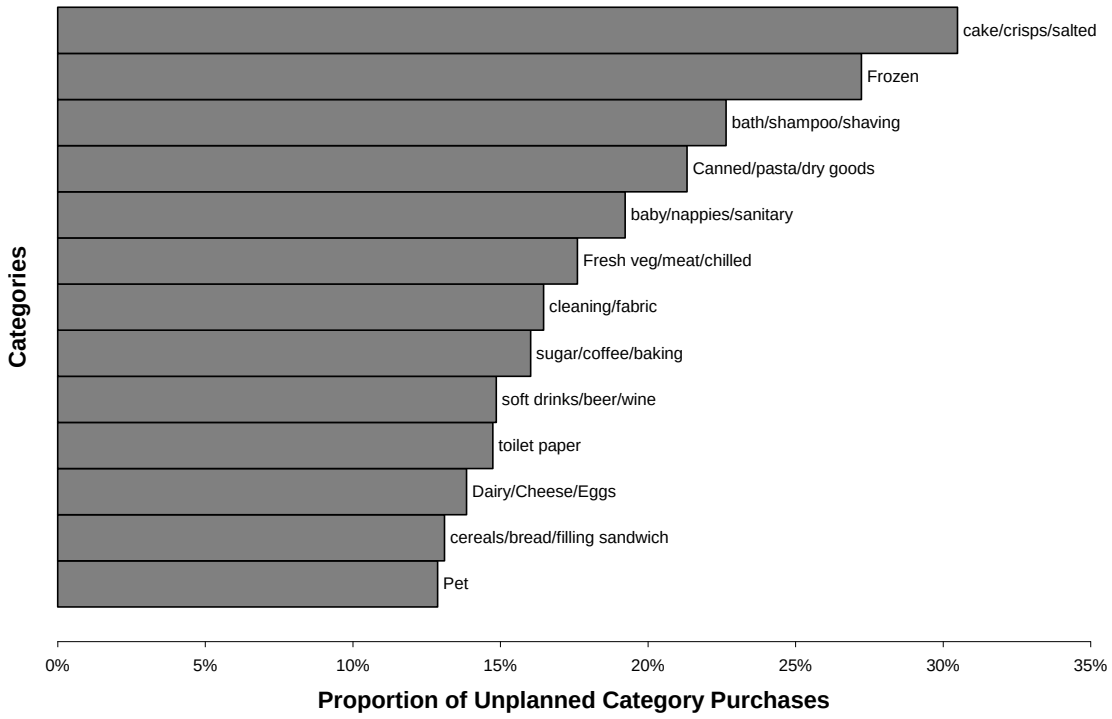


Figure 5

Proportion of Unplanned Category Purchase Incidence by Category



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APPENDIX

Appendix A: Multi-Attributed Household-Store Perceptions

The interviewer first made the following statement to each respondent screened for inclusion in the panel. "I would now like you to tell me your opinion of these supermarkets. Using a 1—10 scale please indicate how strongly the statement applies to each supermarket." At which point, the interviewer showed the respondent a card with an individual statement (from among the list given below).

There were five such collections of statements, and each is reproduced below. The statements were individually pre-tested to tap into specific evaluative dimensions of household-store perceptions. For each collection of statements corresponding to a different evaluative construct we also report the Cronbach Alpha measure of scale reliability.

Comfort and Store Knowledge (α = .854)

"A supermarket one can trust"

"A supermarket I feel comfortable with"

"I am familiar with the store"

"I feel comfortable with the other shoppers in the store"

"The supermarket always fulfils its promises (in leaflets, communications, etc.)"

Assortment Quality (α = .807)

"Products are much fresher / of better quality than elsewhere"

"Large choice of products and brands"

"Choice of retailer's own brands as alternatives to A-brands"

Price Image (α = .752)

"The products I bought are cheaper than elsewhere"

"Attractive promotions / special offers"

"Quality and choice of products match what I am willing to pay"

Appendix B: List of Product Categories Used in the Analysis (in alphabetical order)

Baby and toddler food
Baking and dessert products
Bath and shower products
Beer
Books, CD's, CD-roms
Bread (incl. crackers/toast/biscuit rusk) and bread rolls
Butter/margarine
Cake/biscuits/chocolate/ sweets
Cereals (corn flakes, cruesli, etc.)
Cheese
Chilled meals/pizzas
Chilled soup
Cleaning products
Clothes (incl. shoes, jewellery, clocks etc.)
Coffee and tea
Crisps/salted snacks/nuts
Deodorant
Dishwasher/washing up liquid/powder
Dry groceries (/salt/spices/herbs)
Eggs
Fabric conditioner
Fish (incl. crustacean and shellfish)
Flowers and plants
Fresh dairy products (drinks and desserts)
Fresh vegetables/fruit/potatoes
Frozen ice cream
Frozen meals/pizzas/snacks
Frozen vegetables/ potato products/fish/meat
Household goods (dishcloths, brushes, candles, crockery, matches, light bulbs, etc.)
Long-life dairy products
Magazines
Mayonnaise and other cold sauces
Meals in a tin/jar/packet/box (incl. dinner kit)
Meat/chicken (incl. Meat products)
Medicine/pills/supplements
Mixes for meals/packet mixes/ cooking sauces
Moisturising cream and body lotion
Nappies/other babyand toddler products)
Office articles (incl. Computers/printers)
Olive oil/vinegar
Other articles
Other products in a jar/tin (meat, fish, olives, gherkins, etc.)
Pasta/ rice
Pastries and confectionary
Pet food en pet care
Sandwich filling (non chilled)
Sanitary products/panty liners
Shampoo and conditioner
Shaving products
Smoking materials
Soft drinks/juices/ice tea/sport drinks/diluting juice
Soups and bouillon (tinned/packet)
Sugar and condensed milk/creamer
Toilet paper/kitchen rolls/tissues
Toothbrushes/toothpaste/ oral care
Vegetables in a tin/jar
Washing powder/liquid
Wine and other alcoholic beverages

Appendix C: Correlation of Variables Used in Model

Trip Level Variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Easy to find	1															
2	Female	0.02	1														
3	Transport bike	-0.01	0.06	1													
4	Transport car	0.02	-0.04	-0.62	1												
5	Major weekly	0.01	-0.04	-0.22	0.31	1											
6	Immediate needs	-0.01	0.00	0.07	-0.05	-0.17	1										
7	Journey time	-0.05	0.02	0.00	0.14	0.07	0.04	1									
8	Trip unplanned	-0.02	-0.15	-0.04	0.01	-0.09	0.07	0.07	1								
9	Shopping alone	-0.01	-0.11	0.21	-0.19	-0.16	0.01	-0.10	-0.05	1							
10	Offers seen before	0.07	0.07	-0.02	0.06	0.15	0.01	0.03	-0.06	-0.01	1						
11	Offers seen in store	0.09	0.08	-0.06	0.08	0.10	-0.11	0.04	0.02	-0.09	0.24	1					
12	Fast & efficient trip	0.00	-0.03	0.05	-0.06	0.05	0.03	-0.07	-0.18	0.11	-0.04	-0.14	1				
13	Friday or Saturday	0.02	-0.02	-0.08	0.12	0.22	-0.02	-0.03	0.01	-0.10	0.02	-0.01	0.02	1			
14	Log of time spent shopping	0.05	0.06	-0.11	0.24	0.38	-0.27	0.20	-0.04	-0.20	0.16	0.24	-0.17	0.14	1		
15	Household deviation time spent shopping	0.01	0.01	-0.14	0.19	0.38	-0.21	0.09	0.00	-0.17	0.12	0.17	-0.16	0.19	0.73	1	
16	Multi-store shopping trip	-0.04	0.04	-0.03	0.06	0.04	0.12	0.02	0.00	-0.06	0.04	-0.02	0.01	0.06	-0.09	-0.07	1

Shopper-Store Variables

		1	2	3
1	Store knowledge	1		
2	Store price	0.57	1	
3	Store assortment	0.38	0.50	1

Shopper Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1 Lifestage 2	1											
2 Lifestage 3	-0.11	1										
3 Lifestage 4	-0.18	-0.21	1									
4 Lifestage 5	-0.24	-0.28	-0.44	1								
5 Lifestage 6	-0.11	-0.13	-0.20	-0.26	1							
6 Income 2	-0.05	-0.09	0.04	0.10	-0.01	1						
7 Income 3	0.11	-0.11	-0.02	-0.01	0.12	-0.30	1					
8 Income NA	-0.02	-0.06	0.11	0.01	0.01	-0.37	-0.32	1				
9 Information from newspaper	-0.07	-0.11	0.08	0.07	0.00	-0.13	0.12	0.08	1			
10 Infromation from shelf	0.00	-0.01	-0.10	0.06	0.04	-0.02	0.11	-0.10	0.07	1		
11 Average time shopping	-0.04	-0.06	-0.06	0.16	0.08	0.02	0.00	0.00	-0.01	0.04	1	
12 Propensity fast & efficient	-0.19	0.03	0.13	-0.03	0.06	-0.09	0.00	0.08	0.03	-0.06	-0.08	1