

Unplanned Buying by Supermarket Shoppers

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are our own. Authorship is alphabetical; all authors contributed equally. **Unplanned Buying by Supermarket Shoppers**

Abstract

Unplanned buying is a rich and ubiquitous aspect of consumer shopping behavior. We hypothesize that three classes of factors—shopper predispositions (including demographics and shopping habits), store environments, and shopping trip contexts—affect the cost-benefit calculus for unplanned buying. A multi-level random effects Poisson model calibrated on over 18,000 purchases in 58 categories is used to explain variation in the number of unplanned categories in the shopping basket. We find a high degree of *within*-household clustering (for two trips taken by the same household, the intra-class correlation is .579). Conversely, for any two trips taken at the same *store*, the intra-class correlation is extremely low (less than .010). Thus, the majority of variation is across shoppers, explainable in part by traditional demographics, but more by other “traits” that reflect long-run shopping habits including “enjoyment for shopping” and “information gathering styles”. Shopping trip factors including trip antecedents, trip types, and in-store experiences are also influential. Finally, we replicate the classic findings on time available (more unplanned buying) and high store knowledge (less unplanned purchasing). Implications for researchers and managers are discussed.

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

Managers, acting in accordance with this widespread belief, 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 forecasted a compound annual growth rate for in-store marketing related budgets of 21 percent for manufacturers and 26 percent for retailers in upcoming years). On July 28, 2008 *Advertising Age* 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.”

Classic (e.g., Kollat and Willett 1967) and recent (e.g., Inman, Winer, and Ferraro 2009) academic articles study in-store decision making using cross-sectional shopper intercept data that is carefully focused on in-store decision making. In this paper we study the costs and benefits of unplanned category purchases, from the perspective of the entire shopping process. That is, we decompose variation in unplanned buying as it results from the confluence of three factors: the shopper, the store in which the trip is taken, and context for the trip itself.² Inman, Winer, and Ferraro (2009) explore important welfare implications—how might consumers safeguard themselves from “too much” unplanned

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

² In outlining an agenda for future research Inman, Winer, and Ferraro (2009) remark “...we do not individual-level longitudinal data but only cross-category at one point in time.”

buying—we study the cost-benefit trade-offs for unplanned buying within the context of the full shopping process.

Given the importance of unplanned buying, academic research is less common than one might hope. Appropriate data are rare as direct measures of unplanned purchasing are typically not collected. Exceptions include the field experiments of Park, Iyer, and Smith (1989) and the shopper intercept data from third parties in Inman, Winer, and Ferraro (2009). What constitutes “unplanned buying” differs from study to study (e.g., Abratt and Goodey 1990; Beatty and Ferrell 1998; Bucklin and Lattin 1991; Granbois 1968; Inman, Winer, and Ferraro 2009; Iyer 1989; Kollat and Willett 1967, 1968; Park, Iyer, and Smith 1989); we focus on *unplanned category purchases* since prior research on shopping lists (Block and Morwitz 1999) shows that planning occurs at the category, rather than brand or stock-keeping-unit level.

We propose a three-factor shopping process for unplanned category purchases. Shoppers evaluate the costs and benefits (e.g., Chandon, Wansink, and Laurent 2000) of unplanned buying on a given shopping trip in accordance with: (1) their natural predisposition towards shopping, (2) the store environment they find themselves in, and (3) the objectives and context of the shopping trip. Our goal is to understand how each contributes to variation in unplanned purchasing across shoppers, stores, and trips.³

Within each factor we study a number of sub-factors that are expected to affect the net benefit of unplanned buying. 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. We also include a

³ While panel data (i.e., data across households and within households over time) are the norm for studying brand choice, to our knowledge all published studies on unplanned purchasing (aside from Bucklin and Lattin 1991) use cross-sectional data.

variety of store image (e.g., Bell and Lattin 1998) and trip-specific factors (Fox and Hoch 2005; Lee and Ariely 2006). Some shoppers have a greater inclination to delay planning until inside the store than others; furthermore, different store environments will engender different rates of unplanned buying from the *same* shopper, as will different trips with different needs.

This research has two main contributions. First, we develop hypotheses for how the sub-factors affect the net benefit of unplanned buying. Second, we test the predictions using data with a panel structure which allows us to decompose variation in the underlying rate of unplanned buying. We begin with the conceptual development and hypotheses, followed by a focused literature review. Next, we describe our unique data covering over 18,000 purchases in 58 categories, from more than 3,000 trips and 21 stores. We then specify the multi-level random effects Poisson model and present the empirical findings. A concluding section presents implications for management and an agenda for future research.

CONCEPTUAL FRAMEWORK AND RESEARCH PREDICTIONS

Unplanned category purchases take place within a “feasible space” given the overall context of shopping for a basket of items. Figure 1 plots the number of unplanned category purchases (y -axis) against total number of categories purchased (x -axis).⁴

[Figure 1 about here]

⁴ The x -axis starts at 1, indicating that on any given shopping trip at least one product category will involve a purchase (shoppers don’t go to the supermarket and walk out with nothing). The y -axis starts at 0, since it is possible that a shopping trip involves no *unplanned* category purchases.

Some extreme cases are notable. 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) ; 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 category unplanned purchasing.

Conventional wisdom suggests a third line (the dashed line) with a constant slope. A slope of .50, for example, implies that in aggregate 50% of all product *categories* purchased are not planned in advance. The mix of consumer behavior in the population that would lead to an aggregate rate of (say) 50% is not well understood—is it because half the shoppers always plan and half do not, or some other alternative? A key contribution of this research is therefore to “locate” a shopping trip on the x -axis—by controlling for who is taking the trip, in what store, and for what reason(s)—and then explain the conditional variation along the y -axis. To our knowledge, this decomposition, which requires panel data, has not been attempted in the literature.

The Net Benefit of Unplanned Buying

Consumer actions in retail stores are driven by perceived overall net benefits. Consumers redeem coupons when the price benefit exceeds the effort cost of sorting and clipping (e.g., Chiang 1995; Dhar and Hoch 1996; Neslin 1990;). Shoppers stockpile when the price savings exceed the storage and holding costs (e.g., Bell and Hilber 2006), and may also be induced to consume more of the product (Ailawadi and Neslin 1998; Sun 2005). Signs and displays (Inman, McAlister, and Hoyer 1990) may stimulate sales

as shoppers perceive a lower net benefit of waiting, and category purchases are accelerated when category marketing activity is favorable relative to a prior reference point (Bell and Bucklin 1999).

The cost-benefit calculus adds a natural clarity to the analysis of consumer decision making. We study how shopper predispositions, store environments, and trip factors influence this calculus with respect to unplanned buying. The linking of a cost-benefit decision-making calculus to “exogenous factors” has some precedent in the literature. For example, prior research connects the cost-benefit trade off to consumer psychographics (e.g., Ailawadi, Neslin, and Gedenk 2001), and to monetary and non-monetary promotional factors (e.g., Chandon, Wansink and Laurent 2000). In this latter study shoppers respond more strongly to coupons than to price promotions because this allows a stronger display of “value expression.” Urbany, Dickson, and Kalapuraj (1996) find that consumers experience “psychosocial returns” such as shopper enjoyment when engaging in price search.

We also assume that a shopper engaging in unplanned category purchasing is evaluating costs and benefits. Specifically, a shopper making an unplanned category purchase is deciding to take advantage of an opportunity to purchase *now*, without further deliberation or search costs. Exposure to in-store offers, for example, makes the benefit of purchasing now more salient: it requires little on-the-spot cognitive effort and no preparation before entering the store. Specific information gathering strategies adopted in the long-run, such as searching for offers in the newspaper and planning category purchases accordingly, may reduce the net benefit of making the unplanned purchase.

Next, we provide specific predictions for individual covariates (see also Table 4, right column).

Shopper Predispositions

Demographic Factors. Family life-stage, household size, and household income should all influence the extent of unplanned buying. Prior research shows unplanned purchasing is higher for couples married less than ten years (Kollat and Willett 1967), females, and larger households (Inman, Winer, and Ferraro 2009). Higher income and younger households are likely to be more time-constrained and have higher search costs. Larger households may have more complex planning requirements, but the economic cost of not planning is multiplied by family size. Hence, we expect that younger families and families with more income will engage in more unplanned buying.

Shopping Habits. Rook and Fisher (1995) and Beatty and Ferrell (1998) show unplanned buying is higher for individuals with strong “impulsivity traits”. We therefore broaden our conceptualization of traits away from demographics alone, and focus on three additional factors. Shoppers collect information in two different ways. Those who collect newspaper inserts or study advertisements *before* shopping are informed prior to entering the store and more likely to plan categories to purchase on their trips. We expect that, on average, the net benefit of unplanned buying is lower for these households. Conversely, those who typically gather information in-store are more likely to shop opportunistically (e.g., Bucklin and Lattin 1991) and therefore see a higher net benefit from unplanned buying. Finally, consumers who have low entertainment values for

shopping (e.g., Ailawadi, Neslin, and Gedenk 2001) will be more efficient, spend less time in the store, and see a lower net benefit of engaging in unplanned purchasing.

Store Environments

Field experiments in Park, Iyer, and Smith (1989) show that shoppers do more unplanned buying in unfamiliar store environments because they are more attune to in-store stimuli. More recently, Inman, Winer, and Ferraro (2009) find that shoppers do more unplanned buying in *familiar* environments. We use the panel structure of our data to reconcile these two findings. An unfamiliar environment should increase the salience of in-store cues, which in turn raises the net benefit of unplanned buying. However, shoppers in *familiar* environments who have *more time* to on a given trip will do more unplanned buying. Historical knowledge of the store environment, coupled with additional time to process in-store information reduces the uncertainty associated with “buying now”, and therefore increases the likelihood of unplanned buying. Stores that have a favorable price image (e.g., Bell and Lattin 1998), and attractive assortment (Briesch, Chintagunta, and Fox 2009), should see more unplanned buying.

Shopping Trip Factors

In addition to shopper predispositions and store settings, we must also consider the contextual factors that surround the shopping trip. The context and mission for an individual trip varies not only across shoppers, but also within shoppers over time.

Shopping Trip Antecedents. First, we control for the time to reach the store—a proxy for an important “fixed cost” of shopping. Prior research (e.g., Tang, Bell, and Ho 2001)

suggests that shoppers seek to amortize this cost: the more time spent getting to the store, the larger the shopping basket. However, we have no specific predictions about whether the number of *unplanned* categories in the basket will increase. Second, since the method of travel to the store (walking, cycling, or driving) affects the capacity to transport goods, we anticipate larger baskets when the shopper drives, but make no specific prediction about the number of unplanned category purchases. Prior research shows that females have a higher propensity for planning; solo shoppers (as opposed to couples or families) are also less likely to engage in spontaneous buying. Studies on the periodicity of shopping report day of week effects (e.g., Helsen and Schmittlein 1993; Kahn and Schmittlein 1989), however we have no specific prediction as to whether “weekend” shopping would induce more unplanned buying per se.

Trip Type. “Trip type” (Kahn and Schmittlein 1989, 1992) predicts store choice (e.g., Bell and Lattin 1998) and in-store behavior (Seethuraman, Ainslie, and Chintagunta 1999). “Major trips” involve more category purchases, yet coupon and shopping list use—which suggests planning—is more prevalent on major trips; hence we have no specific prediction for the effect of a major trip on unplanned buying. “Spontaneous trips” indicate impulsivity (e.g., Rook and Fisher 1995) and therefore induce more unplanned buying. Trips for “immediate or forgotten needs” and “quick trips” are more focused and will generate fewer unplanned category purchases. “Multi-store shopping trips” involve planning and even strategic behavior, such as cherry picking (e.g., Fox and Hoch 2005). Stores visited *subsequent* to the first store visited should be visited for specific needs, and therefore see less unplanned buying.

In-Store Factors. When shoppers can easily locate products and when they are exposed to special in-store offers there will be more unplanned buying (Dhar and Hoch 1996; Inman, Winer, and Ferraro 2009; Inman and McAlister 1993). More time available in the store will lead to more unplanned buying (Inman, Winer, and Ferraro 2009; Park, Iyer, and Smith 1989).⁵

LITERATURE REVIEW

We summarize extant literature by emphasizing data and methods used, and the level of aggregation at which unplanned purchasing is studied. We rely on time-varying self-report data rather than store intercept data (we comment later on the relative merits of each), and focus on category-level unplanned purchasing.

Data, Measures, and Methods

Prior Research. Table 1 summarizes data, methods, and findings from past research.

[Table 1 about here]

Kollat and Willett (1967) use cross-sectional shopper intercept data from 596 shoppers buying 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.⁶ In Granbois (1968), 388 “shopping parties” were

⁵ It is natural to include an exposure variable in a Poisson regression and estimate its coefficient (see Gelman and Hill 2007, p. 112). Like Inman, Ferraro, and Winer (2009) we find a relatively small positive correlation between time spent shopping and the number of categories bought ($r = .24$) and do not believe that time in store is endogenous.

⁶ 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 reevaluate their shopping motives. A reply is given in Kollat and Willett (1968).

interviewed about their shopping plans and then followed as they shopped. Shoppers' travel patterns and characteristics (e.g., "age under 30") were observed from a distance.

Park, Iyer, and Smith (1989) conduct a field experiment with 68 shoppers, and study how situational factors affect unplanned purchasing. "Store knowledge" was manipulated by forcing 34 of the 68 subjects to shop in stores where they had not previously shopped.⁷ "Time pressure" was manipulated by giving shoppers exactly one half of time they estimated they needed to complete the shopping trip. Iyer (1989) studies the same 68 shoppers but focuses on conformity between encoded and actual purchasing sequences, as a function of store knowledge and time available for shopping. Beatty and Ferrell (1998), like Kollat and Willett (1967), conduct pre- and post-shopping interviews with shoppers. Their 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) use 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 moderating factors including normative aspects of unplanned buying (e.g., impulsively buying a gift could be considered "good"; splurging on oneself could be considered "bad"). Inman, Winer, and Ferraro (2009) use cross-sectional field data from 2,300 shoppers in 14 cities in the United States and relate unplanned buying to consumer self control factors and category characteristics. Bucklin and Lattin (1991), in a departure from the norm, employ scanner panel data. They treat the shopper's state—planned or opportunistic—as latent and a function of three behavioral measures ("deal loyalty", "inventory on hand", and "store loyalty").

⁷ 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.

This Research. In summary, almost all other studies use experiments and collect shopper intercept data in the field, whereas in our study shoppers self-report whether a category purchase is planned (see Data and Measures). There are drawbacks and advantages inherent in both methods. Intercepts may: cause a shopper to formalize or change their plans (Pollay 1968), exclude shoppers who do not use a list (Thomas and Garland 2004), and overestimate the number of unplanned purchases from shoppers who use the store itself as a shopping list (Kollat and Willett 1967). Self-report data may underestimate the amount of unplanned purchasing if shoppers engage in post-hoc justification or rationalization of their activities (Pieters, Baumgartner, and Bagozzi 2006). Hence, we are cautious in making inferences about the *overall level* of unplanned buying and focus instead on *explaining variation* in unplanned purchasing as it relates to the set of factors discussed above.⁸ Our study, to the best of our knowledge, is unique in that it combines an extensive set of covariates (thirty-one) *and* data that varies across shoppers, stores, and within-shopper over trips. A final distinction is that the *collective number* (basket) of unplanned purchases on a shopping trip is the unit of analysis.

“Unplanned Purchasing”

Kollat and Willett (1969, p. 81) state 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) report an enduring “lack of consensus.”

Even today, attempts to achieve consensus are likely to be counterproductive. Rather,

⁸ As a final point we note that the self-report data and observation period of our data are very similar to the Consumer Expenditure Survey set up by the Bureau of Labor Statistics for the United States Government (see <ftp://ftp.bls.gov/pub/special.requests/ce/readme.txt>).

researchers should define “unplanned purchasing” precisely within the bounds and objectives of a particular study. We advocate our focus on unplanned *category* purchases.

Prior Research. 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).⁹

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 (2009) define specifically planned (“buy Pepsi”), generally planned (“buy soft drinks”), and unplanned purchasing. Rook and Fisher (1995) and Beatty and Ferrell (1998) distinguish unplanned and impulse buying. The latter is driven by a “spontaneous urge” to buy (see also Strack, Werth, and Deutsch 2006; Vohs and Faber 2007); the former simply reflects absence of a decision in advance of the trip.

This Research. Planning at the category level reflects the way items are listed by shoppers. Prior research (Block and Morwitz 1999) found that only 9.4% of purchased items were written on a shopping list with a specific brand name. In addition, category-level intentions can be measured parsimoniously¹⁰ and category purchase behavior is of particular interest to both supermarket retailers and CPG manufacturers. Finally, by modeling the number of unplanned category purchases per trip we can assess the

⁹ Intentions are linked 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.”

¹⁰ 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.

“implicit hypotheses” that unplanned purchases are a “sizable portion” of basket and that they are mainly driven by environmental stimuli.

DATA AND MEASURES

The panel data contain over 18,000 category purchases from 58 product categories (see Appendix B). Participating households were screened to be representative of the market for the country in question and were paid 20 Euros for their cooperation. For each trip, households completed a short questionnaire, checked off each category purchased and whether it was “planned in advance of the store visit and purchased” or “decided in store and purchased.”¹¹ The questionnaire included several other questions. Households were told to fill in a new questionnaire directly after completing each shopping trip, and to attach their receipts (we asked this to ensure accurate reporting).¹² After two weeks the research firm visited each household and collected the questionnaires.

We focus on households that have at least 4 shopping trip observations. Usable data comprise 434 households; they 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 separate 90 minute in-home interviews with shoppers. Details are provided in Table 2.

¹¹ Shoppers were told that the purpose of the study was to record their “shopping habits”, i.e., they were not told it had anything to do with unplanned buying.

¹² For a random sample of panelists, the receipt data matched the category data.

[Table 2 about here]

The measures cover the three categories—Shopper Predispositions, Store Environments, and Shopping Trips—discussed earlier. The first category includes demographic factors (life stage and income bracket) and three trait measures that capture shopping habits. 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. The Store Environment measures vary across households and trips to *different* stores, but not trips to the *same* store. Three summated score measures—“Comfort and Store Knowledge” (Cronbach $\alpha = .854$), “Price Image” (Cronbach $\alpha = .752$), and “Assortment Quality” (Cronbach $\alpha = .807$)—are developed from multi-item scales (see Appendix A).¹³ Shopping Trip measures (including antecedents, trip type, and in-store experience variables) vary across households, stores, and trips. Correlations among all variables are in Appendix C.

MODEL AND DESCRIPTIVE ANALYSIS

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

Consumer Shopping Behavior and Poisson Approach

Consider $h = 1, 2, \dots, H$ households taking $t = 1, 2, \dots, T_h$ shopping trips $s = 1, 2, \dots, S$ supermarkets. Households sometimes make more than one shopping trip in a single time

¹³ 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.

interval (day). On each shopping trip t for each household h shopping in store s , the total number of unplanned purchases, $UP_{hs}(t)$, is observed. We assume that $UP_{hs}(t)$ follows a Poisson distribution for several reasons. First, the number of unplanned purchases is an integer count variable with no a priori upper bound.¹⁴ 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, \dots, X_n) with possibly different means. To see this, let $X_i, i = 1, 2, \dots, N$ equal 1 if the household makes an unplanned purchase in category i , and 0 otherwise. N denotes the total number of 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, $X_i | \theta_i \sim \text{Bernoulli}(\theta_i)$. 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 $p = \frac{a}{a+b}$.¹⁵ If p is small then the Poisson approximation states that $UP \sim \text{Poisson}(Np)$ 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.

¹⁴ 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.

¹⁵ 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.

An alternative approach counts the number of unplanned purchases or “successes” that can occur at a predetermined number of “trials”. The response variable would be expressed as a sample proportion of unplanned purchases (Rabe-Hesketh and Skrondal 2005). However, in contrast to an assumption often implicit in discussions of unplanned category purchases, we find they are not proportional to the overall size of the market basket; hence, we do not model the proportion of purchases that are unplanned on a 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

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

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 $g(\bullet)$ 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 use a two-way error components model (Baltagi 2005) since shopping trips (the unit of observation), belong to two overlapping categories: stores and households. Our multi-level Poisson model allows for correlation in count outcomes between trips taken by (1) the same household at the same store, (2) the same household at *different* stores, and (3) *different* households at the same store. At the household level demographic factors and long run shopping habits 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 random effects correct for 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).¹⁶ A standard log-linear formulation relates model variables to the rate parameter, $\lambda_{hs}(t)$. Specifically,

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

The log rate depends on household, store, and trip-specific variables $x_{hs}(t)$ (Shopping Trips), and on higher level store-household (ω_{hs}) (Store Environments), and household variables (v_h) (Shopper Predispositions) listed in Table 2. Unobservable store effects that are shared across households are controlled with store-specific fixed effects, ψ_s . Random intercepts v_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 shows the relationship between the number of unplanned category purchases and the total number of products purchased, i.e., it is the empirical analog of the Figure 1. The x -axis records the number of categories bought. The y -axis shows the *average* number of category-level unplanned

¹⁶ 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 close to one. Hence, our model with random effects at the household and household-store levels suitably controls for over-dispersion.

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. Baskets of two categories, for example, 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, etc.

[Figure 2 about here]

Figure 2 reveals some interesting empirical patterns. First, when the shopping trip involves a *single* category, that purchase is *always* planned in advance. The maximum number of unplanned category purchases never exceeds the total basket size minus 1 (there are no “completely unplanned” baskets in the 2,945 shopping trips). Second, the overall level of unplanned category purchase incidence, as measured by the average bars, is about 18-20% (the overall average number of unplanned category purchases across all basket sizes is 1.13, and the average basket size is 6.4). Given our comments earlier on self-report data, we interpret this figure as a lower bound on the true number of unplanned category purchases. Figure 2 also shows that *at the level of category purchase incidence*, the proportion of unplanned buying is not constant across baskets of different sizes.

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).

Variance Due to Shopper Predispositions, Environments, and Shopping Trips

The majority of the variation in unplanned category purchase incidence is attributable to households (as shown in Table 3). The magnitude of the estimate (1.879) implies that about two-thirds of the households will have a total number of unplanned category purchase incidences per trip between .19 and 1.92.¹⁷

[Table 3 about here]

In Table 3, intra-class correlations are shown below the 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 .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 .01. For different trips by the *same* household at the *same* store, the intra-class correlation rises to .684, since, in addition to the household and store clustering, we add the household-store interaction clustering. The variance decomposition implies unplanned buying is largely a household-driven phenomenon. We investigate the drivers next.

¹⁷ The overall intercept (not reported in Table 3) is -.720 and one standard deviation above and below = $\exp(-.720 \pm \sqrt{1.879})$.

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 and the marginal effects for continuous covariates (see Table 4) are computed at one standard deviation above and below the mean.

Shopper Predispositions (δ_1 - δ_{11}). Traditional demographic factors show effects (δ_1 - δ_8) that are consistent with prior research. Unplanned category purchasing is negatively related to age ($\delta_3 = -0.643$, t -stat = -2.76) and family size ($\delta_5 = -1.050$, t -stat = -3.75), and positively related to income ($\delta_7 = 0.374$, t -stat = 2.18). Coefficients of long term shopping habits (δ_9 - δ_{11}) are all large in magnitude and significant. Consistent with our predictions, shoppers who place a low entertainment value on shopping and are generally “fast and efficient” show an approximately 82% decline in the base rate ($\delta_{12} = -1.711$, t -stat = -8.49). Households who typically use newspapers to obtain information about prices and offers *prior* to shopping do 25% *less* unplanned category buying ($\delta_{10} = -.290$, t -stat = -2.16), whereas those collecting information at the shelf do 35% *more* ($\delta_{11} = .299$, t -stat = 2.70). Both findings are consistent with our predictions.

[Table 4 about here]

Store Environments (γ_1 - γ_3 , θ_1). Price image and assortment quality are not significant. These perceptual elements may however affect unplanned category buying indirectly via the store choice decision, which is not modelled. Second, store fixed effects (ψ_s in equation 2) may crowd out these effects if there is limited variation across households in their perceptions for a particular store. Households should, therefore, be more similar in their price and assortment perceptions for a store than in their level of store comfort and

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 ($\gamma_3 = -.138$, t -stat = -2.04). The interaction of comfort and store knowledge with time spent in store is positive and significant ($\theta_1 = .005$, t -stat = 1.97). This is consistent with the idea that historical knowledge of the store environment, coupled with additional time to process in-store information, reduces the uncertainty associated with “buying now”, and therefore increases unplanned buying. This test, possible because of the panel structure of our data, helps reconcile the Park, Iyer, and Smith (1989) negative main effect of knowledge finding, with the positive main effect reported in the more recent study by Inman, Winer, and Ferraro (2009).

Shopping Trip (β_1 – β_{14}). Shopping trip antecedents affect unplanned buying in the expected directions. We had no prediction for travel time to the store (which could be viewed as sunk), and the estimate is not significant. As expected, the rate of unplanned buying increases by 20% ($\beta_2 = .185$, t -stat = 2.22) and 44% ($\beta_3 = .367$, t -stat = 4.36) when trips are taken by bicycle or car, respectively (the base case is walking). Contrary to expectations neither gender nor shopping alone had any effect (although the latter is in the expected negative direction, and marginally significant, $p = .08$). Unplanned buying is lower on “weekends” by about 18% ($\beta_6 = .195$, t -stat = -4.26), although we had no specific prediction here.

Shopping trip type variables, which are typically not studied in the literature, show interesting effects. As expected, spontaneous trips lead to more unplanned buying (23% increase, $\beta_7 = .203$, t -stat = 3.22); “quick” and “immediate need” shopping trips reduce unplanned buying by 53% ($\beta_9 = -.745$, t -stat = -13.42) and 17% ($\beta_{10} = -.183$, t -stat = -

2.11), respectively. On multi-store trips, stores visited after the first see a 9% reduction unplanned category buying ($\beta_{11} = -.099$, t -stat = -2.01). Trips occurring later in the shopping sequence are likely taken for specific reasons, including cherry picking (Fox and Hoch 2005).

In-store experience variables also have large and significant impacts on unplanned category purchasing. Shopping ease increases unplanned buying by 11% ($\beta_{12} = .050$, t -stat = 3.34).¹⁸ Exposure to special offers while shopping increases unplanned buying by 53% ($\beta_{13} = .426$, t -stat = 8.41). Consistent with all prior research, time spent in the store has an overall positive effect ($\beta_{10} = 0.762$, t -stat = 7.71), even accounting for heterogeneity across individuals ($\phi_1 = -.032$, t -stat = -3.32) and trip-specific deviations at the household level ($\phi_2 = -.020$, t -stat = -4.16).

The overall fit of the model is good (see Table 4): 75% of the variation in unplanned category purchasing is explained by the model, with 16% explained at the level of the store environment and 40% at the household trait level.

GENERAL DISCUSSION AND CONCLUSION

We study unplanned buying by supermarket shoppers. Understanding what drives this phenomenon has implications for managers, for resource allocation, and for academics

¹⁸ 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. “Shopping ease” 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 “shopping ease” on “comfort and knowledge” (plus all controls) reveals a significant positive 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.

interested in developing theories and measures of planning and proclivity for impulsiveness.

Corroboration of Classic Findings: Time, Store Knowledge, Category-Level and Overall Unplanned Buying

Time and Store Knowledge. Two significant findings from the literature (Bettman 1979; Park, Iyer, and Smith 1989) are: (1) more store comfort and knowledge has a negative effect on unplanned buying, and (2) more time for shopping has a positive effect. We replicate both despite significant differences in methodology, time frame, and data. Figure 3 shows the percentage change in the rate of unplanned category buying as calculated from our parameter estimates, as one standard deviation above (below) the average time spent per trip, and average evaluations of store knowledge. More unplanned buying is done in “low knowledge” stores and on trips with more time available (i.e., the household is spending more than their average time shopping).

[Figure 3 about here]

Interestingly, since the publication of Park, Iyer and Smith (1989), Inman, Winer, and Ferraro (2009) find 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. 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 ($\theta_t = 0.005$, t -stat = 1.97). 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, engaging in unplanned category purchase incidence at stores where one feels “comfortable” and has “knowledge” may be normatively acceptable for shoppers (see Rook and Fisher 1995).

Category-Level Unplanned Buying. Our data allow a preliminary investigation of variation across individual categories. To better visualize the data, we aggregate the 58 product categories to 13 “super-categories” and calculate the proportion of category purchase incidences which are unplanned (see Figure 4). The proportion ranges from .13 (pet category including food and pet care products) to .31 (sweets and salty snacks). Consistent with Kollat and Willett (1967, 1969), more “hedonic” categories 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, and cereal.

[Figure 4 about here]

Prevalence of Unplanned Buying. In our data 18% of the categories in the shopping basket are unplanned. One possible reason for the sharp divergence of this number from other numbers cited earlier is that it measures a different level of consumer choice. We focus on categories, whereas other studies may focus on brands or SKUs. 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). Nevertheless, *Advertising Age* (July 28, 2008) recently 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% of category purchases are unplanned) is “controversial” as it is very different from that sometimes reported by POPAI, but interestingly, is close to ours. Very recent evidence implies that unplanned buying is further on the decline as economic conditions worsen: “For years, marketers have operated under the traditional wisdom that 70% of all purchase decisions are made in store. But IRI's research found that by the end of last year, more than three-quarters—76%—of consumers were making their purchase decisions at home, up from 60% in the first quarter (*Advertising Age*, March 2, 2009).

Figure 2 sheds further light on the heterogeneity in unplanned buying. Each trip involved at least one planned category; furthermore, the fraction of unplanned categories bought is not constant across basket size. This calls into question whether one should think in terms of a fixed fraction of all purchases (e.g., 50%) that might be unplanned. According to the consulting firm Deloitte, some retailers are now focusing on “trip types” as an important driver of shopper behavior. In our data the fraction of unplanned buying is .10 on quick trips (.34 on non-quick trips) and is .37 on spontaneous trips (.16 for non-spontaneous trips).

New Implications for Retail Management and Future Research

The Importance of the Shopper. Of the three different factors we study (shopper predispositions, store environments, and shopping trip objectives and contexts) across 31 measures, shopper factors account for the majority of variation in unplanned buying (Table 3). This inference is possible due to our unique combination of panel purchase and detailed survey data. The number of unplanned items in the basket is driven more by *who*

is shopping, rather than the environment a given shopper is in, or the type of trip they are taking. While traditional demographic factors (household life stage and income) play a role, long term shopping habits have more pronounced marginal effects. Individual differences in the tendency to search for information prior to shopping or in-store, and the inherent enjoyment in the process of shopping contribute significantly to variation in the number of unplanned items purchased.

Even though individual difference variables are the most important factors in the model, these household observables account for only 40% of the total variation. One implication is clear: Researchers and managers should start uncovering and measuring other “traits” such as proclivity for impulsivity (e.g., Rook and Fisher 1995), or the propensity to be a “spendthrift” or “tightwad” (Scott, Cryder, and Loewenstein 2008).

The Role of the Shopping Trip. Shopping trip factors including trip antecedents, trip types, and in-store experiences are the second most influential set of factors. All define the shopping mission. The marginal effects of factors in this group range from about 10% in absolute value (shopping ease = +10%, store subsequent to the first store on a multi-store trip = -10%) to more than 50% (offers seen in store = +50%, quick trip = -50%). We find that short, quick trips with limited scope generate the least unplanned buying (this complements work by Inman, Winer, and Ferraro (2009) on the role of factors inside the store. Further study of short term shopping goals (e.g., Lee and Ariely 2006) is likely to be worthwhile. Thus, retail managers might not only advertise prices and assortments, but also suitability for certain types of trips, or an ability to deliver specific in-store experiences, and also try to influence the order in which their stores are shopped on multi-store trips (“secondary” stores get less unplanned buying).

In summary, while shopping trip factors explain *less* of the total overall variation in unplanned buying than shopper predispositions do, the amount of variation *explained* by our covariates is more for the trip factors than the shopper factors.

The Persistence of Store Effects. We find chain-level effects (ψ_s in equation 2) that are not explained by store perceptions, shopper habits, or trip level factors; these effects appear to be robust to alternative model specifications. Of the twenty store fixed effects estimated, eight are significant; the marginal effect sizes range from 33% to 69% more unplanned purchasing, relative to Store 1 (the base case). These differences do not appear to be explained by pricing strategy (e.g., Hi-Lo vs. EDLP) or quality tier (discount vs. premium). Recall also that direct perceptual measures were not significant, given the that model already contained the ψ_s parameters; see Table 4). These may reflect persistent sources of competitive advantage (see Antonio, Freez, and Valdez 2008 for analogous effects). One implication is that, at the very least, it may be useful for managers benchmark unplanned buying relative to competitors.

Limitations. Our data are from one country. Wal-Mart's pullout from Germany (*New York Times*, August 2, 2006) implies a need to understand variation across countries. We model unplanned buying at the basket level however Bucklin and Lattin (1991) find significant across-category differences in the probability of unplanned category purchase incidence. We present only preliminary analysis of cross-category differences (as these are not our focus). Finally, while we rely on theory for variable selection and *ex ante* expectations, we do not develop original theory. 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 2008).

Table 1
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: <i>Shopper traits</i> , i.e., demographics, and <i>Shopping trip factors</i> , 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: <i>Shopper traits</i> , e.g., demographics, and <i>Shopping trip factors</i> , 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: <i>Shopping trip factors</i> , 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: <i>Shopper traits</i> , i.e., demographics, “impulse buying tendency”, <i>Shopping trip factors</i> , 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”

<p>Bucklin and Lattin (1991) “A Two-State Model of Purchase Incidence and Brand Choice”</p>	<p>Main dependent variable: Probability of category purchase incidence; latent shopping state (planned or opportunistic)</p> <p>Main independent variables: <i>Shopper “traits”</i>, i.e., deal loyalty, <i>Shopping trip factors</i>, e.g., inventory, store loyalty, marketing mix variables</p>	<p>Collection method: Purchase data collected from supermarket scanners</p> <p>Amount and type of data: 152 shoppers, 52 weeks of purchases, 2 categories, panel data structure</p>	<p>“Probability of unplanned state is higher in low loyalty stores, and for households who buy on deal”</p>
<p>Rook and Fisher (1995) “Normative Influences on Impulsive Buying Behavior”</p>	<p>Main dependent variable: alternative purchase scenarios that vary in level of “impulsiveness”</p> <p>Main independent variables: <i>Shopper “traits”</i>, i.e., buying impulsiveness, normative evaluations of impulsiveness as moderator</p>	<p>Collection method: Respondent evaluation of hypothetical buying scenarios (study 1), actual buying behavior (study 2)</p> <p>Amount and type of data: 212 undergraduate students (study 1), 104 mall shoppers (study 2), cross-sectional data</p>	<p>“Impulsive buyers (trait) do more impulsive buying but this is moderated by normative evaluation of acceptability of impulsive purchase”</p>
<p>Inman, Winer, and Ferraro (2009) “The Interplay Between Category Factors, Customer Characteristics, and Customer Activities on In-Store Decision Making”</p>	<p>Main dependent variable: Decision type classified as planned, generally planned, or completely unplanned, for each product category</p> <p>Main independent variables: <i>Shopper traits</i>, i.e., demographics, <i>Shopping trip factors</i>, e.g., time, use of shopping list, etc., <i>Category factors</i>, e.g., display, coupon availability, category hedonicity</p>	<p>Collection method: Shoppers interviewed as in Kollat and Willett (1967)</p> <p>Amount and type of data: 2,300 shoppers, 14 US cities, over 40,000 purchases, cross-sectional data</p>	<p>“Stable category factors and customer-self control factors exert the most influence on unplanned buying”</p>
<p>Our Study (2009) “Unplanned Buying by Supermarket Shoppers”</p>	<p>Main dependent variable: Number of unplanned category purchases per trip</p> <p>Main independent variables: <i>Shopper predispositions</i>, e.g., shopping habits, <i>Store environment</i>, e.g., store knowledge, <i>Shopping trip factors</i>, e.g., trip type</p>	<p>Collection method: Shoppers interviews and self-reports</p> <p>Amount and type of data: 434 shoppers, 58 product categories, over 15,000 purchases, panel data</p>	<p>“The majority of variation in unplanned buying is across shoppers, explainable in part by demographics and part by shopping habits”</p>

Table 2
Model Variables and Summary Statistics

Household, Household-Store, and Shopping Trip Variables	Mean	Standard Deviation	Minimum	Maximum
Shopper Predispositions				
<i>Demographic Factors</i>				
Household Life Stage 1; Single adult \leq 34 years old	0.069	0.253	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	0.308	0	1
Income Bracket 1; Beneath modal income ($<$ 28,500 EUR/yr)	0.250	0.434	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	0.283	0.451	0	1
<i>Shopping Habits</i>				
Stay Informed through Newspaper About Special Offers and Advertisements; 1 = Yes, 0 = No	0.239	0.427	0	1
Stay Informed at Shelf About Special Offers and Advertisements; 1 = Yes, 0 = No	0.457	0.498	0	1
Propensity to be “Fast and Efficient” when shopping; fraction of trips	0.723	0.276	0	1
Store Environments				
Comfort and Store Knowledge (standardized scale, see Appendix A)	0.00	0.794	-4.87	1.52
Price Image (standardized scale, see Appendix A)	0.00	0.817	-4.74	1.68
Assortment Quality (standardized scale, see Appendix A)	0.00	0.794	-4.75	1.86

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 2 (Continued)

Household, Household-Store, and Shopping Trip Variables	Mean	Standard Deviation	Minimum	Maximum
Shopping Trips				
<i>Shopping Trip Antecedents</i>				
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
Primary Shopper Female on Current Trip; Y = 1, N = 0	0.832	0.373	0	1
Shopping Trip Completed Alone; Y = 1, N = 0	0.712	0.453	0	1
Trip on Friday or Saturday; Y = 1, N = 0 (stores closed Sunday)	0.368	0.482	0	1
<i>Shopping Trip Type</i>				
Major Weekly Shopping Trip; Y = 1, N = 0	0.195	0.396	0	1
Spontaneous Shopping Trip; Y = 1, N = 0	0.124	0.330	0	1
Quick 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
Multi-Store Shopping Trip (At Least One Other Store Visited on this Trip Prior to Current Store); Y = 1, N = 0	0.261	0.439	0	1
<i>In-Store Experience</i>				
Shopping Ease (“Easy and Quick to Find My Products,” 1 = “Completely Disagree”, 10 = “Completely Agree”)	7.17	2.26	1	10
Special Offers Seen in Store on This Trip; Y = 1, N = 0	0.441	0.497	0	1
Time Spent Shopping (minutes)	17.8	11.8	1	90
Dependent Variable				
Total Number of Unplanned Category Purchase Incidences	1.13	2.01	0	20

Table 3

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 Correlation¹	
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

¹The 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 4

**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	Expectation
Model Intercept ¹	-1.272 ^{***}		
Shopper Predispositions			
<i>Demographic Factors</i>			
δ_1 , Household Life Stage 2; Two adults, household manager \leq 34 yrs	0.330	--	Positive
δ_2 , Household Life Stage 3; Single adult > 35 yrs	-0.456	--	
δ_3 , Household Life Stage 4; Two adults, household manager > 35 yrs	-0.643 ^{**}	-47.4%	
δ_4 , Household Life Stage 5; Family, youngest \leq 17 yrs	-0.378	--	
δ_5 , Household Life Stage 6; Family, youngest > 18 yrs	-1.050 ^{***}	-65.0%	Negative
δ_6 , Income Bracket 2; Modal income (28,500 – 34,000 EUR/yr)	0.192	--	
δ_7 , Income Bracket 3; More than modal income (> 34,000 EUR/yr)	0.374 [*]	45.4%	Positive
δ_8 , Income Not known	-0.011	--	
<i>Shopper Habits</i>			
δ_9 , Informed Through Newspaper (Special Offers or Advertisements)	-0.290 [*]	-25.2%	Negative
δ_{10} , Informed at Shelf (Special Offers or Advertisements)	0.299 ^{**}	34.9%	Positive
δ_{11} , Propensity to be “Fast and Efficient” When Shopping	-1.711 ^{***}	-81.9%	Negative
Store Environments			
γ_1 , Price Image (Higher Value is More Favorable)	-0.116	--	Positive
γ_2 , Favorable Assortment Quality	0.076	--	Positive
γ_3 , Store Evaluation: Comfort and Store Knowledge	-0.138 [*]	--	Negative
θ_1 , Interaction of “Store Comfort and Knowledge” with Time Spent Shopping x 10^{-2}	0.458 [*]	58.1%	Positive
Shopping Trip			
<i>Shopping Trip Antecedents</i>			
β_1 , Travel Time to Store (in minutes) x 10^{-2}	0.569	--	No Prediction
β_2 , Travel to Store by Bicycle or Scooter	0.185 [*]	20.3%	Positive

Table 4 (Continued)

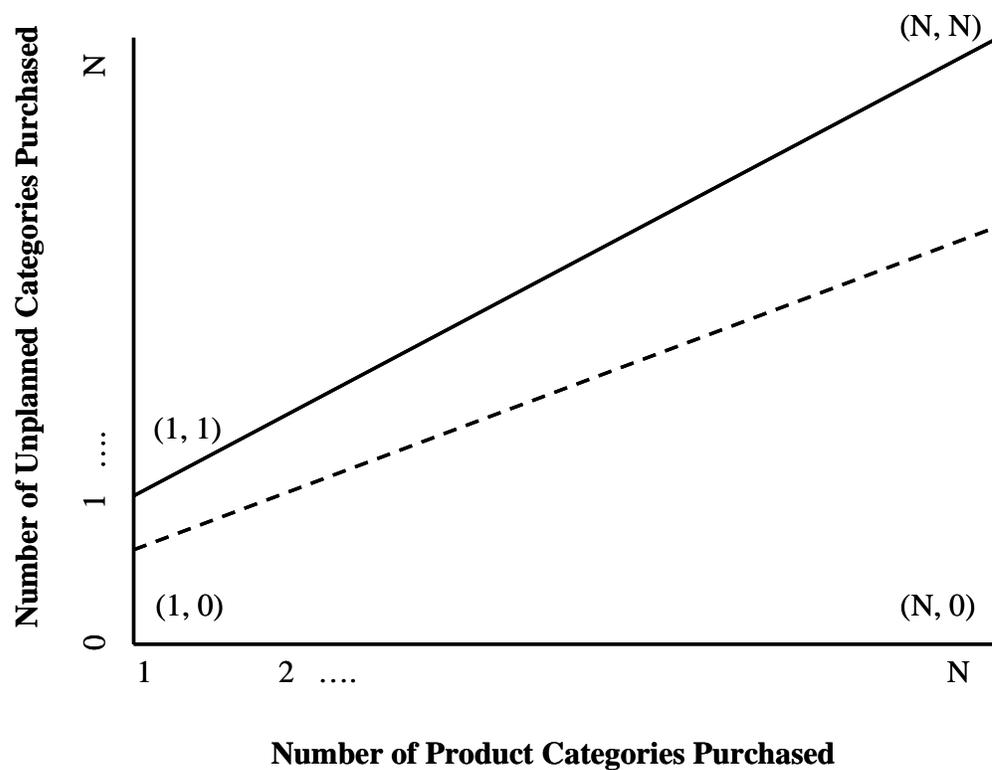
Household, Store, and Shopping Trip Variables	Parameter Estimate	Marginal Effects (%)	Expectation
Shopping Trip			
β_3 , Travel to Store by Car or Taxi	0.367 ^{***}	44.3%	Positive
β_4 , Primary Shopper Female on Current Trip; Y = 1, N = 0	0.123	--	Positive
β_5 , Shopping Trip Completed Alone; Y = 1, N = 0	-0.094	--	Negative
β_6 , Trip on Friday or Saturday; Y = 1, N = 0 (Stores closed Sunday)	-0.195 ^{***}	-17.7%	No Prediction
<i>Shopping Trip Type</i>			
β_7 , Major Weekly Shopping Trip; Y = 1, N = 0	0.123	--	No Prediction
β_8 , Spontaneous Shopping Trip; Y = 1, N = 0	0.203 ^{**}	22.5%	Positive
β_9 , Quick Shopping Trip; Y = 1, N = 0	-0.745 ^{***}	-52.5%	Negative
β_{10} , Immediate Needs or Forgotten Items Trip; Y = 1, N = 0	-0.183 [*]	-16.7%	Negative
β_{11} , Multi-Store Shopping Trip; Y = 1, N = 0 (At Least One Other Store Visited on Trip Prior to Current Store)	-0.099 [*]	-9.4%	Negative
<i>In-Store Experience</i>			
β_{12} , Shopping Ease (“Easy and Quick to Find My Products,” 1 = “Completely Disagree”, 10 = “Completely Agree”)	0.050 ^{***}	11.2%	Positive
β_{13} , Special Offers Seen In-Store During Trip; 1 = Y, 0 = N	0.426 ^{***}	53.1%	Positive
β_{14} , Time Spent Shopping (Log of Minutes in Store)	0.762 ^{***}	47.3%	Positive
Other Controls			
ϕ_1 , Average Time Spent Shopping	-0.032 ^{***}	-22.9%	
ϕ_2 , Household-Specific Deviation from Mean Time Spent Shopping x 10^{-1}	-0.198 ^{***}	-3.6%	
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 (available upon request).

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

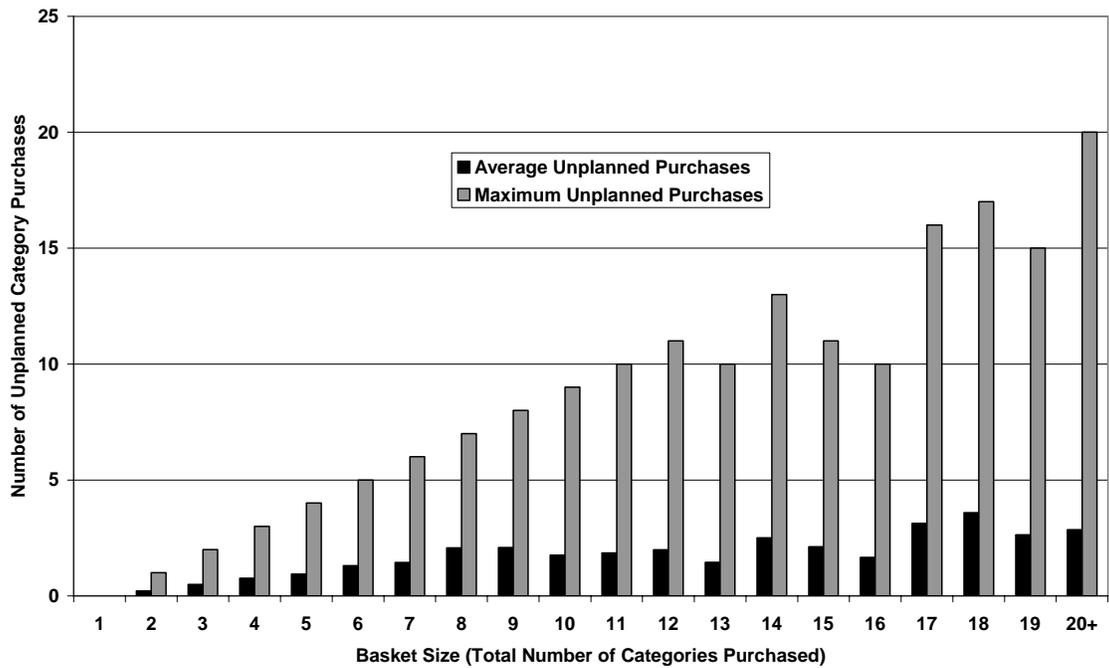


Figure 3

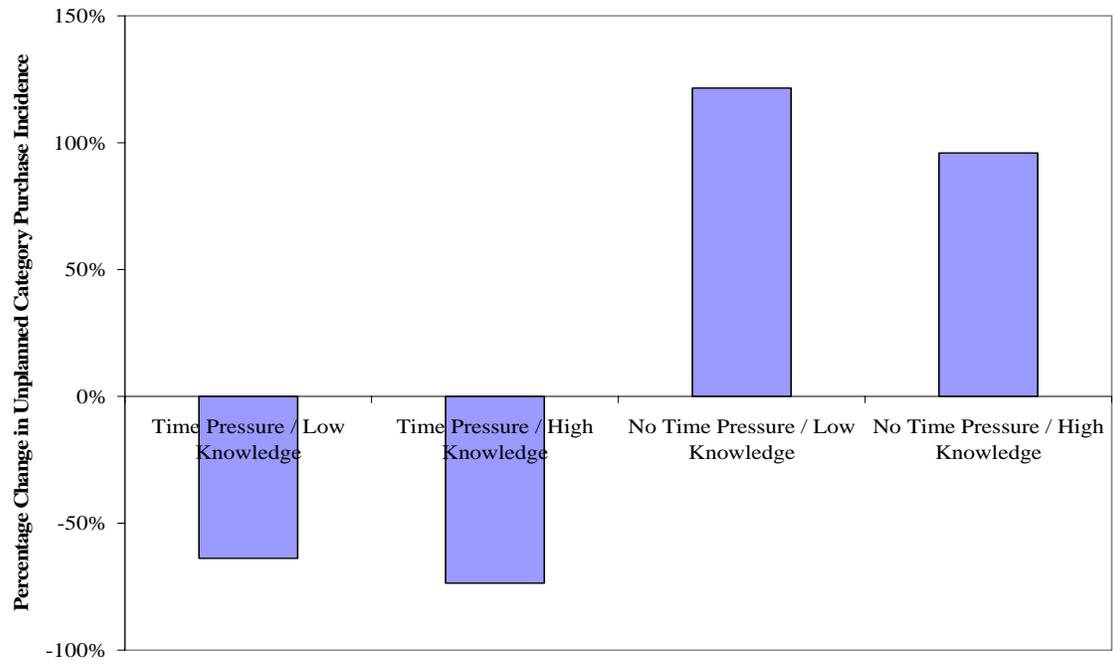
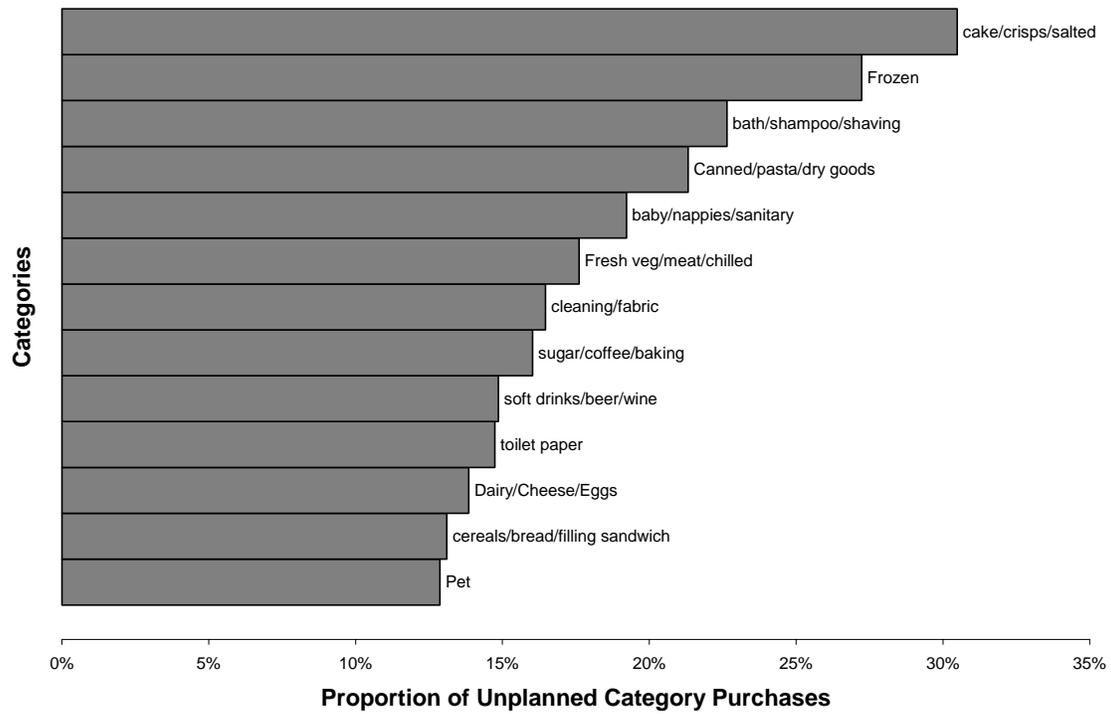
The Effect of Time and Knowledge on Unplanned Category Purchase Incidence

Figure 4**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 ($\alpha = .854$)

“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 ($\alpha = .807$)

“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 ($\alpha = .752$)

“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	Long-life dairy products
Baking and dessert products	Magazines
Bath and shower products	Mayonnaise and other cold sauces
Beer	Meals in a tin/jar/packet/box (incl. dinner kit)
Books, CD's, CD-roms	Meat/chicken (incl. Meat products)
Bread (incl. crackers/toast/biscuit rusk) and bread rolls	Medicine/pills/supplements
Butter/margarine	Mixes for meals/packet mixes/ cooking sauces
Cake/biscuits/chocolate/ sweets	Moisturising cream and body lotion
Cereals (corn flakes, cruesli, etc.)	Nappies/other babyand toddler products)
Cheese	Office articles (incl. Computers/printers)
Chilled meals/pizzas	Olive oil/vinegar
Chilled soup	Other articles
Cleaning products	Other products in a jar/tin (meat, fish, olives, gherkins, etc.)
Clothes (incl. shoes, jewellery, clocks etc.)	Pasta/ rice
Coffee and tea	Pastries and confectionary
Crisps/salted snacks/nuts	Pet food en pet care
Deodorant	Sandwich filling (non chilled)
Dishwasher/washing up liquid/powder	Sanitary products/panty liners
Dry groceries (/salt/spices/herbs)	Shampoo and conditioner
Eggs	Shaving products
Fabric conditioner	Smoking materials
Fish (incl. crustacean and shellfish)	Soft drinks/juices/ice tea/sport drinks/diluting juice
Flowers and plants	Soups and bouillon (tinned/packet)
Fresh dairy products (drinks and desserts)	Sugar and condensed milk/creamers
Fresh vegetables/fruit/potatoes	Toilet paper/kitchen rolls/tissues
Frozen ice cream	Toothbrushes/toothpaste/ oral care
Frozen meals/pizzas/snacks	Vegetables in a tin/jar
Frozen vegetables/ potato products/fish/meat	Washing powder/liquid
Household goods (dishcloths, brushes, candles, crockery, matches, light bulbs, etc.)	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
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
12 Fast & efficient trip	0.00	-0.03	0.05	-0.06	0.05	0.03	-0.07	-0.18	0.11	-0.04
13 Friday or Saturday	0.02	-0.02	-0.08	0.12	0.22	-0.02	-0.03	0.01	-0.10	0.02
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
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
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

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 Information 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