Cherry Picking

Edward J. Fox (Southern Methodist University)*
Stephen J. Hoch (Wharton School, University of Pennsylvania)**

(keywords: cherry picking, retail, shopping behavior, customer types)

June 2003
Revised May 2004, Aug 2004

Journal of Marketing (2005 in press)

* W.R. and Judy Howell Director, JCPenney Center for Retail Excellence and Assistant Professor of Marketing, Edwin L. Cox School of Business, Southern Methodist University, Dallas, TX; phone: 214-768 3943; fax 214-768-4099; http://faculty.cox.smu.edu/efox.html

**John J. Pomerantz Professor, Chair of Marketing Department, Wharton School University of Pennsylvania, Philadelphia, PA 19104; phone 215 898-0233; fax: 214-898-2534; http://www-marketing.wharton.upenn.edu/people/faculty/hoch.html

Cherry Picking

Cherry picking means taking the best and leaving the rest. This paper focuses on buyer-side cherry picking in the context of grocery shopping and compares the behavior of consumers who cherry pick by visiting two grocery stores on the same day (8% of all trips) compared to visiting a single store. Both trait and state aspects of cherry picking are examined. Consistent with economic theory of search, the propensity to cherry pick is found to be inversely related to shoppers' transaction and inventory holding costs, both due to demographics (e.g., working women, age, income, household size, home ownership) and geography (distance between nearby stores). The likelihood of cherry picking is found to be higher on the weekends and when household inventory is low due to an extended time since the last shopping trip or a smaller basket purchased on that trip. The question of whether cherry picking is economically justified is also addressed by investigating the cost-benefit tradeoff between the extra money saved and the extra shopping costs incurred when making an additional store visit. Shoppers are found to save over $14 more on average when cherry picking two stores rather than just one; this savings compares favorably with the opportunity cost of shopping in terms of wage rates. The economic benefits of cherry picking arise from two sources: (i) higher percent savings on items purchased (about 5% higher); and equally important (ii) much larger market baskets (about 67% larger in both dollar and units terms). Finally, cherry picking is found to be significantly more painful for shoppers' secondary compared to their primary stores because not only do consumers buy at lower prices at secondary stores, they also buy significantly less.

Cherry Picking

Merriam-Webster Dictionary defines cherry picking as "selecting the best or most desirable" or, describing one idiom with another, "taking the pick of the litter." The term is used to describe both buyer and seller behavior. Sometimes the phrase describes sellers who are selective about which customers they serve. For example, Southwest cherry picks price-sensitive travelers who place little premium on amenities and Dell cherry picks customers who are savvy enough to buy on the internet and to make the necessary customization choices without much hand holding. Both firms choose not to serve customers with a higher willingness to pay because it would require significant changes to efficient operating models. The Cambridge International Dictionary of Idioms defines cherry picking as choosing "only the best people or things in a way that is not fair", such as financial institutions that are vilified because they refuse to serve high-risk populations. The term also describes the behavior of buyers who are selective about which products or services they purchase at what locations and prices. In both seller and buyer contexts, cherry pickers opportunistically take the best and leave the rest.

This paper focuses on buyer-side cherry picking. In a retail context, cherry picking can occur within a single store visit as when consumers literally stand at the end-cap display of Mt. Rainer cherries and pick through each and every one, choosing only the largest and plumpest. Cherry picking can also occur across stores. Levy and Weitz (2004) define cherry pickers as customers who visit a store and only buy merchandise sold at big discounts. Consumer Reports (1988) advises consumers to "scrutinize the food-day ads and 'cherry pick' the specials" (p. 158).

Let us imagine a market with two grocery chains, Jewel and Dominick's Finer Foods for example. The preceding comments imply that consumers can cherry pick in at least two related ways. First, each week they can buy their entire market basket at the retailer where they expect to get the best deals. To the extent that competing retailers promote non-identical items, store switching across weeks increases the number of cherry picking opportunities compared to consumers who are store loyal. Moreover, the transaction costs associated with switching stores across weeks do not seem to be much greater than those incurred by store-loyal shoppers, assuming that travel costs to the stores from which they choose are similar and that consumers switch often enough to be adequately familiar with store layouts.

Second, shoppers could engage in a more extreme form of cherry picking where store switching occurs within weeks. In this case, customers split their market basket across stores within a week (potentially on the same day) to benefit from deals offered by different stores. Grocery retailers typically offer new specials every week including uncoordinated promotions on the same brands (Drèze 1999; Lal 1990), so this second form of shopping behavior offers many more cherry picking opportunities. The nature of these opportunities is illustrated in Figure 1, a histogram of the differences in weekly prices at Jewel and Dominick's for about 21,000 sku's over a period of 104 weeks. It shows the savings available from buying each item at the lower-priced versus the higher-priced retailer, savings that are more accessible when switching stores within weeks. The average difference in prices is about 10%, even though the two chains match prices on nearly a third of the items and average prices are almost identical. Moreover, there is substantial surplus available to cherry pickers who are selective about which cherries they pick. For example, the top decile of price differences averages 39%, the second decile 21%, and the third 15%. But unlike cherry picking across weeks, within-week (or day) cherry picking is likely to substantially increase transaction costs since it requires two store visits.

We view cherry picking as one end of the price sensitivity/deal proneness continuum. In terms of models of horizontal competition in the Hotelling tradition, cherry pickers have low travel and search costs (Narasimhan 1988; Raju et al. 1988) and are therefore willing to search for information on deals and visit more than one store to benefit from them (Lal and Rao 1997). The goal of this paper is to gain an in depth understanding of the shopping behavior of consumers who cherry pick by visiting two or more grocery stores on the same day. Using two years of household panel purchase data, we identify the individual characteristics (traits), both demographic and geographic, that are most closely associated with frequent across-store, within-day cherry picking. We compare how people shop when they cherry pick two stores versus when they engage in more common single-store visits, and then examine how experienced cherry pickers exploit a cherry picking occasion compared to those who are less experienced.

We also focus on the question, "Is cherry picking worth it?" The answer boils down to a cost-benefit tradeoff between the extra money saved and the extra shopping costs incurred by visiting an additional store. We calculate the money saved due to cherry picking and argue that it represents a reasonable estimate of shoppers' opportunity cost of time. We find that the savings on cherry-picking days average over $14 more than the savings on single-store days. This economic benefit exceeds the opportunity costs of the extra store visit for a most households. The cherry picking savings arise from two sources: (i) higher percent savings on items purchased (about 5% higher), and equally important (ii) much larger market baskets (about 67% larger in both dollar and units terms). Both of these effects are consistent with economic theories of search.

This paper contributes to the marketing literature in several ways. Despite its ubiquity as a surrogate for price sensitivity heterogeneity in economic models of retail competition, cherry picking has seldom been a subject of empirical research. Analysis of this behavior broadens our understanding of consumer response to price and promotion. We look at longer-term shopping decisions and patterns (e.g., propensity to cherry pick), resulting in insights about shopping strategies that are less discernible when focusing on single purchase occasions. Moreover, the multi-outlet panel data we use facilitates the analysis of shopping across stores in a depth not previously possible. Our analysis shows why and when shoppers cherry pick, and identifies the traits of frequent cherry pickers. We find that cherry picking is consistent with economic rationality, specifically with models of price search across storesWe also document systematic differences in shopping behavior that are associated with cherry picking, with predictable consequences for retailer sales and profits. Finally, we show which retailers are most severely affected by cherry picking behavior.

The remainder of the paper is organized as follows. The next section briefly reviews the relevant literature and develops propositions about cherry picking. Next, we describe the data to be analyzed. The analysis proceeds as follows: first, we examine how demographic and geographic characteristics relate to cherry picking; then we determine how time-varying factors influence the probability of cherry picking; next, we measure the savings that shoppers generate by cherry picking; and finally we investigate buying behavior in shoppers' primary (most frequently visited) and secondary (less frequently visited) stores. The concluding section discusses the results of our study and future research.

Economics of Price Search

There is an extensive literature in economics and marketing on price search that is relevant to cherry picking. This literature focuses on two distinctly different problems: (i) sequential search across stores for a single costly durable good (e.g., Lippman and McCardle 1991); and (ii) price search across grocery stores for information about frequently purchased goods (e.g., Stigler 1961). Studies of type (i) find that the extent of search is negatively related to the opportunity cost of time, usually operationalized as wage rate or household income (Ratchford and Srinivasan 1993, Marmorstein, Grewal and Fishe 1992), but positively related to self-reported benefits from search such as enjoyment of shopping (Doti and Sharir 1980, Marmorstein, Grewal and Fishe 1992) or social returns to market knowledge (Feick and Price 1987). Note that the findings relate to individual characteristics, or traits, that are predictive of search behavior. Studies of type (ii) relate similar individual traits to price search among grocery stores. Petrevu and Ratchford (1997) and Urbany, Dickson and Kalapurakal (1996) find that economic benefits from searching, which are dependent on price dispersion and per capita income, are positively related to search. They also find that the costs of search, including opportunity cost of time and perceived costs such as time pressure, difficulty in comparing stores, and lack of physical energy, are negatively related to search.

Burdett and Malueg (1981) and Carlson and McAfee (1984) model a consumer visiting one or more grocery stores in order to minimize the cost of shopping for a predetermined list of items. Burdett and Malueg detail their assumptions:

> Before starting out to buy groceries for the week, suppose an individual makes a list of the *n* goods required ($n \geq 2$). The list also states the amount required of each good. There are many grocery stores the individual can visit. Each of these stores sells all the goods desired. The individual can visit any store at a cost and observe the *n* vector of prices offered, one price for each of the *n* goods. The individual can purchase any number of the goods required from this store and then continue to search for the remaining goods. p. 362

In other words, the consumer may buy all required items at the first store visited, or buy a subset of the required items there and visit additional stores to buy the remaining items. Burdett and Malueg develop a mathematical model of this decision for $n=2$ products; Carlson and McAfee extend it for any positive integer *n*. Together, these models represent a theory of multi-store shopping for a predetermined list of goods. Because shopping lists and retailer prices vary between trips, we expect trip-specific variables which we term "state" (as opposed to trait) to affect multi-store shopping.

Carlson and Gieseke (1983) test some predictions of this theory. They find that prices paid are negatively related to the extent of search, which they operationalize as the number of grocery store visits a shopper made during a given period (one week for perishable goods, 13 weeks for storable goods). Carlson and Gieseke also find that the number of store visits is positively related to quantities purchased and to the shopper's age.

We apply the multi-store shopping theory of Burdett and Malueg (1981) and Carlson and McAfee (1984) to cherry picking. Three propositions about cherry picking behavior are implied by the theory:

1. *There is a negative relationship between the probability of cherry picking on a given shopping trip and the consumer's cost of visiting an additional store*
2. *There is a positive relationship between the probability of cherry picking on a given shopping trip and the size of the consumer's shopping list*
3. *Prices paid when cherry picking are less than the prices paid on single-store visits*

The first proposition pertains to the costs of search while the last two relate to the benefits of search. We will examine what this cost-benefit tradeoff implies about: <u>who</u> is more likely to cherry pick; <u>when</u> they are more likely to cherry pick; and <u>how</u> cherry picking affects shopping behavior and the benefits that accrue.

The first proposition considers the cost of an incremental store visit, including extra planning and travel, time spent shopping and checking out. It is well established that the cost of a shopping trip increases with the consumer's opportunity cost of time. This leads us to hypothesize that *there is a negative relationship between the probability of cherry picking on a given shopping trip and the consumer's opportunity cost of time*. Because opportunity cost is not directly observable, our empirical analysis of this hypothesis will include a number of proxy measures: (a) household earned income (-); (b) presence of a working adult female in the household (+); (c) senior citizen ≥65 years old (-); (d) college education (+); and (e) weekend vs. weekday shopping time (-).[1] Measures (a-d) are shopper traits that commonly serve as proxies for opportunity cost of time (e.g., Becker 1963; Blattberg et al. 1978; Hoch et al. 1995), whereas (e) is a state, or trip-specific, variable. The cost of shopping also increases with the distance the shopper must travel to the store, reflecting the time and/or direct cost of transportation. We cannot measure travel distance for specific shopping trips, however, because we do not know with certainty where each trip originated and what route the shopper took. Thus, we must treat travel distance as a household trait, rather than a state variable. If we make the simplifying assumptions that (i) all trips originate from home, and (ii) the shopper travels from the first store visited directly to subsequent stores without intermediate stops, then the distance between the closest and next-closest stores reflects the cost of an incremental store visit.[2] We therefore hypothesize that *there is a negative relationship between the probability of cherry picking on a given shopping trip and the distance between the closest and next-closest stores to the consumer's home*.

Together, the second and third propositions relate the benefits from cherry picking to the size of the consumer's shopping list and the price dispersion of individual items across stores. Visiting two stores on the same day basically doubles the number of savings opportunities that shoppers can exploit if they so choose (see Figure 1). If a shopper plans on purchasing a bigger-than-average market basket, then the benefits of search will be greater because the total savings

[1] The sign in parentheses following the proxy measure of opportunity cost reflects the expected relationship, positive or negative, between the probability of cherry picking and that specific measure.
[2] In our dataset, in 99% of cherry picking days only two stores are visited. Thus, the distance from the nearest store to the store closest to it provides a reasonable approximation of the cost of an incremental store visit.

from cherry picking equals the number of items multiplied by the savings per item. One way to increase basket size is to buy larger quantities, so we hypothesize that *there is a positive relationship between the probability of cherry picking on a given shopping trip and a household's purchase quantities*. Big families in particular tend to buy in larger quantities (Blattberg and Neslin 1990) and are also more price sensitive (Hoch et al. 1995). Note that Carlson and Gieseke (1983) find that the low prices obtained by searching across stores induce the shopper to buy larger quantities, suggesting a healthy dose of endogeneity in the purchase quantity and cherry picking decisions. The size of the shopping list also depends upon the cost of holding inventory so we hypothesize that *there is a negative relationship between the probability of cherry picking on a given shopping trip and a household's inventory holding cost*. This suggests that household traits which reduce holding cost, for example home ownership, will have a positive impact on the likelihood of cherry picking. Inventory holding cost is also negatively related to current inventory. We expect that current inventory (hence holding cost) will be lower and the likelihood of cherry picking will therefore be higher: (a) when more time has elapsed since the last shopping trip and (b) when spending on the last trip was smaller.

The propositions and associated hypotheses are summarized in Table 1. Note that we offer no additional hypotheses for the third proposition—we will test it directly.

The Study

Data and Variable Construction

The data come from a multi-outlet IRI household panel in Chicago covering a two-year period (104 weeks) between October 1995 and October 1997. This dataset is different from the majority of panel datasets used in academic research because panelists record their purchases using in-home scanning equipment, so their purchase histories are not limited to the usual small sample of stores. All purchases, including the UPCs of packaged goods purchases, are captured on all trips to a wide variety of retailers. Our analysis focuses on grocery retailers. We find that the two largest grocery chains, Jewel and Dominick's, together account for 74% of panelists' purchases at known grocery stores; the eight largest grocery chains together account for 99% of purchases. Each packaged goods purchase in the panel dataset is accompanied by the purchase price and indicators of whether the item was sold on deal and/or feature advertised.

The purchase dataset is supplemented by a merchandise file containing all item prices at Jewel and Dominick's for the following ten packaged goods categories: chocolate candy, carbonated beverages, coffee, diapers, dog food, household cleaners, laundry detergent, salty snacks, sanitary napkins, and shampoo. The availability of item prices at the two largest retailers allows us to compare them directly and quantify the savings due to cherry picking. The dataset also includes demographic information for each household, enabling us to test the relationships between household characteristics (traits) and cherry picking. The dataset is further augmented by locations of panel households and grocery stores.[3] These locations allow us to compute travel distances both from shoppers' homes to stores and between stores in order to assess the relationships between geographic variables and cherry picking. We limit our analysis to store visits on which a significant purchase is made, as opposed to, for example, buying a bag of ice. Accordingly, visits with purchases of at least $5 are analyzed (including smaller trips has no material influence on results).

We present a broad set of analyses. For most of these analyses we report shopping trips, purchases, spending, etc. across the eight largest grocery store chains in the market. This permits our investigation to be as comprehensive as possible. However, calculating the economic

[3] The household location provided is the centroid of the panelist's zip+4. Actual street addresses are unavailable to preserve panelists' privacy. Travel distances are Euclidean distances between stores and households (or for one analysis between stores and other stores).

benefits of cherry picking requires us to measure savings in a relative rather than an absolute context. Because this market is essentially a duopoly, we have chosen to compute savings based on direct comparison of Jewel and Dominick's prices in the ten categories for which we have item-level price information. We then extrapolate from these sample categories to the entire market basket in order to assess the magnitude of savings. Using this approach, our analysis of the economic benefits of cherry picking includes a sample of 22,913 individual purchases made during 9,562 shopping trips.

Because preliminary analyses suggested that some of the panel households were not faithfully recording all of their shopping trips and purchases, we developed criteria to screen households that did not appear to be recording diligently. Panel households were included in our dataset only if, over the 24 month duration of the panel: (i) they recorded grocery purchases in each month, (ii) they averaged less than 14 days between shopping trips, and (iii) they spent at least $25 per week at grocery stores.[4] This resulted in a total of 201 households with complete data. These households reported a total of 27,978 shopping days (5.8 shopping days/month) over the two-year period. Aware that our screening criteria may have resulted in omission of households that were accurately recording sparse grocery purchases or that less vigilant recorders behave differently from those that are more diligent, we ran the same analyses after relaxing the screening criteria. The inferences were virtually the same as those reported here.

Cherry Picking Propensity – Demographic and Geographic Variables

As mentioned earlier, we view cherry picking as a continuum much like a shopper's degree of price sensitivity or deal proneness. For the purpose at hand, a shopping trip is classified as cherry picking if two or more grocery stores are visited on the same day, i.e.,

---

[4] Note that the supercenter format had very low penetration in the market during the period that data were gathered (Oct 1995 – Oct 1997). Thus, panel households eliminated by our screen were very unlikely to have been shopping at supercenters as an alternative to grocery stores.

without intervening consumption. We use the term "trip," though we do not actually observe whether the shopper goes from one store directly to the next or makes intervening stops, perhaps at home. Moreover, this operationalization clearly misses some cherry picking, where shoppers with foresight visit two or more stores on different days during the same week to acquire that week's provisions. At the same time, our operationalization avoids confusing a fill-in trip, where the consumer runs out of items or forgets to get everything on their list, with a pre-planned and purposeful attempt to split the market basket in order to save money.

Figure 2 shows the distribution across households of cherry picking trips as a percentage of all the household's shopping trips. Two important characteristics are evident. First, nearly one-fifth of the sample does not cherry pick at all. Second, the distribution is heavily skewed with a long right tail. Thus, most households are on the low end of the cherry-picking continuum. The mean and median of the percent cherry-picking distribution are 7.7% and 4.2%, respectively, while households in the top decile cherry pick on 32.0% of shopping trips. Though they may not seem compellingly large, these statistics belie the fact that each cherry-picking trip is made up of multiple store visits. If we consider the distribution of *store visits*, which reflect retailer traffic counts, we find that the mean and median are 13.2% and 8.2% respectively, while the top decile cherry picks on 49.3% of visits.

The dependent variable in our first analysis is the percentage of trips on which the household cherry picked (visited $\geq$2 grocery stores) out of all shopping trip days. By aggregating cherry-picking behavior across time at the household level, we can focus on household-specific traits, both demographic and geographic, rather than time-varying states. As mentioned previously, nearly 20% of the households never cherry picked. To accommodate this "spike at zero," we model cherry picking across households using a censored regression methodology

(Tobin 1959). The dependent variable is log-transformed to more closely approximate the assumption of normally-distributed residuals. Because the demographic/geographic predictors are in some cases interrelated, we specify the model using a forward stepwise procedure, sequentially adding whichever predictor maximizes the likelihood of the data, conditioned on the current set of predictors. The resulting specification therefore avoids multicollinearity, so the standard errors may be used for inference. The stepwise procedure stops when adding an additional variable fails to improve AIC.

The resulting model is shown in Table 2. Along with the overall fit of the model, Table 2 shows the regression coefficient, associated standard error and p-value for each independent variable. The last column in the table displays the expected level of percent cherry picking if that parameter took on the value of zero while all other parameters were at their estimated values; to give an indication of the substantive impact of each variable, these numbers can be compared with the expected value of percent cherry picking when *all* parameters take on their estimated values, i.e., $E(y)|\beta=\beta^*= 4.18\%$. The results are straightforward and are consistent with an opportunity cost perspective. Specifically:

- Households are less likely to go cherry picking when there is a working adult female in the family, presumably because it is more costly for them to spend time shopping for groceries. If none of the households in our sample contained working adult females, the expected cherry picking probability would be about 16% higher [(4.83%-4.18%)/4.18%].

- Senior citizens (≥65 years old) are less likely to be employed outside of the home and so have more time to invest in shopping. Presence of a senior citizen in the household increases percent cherry picking by about 15%.

- Homeownership implies greater inventory carrying capability. This further implies that home owning households can take advantage of the greater number of discounts available through cherry picking because they have more opportunity to accelerate purchases by forward buying. Homeownership increases the propensity to cherry pick by about 43%.

- Wealthy households are assumed to have higher opportunity costs and be less price sensitive. Indeed, household income has a negative impact on percent cherry picking.

- Larger households are assumed to be more price sensitive, both because they have to spend a greater proportion of their income on groceries (budget constraint) and they have greater returns to price search by virtue of purchasing scale. Each additional person in the household increases the propensity to cherry pick by about 4%.

- Travel distances and times also exert an influence on cherry picking propensity. Although we find no effect for how close the nearest store is to the home, there is a negative effect for the distance from the nearest to next-nearest store. We take this as evidence that the household considers the incremental cost of the extra store visit (which can be very low if nearby stores are close together or more costly if not) against the expected benefit of the additional discounts available if that extra store visit is made. Each extra mile between stores decreases percent cherry picking by about 5%.

- Finally, it is worth noting that although college education (another surrogate for opportunity costs) did enter the final model through the stepwise procedure, the positive parameter estimate is not significant.

Given the large number of household-specific factors that significantly affect the propensity to cherry pick, we now consider the question of whether cherry pickers are heterogeneous. To investigate heterogeneity we perform a k-means cluster analysis on the 50 households that comprise the top quartile of cherry pickers using the demographic/geographic factors selected by the stepwise procedure as predictors. The two-cluster solution explains over 43% of the variance in these predictors and offers a clear interpretation.[5] The larger cluster (60% of top quartile households) is composed of 43% senior citizens with an average of 2.16 members per household, none of which have five or more members. The smaller cluster (40% of the top quartile) has only 10% senior citizens but averages 4.75 members per household, almost half of which have five or more members. Thus there appear to be two distinct types of cherry-picking households: those with older heads-of-household and those with many members.

Probability of Cherry Picking – Trip-Specific Variables

---

[5] Solutions with higher number of clusters offered relatively small increases in R^2, generated small cluster sizes and were ambiguous in interpretation.

Multi-store shopping theory focuses on the household's list for a particular shopping trip. Because the shopping list differs from trip to trip, our empirical analysis must also include trip-specific factors. Having already considered consumer traits as antecedents of cherry picking, we now turn our attention to state, or trip-specific, factors.

Consider the day-of-the-week that consumers shop. The standard work week is Monday through Friday; on weekends consumers bear the opportunity cost of time for non-working days. We find that both single-store and cherry-picking trips are made at a higher rate on weekends, particularly if we include Friday. The three biggest shopping days are Sunday followed by Friday and Saturday, with 58% of cherry-picking trips and 46% of single-store trips made on those three days. This suggests that opportunity costs on weekends are lower than those on weekdays.

Consumption, by its definition, implies a negative change in inventory over time. Because higher inventory levels mean lower purchase requirements, we expect the number of items on the consumer's shopping list to increase with the time since the last shopping trip, the last opportunity to replenish household inventory. On that last trip, the shopper's inventory was incremented by the amount purchased. By the same reasoning then, we expect the number of items on the shopping list to decrease with the amount purchased on the last shopping trip. Therefore, the probability of cherry picking should increase with the time since the most recent trip, but decrease with the amount purchased on that trip.

Table 3 shows the results of a logistic regression of shopping trips, with cherry picking (1=yes, 0=no) as the dependent variable. To control for consumer traits, we estimate household-level intercepts using the dummy variable approach (Judge, et al. 1985, pp. 519-21). This specification limits us to modeling only households that make at least one cherry-picking trip, resulting in a total of 23,796 trips, 2,416 (10.15%) of which involved cherry picking. The predictors are: (a) an indicator variable for whether the trip was made on a weekend (1=yes, 0=no), (b) number of days since the last shopping trip, (c) dollar spending on the last shopping trip, and (d) the interaction between (b) and (c). We subtract one from variable (b), the number of days since the last trip, so that the main effect of spending on the last trip can be interpreted as applying to the day after that trip. If we do not to "relocate" this variable by one day, the main effect of spending on the last trip would apply to the day of that trip (i.e., zero days since the last trip), which makes interpretation difficult. Variable (c), spending on the last trip, is median-centered. The main effect of time since the last trip therefore assumes the median value of spending on that trip.[6]

Estimated coefficients for all predictors are statistically different from zero and consistent with *a priori* reasoning:

- The longer the time since the last shopping occasion, the more likely it is that people will engage in a cherry picking trip. Presumably this is due to the fact that inventory is lower, so the household has greater inventory carrying capacity and can better exploit the extra deals afforded by shopping two stores rather than just one. Increasing the time since the last trip by one day would increase the probability of cherry picking by an average of nearly 2%.

- Analogously, the amount spent on the last trip is a significant negative predictor. This effect is also consistent with the inventory carrying story just presented. Increasing the amount spent on the last trip by $10 would decrease the probability of cherry picking by an average of 2.6%.

- The interaction between time since the last shopping trip and amount spent is positive and significant, suggesting that the negative effect of the last trip's spending on the probability of cherry picking dissipates as the time since that trip increases.

- The indicator variable for weekend is a positive predictor of cherry-picking trips. The effect size is substantial—the expected probability of cherry picking would be reduced by 7.2% [(9.43%-10.17%)/10.17%] if no trips were made on weekends. Marmorstein, Grewal and Fishe (1992) counter-intuitively argued that the marginal cost of non-

---

[6] We use the median rather than the mean for centering because the distribution of spending on the last trip is highly skewed.

> working time should reflect a higher overtime wage rate, but our result suggests that paid overtime is not often an alternative to time spent shopping or at leisure on the weekend. To the contrary, it suggests that the opportunity cost of time during the weekend is lower than during the workweek.

Behavioral Consequences of Cherry Picking

We have shown that household traits, including consumer/household characteristics and distances between stores, affect the probability that a household will cherry pick. We have also shown that trip-specific state variables, including previous shopping decisions and day-of-the-week, affect the probability of cherry picking. Next we examine how shopping behaviors differ between cherry-picking and single-store trips. We model these shopping behaviors as a function of the household's propensity to cherry pick (trait), whether the trip is single store or cherry picking (state), and the interaction of trait and state. Our intent with these models is to investigate whether the economic returns to cherry picking are influenced by experience engaging in this shopping pattern.

Table 4 summarizes differences in a variety of measures of shopping behaviors (left panel) on cherry picking versus single store trips. The center panel compares cherry picking shopping trip days to single store shopping trip days across all panel members. The right panel of the table reports the parameters and their associated standard errors for multiple regressions of each dependent variable onto:

(a) HH% CP: household percent of cherry-picking trips, a measure of household-specific differences in cherry-picking propensity;

(b) CP Trip: a cherry-picking indicator for the trip of interest (yes=1, no=0) which captures trip-specific differences; and

(c) HH% CP x CP Trip: the interaction of the two.

Applying appropriate techniques for moderated regression (Irwin and McClelland 2001), household percent of cherry-picking trips (HH% CP) is centered on its median value. The main effect of the indicator variable for cherry-picking trip (CP Trip) therefore assumes the median-level HH% CP—5% of the time. CP Trip is coded (0=no, 1=yes) so that the main effect of HH% CP is based on the more common non-cherry picking (i.e., single-store) trip. Depending upon the distribution of the dependent variable, we estimate an OLS, weighted least squares (WLS), logistic or censored regression.[7]

For eight out of nine of the dependent variables in Table 4, there are obvious and statistically significant differences between cherry picking and single store trips (the state variable), the exception being quantity purchased. We will discuss each modeled shopping behavior in turn and consider how HH% CP, the household trait reflecting cherry picking experience, influences differences between single and multi-store shopping occasions. Unless noted, the main effects and interactions we discuss are statistically significant (see Table 4).

Trip Size: There are substantial differences in the amount of merchandise purchased depending on whether the household visits one or multiple stores on a particular shopping occasion. Whether measured in total dollar expenditures or number of units, people buy over two-thirds more when cherry picking. As shown in Table 4, this cherry picking effect is large and statistically reliable. In addition, the negative main of effect of cherry picking propensity and the large positive interaction indicates that the trip size differences between cherry picking and single store occasions are substantially greater for those households more practiced at cherry picking. To get a handle on the magnitude of this effect, we compare the top quartile of HH% CP to the other three-quarters of households. For the top quartile of cherry pickers, the

[7] OLS is used for most continuous dependent variables. WLS is used for continuous dependent variables that are the means of unequal numbers of observations (e.g., savings per trip for each household); the weight assigned to each observation is proportional to the square root of the number of observations that comprise the dependent variable (e.g., square root of the number of savings observations for each household). Logistic regression is used when the dependent variable is binary. Censored regression is used for continuous dependent variables that are bounded below at zero, and where there are several zero observations (e.g., the proportion of feature advertised products purchased on a given trip).

difference between single and multi-store visits is over 105% (e.g., $119 vs. $58) compared to less than 60% ($119 vs. $75) for the remaining households. This suggests that more experienced cherry pickers may plan on being opportunistic. By buying less on single store trips, they put themselves in a position to benefit more from cherry picking trips, where they can take greater advantage of the additional price deals afforded by shopping two stores. These findings are related to what we saw in Table 3, where the size of the last trip and time since the last trip were found to have negative and positive influences, respectively, on the likelihood of cherry picking on the current trip.

Items on Deal/Feature Advertised: The pattern of results for both the percent of items bought at discounted prices and featured advertised are quite similar. Because there are more potential deals to exploit when going to two stores rather than just one, we find that people purchase 25% more items on deal. They also buy over a third more items that are feature advertised. Although we have no direct evidence of this, it is possible that shoppers are more likely to read the best day food ads when they cherry pick, or maybe it is the case that particularly attractive advertised specials provide partial motivation to cherry pick. Besides the significant main effects of CP Trip, the price deal and advertising variables also have positive main effects for HH% CP, coupled with negative interactions. Irrespective of whether the shopping occasion is single or multi-store, heavy cherry-picking households (i.e., the top quartile) are more likely to buy items on deal (23%) or advertised (25%) than other households (deals-17%, advertised items-23%). The negative interaction coefficients indicate that the differences in buying items on deal or advertised between cherry picking and cherry picking days are smaller for heavy cherry pickers (deals-12%, advertised items-21%) compared to the other three-quarters of the sample (deals-33%, advertised items-50%). Overall, these results suggest that households take advantage of the increased number of price savings opportunities afforded by cherry picking. The results also suggest that heavy cherry pickers are more vigilant shoppers irrespective of type of shopping occasion, though there are diminishing returns to this vigilance.

Quantities Purchased: Another way in which households can take advantage of the additional price savings opportunities afforded by cherry picking is to buy larger package sizes. The quantity variable used in this analysis is volumetric units purchased (e.g., ounces, liters, count, # rolls) divided by average volumetric units purchased in that category, thus permitting comparison across categories. Like an index, the quantity variable is centered at one. As the table shows, people buy 3% larger package sizes when cherry picking, though this difference is not significant. The only statistically significant effect is for the HH% CP variable. The top quartile of cherry pickers buy 5% larger package sizes compared to the rest of the population. This difference might be related to the lower inventory carrying costs of these heavy cherry pickers that we observed earlier, which may make it easier to increase the overall size of cherry picking trips through more opportunistic planning of big purchases.

Prices Paid: To get a sense of differences in price sensitivity between shopping occasions, we construct a standardized measure of price-per-unit. The item price is divided by the number of volumetric units (e.g., liters, ounces, count, # rolls) of the item, then standardized by dividing by the average price-per-unit for the category. This controls for non-comparability in package sizes and for the fact that most products are priced to provide a quantity discount for buying large packages. We observe that people pay 5% less on cherry picking occasions compared to single store trips, a difference that is economically significant. We also see a significant negative main effect of HH% CP along with a significant positive interaction.

Overall, heavy cherry pickers pay over 5% less per unit compared to the rest of the sample. The interaction reduces this difference on cherry picking occasions (declining from 6% vs. 4%).

Economic Benefits from Cherry Picking

The next set of analyses focuses on the economic benefits realized when shopping at a single store compared to cherry picking multiple stores. We have already shown that there are substantial differences in the size of cherry picking ($119) and single store ($71) shopping trips. In order to estimate the total savings from cherry picking two stores, we first determine how much money shoppers save compared to if they had purchased all items at the higher-priced store. Although cherry picking affords twice as many potential savings opportunities as shopping at a single store, an important question is whether and how well shoppers exploit those opportunities. Recall that the Chicago grocery market is effectively a duopoly, with the majority (65%) of cherry picking at known stores involving Jewel or Dominick's Finer Foods.[8] Also recall that Figure 1 showed how most items can be purchased less expensively at one retailer or the other, sometimes far less, even though Jewel and Dominick's share many common prices. In order to determine whether shoppers pay lower prices when cherry picking, we focus exclusively on item purchases at Jewel and Dominick's in the ten categories for which we have upc-level price information. We include only those items which are available concurrently at both Jewel and Dominick's. Although this is an imperfect measure because people shop at other retailers, we see no reason to believe that there is any systematic bias. The resulting item purchase dataset contains 22,913 individual item purchases, 2,450 of which are made while cherry picking.

---

[8] Jewel and Dominick's together account for 65% of cherry picking visits but 75% of all store visits. The difference is explained by the number of possible store combinations. If stores were chosen randomly, Jewel and Dominick's would have a 2/S (S = the number of grocery store chains in Chicago) probability of being chosen. The random probability of both Jewel and Dominick's being chosen when cherry picking would be S!/((S-2!)2!), however, which is much smaller given the number of grocers in the Chicago market.

Buying at the Lower Price: For each household we compute the percentage of times that items are bought at the lower price (between Jewel and Dominick's) both when cherry picking and when shopping at a single store.[9] As Table 4 shows, households are able to exploit the additional savings opportunities afforded by cherry picking. The probability of buying at the lower price is 8% greater when cherry picking versus single-store shopping. Consistent with other results in Table 4, the positive main effect of HH% CP suggests that heavy cherry pickers tend to be more vigilant shoppers (trait) irrespective of the type of trip (state).

Percent Off the Higher Price: Having established that consumers buy items at the lower price most of the time, we now turn to the question how much they save. Figure 3 displays separate histograms of item-level savings off the higher price for cherry-picking and single-store purchases. The histograms show clearly that cherry picking shifts the distribution of percent savings to the right, reducing the number of zero and small savings and increasing the number of bigger savings. Because we have complete pricing data at both Jewel and Dominick's for only 10 categories, and there are many trips on which households did not buy anything in those categories, we cannot compute savings on a trip by trip basis. Consequently, we have elected to aggregate all purchases in the 10 key categories for each household into two bins—cherry picking trips and single store trips—then compute percent savings off the higher price using the two bins as household observations. This aggregation allows us to avoid modeling the large proportion of missing observations and enables us to analyze the data with a linear (WLS) model. The resulting dataset includes every household with at least three item purchase observations at Jewel or Dominick's in a given state: 113 households when cherry picking and 187 households when shopping at a single store, for a total of 300 observations. Note that we tested alterative screening criteria to include a household's single store or cherry picking

[9] If Jewel and Dominick's offered the same price, we record that the shopper got the lower price.

observation in our dataset, anywhere from a minimum of one to five item purchases. While the total number of household cherry-picking observations changed with the screening criterion, our findings did not.

Similar to the results we obtained for the probability of buying at the lower price, Table 4 shows positive main effects of both HH% CP and CP Trip for percent off the higher price. Shoppers save 46% more on each item when cherry picking (15%) compared to when shopping at a single store (10%). This is consistent with our previous observation that the price per unit is 5% less when cherry picking. Moreover, the top quartile of cherry pickers saves substantially more on all shopping occasions (14%) compared to other shoppers (11%).

Savings Generated by Cherry Picking: The previous analyses showed that people are on a shopping mission when they cherry pick two stores; that is, the act of cherry picking is premeditated and thought out. For example, shoppers spend far more on cherry-picking days, nearly twice what they spend on single-store days. A similar finding applies to the number of items bought. This is not completely surprising since the shopper is visiting twice as many stores, but it does suggest that the shopper planned on spending more than normal to take advantage of the extra store visit. Thus, cherry picking appears to be a case of planned opportunism (Hayes-Roth and Hayes-Roth 1979). Cherry picking trips are also associated with greater sensitivity to temporary price discounts and feature advertising, and generally paying less than on single-store shopping occasions. Moreover, these tendencies are magnified by the household's propensity to cherry pick. The overall portrait suggests that cherry pickers reside in the upper tail of the price sensitivity and deal proneness distributions.

An important issue is whether there is any rational economic justification for cherry picking. Undoubtedly, shoppers may experience some transaction utility from being a market maven (Feick and Price 1987) or a smart shopper (Schindler 1992). Beyond these psychological benefits, however, it is interesting to see whether cherry pickers save enough money to justify the extra store visit. Our priors were that the savings would be modest at best; it turns out that we were wrong.

To quantify the savings that consumers reap from cherry picking, we extrapolate from their average percent savings in the ten product categories for which we have detailed price information. We calculate the savings per shopping trip as follows:

$$\text{for CP Trip} = i \ (i \in 0,1) \qquad \overline{\text{savings / trip}}_{hi} = \frac{\overline{\text{spend / trip}}_{hi}}{1 - \left(\frac{\sum_{k_{hi}=1}^{K_{hi}} \text{price}^{+}_{k_h} - \sum_{k_{hi}=1}^{K_{hi}} \text{price}_{k_h}}{\sum_{k_{hi}=1}^{K_{hi}} \text{price}_{k_h}} \right)} - \overline{\text{spend / trip}}_{hi}$$

where h indexes the household, K_{hi} is the number of item purchase observations for household h when either cherry picking (i=1) or shopping at a single store (i=0), price^{+} is the larger price available on the item at Jewel or Dominick's, and price is the actual price paid. Separating cherry picking and single-store trips, this calculation scales the household's average percent off the higher price (the quantity in parentheses in the denominator) by its average spending per trip.

Table 4 shows that shoppers save over 160% more on cherry-picking versus single-store trips. This occurs because trip savings is essentially the size of the shopping trip (cherry picking trips are 68% larger) multiplied (as in the equation above) by the % off the higher price (45% greater for cherry picking trips). By cherry picking two stores rather than just one, shoppers save over $14 ($23.56-8.90) on average. Using average trip savings as the dependent variable, we estimate a WLS regression using the same predictor variables as other analyses in Table 4. Weights are proportional to the square root of the number of item purchase observations, K_{hi}. Although the main effect of HH% CP is not significant, both the CP Trip main effect and the interaction are statistically different from zero. The results are graphed in Figure 4. For households that seldom cherry-pick, we see that the savings when cherry picking is roughly twice the savings when single-store shopping (what one might naively expect when spending more than two-thirds as much). However, as cherry picking experience increases, savings when cherry picking increases rapidly because of the interaction. The difference between the two curves gives us incremental savings due to cherry picking. For the median cherry-picking household, which cherry picks on 4.3% of shopping trips, this difference is $11.93. For a household in the 75th percentile of cherry picking (10.1% of trips) the expected incremental savings is $13.34. For a household in the 90th percentile of cherry picking (20.0% of trips) the expected incremental savings goes up to $15.76. These findings are insensitive to the weighting scheme as a standard regression produced similar results.

There appear to be two reasons why cherry pickers benefit more from the extra store visit. First, they are more experienced and consequently more accomplished at taking advantage of the extra savings opportunities afforded by the extra store visit. Second, their greater marginal benefit is due to the fact that they appear to opportunistically plan their shopping trips into two types: much smaller single store visits that may be fill-in trips, and larger two store trips where they buy significantly more.

Cost/Benefit Analysis of Cherry Picking

Is the decision to make an extra store visit on the same day economically justified? Across all shopper types, the incremental savings for cherry picking vs. single-store trips is $14.66. Habitual cherry pickers, by virtue of extended practice, enjoy greater incremental savings. For example, a household in the 90th percentile of cherry picking propensity realizes $3.83 more in incremental savings per trip compared a median cherry-picking household. If we assume InsightExpress.com's (2003) estimate of 47 minutes to make a shopping trip, the ratio of incremental savings per additional hour spent shopping is $18.49 = $14.66 / 0.78 hours. Though this savings does not include time spent planning or direct transportation costs (like gasoline and vehicle depreciation), it nonetheless compares favorably to prevailing after-tax wage rates.

Consider the following analysis. First, we compute the average wage rates of households in our dataset. Dividing annual household income by the number of hours worked per year (2000 for full-time employed adult; 1000 for part time), we find the average household wage rate to be $22.09 per hour for the 176 (out of 201 total) households in which either male or female head of household worked at least part time. We then compare the household's average wage rate to its expected incremental savings from cherry picking.[10] For 33.5% (59 of the 176 households) the incremental savings from an extra 47-minute store visit exceeded their average wage rate. In addition, the 25 households in which no adult worked (201-176) need not have foregone any wages to make an extra store visit when cherry picking. Yet this analysis is conservative, overstating the opportunity cost of cherry picking in several ways: (i) the incremental store visit when cherry picking is likely to be less time consuming than the typical 47-minute trip because the shopper spends only $45 (see Table 5) compared to $71 (see Table 4) when single-store shopping; (ii) cherry picking trips are made more often on weekends, when opportunity costs are systematically lower (see Table 3); (iii) if two adults in a household work, their average wage rate will almost certainly be higher than the minimum of the two; and (iv) only 39% of households in our sample had working women and 18% had senior citizens. Building on point (iv), 44 households in the sample included a non-working adult along with one that worked. Given that these households also did not have to forego wages to make an extra

---

[10] The household's incremental savings is computed using parameter estimates from Table 3 as follows:
CP Savings = 11.4 + (24.4 H (HH%CP-median%CP)). Recall that HH%CP was centered on its median value for the original estimation.

store visit, we find that for 63.5% [(59+25+44)/201] of households in our dataset, the opportunity cost in wages of making an additional shopping trip was less than the expected savings due to cherry picking. Irrespective of the assumptions made in computing the incremental costs and savings due to cherry picking, there appears to be a strong economic justification for most households.

Cherry Picking at Primary Versus Secondary Stores:

The final issue of interest is how cherry picking differentially affects retailers. Specifically, we focus on how cherry picking behavior varies depending upon whether the store is the shopper's primary grocery outlet or a secondary grocery outlet. The reasoning for this analysis is that it is one thing to be a shopper's primary store, where every so often the shopper cherry picks your competition and so spends a bit less money at your store than on a single-store trip. It is another thing to be a secondary store, the one which is actually being cherry picked. Not only does the shopper fail to spend as much in your store, but when she does patronize it, she opportunistically buys more sale items. For each household, we designated as its primary store the grocery chain at which the household spent the most money over the two-year period. All other stores were designated secondary outlets.

We estimate regressions using the same dependent variables as in Table 4. However, this analysis relates to store *visits* at primary and secondary outlets, rather than store *trips*. Note that these store visits are all made on cherry picking days. The predictors for these regressions are: (a) the trait variable HH% CP, (b) Secondary Store, an indicator for whether the visit was made to a secondary outlet which captures trip-specific (i.e., state) differences, and (c) the interaction of the two. We again centered HH% CP on its median value, so the main effect of Secondary Store assumes a household with median-level propensity to cherry pick. Secondary Store was coded (yes=1, no=0) so that the main effect of HH% CP assumes a visit to the primary, rather than a secondary, outlet.

Table 5 shows the results. Cherry picking visits at secondary outlets are systematically smaller than those at primary outlets, 37% in dollars and 40% in units. This is not surprising given that shoppers are more familiar with shopping at their primary store. We also observe that shoppers are more likely to buy discounted (12% more) and feature advertised items (32% more) at the secondary store. However, the negative main effect of HH%CP and the positive interaction in the two promotional analyses suggest a slightly more complicated picture. Heavy cherry pickers have a much bigger increase in the probability of buying discounted or feature advertised items when shopping in secondary stores as compared to their primary shopping outlet than lighter cherry pickers. The large difference in the feature advertising variable (32%) suggests that a sizable group of consumers may plan out their secondary store visits based on a perusal of that week's best food day advertising circular. The rest of the shopping behaviors analyzed in Table 5 show no systematic differences between visits at primary and secondary stores. And although shoppers save 18% more in their primary outlet, the savings is proportionally greater in secondary stores because spending on visits to primary stores is 38% larger.

In summary, we find that secondary stores are hurt more (proportionately) by cherry picking than a household's primary outlet. The pain is compounded by the shopper's propensity to cherry pick, which is has a significant moderating effect. The primary driver of secondary stores' disadvantage seems to be smaller purchase amounts, which are substantially smaller, rather than systematically greater price sensitivity or deal proneness. Moreover, differences in price sensitivity and deal proneness seem to be limited to experienced cherry pickers.

It is also interesting to note that a visit to the primary store in many ways resembles a single-store shopping trip. Comparing column 3 in Table 4 to the same column in Table 5, we see strong similarities in the values for single-store trips and primary outlet visits while cherry picking. The only differences are that shoppers are more sensitive to deals and advertising and consequently more likely to save money off the higher price.

Discussion, Implications and Future Research

This paper has examined buyer-side cherry picking, asking and hopefully answering a number of previously open questions. Specifically, which household-specific and trip-specific factors lead to cherry picking? Secondly, is cherry picking worthwhile for consumers in the sense that the savings realized from visiting two grocery stores on the same day is economically justified? And finally, how badly is the retailer hurt by this extreme manifestation of price sensitivity? Our research strategy was to examine cherry picking as both a state (did the consumer choose to cherry pick on a given shopping trip?) and a consumer trait (the household's overall propensity to cherry pick). We found that several household characteristics are predictive of a household's propensity to cherry pick: working woman in the household (-), senior citizen head of household (+), larger family (+), household income (-) and home ownership (+). We also found that the proximity of local stores to one another facilitates cherry picking, although proximity of the store to the shopper's home does not. Analysis of trip-specific factors showed that shoppers are more likely to cherry pick on the weekend as compared to weekdays; and also when their household inventories are depleted because they had not shopped very recently or their most recent basket purchase was small.

We uncovered substantial differences in shopping behaviors due to cherry picking, both the trait (household propensity to cherry pick) and the state (cherry picking on a given trip).

Shoppers buy much more when cherry picking than when shopping at a single store; in the case of frequent cherry pickers, twice as much. Not surprisingly, cherry picking trips involve the purchase of a higher percentage of discounted items than single store trips, at least partly because cherry picking trips evidence greater attention to retailers' weekly feature advertising. Inveterate cherry pickers buy more feature advertised and discounted items whether or not they are cherry picking. In the same vein, shoppers pay lower prices per unit when they cherry pick and are more likely to select items at the lowest price available in the market, as predicted by multi-store shopping theory. In addition, frequent cherry pickers buy in larger quantities than less frequent cherry pickers, suggesting that they are more willing to incur inventory holding costs to reduce their per unit prices, which we also found to be significantly lower. These systematic differences in shopping behavior suggest that cherry picking is a case of planned opportunism, with shoppers exploiting the additional deals available from visiting multiple stores across a bigger basket of goods. Moreover, the portrait of the frequent cherry picker that emerges is a shopper who is opportunistic on all trips, exploiting price deals and buying larger sizes regardless of whether or not they cherry pick on a particular day.

Our analysis of the economic benefits of cherry picking revealed two related but separate ways by which consumers save money when visiting two grocery stores on the same day. First, two same-day store visits afford the shopper more opportunities to save money, especially when they can plan out their shopping informed by feature ads. Accordingly, we found that cherry picking affords the shopper about 5% extra savings per item across the total shopping basket. But this is only part of the story, and in fact arguably not the most important aspect of cherry picking from a consumer welfare perspective. A key reason that cherry picking generates consumer surplus is because shoppers plan out their cherry picking days and purchase more (over two-thirds more on average) on such occasions. And so the 5% savings is applied to a much larger expenditure than what would normally be spent on a single-store shopping day. We recognize that the size of the cherry-picking basket is endogenous; it both affects (Carlson and Gieseke 1983) and is affected by the decision to cherry pick.

Finally, we considered the impact of cherry picking on the retailers being cherry picked. This is difficult to assess in the absolute, although comparing the extra consumer surplus extracted when cherry picking to supermarket gross margins of roughly 25% and net margins of 1.5% - 2% suggests that cherry picking has a material effect on customer profitability. The fact is that cherry picking gives shoppers access to more of the surplus, five percent more off of the premium (higher) market price per item. Yet much of this savings on cherry picking trips is due to the purchase of more promoted items, where the consumer surplus is subsidized by manufacturer discounting. Thus, the burden of cherry picking is borne by both retailer and manufacturer, with manufacturers selling more on deal as a result. Also of interest to manufacturers, there is a negative correlation between cherry picking and brand loyalty. Returning to the retailer's perspective, we note that households that cherry pick more often also have more family members and so consume more goods, suggesting that cherry picking households may generate more retailer revenues. This is true for our sample; we find that the top quartile of cherry picking households spends $576/month while households that cherry pick less frequently spend only $498/month. The additional spending of frequent cherry pickers increases their attractiveness to retailers, but their lower loyalty—they spend only 47% of their grocery budget at their primary store versus 68% for other households—suggests that those extra revenues are spread more equally across retailers. It is clear that cherry picking shoppers are far more likely to be unprofitable for their secondary stores compared to their primary store. Not only do secondary stores sell less per shopper ($45 vs. $71), but they also make lower margins on what they sell to those cherry pickers, who really do "pick the best and leave the rest."

This study focused on identifying and describing buyer-side cherry picking behavior. In light of our empirical findings, several questions remain. Is cherry picking a sequential search process as our theory assumes and thus dependent on the prices observed at the first store, or is it truly premeditated based on shoppers' expectations about prices at the two stores? Answering this question would require testing alternative models of the behavior. In light of our findings linking promotional response to cherry picking trips and a household's propensity to cherry pick, it would also be useful to explore the relationship between promotions and cherry picking further. By exploring this relationship, future research might be able to address how a retailer's promotional decisions influence whether customers cherry pick its stores and whether frequent cherry pickers shop its stores. Another interesting empirical finding related the propensity to cherry pick to the distance between stores near the shopper's home. The cost of an additional shopping trip likely depends on other factors, including the size of the store (smaller stores are easier to shop) and the time of day (off hours mean shorter check-out lines). Exploring these factors represents another interesting research opportunity, albeit requiring additional data.

While we held cherry-picking behavior up to the lens of a theory of multi-store shopping that is grounded in economic rationality (Burdett and Malueg 1981; Carlson and McAfee 1984), we did not consider the psychological benefits of cherry picking. A study which focuses on the psychological benefits, or better still incorporates them along with the economics of cherry picking, would be compelling. Another topic of interest is the importance of cherry picking from the point-of-view of retailer and manufacturer sales and profits. The trade press claims that cherry picking has a material effect on retailer performance (e.g., MMR 2002); assessing such claims could be quite useful. An additional potentially important topic for study is the effect of cherry picking on retail customer loyalty and lifetime value. With customer "share of wallet" and customer relationship management increasingly of interest to retailers, studying the effect of cherry picking on store selection could also make a meaningful contribution.

TABLE 1
Propositions and Associated Hypotheses

Proposition	Hypothesis
1. There is a negative relationship between the probability of cherry picking on a given shopping trip and the consumer's cost of visiting an additional store	• There is a negative relationship between the probability of cherry picking on a given shopping trip and the consumer's opportunity cost of time, operationalized as: (a) household earned income; (b) presence of a working adult female in the household; (c) senior citizen ≥65 years old; (d) college education; and (e) weekend vs. weekday shopping time • There is a negative relationship between the probability of cherry picking on a given shopping trip and the distance between the closest and next-closest stores to the consumer's home
2. There is a positive relationship between the probability of cherry picking on a given shopping trip and the size of the consumer's shopping list	• There is a positive relationship between the probability of cherry picking on a given shopping trip and the household's purchase quantities, operationalized: (a) directly and (b) indirectly as family size • There is a negative relationship between the probability of cherry picking on a given shopping trip and the household's inventory holding cost, operationalized as: (a) the time elapsed since the last shopping trip; (b) the amount spent on the last trip; and (c) home ownership
3. Prices paid when cherry picking are less than the prices paid on single-store visits	

TABLE 2
Stepwise Censored Regression for Household Percent of Cherry-Picking Trips

Observations	201			
% Cherrypicking>0	162			
% Cherrypicking=0	39			
Log-Likelihood	-340.2943			
U^2	0.0435			
E(y)|β=β*	4.18%			
Parameter	β*	Std Err	P-value	E(y)|β=0
Intercept	-4.112	0.394	<0.0001	
Working Adult Female	-0.599	0.248	0.0159	4.83%
Senior Citzen (=65 years)	0.739	0.318	0.02	3.55%
Home Owner	0.738	0.359	0.0399	2.37%
Distance Between Nearest and Next Nearest Stores (miles)	-0.226	0.106	0.0334	5.36%
Family Size	0.154	0.083	0.0613	3.20%
Household Income(000s)	-0.010	0.005	0.0295	6.56%
College Educated	0.406	0.268	0.1304	3.85%

TABLE 3
Logistic Regression for Cherry Picking Trip with Random Coefficients

Observations	23796
Cherrypicking=1	2416
Cherrypicking=0	21380
Log-Likelihood	-6476.947
U^2	0.607
$E(y)\|\beta=\beta^*$	10.15%

Parameter	β^*	Std Err	P-value	$E(y)\|\beta=0$
Mean Intercept [Y]	-2.99	0.10	0.0062	
Weekend	0.265	0.0499	<0.0001	9.42%
Spending on Last Trip	-0.00335	0.00061	<0.0001	10.46%
Time Since Last Trip	0.0244	0.0053	<0.0001	9.47%
Spending on Last Trip × Time Since Last Trip	0.000258	0.000082	0.0017	10.02%

[Y] Mean of estimated household intercepts is reported along with standard error and p-value

TABLE 4
Cherry Picking Trait vs. State Analyses

Variable	Marginal Means: Cherry Picking Trip	Marginal Means: Single Store Trip	Marginal Means: % Difference	Parameter Estimates: Analysis	n	R^2 ^Y^	HH % CP	CP Trip	HH % CP X CP Trip
Trip Size $	$118.93	$70.71	68.2%	OLS	27978	0.076	-98.7 **	45.5 **	99.6 **
							(3.9)	(1.7)	(8.0)
Trip Size Units	54.5	32.4	68.1%	OLS	27978	0.054	-49.8 **	20.2 **	53.2 **
							(2.2)	(1.0)	(4.5)
% Items Bought at Discounted Prices	37.4%	29.9%	24.8%	tobit	25879	0.015	0.275 **	0.108 **	-0.365 **
							(0.022)	(0.009)	(0.043)
% Items Bought that Are Advertised	24.4%	18.2%	34.3%	tobit	25879	0.017	0.278 **	0.121 **	-0.347 **
							(0.023)	(0.009)	(0.045)
Price Per Unit (indexed measure)	0.952	1.006	-5.3%	OLS	22913	0.003	-0.295 **	-0.0348 **	0.152 *
							(0.043)	(0.0157)	(0.079)
Quantity (indexed measure)	1.028	0.997	3.2%	OLS	22913	0.001	0.272 **	0.0220	-0.184
							(0.062)	(0.0399)	(0.114)
Probability of Buying at the Lower Price	78.0%	72.4%	7.8%	logistic	22913	0.003	1.09 **	0.125 *	-0.055
							(0.21)	(0.069)	(0.406)
% off Higher Price	14.9%	10.2%	45.9%	WLS	300	0.160	0.168 **	0.0280 **	-0.0509
							(0.036)	(0.0088)	(0.0587)
Savings per Trip	$23.56	$8.90	164.6%	WLS	300	0.385	5.92	11.4 **	24.4 **
							(5.75)	(1.4)	(9.3)

** = Statistically significant at α=0.01; * = Statistically significant at α=0.05;

^Y^ = For tobit regressions a psuedo-R^2 which approximates the percent of variance explained is reported; for logistic regressions U^2 is reported (U^2 and R^2 are not directly comparable)

TABLE 5
Primary vs. Secondary Store Visit Analyses for Cherry Picking Trips

	Marginal Means			Parameter Estimates					
Variable	Secondary Store	Primary Store	% Difference	Analysis	n	R^2 [Y]	HH % CP	Secondary Store	HH % CP XSecondary Store
Visit Size $	$45.01	$71.44	-37.0%	OLS	5206	0.107	17.0 **	-15.8 **	-59.0 **
							(5.4)	(1.7)	(6.9)
Visit Size Units	20.2	33.4	-39.5%	OLS	5206	0.082	9.50 **	-8.24 **	-27.6 **
							(3.08)	(0.95)	(3.9)
% Items Bought at Discounted Prices	40.4%	36.2%	11.6%	tobit	4818	0.004	-0.167 **	-0.0136	0.244 **
							(0.037)	(0.0126)	(0.055)
% Items Bought that Are Advertised	29.3%	22.2%	31.8%	tobit	4818	0.010	-0.119 **	0.0262 *	0.180 **
							(0.040)	(0.0135)	(0.059)
Price Per Unit (indexed measure)	0.936	0.972	-3.6%	OLS	2450	0.003	-0.137	-0.0332	-0.001
							(0.089)	(0.0301)	(0.130)
Quantity (indexed measure)	1.009	1.052	-4.1%	OLS	2450	0.003	0.218	0.0024	-0.265
							(0.118)	(0.0399)	(0.173)
Probability of Buying at the Lower Price	79.4%	76.3%	4.1%	logistic	2450	0.006	0.418	-0.049	1.30
							(0.451)	(0.149)	(0.68)
% off Higher Price	15.7%	13.5%	16.4%	WLS	152	0.074	0.0212	0.0040	0.185 *
							(0.0654)	(0.0145)	(0.094)
Savings per Store Visit	$9.72	$11.92	-18.5%	WLS	152	0.042	6.35	-2.68	4.73
							(6.63)	(1.47)	(9.49)

** = Statistically significant at α=0.01; * = Statistically significant at α=0.05;

[Y] = For tobit regressions a psuedo-R^2 which approximates the percent of variance explained is reported; for logistic regressions U^2 is reported (U^2 and R^2 are not directly comparable)

FIGURE 1
Histogram of the Difference in Prices Across Grocery Chains

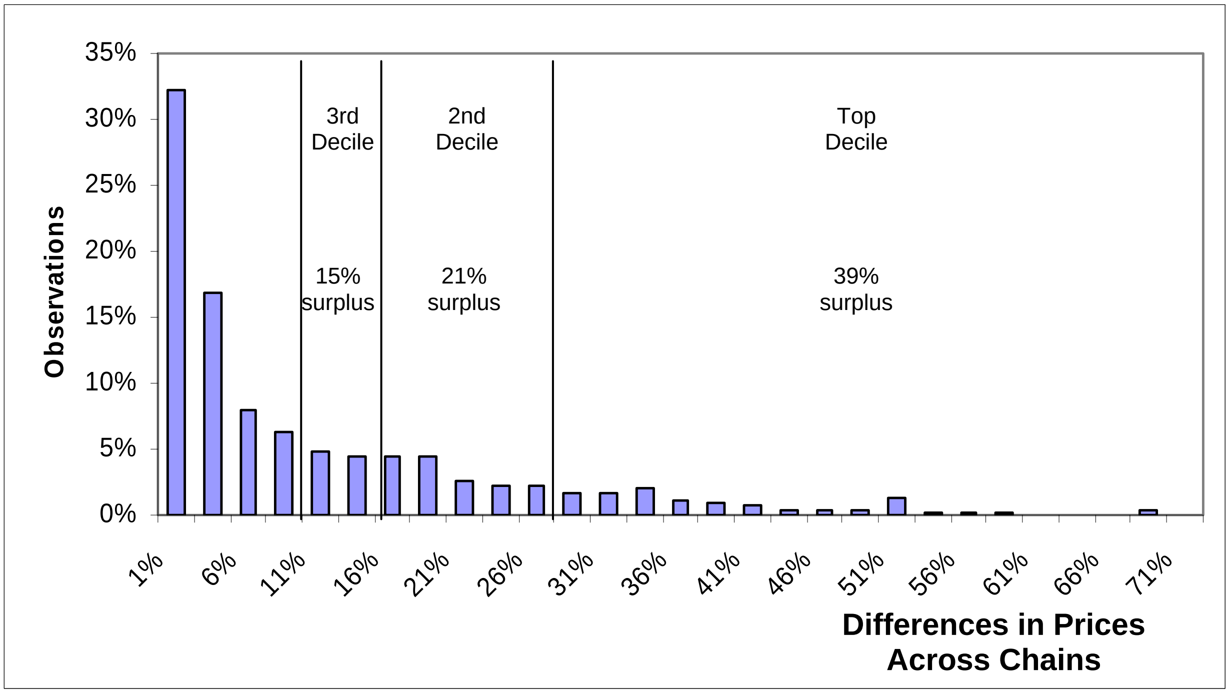


FIGURE 2
Distribution of Household Percent Cherry Picking Trips

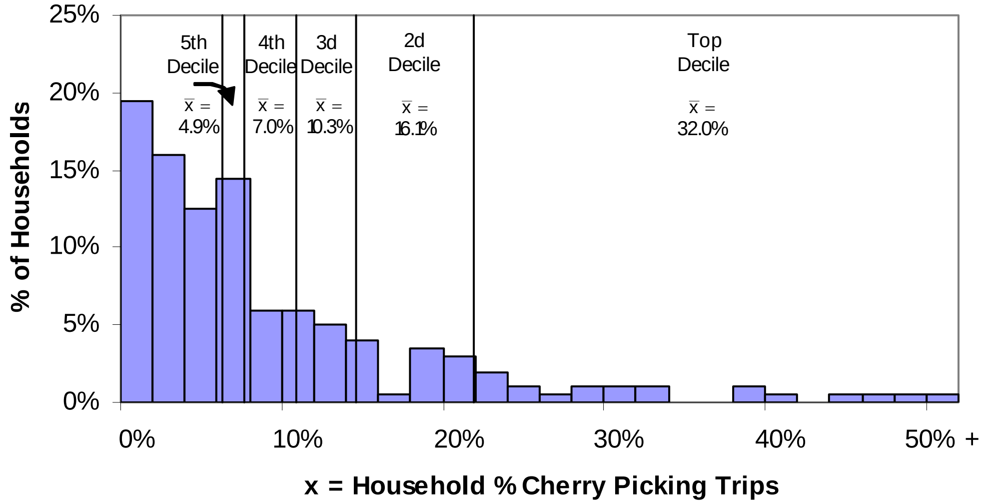


FIGURE 3
Percent Off the Higher Price by Purchase Occasion Type

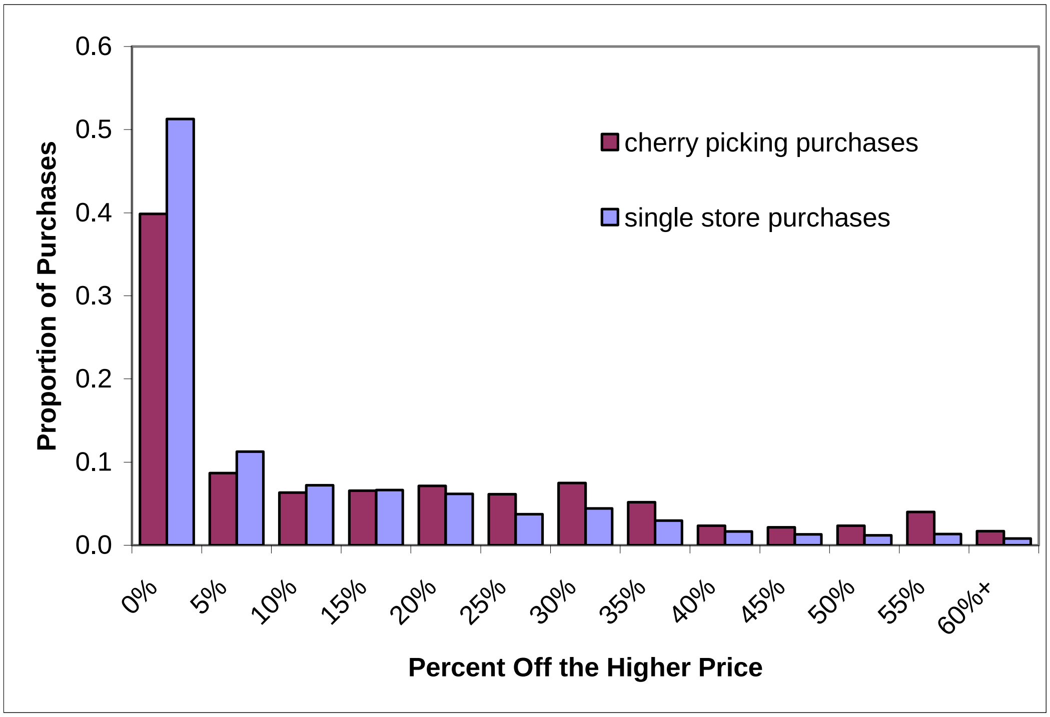
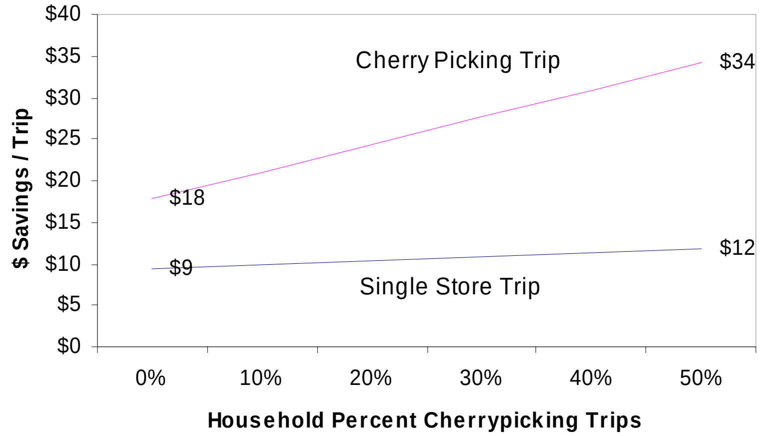


FIGURE 4
Interaction Model of Cherry Picking on Savings per Shopping Trip



References

Bishop, Willard (1991), *How Consumers Are Shopping the Supermarket 1991*. Food Marketing Institute: Washington DC.

Becker, Gary (1965), "A Theory of the Allocation of Time," *Economic Journal*, 75, 493-517.

Blattberg, Robert C., Thomas Buesing, Peter Peacock and Subrata K. Sen, "Identifying the Deal Prone Segment," *Journal of Marketing Research*, 15 (3), 369-77.

Blattberg, Robert C., and Scott A. Neslin (1990), *Sales Promotion—Concepts, Methods and Strategies*. Englewood Cliffs, NJ: Prentice Hall.

Burdett, Kenneth, and David A. Malueg (1981), "The Theory of Search for Several Goods," *Journal of Economic Theory*, 24, 362-76.

Carlson, John A., and Robert J. Gieseke (1983), "Price Search in a Product Market," *Journal of Consumer Research*, 9 (March), 357-65.

Carlson, John A., and R. Preston McAfee (1984), "Joint Search for Several Goods," *Journal of Economic Theory*, 32 (2), 337-45.

Consumer Reports (1988), "How Much Money Smart Supermarket Shopping Can Save," (March), 158.

Doti, James L., and Shmuel Sharir (1980), "Households' Grocery Shopping Behavior n the Short-Run: Theory and Evidence," *Economic Inquiry*, 19 (April), 196-208.

Drèze, Xavier (1999), "Rehabilitating Cherry-Picking," working paper, University of Southern California. Marshall School of Business.

Feick, Lawrence F. and Price, Linda L. (1987), "The Market Maven: A Diffuser of Marketplace Information," *Journal of Marketing*, 51 (1), 83–97.

Food Marketing Institute (2002), *Trends – Consumer Attitudes and the Supermarket*, Washington DC: Food Marketing Institute.

Hayes-Roth, Barbara, & Hayes-Roth, Frederick (1979), "A Cognitive Model of Planning," *Cognitive Science*, 3 (4), 275-310.

Hoch, Stephen J., Byung D. Kim, Alan L. Montgomery, and Peter E. Rossi (1995), "Determinants of Store-Level Price Elasticity," *Journal of Marketing Research*, 32 (February), 17-29.

InsightExpress.com (2003), "Topline Insights," (accessed April 2003), [available at http://www.insightexpress.com/ix/toplines.asp].

Irwin, Julie R., and Gary H. McClelland (2001), "Misleading Heuristics and Moderated Multiple Regression Models," *Journal of Marketing Research*, 38 (February), 100-9.

Judge, George G., W.E. Griffiths, R.Carter Hill, Helmut Lutkepohl and Tsoung-Chao Lee (1985), *The Theory and Practice of Econometrics* (2nd Edition). New York, NY: John Wiley & Sons.

Lal, Rajiv (1990), "Price Promotions: Limiting Competitive Encroachment", *Marketing Science*, 9 (3), 247-62.

Lal, Rajiv, and Ram C. Rao (1997), "Supermarket Competition: The Case of Everyday Low Pricing," *Marketing Science*, 16 (1), 60-80.

Levy, Michael and Barton A. Weitz (2004), *Retailing Management* (5th Edition). New York, NY: McGraw-Hill Irwin.

Lippman, Steven A., and Kevin F. McCardle (1991), "Uncertain Search: A Model of Search Among Technologies of Uncertain Values," *Management Science*, 37 (11), 1474-90.

Marmorstein, Howard, Dhruv Grewal and Raymond P.H. Fishe (1992), "The Value of Time Spent in Price Comparison Shopping: Survey and Experimental Evidence," *Journal of Consumer Research*, 19 (June), 52-61.

MMR (2002), “Wal-Mart’s Challenge,”19 (5), 5.

Narasimhan, Chakravarti (1988), “Competitive Promotional Strategies”, *Journal of Business*, 61 (4), 427-49.

Petrevu, Sanjay, and Brian T. Ratchford (1997), “A Model of Search Behavior with an Application to Grocery Shopping,” *Journal of Retailing*, 73 (4), 463-86.

Raju, Jagmohan, V. Srinivasan and Rajiv Lal (1988), “The Effects of Brand Loyalty on Competitive Price Promotional Strategies,” *Management Science*, 36 (3), 276-304.

Ratchford, Brian T., and Narasimhan Srinivasan (1993), “An Empirical Investigation of Returns to Search,” *Marketing Science*, 12 (1), 73-87.

Schindler, Robert M. (1992), "A Coupon is More Than a Low Price: Evidence From a Shopping-Simulation Study," *Psychology and Marketing*, 9 (Nov/Dec), 431-51.

Stigler, George J. (1961), “The Economics of Information,” *Journal of Political Economy*, 69 (June), 213-25.

Tobin, James (1958), “Estimation of Relationships for Limited Dependent Variables,” *Econometrica* 26, 24-36

Urbany, Joel E., Peter R. Dickson, and Alan G. Sawyer (2000), "Insights into Cross- and Within-Store Price Search: Retailer Estimates vs. Consumer Self-Reports," *Journal of Retailing*, 76 (2), 243-58.

Urbany, Joel E., Peter R. Dickson, and Rosemary Kalapurakal (1996), "Price Search in the Retail Grocery Market," *Journal of Marketing*, 60 (April), 91-104.

Urbany, Joel E., Peter R. Dickson, and Rosemary Key (1991), "Actual and Perceived Consumer Vigilance in the Retail Grocery Industry," *Marketing Letters*, 2 (1), 15-25.