

**Shopping Time, Grocery Expenditures, and Coupon Savings:
Insights into a Time/Money Tradeoff**

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This study examines the relationship between shopping time, expenditures on groceries, and coupon savings using a utility maximization model. It incorporates shoppers' preferences for time and shopping, and includes a more exact measure of shopping time by accounting for both travelling and in-store time, and psychological characteristics that may affect shopping behavior.

Forty-nine percent of grocery shoppers want "short waits at the checkout" (Progressive Grocer 1991), 50% want "good (supermarket) layouts for fast easy shopping," and 66% of dual earner households indicate "we have less time to shop than five years ago" (Fram and Axelrod 1990). Time is scarce, and we appear to have less of it. On the other hand, 50% of consumers cite low prices, frequent sales, and availability of specials as important aspects of choosing a supermarket, and 56% indicate that they used cents-off coupons at a higher rate in 1990 than in 1989 (Progressive Grocer 1991). Because consumers are concerned with both money and time when grocery shopping, these statistics raise the question, "What is the relationship of the time-money tradeoff in grocery shopping behavior?"

Review of Literature

Time spent grocery shopping has not been a priority topic for economic research. It is not mentioned in two recent reviews of the household time use literature (Juster and Stafford 1991; Godwin 1991), though a few researchers have examined shopping in the aggregate (Kooreman and Kapteyn 1987; Gershuny 1987). Doti and Sharir (1981) have posited an economic model of grocery shopping in which households consume two composite goods (groceries and non-groceries) and allocate time between work, buying goods, and other leisure, subject to time and budget constraints. Estimates of simultaneous decisions between grocery expenditures and shopping time using a sample of 100 California consumers were obtained using two stage least squares. Dislike of shopping, employment of wife, presence of children, and increased educational attainment decreased the time spent shopping, while increases in expenditures increased shopping time. Employment of wife,

increased educational attainment, presence of children, and increases in shopping time all increased expenditures on groceries.

Marketers have been somewhat interested in shopping time. Arndt and Gromno (1976) developed a model that specified shopping time as a function of structural market conditions, social position, needs, and shopper orientation. Using 3,040 observations from a Norwegian time-budget study, they found that being female and having higher incomes increased time spent shopping. Ownership of a freezer, living close to a grocery store, and working longer hours decreased time spent shopping. Park, Iyer, and Smith (1989) examined the role of store environment and time available for shopping on grocery shopping behavior. Using a two by two factorial design, they selected a random sample of 68 California consumers. Shoppers who felt "time pressure" spent significantly less time shopping, had fewer unplanned purchases, and failed to purchase intended products more often than those who did not feel pressured for time.

Missing from these studies of shopping time is the endogeneity of prices paid for groceries. Price dispersion in the grocery market is well documented. Although consumers may misperceive actual price differences (Maynes and Assum 1982), a distribution of grocery prices can be sustained due to market characteristics including product differentiation not based on objective attributes of quality, size of seller, market concentration, and the proliferation of coupons and other discounts (Conner et al. 1985; Collins 1968; Gallo 1982a). Carlson and Geiseke (1983) examined number of searches (which decrease price paid for groceries) and grocery expenditures. 284 responses were obtained from a 1956 Michigan panel study of food purchases. Two stage least squares estimates revealed that increases in expenditures, income and age increased the number of searches made. Increases in prices, income and age increased expenditures on groceries. Prices paid for groceries fell as the number of searches increased. Kolodinsky (1990) developed a model of price information search that incorporated household production theory (Becker 1965), the economics of information (Stigler 1961), and the idea that time can yield utility directly. Savings from search were endogenously determined. Analysis using a

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sample of 95 dual earner households found increased price savings increases time spent in search. Levendahl (1988) formulated a model of coupon redemption based on utility maximization in which coupons explicitly allow households to obtain discounts on food. Using a sample of 299 New York, Chicago, and Los Angeles households, paper towel purchases were analyzed. Both income and education are positively related to coupon redemption. This evidence supports two hypotheses related the impact of these variables. First, highly educated, higher income consumers may be better shoppers because they more efficient shoppers. That is, they are better able to locate, sort, organize, and cash in coupons. The cost of using coupons is lower. Second, these consumers are more likely to purchase brands for which coupons are available.

Enjoyment spent in an activity has been anecdotally included in discussions of time allocation (Dow and Juster 1980; Wilkie and Dickson 1980). Butler (1991) speaks of Canadian malls as tourist attractions. Prus and Dawson (1991) explore shopping as recreational or laborious. Specific to grocery shopping, both economists and marketers have touched on the idea of time enjoyment. In the economic literature, Doti and Sharir (1981) found dislike of shopping to have negative, albeit not significant, effect on shopping time, while Kolodinsky (1990) found that enjoyment of price information search increased the time spent in the activity. In the marketing literature, Hortman et al. (1990) found pleasant atmosphere oh several segments of shoppers: non-discount store shoppers, non-price sensitive shoppers, the elderly, and even highly price sensitive shoppers. Using a sample of 910 Quebec grocery shoppers, Labrecque (1991) found that shopper preferences for store attributes affected the probability of choosing a store type. Enjoying grocery shopping increased the probability of shopping at more than one store type and shopping at superstores, as opposed to traditional supermarkets.

All these studies have explained in part time use, expenditures, and savings from search. However, most studies used relatively small samples, making the results difficult to generalize. Some studies were either focused on marketing applications, and concentrated more on shopping orientated variables. Other studies were economic applications, and focused more on price, income, quantity relationships without accounting for shopping variables that do not fit neatly into neoclassical microeconomic theory. In addition, shopping time has typically been measured as the time spent in a store, with no regard for travel time to or between stores.

Methodology

Theory

The model proposed to examine grocery shopping time, expenditures and savings has its roots in the work of Doti and Sharir (1981) and Kolodinsky

(1990). It utilizes Stigler's (1961) model in which searching for price information can lower prices paid in a market. However, while Doti and Sharir (1981) used dislike of shopping as a taste shifter in their empirical analysis, they did not explicitly account for it in their theoretical specification. And, while Kolodinsky (1990) explicitly modelled time as a direct source of utility and the endogeneity of prices paid for groceries, the specification accounted only for time spent in price search and "other home produced goods." The utility maximization model accounts for food purchased, time spent shopping, other purchased goods, and leisure other than that provided by grocery shopping. Choices are constrained by the budget, specified as a full income constraint.

$$U = f(X_i, \sum_{i=1}^N T_{si}, X_o, L; K) \tag{1}$$

$$wH + v = P_1(\sum_{i=1}^N T_{si})X_i + w\sum_{i=1}^N T_{si} + P_o X_o + wL \tag{2}$$

- where
- X_i = food purchased
- $\sum_{i=1}^N T_{si}$ = time spent shopping, $i=1,2,\dots,N$
- X_o = other goods, a composite commodity
- L = leisure time
- K = taste and productivity shifters
- w = market wage rate
- H = total available time
- v = non-wage income allocated to meal production
- P_1 = price of grocery inputs
- P_o = price of other goods

Time is explicitly included in the utility function, and its components include all time related to shopping. Examples are in-store shopping and travel time.

Imposing weak separability allows the derivation of food and shopping time demand without explicitly considering the demand for other goods. The Lagrangian function for this case is written:

$$L = u(X_i, \sum_{i=1}^N T_{si}; K) \lambda((wH + v) - P_1(\sum_{i=1}^N T_{si})X_i - w\sum_{i=1}^N T_{si}) \tag{3}$$

where $(wH + v)$ equals the portion of total income pre-allocated to purchasing food and spending time shopping. Maximization of (3) reveals the demand equations for food purchased and time spent grocery shopping. Importantly, prices paid for food are endogenous.

Data

Data are from a 1987 study that included 1200 respondents who participated in a mail panel lasting one week. Respondents kept track of expenditures, coupon use and value, travel time, and grocery shopping time in each store they visited during the seven day period. Questions about shopping attitudes and demographics were

TABLE 1. SUMMARY STATISTICS AND HYPOTHESIZED EFFECTS

		MEAN	HYPOTHESIZED EFFECT		
			COUPVAL	EXP	TIME
LNINC	Nonwage Income	35.498 (16.025)	(?)	(+)	(?)
WAGE	Wage Rate Of Shopper	10.32 (7.00)	(-)	(+)	(-)
AGE	Age Of Shopper	38.45 (11.57)	(?)	(?)	(+)
EDUC	Years Of Education	13.45 (2.44)	(?)	(?)	(?)
GENDER	Percent Male Shoppers	.21 (.40)	(?)	(?)	(-)
LNPERSON	Family size	2.31 (1.57)	(+)	(+)	(+)
KID6	Number Of Children ≤ 6	.45 (2.04)	(+)	-	-
KID18	Number Of Children $\geq 6 \leq 18$.52 (.85)	(+)	(+)	(+)
PRICE	Chooses A Store Based On Price	.00 ^a	(-)	(-)	(?)
QUALITY	Chooses A Store Based On Quality	.00 ^a	(?)	(+)	(+)
BR*PR	Interaction Of Price And Brand	.04 (.72)	(-)	-	-
MICRO	Ownership Of A Microwave	.52 (.49)	-	(?)	-
FREEZER	Ownership Of A Freezer	.53 (.50)	(+)	(?)	(?)
AWARE	Shopper Is Price Aware	.00 ^a	(+)	(-)	(?)
BRAND	Shopper Is Not Brand Loyal	.00 ^a	(-)	(-)	(?)
INDIVID	Shopper Likes Individual Service	.00 ^a	-	-	(+)
PARTY	Shopper Likes To Feast	.00 ^a	-	(+)	-
BROWSER	Shopper Likes To Shop	.00 ^a	-	-	(+)
ACTIVE	Shopper Is Pressed For Time	.00 ^a	(-)	(?)	(-)
COUPVAL	Value Of Coupons	.97 (2.84)	-	(?)	(?)
EXP	Weekly Expenditures On Groceries	98.36 (64.11)	(+)	-	(+)
TIME	Weekly Shopping Time, Including Transportation	102.64 (76.37)	(?)	(?)	-

N=580^a Factor Analyzed Variable

included. A response rate of 79% was obtained, as 950 respondents returned the survey, a rate above the 75% average found when the "total design method is used" (Dillman 1978), and cited as being "not unlike other surveys of this type" (Arndt & Gromno (1976). Because of the detailed nature of the information, a number of respondents did not complete all the information necessary to be included in this particular analysis. Most missing data concerned psychological aspects of shopping. This analysis includes 580 respondents, or 61% of those returned. Determining non-response bias is difficult. Comparison of the respondents compared with non-respondents would be a formidable task, given that non-respondents were classified as so because they did not provide the psychological information. An examination of this group with those that did provide all information based on demographic characteristics including age, gender, education, and family composition showed no significant differences. The final data set is rich with the types of variables needed for the empirical analysis. Table 1 summarizes the variables used in the analysis.

Expenditures are measured as the total spent on groceries for a one week period. Because of the panel nature of the data, actual expenditures were summed, excluding those made in convenience stores, as these are not "major purchases" (Canadian Grocer 1991).

Equation (3) implies that prices paid for food are endogenous and are a function of time spent shopping. The sample includes information on the savings obtained through coupon redemption, used as a proxy variable for prices. As the value of coupons increases, prices paid for individual items decreases. Because our major interest is in the fact that search can yield savings, this is the appropriate variable to measure.

Time spent shopping includes many possible time uses, some of which were outlined in the theory section of this paper. We have explicit information on in-store shopping time and travelling time, which are not accounted for together in previous research.

Two economic variables are measured: non-wage income (LNINC) and wages (WAGE). The wage rate is the hourly wage earned in the labor market by the self-designated major grocery shopper. For those respondents who are not employed in the labor market, Heckman's (1977, 1979) method for estimating the reservation wage rate was used to obtain a value for the wage variable. Non-wage income includes all household income other than that earned as wages by the major shopper. The natural log of income is the variable used. As income increases, expenditures on food increase, but not in a linear fashion, a phenomenon known as Engel's Law (Timmer et al. 1983).

The theoretical specification also indicates

that tastes are important. Demographic variables include age of shopper (AGE), number of persons in the household (LPERSON), number of younger and older children in the household (KID6 and KID18), education in years, (EDUC), and gender of the major shopper (GENDER). The natural log of household size is the variable used. As the number of persons in a household increases, food expenditures increase, but not in a linear fashion. Also, one would expect more time to be taken to shop for a larger family. However, one would not expect time to increase in a linear fashion. While more items may be purchased, for many items, an increase in quantity is obtained by simply reaching for a larger size. Several variables related to shopping are also included to reflect taste differences. QUALITY, a measure of whether a shopper chooses a store based on quality of items, PRICE, a measure of whether a shopper chooses a store based on price, FREEZER and MICRO, measures of ownership of a freezer and microwave oven are included. Six shopper preference variables related to shopping behavior and time use were formulated. While previous studies have included variables accounting for like or dislike of shopping, (Doti and Sharir 1981; Kolodinsky 1990), several dimensions of shopper preferences may affect shopping behavior. These variables were extracted using factor analysis and varimax rotation on a series of 31 statements describing food shopping and meal preparation activities, along with shopping attitudes and opinions. Varimax rotation is preferred because it produces high loadings on some statements and near zero loadings on others, making interpretation of the factors rather straight forward (Greene et al. 1988). Six factors accounted for 98% of the variance in the 31 statements. The factors identified include: awareness of prices (AWARE), choosing bulk or store brand items most often (lack of brand loyalty) (BRAND), enjoyment of shopping (BROWSER), time savers (ACTIVE), those that prefer individual service (INDIVID), and those fond of gourmet meals and having dinner parties (PARTY). Hypothesized directions of effects of the variables are included in Table 1.

Empirical Specification

The specification of the demand equations must account for the simultaneous determination of prices, time spent shopping and grocery expenditures. It must also account for censored sample bias, as 8% of the sample reported zero expenditures and shopping time, and 63% of the sample did not use a coupon during the survey period. Finally, we are interested in structural equations. Theory indicates that prices and expenditures on groceries, and time spent shopping are simultaneously determined. The structural equations are of the form:

$$Y_i = \alpha_{ij} \sum_{j=1}^2 Y_{ij} + \beta_{im} \sum_{m=1}^{19-2} X_{im} + e \quad (4)$$

$i \neq j$

TABLE 2. STRUCTURAL EQUATION ESTIMATES

VARIABLE	COUPVAL	EXP	TIME
INTERCEPT	.96 (4.16)	-36.43 (51.59)	1.59 (51.02)
LNINCOME	-1.14 (.58)**	9.17 (5.03)**	-1.24 (5.41)
WAGE	-.07 (.03)**	.11 (.42)	.32 (.44)
AGE	-.002 (.03)	.42 (3.0)*	.65 (.27)***
EDUC	-.1 (.09)	-1.36 (1.13)	.59 (1.21)
GENDER	1.70 (.57)***	-7.52 (2.86)	-1.56 (2.96)
LNPERSON	-1.51 (1.11)	13.95 (6.34)**	-1.24 (5.41)
KID6	.58 (.54)	-	-
KID18	-.73 (.50)*	-1.79 (2.86)	1.62 (0.37)***
PRICE	.18 (.24)	-1.79 (2.86)	-1.59 (2.96)
QUALITY	.71 (.31)**	-1.76 (3.53)	4.03 (3.06)*
BR*PR	.46 (.30)*	-	-
MICRO	-	-1.52 (6.74)	-
FREEZER	-1.88 (.74)***	14.43 (5.50)***	.004 (6.95)
AWARE	-.12 (.55)	-7.09 (3.65)**	7.98 (3.65)**
BRAND	-.78 (.22)***	-7.63 (3.44)**	-2.83 (3.58)
INDVID	-	-	-5.68 (1.21)***
PARTY	-	1.04 (3.55)	-
BROWSER	-	-	-4.78 (3.20)*
ACTIVE	1.40 (.32)***	-4.07 (3.65)	-3.95 (4.42)
COUPHAT	-	.95 (1.58)	6.10 (1.45)***
EXPHAT	.09 (.04)**	-	.20 (.23)
TIMEHAT	.02 (.030)	-.04 (.22)	-
SIGMA	4.94 (.15)***	59.03 (1.80)***	60.87 (1.85)***
LOG LIKELIHOOD	-1689.3	-3058.8	-3080.9
R2	.46	.197	.367

N=580 Standard errors in parentheses. *Significant at $\leq .10$ **Significant at $\leq .05$ ***Significant at $\leq .01$

There are two endogenous and seventeen exogenous variables in each equation, because two of the exogenous variables in each structural equation must not appear in any other equation to insure identification. Given these factors, a two stage Tobit estimator is used (Maddala 1983; Nelson and Olson 1978).

In the first stage, reduced form equations are estimated for coupon value, time spent shopping, and grocery expenditures, expressed as Y_i , for $i=1,2,3$:

$$Y_i = \gamma_{i0} + \sum_{m=1}^{19} \phi_{im} X_{im} \quad (5)$$

where X_{im} are independent variables.

Tobit was used to estimate reduced form equations to correct for sample selection bias. Spearman rank correlation tests indicated that heteroskedasticity was not a problem in the expenditure equation. In the second stage, Tobit was used to estimate structural equations.

Results

Results of estimating the structural equations for coupon value (COUPVAL), grocery expenditures (EXPGROC), and shopping time (TIMESHOP) are presented in Table 2.

Coupon Value

As a whole, results are robust, with an R^2 of .46 before iterating and a log likelihood of -1689.3 after. Eleven of the right hand side variables were significant, including Sigma.

Coupon savings are an inferior good. As the price of time increases (WAGE) savings decrease, as expected for a time intensive activity. Female shoppers (GENDER) reap more savings, while presence of older children (KID18) has a negative effect on savings. While shopping for quality (QUALITY) increases coupon savings, shopping for price (PRICE) has no significant effect, although the coefficient is positive. Selecting a store based on price and having a lack of brand loyalty (BR*PR) increase savings. Ownership of a freezer (FREEZER) has the unexpected result of decreasing coupon savings. Some psychological variables influence savings. A lack of brand loyalty (BRAND) decreases savings, while being pressed for time increases coupon savings (ACTIVE). Increases in expenditures (EXPHAT) increase coupon values.

Expenditures

The expenditures equation was less robust than the other two equations, with an R^2 of .17 before iterating and a log likelihood of -3508.8 after. Seven of the independent variables are significant.

Expenditures are a normal good; as income increases (LNINC), expenditures increase. Increases in age (AGE) increase expenditures. The

effect of increasing family size (LNPERSON) is positive as is owning a freezer. Psychological variables influence expenditures. Price awareness (AWARE) reduces expenditures, as does choosing bulk items and store brands (BRAND).

Shopping Time

The shopping time equation produced an R^2 of .37 before iterating and a log likelihood of -3080.0 after. It performed in between the other two equations. Eight of the right hand side variables were significant, including Sigma.

Both age (AGE) and presence of older children (KID18) are positively related to time spent shopping. Choosing a store based on quality (QUALITY) increases shopping time. Psychological variables also influence time. Price awareness (AWARE) increases shopping time. Enjoyment of shopping (BROWSER) and preferring individual service (INDIVID) actually decrease shopping time. Increases in coupon value (COUPVAL) increase shopping time.

Discussion

Because this study is the first that examines shopping time, grocery expenditures, and coupon savings in a single simultaneous system, comparison with previous research is difficult. Notwithstanding this, our results are most like the findings of Carlson and Geiseke (1983) with regard to savings and expenditures. Food is a normal good and increases in age are associated with increased expenditures. The relationship between age and expenditures is not unusual because in our study age of respondent ranged from 21 to 68, with the majority of respondents reporting children living in the household. One major difference between the two studies is the result concerning increases in price (decreases in price due to increases in coupon value (COUPVAL)). While Carlson and Geiseke (1983) found that increases in prices increased expenditures on food, our results show that increases in coupon savings (decreases in price) have an insignificant, but positive effect on expenditures. Because any price variable contains both a substitution and income effect, our results can be explained by competing directions of the two effects. While more savings decrease prices paid, which should decrease expenditures, decreased prices also lead to more real income. Since food is a normal good, expenditures will increase. In our case, the insignificance can be due to a netting out of the negative price effect and the positive income effect.

The results regarding shopping time and expenditures are as interesting as those regarding savings and expenditures. They are unlike the results of Doti and Sharir (1983), who found that wife's employment and presence of children decreased shopping time, or Arndt and Gromno (1976) who found that longer hours of employment decreased shopping time. The economic explanation for these results is that employment increases the price of

time, as do the presence of children. Our results indicate that economic variables (WAGE, LNINC) Do not affect shopping time, perhaps because ALL consumers want shorter waits at the checkout and have less time for shopping (Fram and Axelrod 1990). Regardless of income or working status (price of time), consumers are trying to save time where they can. Our results indicate that having children ages 6-18 in a household increase shopping time but decrease grocery expenditures. One explanation for this is that older children may have different preferences than their parents, and they may have influence in household purchase decisions. This can increase the time it takes to find a particular product in a single grocery store. Or, it can increase travelling time if parents must travel to a particular store to purchase a product desired by children. School age children may also eat away from home more often than younger children (i.e. school lunches), thus decreasing grocery expenditures. This might explain the sign differences on our two included family composition variables as compared to the single variable used by Doti and Sharir (1981). Arndt and Gromno (1976) also found that ownership of a freezer decreased time spent shopping. Our results are positive, albeit insignificant. Because our measure of shopping included travelling time, the discrepancy in results could be that when travelling time is added, we find some consumers making special trips to take advantage of specials at stores they may not normally shop at, while others stock up at one time and don't shop as frequently. The net effect is insignificant. This speculative result is reinforced by the significant positive effect of FREEZER on expenditures. Whereas owning a freezer is supposed to be a means of saving on the food bill in the long run, it appears that in the short run consumers actually spend more. This may be an artifact of the data, which was collected during early November, when consumers may be stocking their freezers for the winter. Doti and Sharir (1981) also found significant positive effects of time on expenditures and expenditures on time. We have the same results for the effect of expenditures on time. However, we obtain a negative, albeit insignificant, effect of time on expenditures. One major reason for this is our inclusion of coupon savings into the analysis. Indeed, increases in coupon savings increase time spent shopping and increases in expenditures increase coupon savings.

With regard to coupon value, we find our results at odds with Levendahl (1988). Whereas he found highly educated and higher income consumers to be more likely to redeem coupons, we found coupon value to be an inferior good, with education having no significant effect. Because Levendahl (1988) used an aggregate income measure as opposed to our separating out the effect of the price of time (WAGE) and non wage income (LNINC), the discrepancy in results even more troubling. Levendahl's measure contained both a price and income effect. In order for the total effect to be positive, a negative price effect had to be offset

by a very large, positive, income effect. In our study, we found a negative own price effect (the price of time decreases coupon value) and a negative income effect. One explanation is that because Levendahl measured number of coupons, while we measured coupon value, it is possible that higher income consumers redeem more coupons of less value. This is not highly plausible. The expected result would be that higher income and higher wage persons would redeem fewer coupons of higher value if Levendahl's hypotheses about higher income households being more efficient holds true. A more plausible explanation could be a difference in the attitudes toward coupon redemption between Quebecers versus Americans. Kolodinsky and Labrecque (1992) found a significant difference in the value of coupons redeemed between these two groups. As other studies have found inconclusive evidence as to the effects of income, more research is needed to find a definitive answer to the question, "are coupons savings a normal or inferior good?" Gender is only significant in the coupon value equation. Women have higher coupon values. This result has not been found previously, as Kolodinsky (1990) found gender to be an insignificant variable in the prediction of savings. However, women are no more likely than men to have different expenditures or shopping times. Although women continue to be the major shoppers in the household, men seem to be no less efficient in their time or money expenditures. There is still room to catch up in the area of savings, however.

With regard to psychological variables, only one, enjoyment, has previously been accounted for in the economic literature (Doti and Sharir 1981; Kolodinsky 1990). Our findings are at odds with both of these studies. The question arises, "how can those who enjoy shopping actually spend less time doing it?" Two answers are plausible. First, these persons may be more efficient. They may actually get more shopping done in less time. Second, it may be that persons who enjoy shopping are those who do not feel time pressured by the activity. If the latter is true, more research in the area of enjoyment must be undertaken. Enjoyment must become a choice variable and be simultaneously determined with shopping time, if we believe that time use can influence enjoyment and enjoyment influences time use.

Our study finds other psychological variables to be significant indicators of shopping time, grocery expenditures, and coupon savings. Active shoppers have higher savings. This is at first puzzling. However, these time pressed consumers may have found that using a coupon is the fastest way to obtain savings on their food bills. Kolodinsky (1992) found that consumers spend about 30 minutes per week clipping coupons. Walker and Cude (1983) found that comparison pricing strategies (with the exception of buying the largest size of one brand) required a minimum of 20 and a maximum of 231 price comparisons, which would require a hefty time commitment. Combine the

results of these two researchers and the finding that time pressed consumers (ACTIVE) have higher coupon values becomes plausible. This is an area fruitful for future research.

Those who are not brand loyal (BRAND) have lower coupon values. These are the consumers who buy in bulk and choose store brands often. It appears that consumers who use these strategies have chosen them as an alternative to using coupons. These consumers also have significantly lower grocery expenditures, but no significant differences in shopping time, leading to the assertion that for some persons, this strategy works at saving money.

The interaction of a psychological and shopping variable was found significant. Those shoppers who are not brand loyal but choose a store based on price (PR*BR) have higher coupon values. An explanation for this is that there seems to be a proportion of shoppers who use all possible saving strategies, including choosing a store based on price, purchasing store brand and bulk items, and using coupons. Choosing a store based on quality (QUALITY) increased coupon value. It appears that shoppers do equate items for which coupons are available with quality. Combine the findings of Bellizzi et al. (1981), who documented that consumers believe national brands are of higher quality with the fact that coupons are offered most often for national brands (Gallo 1982a) and the explanation becomes clear as to why shoppers of quality have higher coupon values. Shopping for quality (QUALITY) increases shopping time, as these persons are likely to compare merchandise, squeeze fruit and vegetables, and read labels, for example. Awareness of prices (AWARE) decreases expenditures indicating that there are savings associated with price search. This reinforces the findings of Carlson and Geiseke (1983). Finally, a preference for individual service (INDIVID) actually decreases shopping time. This may be explained by the fact that shoppers who prefer individual service may be loyal to a single store, thus decreasing the travelling time portion of shopping time. This is consistent with the findings of Labrecque (1991) who found that being a service oriented shopper decreased the probability of shopping at more than one store type, compared with shopping at traditional supermarkets.

Conclusions

The theoretical specification translates into robust empirical results. And, while a few of the estimated coefficients turned out to be significant in the "wrong" direction, they can be explained using economic theory and combining results found in other studies of shopping behavior. The study has also taken a step forward in the measurement of variables found to be key in the study of the tradeoffs among expending time and money and obtaining savings. Travelling time added to actual in store shopping time gives a more accurate accounting of the time that must be spent in

grocery shopping. And, most of the shopper preference variables included did affect time, expenditures, and/or coupon savings.

There are three limitations with the data that cause a continued problem in the measurement of shopping time. First, we have included only two types of shopping time: travel time and in-store shopping time. Our data set did not include information about the time spent in pre-purchase search, such as reading food ads or clipping coupons. Second, other types of savings need to be measured. Savings from buying in bulk, for example, may be significant. Because the results, even with this measurement error, are so encouraging, data sets that include information about economic variables, time use variables, demographic information, and shopper preferences should be collected in the future so that a full accounting of shopping time can be obtained. Third, the data reflected a random sample of Quebec residents. Results can be generalized only to this province of Canada because of laws regarding store operating hours, which are more restrictive when compared with the rest of Canada and the United States.

Overall, economic and psychological variables not previously included in economic studies of shopping behavior are important in explaining variation in coupon savings, grocery expenditures, and shopping time. We clearly need future analyses that combine these two areas of study in order to better understand the dynamics of shopping behavior.

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