The Value of Time Spent in Price-Comparison Shopping: Survey and Experimental Evidence

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The value that consumers place on time spent in price-comparison shopping is central to the economics of information theory and models of consumers' search behavior. Yet few empirical studies have examined consumers' subjective value of time. Building on Gary Becker's work, this article presents two tests of a model of the subjective value of time. In an effort to explain consumers' subjective value of time while they are price-comparison shopping, the model introduces perceived enjoyment of shopping as a new explanatory variable. The findings reveal that respondents incorporate both wage rates *and* perceived enjoyment of price-comparison shopping into their subjective value of time.

It is commonly accepted that opportunity costs affect the extent of consumers' price-search behavior (Stigler 1961; Urbany 1986), choice of travel mode (see Cherlow 1981 for review), search for employment (Fishe 1982), and other household production and consumption decisions (Strober and Weinberg 1980). Generally, the opportunity cost of time is measured by wages or income (Bryant 1988; Goldman and Johansson 1978; Gronau 1973; Lippman and McCall 1976). In addition, the value of time for nonworking individuals has been estimated by a variety of indirect approaches (see, e.g., Heckman 1979; Zick and Bryant 1983).

Wages alone, however, may not measure opportunity costs correctly if the consumer receives satisfaction or other benefits from price-comparison shopping. For example, previous research suggests that consumers shop for many different reasons (Guiltinan and Monroe 1980; Tauber 1972), that some consumers enjoy shopping (Beatty and Smith 1987; Hornik 1984), and that many consumers value the information acquired while shopping because it enables them to serve as both opinion leaders and sources of information for their acquaintances (Bloch, Sherrell, and Ridgway 1986). To the extent that price-comparison shopping is enjoyable and therefore is not viewed as a pure loss of leisure time, a consumer's wage rate may be an incomplete proxy for the opportunity cost of continued search. Properly defined, then, the opportunity cost of continued search may include wages and the value of other factors related to comparison shopping.

In accordance with this view, this article develops and tests a model of the subjective value of time in which it is possible for consumers to receive both price and nonprice benefits from price-comparison shopping. Throughout the article the term *subjective value of time* is used interchangeably with the term *opportunity cost of time.* The model is based on Becker's (1965, 1985) pioneering work on the allocation of time and goods in the household. As in Becker's model, we introduce a full-income constraint on consumer behavior, but, in contrast to the standard model, we recognize that some consumers derive utility from the process of price-comparison shopping.

The need to look beyond wages when measuring the opportunity cost of search is also suggested by the inconsistent results obtained in previous studies of consumers' search. Although there is some empirical evidence showing a negative relationship between wages and search (e.g., Cattin and Punj 1983), a number of surveys have found little or no evidence of an inverse relationship (e.g., Goldman and Johansson 1978). The inconclusive nature of the extant literature led one ar-

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ticle to recommend that consumers' subjective value of time (i.e., opportunity cost) be explicitly measured (Zimmerman and Geistfeld 1984). It is interesting that efforts to quantify the value that consumers place on their search time have not been forthcoming (cf. Srinivasan, Agrawal, and Grimm 1990), despite the long-standing need for a better understanding of how time costs are actually perceived by consumers (Feldman and Hornik 1981; Jacoby, Szybillo, and Berning 1976).

The next section extends Becker's model of the allocation of time and discusses the implications for price-comparison shopping. The analytical results that are provided serve as the basis for our research hypotheses. The model is then tested with a cross-sectional field survey (study 1). An experimental test is also conducted (study 2) to clarify and augment the cross-sectional results. The final section summarizes our findings and presents issues meriting future research.

A SHOPPING MODEL

Suppose a consumer receives utility, denoted by U, from goods consumed, G, and time spent shopping, S. The utility function, u, is

$$U = u(G, S). \tag{1}$$

Goods consumed by the individual are produced in the household according to the production function, g:

$$G = g(C, HE_h), \tag{2}$$

where C represents purchased goods, H represents time spent producing G, and E_n is the effort applied to the production of G. Effort affects production in the same manner that a time-saving technology might; that is, it affects the *degree* to which a given amount of household time is used in producing goods. In this sense effort is an efficiency variable. It may be treated either as a parameter or as a choice variable depending on the problem addressed. For example, as a time-saving technology it may be fixed until a new technology is developed, but, if effort is transferable across tasks and only a limited amount is available, then the consumer may face a choice of where to place the most effort. In this model, effort is treated as a fixed parameter without any loss of generality.

The budget constraint is the standard form used by Becker (1965):

$$PC = wM + V, \tag{3}$$

where w represents the wage rate, M represents the time spent working, V represents nonlabor income, and P represents the price of purchased goods. The price paid by the consumer is affected by the amount of price-comparison shopping. The relationship between search and the price of purchased goods, P, is

$$P = p(SE_s), \tag{4}$$

where E_s represents the effort transformation of search time. Again, effort will be treated as an efficiency parameter for the consumer. Additional search time lowers price, so the derivative of P with respect to search time, p_s, is negative.

The consumer's time constraint is

$$T = M + H + S, \tag{5}$$

where T is the total time available. Equations 3–5 may be combined to form the consumer's full-income constraint:

$$wT + V = p(SE_s)C + wH + wS, \tag{6}$$

where $wT + V$ is the consumer's full income, which is the monetary value of all of the time the consumer has available for productive activities plus nonlabor compensation. Although it is standard to use the full-income constraint to solve the consumer's choice problem, we will introduce the budget and time constraints separately to help show how both employed and unemployed individuals determine the subjective value of search time.

In this model, the consumer chooses C, S, H, M, the shadow cost of money income (λ_1), and the shadow cost of time (λ_2). The Lagrangian equation, $\mathcal{L}$, for this problem may be written as

$$\mathcal{L} = u[g(C, HE_h), S] + \lambda_1[wM + V - p(SE_s)C] + \lambda_2[T - M - H - S]. \tag{7}$$

The first-order conditions for a maximum are

$$C: \quad u_g g_c - \lambda_1 p(SE_s) = 0; \tag{8}$$

$$M: \quad \lambda_1 w - \lambda_2 = 0; \tag{9}$$

$$H: \quad u_g g_h E_h - \lambda_2 = 0; \tag{10}$$

$$S: \quad u_s - \lambda_1 p_s E_s C - \lambda_2 = 0; \tag{11}$$

$$\lambda_1: \quad wM + V - p(SE_s)C = 0; \tag{12}$$

$$\lambda_2: \quad T - M - H - S = 0, \tag{13}$$

where u_g is the marginal utility of consumption, g_c is the marginal product of purchased goods, g_h is the marginal product of search time, and u_s is the marginal utility of search time.

The first-order conditions form the basis of our analysis. Assuming an *interior solution,* which implies that the consumer is working ($M > 0$), then $\lambda_2 = \lambda_1 w$, from Equation 9. Substituting this result into Equation 11 and rearranging terms reveals the marginal condition for the time spent in price search. This equation may be expressed as

$$-p_s E_s C = w - u_s/\lambda_1. \tag{14}$$

The left-hand side of Equation 14 represents the marginal gain from searching for a lower price. In the empirical analysis below, only one unit of goods is purchased, so $C = 1$.

The right-hand side of Equation 14 is the marginal (opportunity) cost of additional search time. In the standard search model (see, e.g., Lippman and McCall 1976), the wage rate would be the only variable affecting the marginal cost of search. Because shopping time enters the utility function, however, the term u_s/λ_1 may enter to offset some of the lost wages. This term represents the dollar value of the marginal utility gained from price search. The numerator is the marginal utility of shopping time, and the denominator is the marginal utility of income in dollars. We may think of the ratio, u_s/λ_1, as the marginal rate of substitution between shopping time and income, which is the rate at which the consumer is willing to exchange shopping time for income when utility is held.

Implicit in the traditional model is that shopping time, like time spent at work, will reduce a consumer's utility because it reduces the amount of leisure time available. As a result, the opportunity cost of shopping time in the traditional model includes only forgone wages. In contrast, our model expects the consumer to equate the marginal gain from an additional hour of price-comparison shopping to the net opportunity cost of time. The net opportunity cost of time equals the wage rate *minus* the utility that the consumer derives from price-comparison shopping. If price search is a normal good, the model predicts that, as the net opportunity cost of time decreases, consumers will increase their search activity.

An alternative formulation of the value of price search arises if the consumer does not work ($M = 0$). If the consumer does not work, then Equation 9 implies that $\lambda_1 w - \lambda_2 < 0$ in equilibrium, which implies that $w < \lambda_2/\lambda_1$. By the envelope theorem, the multiplier, λ_2, is equal to the marginal utility of the total time available. Because λ_1 equals the marginal utility of income, the ratio λ_2/λ_2, is the dollar value of the marginal utility of time. If a consumer places a dollar value on his or her marginal utility of time that *exceeds* the wage rate when $T - H - S = 0$, then it is optimal not to work ($M = 0$). With no work, the equality developed in Equation 14 must be modified to an inequality:

$$-p_s E_s C > w - u_s/\lambda_1. \qquad \textbf{(15)}$$

Inequality 15 implies that the marginal gain from additional search for the nonworking consumer exceeds the market-determined opportunity cost of time, that is, when the market wage is used to measure the value of time. Inequality 15 becomes an equality when the market wage, w, is replaced by λ_2/λ_1. The no-work situation is important because, as discussed below, the subjective value of additional search time (the left-hand side of Equation 14 or Inequality 15) may exceed the average market wage of consumers.

EMPIRICAL ANALYSIS

The model developed above provides the theoretical basis for the research hypotheses to be tested in our empirical analysis.

H1: Consumers' subjective value of price-comparison shopping time will be positively related to their wage rates.

H2: Consumers' subjective value of price-comparison shopping time will be negatively related to their perceived enjoyment of shopping.

Another way of stating these hypotheses is to note that the subjective value of time is expected to be determined by the right-hand side of Equation 14 if consumers work and shopping time enters the utility function. To test these hypotheses, the subjective value of time or opportunity cost is defined as the hourly cost that each consumer assigns to time spent in price-comparison shopping once an acceptable brand and model has been selected. In this sense, the subjective value of time is a marginal concept because it refers to (additional) search after the particular brand and model have been identified.

Study 1

A Field Survey. There are two major reasons why the initial study makes use of a field-survey methodology. First, this methodology facilitates data collection from a sample of respondents who are likely to be employed. Because the relationship between consumers' wage rates and their subjective value of time is of focal interest, it is necessary to obtain a sample of working respondents. A second advantage of the field approach is that it allows us to survey consumers who are currently in the market for the target products. A recent shopping experience is expected to heighten consumers' interest in the survey, thereby improving the reliability and validity of their responses. It also ensures that the time tradeoffs (i.e., search time vs. household time, leisure time, or work time) associated with price-comparison shopping are salient to the respondents.

Selection of Product Categories. Two criteria guided the selection of product categories. First, the products had to be costly enough to warrant price-comparison shopping by a substantial proportion of consumers. Second, retail distribution of the products had to be sufficient in the target market to enable consumers to compare prices of specific brands and models at multiple stores. Televisions, video cassette recorders, and microwave ovens met these criteria.

Sampling Design. The population is defined as consumers in a southeastern U.S. city who bought a television, video cassette recorder, or microwave oven

TABLE 1

REGRESSION RESULTS OF STUDY 1

Variable	Hypothesis	Regression coefficient	*t*-Value	Effect size[a]	*p*-Value
Criterion variable of subjective value of time at $20:[b]					
Constant		44.02	6.01		.001
Wage rate	1	.55	2.22	.16	.027
Enjoyment	2	−4.15	−2.84	.20	.005
Criterion variable of subjective value of time at $40:[c]					
Constant		51.72	5.54		.001
Wage rate	1	.76	2.53	.16	.012
Enjoyment	2	−5.04	−2.69	.17	.008

NOTE.—The effects of sex, children at home, education, and marital status were also examined and found to be insignificant. Therefore, these variables were not included in the model.

[a]Effect size is the magnitude or degree to which a particular relationship differs from zero. The effect-size indicator used is η (Rosenthal and Rosnow 1984).

[b]Subjective value of time at $20 is $20 divided by the number of hours the consumer would be willing to spend price-comparison shopping in order to save $20. For the overall model, $F(2,195) = 7.18$, $p < .001$, $R^2 = .07$.

[c]Subjective value of time at $40 is $40 divided by the number of hours the consumer would be willing to spend price-comparison shopping in order to save $40. For the overall model, $F(2,232) = 7.67$, $p < .001$, $R^2 = .06$.

during a four-month period in 1987. Fifteen of the 20 local retailers of the target products allowed the study's interviewers onto their premises to distribute the survey. Two of the other five retailers permitted their own salespeople to distribute the questionnaire. The demographic characteristics of the respondents (i.e., age, education, and household income) did not differ significantly as a function of the method of data collection. Moreover, the demographic characteristics of the respondents are very similar to those of the population in the surrounding county.

Consumers were offered $5 for completing the survey. Two hundred thirty-five consumers provided a complete set of responses, representing a response rate of approximately 57.6 percent.

Criterion Variable. The dependent variable is the subjective value of price-comparison shopping time. Preliminary research suggested that consumers are more comfortable responding in terms of the number of hours they are willing to spend shopping to achieve a given amount of price savings rather than in terms of an hourly value of their time. The dependent variable is thus measured by asking each subject to indicate the amount of additional time that s/he is willing to spend to save an extra $20 ($40) on the purchase price of the chosen item (i.e., with brand and model held constant). This method enables us to hold the perceived price dispersion constant across respondents. This assumption was assessed by examining the correlation of respondents' perceived price dispersion with their subjective value of time ($r = -.003$ and $r = -.06$ for the $20 and $40 measures of subjective value of time, respectively). This result confirms the success of the measurement procedure and indicates that respondents did not allow their individual estimates of price dispersion to affect their responses to the criterion variable.

It is noteworthy that the measurement approach used in previous studies of consumers' prepurchase search would not have been adequate for our purposes. These studies have measured either the total time that consumers spent shopping or the information sources that they used. Both measures incorporate consumers' search for features and brands, whereas our dependent measure focuses exclusively on the tradeoff between price-search time and price savings. Consumers' subjective value of time is computed in two different ways: by dividing $20 by the time they would be willing to spend to save this amount of money, and by dividing $40 by the time they would be willing to spend to save this amount of money.

These two measures of subjective value of time were significantly correlated ($r = .77$). A pretest using 200 student subjects found that our measure of consumers' subjective value of time correlated with each of the four alternative measures considered in Srinivasan et al.'s (1990) study. Srinivasan et al. labeled their four measures opportunity cost of time, subjective cost of time, leisure value, and time pressure. The respective correlations with our criterion variable were as follows: .24, $p < .001$; .29, $p < .001$; .17, $p < .02$; and .20, $p < .005$.

Predictor Variables. Two predictor variables are examined in study 1—wage rate and shopping enjoyment. A single direct question is used to measure respondents' hourly wage rate. A total of four seven-point agree-disagree scale items were used to measure consumers' enjoyment of shopping ("I really enjoy gathering information before I make a purchase," "I really enjoy visiting stores before I make a purchase," "I really enjoy talking to salespeople before I make a purchase," and "Overall, I really enjoy shopping before I make a purchase"; $\alpha = .82$).

TABLE 2

CONSUMERS' SUBJECTIVE VALUE OF TIME VERSUS THEIR WAGE RATE

Variable	*N*	Mean	Mean difference (SE)	*t*-Value	*p*-Value
Study 1:					
Subjective value of time at $20	198	32.81	21.42 (2.32)	9.24	.001
Wage rate	198	11.39			
Study 1:					
Subjective value of time at $40	235	39.96	28.17 (2.93)	9.61	.001
Wage rate	235	11.79			
Study 2:					
Subjective value of time at $50	126	36.25	11.49 (2.26)	5.09	.001
Wage rate (adjusted for overtime)	126	24.76			

Results. The regression results using the two measures of consumers' subjective value of time are reported in Table 1. For the $20 savings question, there are 198 nonzero responses. For the $40 question, there are 235 nonzero responses. In each case the estimated model is significant at the 1 percent level, although the R^2 values are both less than 8 percent.

These regressions provide support for our first hypothesis. In each case the coefficient on wages is positive and significant at the 5 percent level. Moreover, a strict interpretation of Equation 14 suggests that the coefficient on wages is expected to be close to one. In fact, the results indicate that the absolute level of the coefficient for the wage effect ($.55 and $.76 for the two criterion variables) was not significantly different from unity.

The second hypothesis proposed that enjoyment of shopping lowers the subjective value of price-comparison shopping. Our results also support this hypothesis. In each regression the coefficient on the enjoyment variable is negative and significant at the 5 percent level. These findings suggest that consumers incorporate the qualitative aspects of price search into their subjective value of time.

One criticism that can be leveled at these results is that they implicitly hold the marginal utility of income constant. This is tantamount to assuming that the marginal utility of a dollar of price savings is constant across income levels. To test the validity of this assumption, we created an income dummy variable for each regression. The income dummy variable equals one if a respondent's income is greater than or equal to $25,000, and is zero otherwise. Because the enjoyment variable is scaled by the marginal utility of income, the dummy is multiplied by the enjoyment variable to test whether the coefficient on enjoyment is changing as income changes. In each case (for both criterion variables), the income-enjoyment interaction variable is insignificant ($p > .50$), which suggests that our assumption about the marginal utility of income is reasonable for our sample of respondents.

Supplementary Issue

The results of this research also lend insight into an anomalous finding in the literature on consumers' search behavior. A number of articles have suggested that the mean level of prepurchase search that is undertaken by buyers of durable goods is surprisingly low (e.g., Newman 1977; Wilkie and Dickson 1985) given the magnitude of price dispersion present in many product markets (Maynes and Assum 1982; Pratt, Wise, and Zeckhauser 1979). One possible explanation is that consumers value their time at a rate that exceeds the economic opportunity cost (i.e., wage rate). In accordance with this possibility, study 1 found a substantial difference between consumers' wage rates and their subjective value of time (see Table 2).

Two plausible accounts of this phenomenon are now considered. First, the subjective value placed on price-comparison shopping time may reflect the marginal, rather than the average, value of time. To the extent that consumers regard price-comparison shopping as another chore impinging on their scarce leisure time, they might be expected to base the value of this time on their overtime rate of pay (rather than on their normal wage rate). Study 1, however, did not examine the overtime rate of pay available to the respondents. Accordingly, study 2 includes the rate of pay at which overtime is available as an independent variable to test this explanation for the high mean subjective value of time observed in study 1.

It is interesting, however, that cross-sectional evidence of a relationship between overtime rate and subjective value of time may not be compelling because selection bias (Cook and Campbell 1979) may provide an alternative explanation for the relationship. Specifically, if consumers who *select* jobs that make overtime hours available at a premium wage rate tend to do so because they value their leisure hours less highly than their counterparts do, then the inference that overtime availability affects consumers' subjective value of time is spurious. Therefore, one reason why an experimental

design is employed in study 2 is that it provides a controlled test of the effect of overtime on consumers' subjective value of time.

A second explanation for the high subjective value of time reported by consumers in study 1 is that they may have wanted to avoid giving the impression that they were miserly. Because of this impression management (Schlenker 1980), consumers may have systematically understated the number of hours that they would be willing to spend on price-comparison shopping and thereby inflated their subjective value of time. Use of a role-playing experiment in study 2 helps overcome this problem and provides an unbiased comparison of consumers' mean subjective value of time and their mean wage rate.

Study 2

Our survey in study 1 did not examine the effect of overtime on consumers' subjective value of time. If overtime is available to respondents at a premium rate, then the relevant opportunity cost of time may increase to the overtime rate of pay (Dunn 1979). An additional hypothesis is suggested by this possibility:

H3: Consumers' subjective value of price-comparison shopping time is directly related to the rate (premium vs. normal) at which overtime employment is available.

A final prediction arises from the fact that the effect of an overtime premium may depend on the level of one's normal wage rate. For example, if one's normal wage rate is \$10 per hour, then an overtime premium of 50 percent (a common rate of pay for overtime work) increases the opportunity cost of time to \$15 per hour (i.e., a change of \$5 per hour). In contrast, if one's normal wage rate is \$30, then the overtime premium of 50 percent increases the opportunity cost of time by a greater absolute amount (i.e., from \$30 to \$45, or a change of \$15 per hour). A fourth hypothesis is suggested by these observations:

H4: The wage rate and overtime premium interact to affect the subjective value of price-comparison shopping time.

Experimental Design. The four hypotheses are tested with a $2 \times 2 \times 2$ between-subjects design. There are two levels of the wage rate (\$10 and \$30), two levels of overtime premium (50% premium to the normal wage rate, no premium to the normal wage rate), and two levels of enjoyment of price-comparison shopping (price-comparison shopping time is very enjoyable; price-comparison shopping time is not very enjoyable). The subjects were all nonacademic employees at a large southeastern university. Subjects were solicited individually and randomly assigned to the eight treatment conditions. A total of 126 respondents completed the required measures.

Procedures. The independent variables are manipulated by providing the subjects with a role-playing scenario, as indicated by the following instructions: "For the purpose of answering the question at the bottom of this page, please try to take the role of a person in the following situation. Your color television has broken, and you have decided to replace it. After visiting a couple of stores, you find the exact brand and model that you want to buy. The decision that you face concerns the amount of time that you now wish to spend on further price-comparison shopping. Remember, you have already decided what brand and model to buy. All that remains is to decide where to buy it." The remainder of the scenario entails the experimental manipulations followed by the measurement of the criterion variable.

Criterion Variable. As in study 1, the criterion variable is consumers' subjective value of price-comparison shopping time. It was measured as follows: "Assume that it would be possible to save \$50 if you were willing to spend the time. Please indicate the number of hours that you would be willing to spend comparing the price of the specific brand and model that you want at different stores to save an extra \$50." For a respondent who indicated five hours, we infer that the subjective value of time spent in price-comparison shopping is \$10 per hour.

Several possible covariates were also measured. Of primary interest is the respondents' own subjective value of time.[1] Because the experiment included a role-playing scenario, we expected respondents' own subjective value of time to anchor their responses to the dependent measure (Davis, Hoch, and Ragsdale 1986). Respondents' own subjective value of time was measured in a fashion parallel to that for the criterion variable (see Table 3).

Manipulation Checks. A pilot study of 142 student subjects was conducted to assess whether the manipulations were effective. Subjects were given aided-recall questions to test their awareness of the level of the three independent variables to which they had been exposed. For each independent variable, the percentage of correct responses was compared with the proportion that one would have expected to be correct if the subjects were merely guessing. The results supported the fact that the three independent variables were manipulated as intended (wage rate: $Z = 11.7$, $p < .001$; overtime: $Z = 11.9$, $p < .001$; enjoyment: $Z = 8.4$, $p < .001$).

Data Analysis. The above hypotheses are tested by way of regression analysis. The results, including the least-square means and sample size for the three main effects, are provided in Table 3.

[1]The other potential covariates were respondents' own enjoyment of shopping and their age and sex. None of these variables was statistically significant.

TABLE 3

REGRESSION RESULTS OF STUDY 2

Variable	Hypothesis	Regression coefficient	*t*-Value	Effect size[a]	*p*-Value
Constant		14.58	3.45		.001
Wage rate	1	11.24	3.19	.28	.002
Enjoyment	2	−9.80	−2.76	.25	.007
Overtime	3	6.87	1.95	.17	.053
Wage × overtime	4	2.05	1.18	.10	.240
Own subjective cost (covariate)[b]		.46	7.65		.001

	Least-square means[c] ($/hour)	Sample size
Wage rate:		
$10	30.43	67
$30	42.86	59
Enjoyment of price-comparison shopping:		
Do not enjoy	43.15	64
Enjoy	29.12	62
Overtime availability:		
Available at normal wage rate	31.86	56
Available at 50% premium to normal wage rate	39.76	70

NOTE.—The criterion variable was the subjective value of time at $50, i.e., $50 divided by the number of hours the consumer would be willing to spend price-comparison shopping in order to save $50. For the overall model, $F(5,120) = 18.87$, $p < .001$, $R^2 = .44$.

[a]Effect size is the magnitude or degree that a particular relationship differs from zero. The effect size indicator used is η (Rosenthal and Rosnow 1984).

[b]At the end of study 2, respondents indicated how much time *they* would be willing to spend comparing prices to save $75. Their own subjective value of time was calculated in a fashion parallel to that of the dependent measure.

[c]The least-square means are adjusted for unequal sample size per cell and the covariate.

Results. Hypothesis 1 predicted that consumers' wage rates are positively related to their subjective value of time. This hypothesis is supported ($t(120) = 3.19$, $p = .001$, $\eta = .28$), replicating the finding of study 1. Hypothesis 2 proposed that consumers who enjoy shopping will place a relatively lower opportunity cost on such activity. The results supported this hypothesis ($t(120) = -2.76$, $p = .006$, $\eta = .25$). Again, this finding corroborates the results of study 1.

The third hypothesis tested the effect of overtime premium. There is a significant effect of the overtime premium on shoppers' subjective value of time ($t(120) = 1.95$, $p = .05$, $\eta = .17$). This result provides empirical support for the idea that consumers' subjective value of time is a function of the opportunity cost of time. The fourth hypothesis pertained to the interaction of wages and overtime premium. Although the pattern of means was in the expected direction, we were unable to reject the null hypothesis ($t(120) = 1.18$, $p = .24$, $\eta = .10$).

The results pertaining to the two initial hypotheses are similar to the ones found in the previous study and support our shopping model. In addition, the fact that overtime premium is positively related to consumers' subjective value of time may help explain the finding in study 1 that consumers' mean subjective value of time exceeds their mean wage rate (see Table 2).

GENERAL DISCUSSION

Limitations and Suggestions for Future Research

This article examined three factors that have been linked theoretically to the value of shopping time to consumers. Although wage rate, overtime premium, and enjoyment of shopping each accounted for significant incremental variation in consumers' subjective value of time, there is much that we have not explained—for example, the R^2s are low in study 1 and less than 50 percent in study 2, our controlled experiment.

Among the explanations for the unexplained variance are the following possibilities. First, the fact that respondents tend to round off their estimates of their subjective value of time probably introduces measurement error into the criterion variable. Rounding of estimates of the subjective value of time would tend to reduce the observed correlations (and effect sizes) with the predictor variables. Use of a direct, dollar-metric measurement scale might improve the precision of this measure (e.g., "When you spend an hour comparing prices, you lose the opportunity to do something else with your time. What dollar value would you assign to the hour you lost because you

were shopping?"). A second possible explanation stems from the fact that respondents may have differed in their acceptance of the assumption that the identical brand and model would be available at another store (see Mittelstaedt and Stassen 1990). Respondents' skepticism of this assumption would be manifested in a lower willingness to search and a higher subjective value of time. In fact, 15 percent of the respondents estimated that their chosen model was available at just one store.[2]

Finally, other situational (Holbrook and Lehmann 1981; Hornik 1982), cultural (Graham 1981), and individual factors that affect consumers' subjective value of time may also remain to be identified. For example, recent research has shown that consumers differ in their inclination to pursue multiple activities at the same time (Kaufman, Lane, and Lindquist 1991). To the extent that consumers with a polychronic time orientation place a lower value on price-comparison shopping time, a factor that is systematically related to subjective value of time has been omitted from our studies. Future research into consumers' subjective value of time should examine its relationship to polychronic time orientation.

This study also focuses on price-comparison shopping for a specific brand and model.[3] Previous research highlights the possibility that the specific shopping context or problem framing may affect consumers' perceptions of value and their search intentions (Grewal and Monroe 1989). Thus, the broader issue of the subjective value of time spent on other purchase activities (e.g., waiting time in a checkout line, driving to stores) remains to be explored (Juster and Stafford 1991).

The gap between consumers' mean wage rate and their subjective value of time is also interesting. As Table 2 shows, including an overtime premium (study 2) reduces the difference between the subjective value of time and the wage rate by more than 50 percent. Thus, it appears that the overtime premium may exert an important influence on consumers' subjective value of shopping time when it is available. The presence of other compensation may similarly affect the relationship between consumers' wages and their subjective value of time. Specifically, retirement benefits raise the monetary value of work time to consumers. To the extent that these benefits are paid in a manner that makes them proportional to the number of hours worked, they change the consumer's effective subjective value of time. Future research should examine whether explicit mention of this factor would close the gap between wages and the subjective value of time further.

Although our model of consumers' subjective value of time accommodated both working and nonworking consumers, our empirical studies focused exclusively on the former. Both housewives and retirees constitute noteworthy consumer markets. Thus, the subjective value of time of nonworking consumers is an important issue and should be examined by future research.

Research Implications and Contributions

Of primary interest was the finding that consumers appear to incorporate the qualitative aspects of shopping into their subjective value of time. Two types of evidence support this conclusion. First, the enjoyment variable has an effect size comparable to that of the wage rate. Second, addition of this predictor significantly increases the amount of variance explained in consumers' subjective value of time. These results help to explain the weak relationship that has been observed between consumers' search and their wage rates (or incomes) in previous empirical research.

As noted earlier, the results of this research also lend insight into why a number of studies have found that the mean level of prepurchase search undertaken by buyers of durable goods is surprisingly low (e.g., Newman 1977; Wilkie and Dickson 1985) given the magnitude of price dispersion present in many product markets (Maynes and Assum 1982; Pratt et al. 1979). The fact that, on average, consumers' subjective value of time is affected by their overtime rate of pay and systematically exceeds their wage rates may help account for this discrepancy.

Another contribution of this article stems from its interdisciplinary approach to studying consumers' subjective value of time. In line with Hogarth and Reder's (1987) suggestion for improving social science research and fostering interaction between psychologists and economists, this article began by developing a model based on Becker's theory of the allocation of time. This model was initially tested by a survey methodology and was supported by these cross-sectional data (study 1). Next, we conducted an experimental investigation of this issue to control for unobservable factors that may have been present in the survey. Again, the results supported the model. Still, the second study did not collect process measures, such as concurrent verbal protocols or thought listing. To provide further insight into the process by which consumers assess their value of time, we conducted a follow-up study of a subsample (n = 30) of our previous respondents. The results clearly indicated that many consumers consider their wage rate, overtime premium, and enjoyment of shopping when assessing the value of price-comparison shopping time. In addition, the results suggest that some consumers may not view work as the next-highest-ranked alter-

[2]These two explanations were offered by an anonymous reviewer.

[3]A number of previous studies in the economics of information domain have been hampered by the fact that not all stores carry all brands and models (e.g., Maynes and Assum 1982). In contrast, this research asks respondents to project themselves from the point at which they have found the brand and model they prefer. Although, in one sense, this specific context represents a limitation of the study, one should also note that "it brings to this literature a much needed linkage to the reality of the marketplace." This point was suggested by an anonymous reviewer.

native use of their time. The subjective value of shopping time may then reflect the value of the next-highest alternative use of their time, such as a favorite leisure activity, and may explain part of the gap between consumers' wages and their subjective value of time that we observed in both studies. Thus, further research into the *process* by which these consumers assign a monetary value to their leisure time may be revealing and should be pursued.[4]

In conclusion, similar results were obtained by way of two distinct and complementary methodological approaches. Although most previous articles in this domain have been either analytical or empirical, the current research provides both a model and empirical evidence consistent with the proposed theory.

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[4]Respondents listed their thoughts pertaining to a direct question about how they placed a dollar value on time spent in price-comparison shopping. These responses were classified into six categories: the economic opportunity cost of time (six responses), the confidence in the efficiency of price search (seven responses), the disutility from shopping or lack of enjoyment of price-comparison shopping (six responses), valuing leisure time highly (nine responses), the belief that shopping detracts from household production (one response), and other (four responses).

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