INVESTIGATING THE DEMAND FOR NEW VEHICLE SERVICE CONTRACTS

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ABSTRACT

Extended warranties in the automotive industry, know as service contracts, have an average price of almost $1,200 with an average markup of 100 percent. Given these conditions, why do consumers decide to purchase these offerings? Using survey data collected from new vehicle buyers, we investigate a number of possible explanations. These explanations include the roles of consumer experience and risk attitudes, financing and vehicle usage, ability of the salesperson, and vehicle characteristics on the service contract purchase decision. Additional socioeconomic and demographic features are discussed.

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INTRODUCTION

Extended warranties in the automotive industry are known as service contracts. These contracts typically provide coverage after the base warranty has expired for up to 7 years or 100,000 miles but do not usually cover routine maintenance or repairs due to excessive use. These offerings are quite profitable as the markup on service contracts for new vehicles can reach upwards of 100 percent. According to Consumers' Checkbook, "…service contracts for automobiles produce big profit… On a contract for which you pay $1,000, the average payout for claims might be less than $250" (Consumers' Checkbook, 2007). In 2001, service contracts had an average retail price of $1,178 and provided dealers with an average profit of $548 (J. D. Power, 2001). There are also considerable profits from the sale of service contracts on used vehicles. The profits were nearly $1.9 billion for franchised dealers in 1997. The average gross profit on each of these contracts was $455 (Automotive News, 1998).

Despite the large mark-up on these offerings, roughly 30 percent of new and used vehicle buyers purchase a service contract (with penetration of 34.1 percent in 2004 according to NADA (2005)). It is intriguing that there is so much activity in the service contract market given that the vast majority of consumer experts state that these items are not a worthwhile purchase. The excessive cost and markup of service contracts has been noted by automotive guides (e.g. AAA, 2004 and 2002; Ultimate Car Book, 2002), general guides (Consumer Reports, 2005), and newspaper and magazine articles.[1]

The profitability of service contracts alone is a sufficient reason for firms to provide these offerings. Firms have stated additional reasons including enhancing brand image, providing the customer with more coverage, and increasing revenues (see Kelley and Conant, 1991). The questions arise on the consumer side of the purchase. The following questions are: Given the high cost of service contracts and

lack of endorsement from automotive guides, why do so many consumers purchase these items? What are the characteristics of these consumers and what attracts them to service contracts? Why do consumers purchase these service contracts when the expected benefits are so small relative to the costs?

Customers' reasons for purchasing these offerings include protection against breakdowns and a belief that the cost of a service contract would be cheaper than the cost of potential repairs. According to Ursula Moran, analyst for Sanford C. Bernstein & Company, two types of consumers purchase extended warranties. "One are the people who live paycheck to paycheck who don't want to deal with any extra expenses. The second kind are those who buy it for convenience." (St. Louis Post Dispatch, 1998) However, low income and convenience are not the only answers as to why these offerings are purchased.

Our primary goal is to investigate which factors are useful in discriminating between service contract purchasers and non-purchasers. To do this we collected information from new vehicle buyers using surveys administered at the point of purchase immediately following the sale. This data is likely to have less measurement error as dealership employees verify the type of vehicle and pricing information. Furthermore, the data may not exhibit the standard sample selection bias that may arise with surveys completed some time period after the sale, where it is possible that the more frustrated or disgusted customers are more likely to respond. A secondary aim is to propose what characteristics of buyers the business managers of dealerships may want to focus on to increase the likelihood of a service contract sale and ways to get these buyers into the dealerships.

This data on new vehicle buyers is used in testing the relative importance of five possible explanations for service contract demand. These explanations involve the predicted reliability and other vehicle characteristics, consumer experience and attitudes toward risk, myopic time horizons involving financing, the value of a working vehicle, and the ability of the salesperson to sell the contract. It is possible that some combination of these factors could lead to a service contract purchase. We find that measures of time preferences, experience, and risk are particularly important in determining service contract purchases, while the relative ability of the salesperson is statistically insignificant.

BACKGROUND AND RESEARCH DESIGN

The Purchase Decision

When buying a new car or truck, information regarding the service contract is not usually presented until the would-be consumer has decided on a vehicle. The usual order of events (as occurred at the dealerships involved with this study) is as follows: First the customer decides on a vehicle while dealing with a salesperson. Then the customer is taken to another employee, typically a business manager, who offers the service contract, presents financing options, and finalizes the total sale.

Some interesting techniques are often used in getting consumers to purchase service contracts. In one particularly noteworthy sales approach the business manager asks the consumer how much of a discount would they require to purchase the vehicle without a base warranty. Often the consumer states a value of roughly $1,500. The business manager then asks, "So isn't it worth (some amount less than the consumer stated) to double your warranty coverage with a service contract?"

The major limitations of service contracts were mentioned in the introduction: high cost, considerable markup, and limited coverage. However, there are some benefits to purchasing a service contract. These may include roadside assistance, coverage of some minimal routine maintenance, a 'loaner' vehicle during repairs, and transferability that can increase the value of the vehicle if the original buyer decides to sell it. Acknowledging that service contracts have some benefits, the anomaly lies in the fact that these consumers are willing to pay a rather large premium for this coverage.

Outline of the Research Design

We collected survey data on new vehicle buyers at the point of purchase after all purchase decisions have been finalized. Information about a number of consumer attributes was collected including length of financing, usage characteristics, product experience, maintenance effort, risk preferences, and demographic factors. Five dealerships in Richmond and Christiansburg, Virginia distributed the surveys. These dealerships sell the nameplates of Chrysler, Ford, Honda, Jeep, Mazda, Mercury, Plymouth, and Saturn. These vehicles have standard 3 year/ 36,000 mile base warranties. The data set has 173 usable observations.[2]

The survey is administered at the point-of-purchase, whereas existing work regarding service contracts for vehicles has used mailings. These mailings were done months after the vehicles were purchased and with limited follow-up. Additionally, we used incentives for both the new vehicle purchaser and the dealership for participating. These incentives included a cash payment or gift certificate (for $10) for the consumer and a cash reward of $250 for the dealerships.[3] Third, we not only look at data on new automobile purchases but also on new light truck purchases such as SUVs, pickup trucks, and vans. Previous research has ignored the light truck market, which has made up roughly 50 percent of the vehicles sold in the United States over the last decade. Because of these efforts, we are able to analyze the new vehicle market more completely. The data also have the potential to be 'cleaner' than the data used in previous studies as an employee at each dealership verifies the purchase information. Finally, the business managers have the actual buyer, that is the person paying or the primary borrower, complete the survey immediately following the finalization of the sale.

There were a few restrictions on the survey imposed by the dealerships. They would not distribute a survey that was longer than three pages. This limitation forced us to cut some questions from the original. More importantly, the dealerships limited the types of questions that could be asked. They did not want any questions that might affect the customers' decisions unless it might *increase* the likelihood of a service contract purchase. We were not able to ask any questions about perceived reliability or the availability of substitutes, such as the number of currently owned vehicles, for the new vehicle.

Theoretical Framework and the Choice of Empirical Model

The consumer decision to purchase a service contract can be modeled using a discrete choice framework. We use the following model as a motivation for the empirical analysis provided in the section titled "Predicting Service Contract Demand."

Let $U(x, \theta; d)$ be the individual's utility as a function of dollars, x, observable personal characteristics, θ, and a risk aversion parameter, d. We assume that $U(.)$ is an increasing and concave function of x.

The consumer has just purchased a new vehicle and is considering buying a service contract. π is the probability that the vehicle works, y is income, w is the dollar valuation of a broken vehicle covered by the base warranty, and v is the dollar valuation of a properly functioning vehicle. We assume that $v>w$. The price of a service contract is t and it provides additional coverage with a dollar valuation of s. Total coverage with a service contract is thus $w+s$.

We also make the following assumptions: $y>0$, $v>0$, $w>0$, $t>0$, $v>w+s$, and $s-t\geq 0$. This leads to the ranking of dollar valuations $y+v > y+v-t > y+w+s-t \geq y+w$. This ordering makes intuitive sense. It shows that the value of a working vehicle is greater than the value of a non-working vehicle regardless of the purchase of a service contract.

The consumer's expected utility without a service contract is:

$$EU_0(y,w,v,\pi,\theta;d) = \pi U(y+v,\theta;d) + (1-\pi)U(y+w,\theta;d) + \phi_0 \qquad (1)$$

where ϕ_0 is an unobservable component of utility.

The consumer's expected utility with a service contract is:

$$EU_1(y,w,v,t,s,\pi,\theta;d) = \pi U(y+v-t,\theta;d) + (1-\pi)U(y+w+s-t,\theta;d) + \phi_1 \quad (2)$$

where ϕ_1 is an unobservable component of utility that is independent of ϕ_0 but with the same distribution.

The consumer will purchase a service contract if and only if

$$EU_1(y,w,v,t,s,\pi,\theta;d) > EU_0(y,w,v,\pi,\theta;d). \qquad (3)$$

Therefore, the probability of a service contract purchase is

$$\text{Prob}\{\phi_1 - \phi_0 > \pi U(y+v,\theta,d) + (1-\pi)U(y+w,\theta,d) - \pi U(y+v-t,\theta,d) - (1-\pi)U(y+w+s-t,\theta,d)\} \quad (4)$$

If $\phi_1 - \phi_0$ is logistically distributed then we can use a logit model to empirically test this theory.

A similar modeling technique to investigate service contract purchases is used by Padmanabhan and Rao (1993), where they provide a consumer utility model that is tested using a binary logit model. Rao (1995) follows in an analogous manner.

The consumer purchase decision is binary in nature; either the service contract is purchased or it is not. Using a standard linear regression in this context, known as a linear probability model, suffers "…from a number of shortcomings." (Greene, 2003) He notes a serious flaw is that the predictions from the model may not look like probabilities. Furthermore, these predicted values are not constrained to the 0-1 interval. Using a logit model assures that the predicted values lie in the 0-1 interval. The predicted values of the independent variable can be interpreted as probabilities, with values closer to zero indicating a low probability of a service contract purchase and values closer to one indicating a higher likelihood of such a purchase. The empirical models are described in more detail in section titled "Predicting Service Contract Demand."

EXPLAINING SERVICE CONTRACT DEMAND

Table 1 presents five possible explanations for consumers' demand for service contracts. These explanations will be evaluated using the variables listed. The five explanations are tied to the characteristics and parameters described in the discrete choice model of the previous section. The first explanation, *perceived vehicle reliability*, relates to π, the probability the vehicle works. Explanation 2, *experience and risk aversion*, relates to d, the risk aversion parameter. Explanation 4, *value of a working vehicle and usage*, relates to v and w, the values for a working and non-working vehicle. The *business manager's abilities*, explanation 5, to sell the service contract, particularly on negotiating prices and coverage levels, relates to the values of s and t, contract coverage and price. Finally, aspects of explanations 2, 3, and 4 relate to the vector of observable personal characteristics, θ, in the theoretical model.

TABLE 1
POSSIBLE EXPLANATIONS FOR SERVICE CONTRACT DEMAND

Explanation 1	Consumers who purchase vehicles with lower reliability purchase service contracts as insurance against a greater likelihood of future repairs. *Variables: reliability, import, suvpick, price*
Explanation 2	Consumers with little experience or knowledge of new vehicles or service contracts view such contracts as reasonable purchases. *Variables: risk, firstvehicle, previousSC, knowledge*
Explanation 3	Consumers purchasing service contracts are myopic in regards to monthly payments for the new vehicles. Additionally, these consumers are interested in having the vehicle covered by some sort of warranty for the expected length of owning the vehicle. *Variables: loanduration, length*
Explanation 4	Consumers that may have a higher value of a working vehicle, such as those who use the vehicle for work, and those consumers who expect above average usage levels are more likely to purchase service contracts. *Variables: primaryuse, purchaser, familysize, over16, oilchange*
Explanation 5	The ability of the business manager to sell the service contract plays an important role in the consumer's decision-making process. *Variable: manager*

Perceived Vehicle Reliability

Explanation 1 suggests that consumers who perceive their vehicles as being unreliable or prone to breakdowns will purchase service contracts as a form of insurance against these future expenditures. A number of variables are used to assess this explanation. *Reliability* is the predicted reliability for the vehicle as listed in Consumer Reports. If the vehicle is a new model and therefore does not have a prediction available, the average of the similar body styles for that manufacturer is used. *Import* indicates if the vehicle has a foreign nameplate. This is included as domestic automobiles have had more registered complaints than imported vehicles (see Douglas, Glennon, and Lane, 1993) and has been used in a previous empirical study (Padmanabhan and Rao, 1993). *Price* of the vehicle, in thousands of dollars, is included here as in other studies (Padmanabhan, 1995; Padmanabhan and Rao, 1993; Eckel et al, 1998) because increasing prices and repair costs make service contracts more 'attractive' (Day and Fox, 1985). It is of some interest to note that this reasoning may imply that more expensive vehicles, for a given base warranty, would not be

considered of a higher quality than lower priced vehicles. *Suvpick* is a binary variable indicating if the vehicle is a sport utility vehicle or pickup truck. These vehicles are typically portrayed as being more rugged than cars or minivans. Buyers of light trucks may therefore feel the vehicles are more reliable.

Experience and Risk Aversion

Explanation 2 asserts that individuals that have less experience or knowledge of vehicle repair frequencies and costs are more likely to purchase service contracts. *Firstvehicle* is a binary variable indicating if this is the first vehicle that the consumer has purchased at a dealership. These consumers may be unfamiliar with service contracts or the techniques used to sell these items. *Firstnew* is a binary variable indicating if this is the first new vehicle that the consumer has purchased. *PreviousSC* measures how frequently each consumer has purchased service contracts for previous vehicles. *Knowledge* is a self-reported measure by the consumer as to how knowledgeable they are compared to the 'average' new vehicle buyer regarding the frequency and costs of repairs. Consumers who consider themselves more knowledgeable than the average buyer may have consulted buyer's guides while investigating the market and found sections in these guides recommending against a service contract purchase.

Consumers with higher degrees of risk aversion are more likely to purchase service contracts (see Eckel et al, 1998; Padmanabhan, 1995; and Padmanabhan and Rao, 1993). The consumer's attitude toward risk is measured according to their response to a hypothetical situation involving trip insurance. The vehicle buyer was asked what they would be willing to pay for insurance (a refund) against the possibility of a cancelled trip.[4] This variable is denoted *risk*.

Discounting and Duration

Explanation 3 suggests that increasing loan durations and customers who intend to own the vehicle for longer time spans are increasingly likely to purchase service contracts. *Loanduration* measures the length of the loan in years. Financing can increase the likelihood of a service contract purchase because the marginal increase in the monthly payment due to the service contract is a small percentage of the payment. As the loan duration increases, the decrease in the absolute size of the monthly payment due to the service contract appears relatively small and thus the service contract may appear to be a more attractive purchase. This suggests myopia in the sense that these consumers may focus on keeping the monthly payment under a certain amount, rather than assessing the full cost of the service contract. They may view these smaller payments for the service contract as inconsequential. It may also be the case that individuals that need longer loans cannot afford the larger monthly payments associated with shorter loans. These consumers may have difficulty in saving funds to cover future repairs. A related topic is expected length of ownership (denoted *length*). Individuals who intend to keep the vehicle for longer periods may want the vehicle to be covered under some sort of warranty protection for as long as possible. This relates to loan duration as individuals may want to be assured of some coverage for the length of their loan.

Value of a Working Vehicle and Usage

Explanation 4 contends that those consumers who have a high value for a working vehicle or expect 'above average' usage will have a greater likelihood of a service contract purchase.[5] As indicated earlier, some contracts provide a loaner

vehicle for a consumer's vehicle that is being serviced under a contract. *Primaryuse* is a binary variable indicating if the vehicle was purchased solely for business purposes. Customers that purchase a vehicle for business use tend to have a greater need for a working vehicle (see Padmanabhan 1995). *Familysize* indicates the number of people living in the household. This is included as the larger the household the more likely a service contract will be purchased (Day and Fox, 1985). *Over16* indicates the number of children in the home who are sixteen years of age or older. As the number of possible drivers in the home, particularly teenage drivers, increases then the usage level is likely to increase leading to a greater likelihood of a service contract purchase. *Purchaser* is a binary variable used to identify customers who purchased the vehicle for another person, where examples include buying the vehicle for a child or a parent. Gift vehicles are often given to individuals, primarily children, who do not have the means to pay for vehicle repairs. Finally, *oilchange* indicates the interval, in thousands of miles, between expected oil changes for the new vehicle. Increases in this interval may be indicative of a buyer who does not follow the suggested routine maintenance. These consumers may be more likely to buy a service contract to insure against future repairs due to this lack of maintenance.

Business Managers' Abilities

A fifth possible explanation is that the consumer's decision to purchase a service contract is affected by the business manager's ability to sell the offering. There is one primary business manager finalizing sales and presenting service contract offerings at each of the dealerships. As there are five dealerships involved in the study, four *manager* dummy variables are used in the model to represent each of the business managers.[6] These variables are included to investigate whether any of the managers are particularly successful at selling service contracts, ceteris paribus. There is no a priori prediction as to the direction or magnitude of the coefficients of these variables. The vehicle characteristics are controlled for and discussed in section 3.1.

Sociodemographic Characteristics

In addition to the variables discussed in the possible explanations, sociodemographic variables are used in the empirical analysis. A number of studies (see Gerner and Bryant, 1980; Bryant and Gerner, 1982; Padmanabhan and Rao, 1993; and Padmanabhan, 1995) indicate that family income and service contract ownership are related. *Income* is a measure of household income. *Married* and *age* indicate if the consumer is married and the consumer's age. Both of these variables have been used as proxies for experience in earlier articles. Day and Fox (1985) discuss how the aging of the US population should lead to a decreased demand for service contracts as this should tie with consumers becoming more experienced with the product. *Education* is a measure of the consumer's level of educational attainment. One might expect that consumers with higher levels of education may spend more time researching their new vehicle purchase and service contracts and discover the high mark-ups for these offerings. However, it's possible that individuals with higher levels of education have higher opportunity costs of their time (although this is likely more accurately captured by the income variable). These individuals therefore would not want to spend time searching for mechanics or dealing with delays from vehicles in need of repair. Finally, the sex of the consumer is included in the analysis. *Female* is a binary variable indicating whether the consumer is a woman. Considerable research suggests that there are gender differences in risk perception (Slovic (2000) provides a thorough review). He states that the general result is

"…men tend to judge risks as smaller and less problematic than women do." Along with perceived differences in risk attitudes, there exists a stereotype that women are generally less knowledgeable about vehicle repairs than men. Also, it has been suggested that a woman may be more likely to purchase a service contract to avoid being 'taken advantage of' by a mechanic, i.e. charged for unnecessary repairs or charged more for a given repair. After controlling for risk attitudes and perceived knowledge about repair rates, we attempt to investigate for any additional gender differences.

THE DATA AND EVALUATING THE POTENTIAL EXPLANATIONS

Data Summary

The data set consists of 173 usable observations using survey responses collected at the point of purchase. The nameplates of the vehicles purchased include Chrysler, Ford, Honda, Jeep, Mazda, Mercury, Plymouth, and Saturn as discussed in section 2.2. Table 2 provides summary statistics for some demographic variables and characteristics of the vehicles purchased.

TABLE 2
DESCRIPTIVE STATISTICS

% Who purchased a service contract	42.20	(0.50)
Mean age in years	45.22	(13.25)
% Married	68.80	(0.47)
% Female	47.40	(0.50)
Mean number of household members	2.38	(1.41)
Mean vehicle price	24687.49	(5727.66)
% of first-time new vehicle buyers	16.80	(0.38)
% Who purchased imports	34.10	(0.48)
% Who purchased an SUV or pickup	48.00	(0.50)
% Who financed vehicle with a loan	84.40	(0.36)
Mean length of loan in years	3.96	(1.86)
Mean self-rating of knowledge of vehicle repairs on a 6 point scale	3.74	(1.23)

Note: Standard deviations in parentheses

Notice that 42 percent of the sample purchased service contracts, which is above the national average. This is not entirely surprising. Some of the makes included in the study have high nationwide contract penetration, such as Plymouth with 44 percent, Saturn 42 percent, and Chrysler 39 percent. Furthermore, in a study by JD Power and Associates, new vehicle buyers in Virginia purchased more contracts than the national average (see JD Power, 2002). Additionally, the average loan duration is roughly 4 years, 47 percent of the new vehicle buyers are women, and the average family size is roughly 2.4 people. The consumers rated themselves as being significantly (statistically) above average regarding their knowledge of new

vehicles. Note that the mean of the consumers' stated *knowledge* is 3.74 as opposed to the average consumer knowledge of 3.5. [7]

Predicting Service Contract Demand

The possible explanations are assessed using logit empirical models. The binary dependent variable, labeled *SC*, indicates whether a service contract was purchased at the time of the vehicle purchase. Model 1 of table 3 presents the results of a logit model of a linear function of the explanatory variables described in section 3 along with an interaction term of *female* and *married*. The overall χ^2 value does not indicate that the model is significantly overfit, yet 16 of the 26 explanatory variables

TABLE 3
COEFFICIENTS FROM LOGIT ESITMATIONS ON *SC*

Explanatory Variables	Model 1		Marginal Effects	Model 2		Marginal effects
Reliability	-0.372	(0.254)	-0.086	-0.374**	(0.149)	-0.086
Price	0.006	(0.044)	0.001	-	-	-
Suvpick	-0.593	(0.547)	-0.137	-	-	-
Import	-1.506	(2.020)	-0.347	-	-	-
Length	0.281	(0.198)	0.065	0.287	(0.179)	0.066
Loanduration	0.572***	(0.157)	0.132	0.529***	(0.149)	0.122
Risk	0.697**	(0.297)	0.161	0.762***	(0.282)	0.176
Firstvehicle	2.526**	(1.398)	0.582	1.985*	(1.157)	0.459
Firstnew	0.355	(0.676)	0.082	-	-	-
PreviousSC	0.840***	(0.323)	0.194	0.825***	(0.285)	0.191
Knowledge	-0.423**	(0.187)	-0.097	-0.424**	(0.172)	-0.098
Over16	1.066	(0.425)	0.246	0.832**	(0.374)	0.192
Primaryuse	0.317	(0.641)	0.073	-	-	-
Purchaser	-0.221	(0.561)	-0.051	-	-	-
Familysize	-0.238	(0.178)	-0.055	-	-	-
Oilchange	-0.590**	(0.295)	-0.136	-0.481*	(0.285)	-0.111
Income	-0.319	(0.203)	-0.073	-0.309*	(0.166)	-0.071
Age	0.001	(0.020)	0.000	-0.003	(0.017)	-0.001
Female	1.489**	(0.823)	0.343	1.406*	(0.783)	0.325
Education	0.032	(0.197)	0.007	-	-	-
Married	1.708**	(0.784)	0.394	1.284**	(0.693)	0.297
*Female*Married*	-1.678*	(0.943)	-0.387	-1.602**	(0.910)	-0.370
Manager1	0.472	(0.815)	0.109	-	-	-
Manager2	0.730	(1.624)	0.168	-	-	-
Manager3	1.135	(2.051)	0.262	-	-	-
Manager4	-0.473	(1.174)	-0.109	-	-	-
Constant	-1.134	(2.131)	-	-1.559	(1.615)	-
Wald overall χ^2	65.150			58.880		
Pseudo-R^2	0.277			0.250		
Ln Likelihood	-85.225			-88.361		

Notes: Standard errors in parentheses; ***p < 0.01, **p < 0.05, *p < 0.10

are not significant at the 10 percent level of significance.[8] To simplify matters, model 2 reports the estimation results after removing variables with little predictive power.

We use an ad hoc approach suggested by Zikmund-Fisher and Parker (1999) to eliminate these variables. This approach consists of removing variables singly and continuing this process until any additional removal would have decreased the pseudo-R^2 by more than 0.005. We verified that none of the removed variables should re-enter the analysis.

Likelihood ratio testing confirms that the coefficients of the removed variables were insignificantly different from zero. The value of the test statistic is 6.27 with a p-value of 0.9018.[9] The marginal effects given for each model in the table are calculated at the means of the regressors. These effects indicate the change in the probability of a service contract purchase from a one unit change in the independent variable of interest. Note that the two largest marginal effects are for the dummy variables *firstvehicle* and *female*. These results will be discussed in greater detail below.

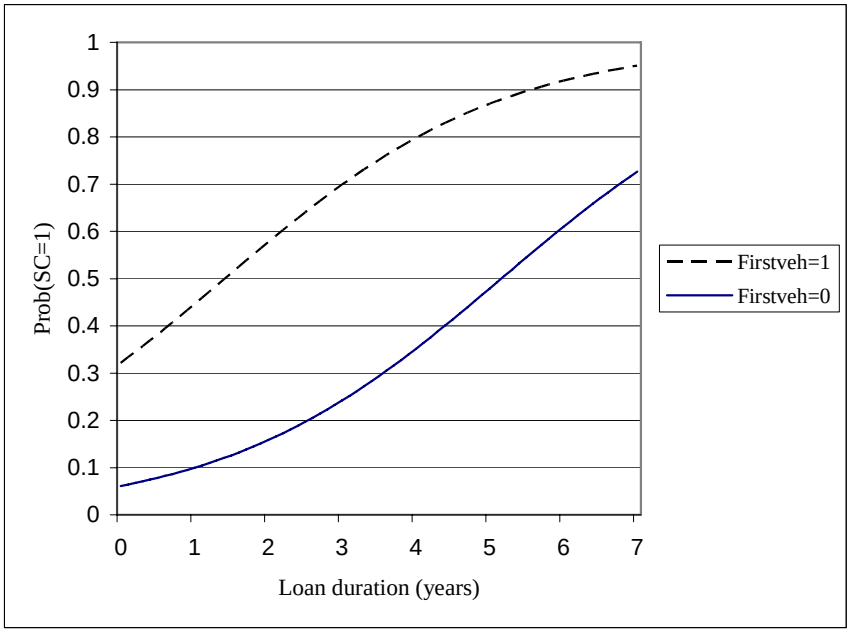
There is limited support for the role of vehicle characteristics in explaining service contract demand. The price of the vehicle, import status, and the vehicle being an SUV or pickup were dropped in model 2 due to insignificance. The predicted *reliability*, however, is significant and has the expected sign. This suggests that consumers who purchase vehicles with higher predicted reliability are less likely to purchase service contracts.

There is evidence of more solid support for the effects of loan duration and length of ownership on service contract purchases. *Loanduration* and *length* of ownership have the expected signs. Loan duration is strongly significant in distinguishing between contract purchasers from non-purchasers. A plausible explanation is that new vehicle buyers are myopic in their payment schedule, focusing on not spending more than some certain amount per month. This could prove costly as service contracts are somewhat expensive and financing their purchase over longer periods increases that cost.[10]

The importance of risk attitudes and experience with both vehicles and service contracts is considerable regarding current service contract purchase decisions. Increases in risk aversion and being a first-time vehicle buyer increase the chance of a contract purchase. Figure 1 shows the probabilities of a service contract purchase as a function of loan duration, evaluated at the means of the other explanatory variables, for first-time vehicle buyers and experienced buyers. This indicates that first-time buyers are much more likely to purchase a service contract over the possible loan durations (minimum marginal effect of 0.225, maximum of 0.459). As expected, consumers who felt they were more knowledgeable about repair frequencies and costs were less likely to buy service contracts. However, the positive and significant coefficient on *previousSC* suggests that consumers who purchased service contracts for previous vehicles are more likely to purchase a contract for the current vehicle.

There is limited support for the fourth possible explanation. *Primaryuse*, *purchaser*, and *familysize* were dropped from the analysis. Having children 16 years of age or older in the household does have the anticipated positive relationship. The negative coefficient on *oilchange* may come as a surprise as it suggests that consumers who change the oil in their vehicle less frequently are less likely to purchase a service contract.

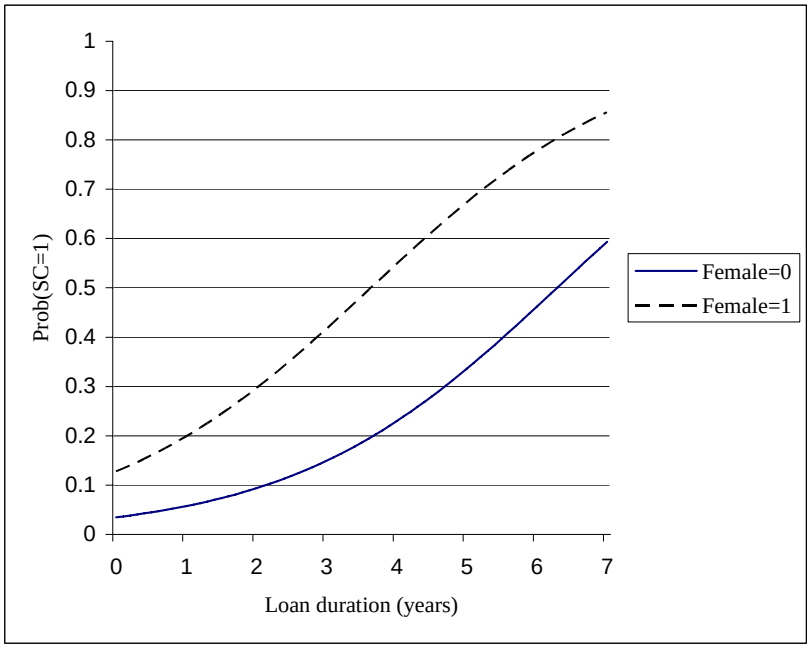
FIGURE 1
EFFECT OF FIRST VEHICLE PURCHASED ON PREDICTED PROBABILITIES



The insignificance of all of the *manager* variables indicates no support for the explanation that any given business manager plays an important role in the consumer's decision-making process. This result suggests that none of the managers were particularly more effective at selling service contracts. The lowest p-value for any of the *manager* variables is 0.562.

Finally, a number of the sociodemographic variables were necessary in the reduced model. The negative and significant coefficient on *income* provides evidence that higher income households choose to self-insure rather than purchase service contracts.[11] The significance of the *female* and *married* variables is interesting. Both have a positive affect on the likelihood of purchasing a service contract. We have attempted to control for the two most common factors involved in stereotypes regarding women in this context: risk aversion and knowledge of vehicles.[12] However, women still appear more likely to purchase service contracts. Figure 2 shows the probabilities of a service contract purchase as a function of loan duration, evaluated at the means of the other explanatory variables, for males and females. The effect of the female variable is substantial. The marginal effects range from a minimum of 0.093 with no loan to a maximum of 0.338 with a loan of 5 years, the most common loan duration. However, a look at the effects of *female* and *married* simultaneously provide the following ordering of least to most likely to purchase a service contract, ceteris paribus: single male, married female, married male, single female.

FIGURE 2
EFFECT OF FEMALE ON PREDICTED PROBABILITIES



MANAGERIAL IMPLICATIONS

The results from the previous section suggest that none of the managers were particularly more effective in selling service contracts. An inference is that the managers may use quite similar techniques in attempting to sell the contracts. The purpose of this section is to propose what characteristics of buyers the managers may want to focus on to increase the likelihood of a service contract sale and ways to get these buyers into the dealerships.

The data indicate that first time vehicle buyers are more likely to buy service contracts, as well as lower income consumers. In many cases these buyers are one and the same, as first time buyers are usually younger persons at the start of their careers. It would therefore likely benefit the dealership to undertake measures to get these types of buyers into the dealership. This could include "discounts" for recent graduates or first time buyers and may provide a rationale for these offerings, which appear periodically.

The results also indicate that women are more likely to purchase service contracts. In this case the dealership may want to undertake advertising that appeals specifically to single women in an attempt to get them into the dealership. The manager may wish to try innovative techniques to lure these buyers and those discussed in the previous paragraph. As odd as it may sound, the dealership could offer a "singles night." This technique first received prominence after its success in Germany's Wal-Mart stores. The concept arose when store associates, "…overheard a

female customer talking about how difficult it was for her to meet interesting single men on a Friday night." (Bhatnagar, 2005)[13]

Another angle that the astute manager should address is the number of driving age children in the household. Simply asking the potential buyer if he or she has any children, and if so their ages, will likely bear fruit. The data reveal that new vehicle buyers with driving age children are more likely to buy service contracts. The manager can point out the possibility of excessive use by the children. The manager may even mention the greater likelihood of accidents by young drivers. While a service contract does not cover accidents, parents may generally feel that the greater the coverage the better.

Managers usually point out how "little" the monthly payment is affected with the addition of a service contract. To that end, managers should recommend that buyers finance their purchases with longer loan durations. In fact, this method can increase revenues in two ways: increased revenues due to the accrual of interest and the greater likelihood of selling a contract.

Note the effect that being married has on the likelihood of a service contract purchase. Ceteris paribus, the married male is the most likely to buy a contract. Managers may want to give the assurance of service contract coverage as an effective and convenient method of taking care of problems that may arise with the vehicle. In this manner the buyer or spouse will not need to worry about whom to contact if problems arise.

CONCLUSION

Previous research into the demand for service contracts for new vehicles found that a limited number of factors affect the purchase decision, primarily risk attitudes, marital status, vehicle price, and whether the vehicle is purchased for business purposes. While I find similar support for risk aversion and the role of marital status, my results suggest that a number of additional factors are also important. The first involves the financing of the vehicle. Increasing loan duration has a positive and significant effect on the likelihood of a service contract purchase. The second involves an understanding of the probability and costs of future repairs, and experience with vehicle buying. Familiarity with these items has a significantly negative effect on service contract demand. However, there is the finding that previous service contract buyers are more likely to buy a service contract for their new vehicle as well. Third, we find that additional sociodemographic characteristics, such as gender, income, and children of driving age in the household are significant factors affecting the purchase decision. Women and new vehicle buyers with driving age children are more likely to buy service contracts, ceteris paribus, while higher income buyers are more likely to self-insure. Finally, particular business managers at the dealerships did not play a statistically significant role in the consumer decision to purchase a service contract. However, this does not rule out the possibility that the managers have similar sales techniques, and therefore focus on selling the contracts to certain new vehicle buyers regardless of the type of dealership. We provided a discussion of the implications of the results for managers and possible methods for increasing the number of service contract buying customers.

ENDNOTES

1. Service contracts have also been mentioned in popular culture. Columnist Dave Barry writes, "Stores *love* service agreements, for the same reason you'd love to have money fall on you from the sky." (Richmond Times Dispatch, 2001) In the animated TV show "The Simpsons", Moe drives a crayon into Homer's brain to make him stupid. Moe decides that he has driven the crayon far enough when Homer declares, "Extended warranties, how could I lose?"
2. Out of 191 surveys collected. 16 surveys were missing information and the remaining 2 were not eligible for service contracts (right-hand-side steering columns). This leaves 173 usable observations (191-16-2=173). Additionally, the dealerships were not willing to give exact sales figures for the period to us. However, we distributed 200 surveys. 9 were returned uncompleted.
3. The consumers received the cash or gift certificate upon completion of the survey. Each of the dealers received their payment upon agreeing to participate in the study and were required to distribute a minimum of 30 surveys.
4. The question involved a menu of prices and asked the consumer whether they would be willing to pay for the trip insurance. In percentage terms, the prices available ranged from was 66.7 to 133.3% of the expected loss.
5. 'Above average' usage includes heavy stop and go driving, driving during adverse weather conditions, driving abusively such as frequent hard accelerations, etc.
6. To clarify, the reader could interpret each of the *manager* dummies as representing each of the dealerships involved in the study. It is plausible that the dealer, not the manager, ultimately determines the effectiveness of the service contract sales effort.
7. The p-value of a two-sided means test of the null hypothesis *knowledge*=3.5 is 0.011. The rating system is a 6 points scale, with a value of 1 labeled as "know very little" to a vale of 6 labeled as "fully knowledgeable."
8. In both models the regressions are significant overall, where the χ^2 in each case is a Wald test of the hypothesis that all of the slope coefficients are equal to zero. For more information see Zikmund-Fisher and Parker (1998).
9. The coefficients and marginal effects of the remaining variables in column 2 were quite stable across the reduction suggesting that the explanatory power of the remaining variables is considerable.
10. While the *length* coefficient is not statistically significant at the 10 percent level, note the p-value of 0.108.
11. This result is contrary to that of Padmanabhan and Rao (1993) who report a significantly positive effect of income on service contract purchases.
12. Means testing of *risk* did not indicate significant differences in the values of the males and females (two sided p-value 0.751). However, males stated a significantly higher (3.99 vs. 3.48) *knowledge* of repair frequency and costs (two-sided p-value 0.007).
13. According to Amy Wyatt, spokeswoman for Wal-Mart's international operations, this has considerably boosted foot store traffic and sales in Germany. (Bhatnagar, 2005) The campaign has since been launched in South Korea, Puerto Rico, and the United Kingdom. (Noe, 2005).

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