What factors most affect a customer's decision to purchase a vehicle service contract?

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I. **<u>INTRODUCTION</u>**

Risks are everywhere. You can't really escape them. Faced with the inevitability of risk, we have two basic ways of dealing with it: doing something to reduce the risk or doing nothing. When buying a vehicle, there's always a risk that your vehicle will experience a mechanical breakdown. And when it does happen, the expense of the breakdown may surprise you.

In the process of buying a vehicle, a customer may be offered a chance to purchase an "extended warranty" or a service contract. With a vehicle service contract you pay only a small deductible per covered repair instead of paying the entire repair bill. Although many car insurance experts and economists debate whether or not buying a service contract is worthwhile, it certainly helps lessen the risk of paying huge repair bills in the long run. According to Endurance Warranty, a vehicle service contract provider, the average cost of an extended car warranty would be around the range of $1,800.

The purpose of this project is determine which factors most affect a customer's decision to buy a vehicle service contract. The motivation behind doing this project is to see if age and gender had any effect on the purchasing of vehicle service contract. This information could will be very useful to car dealerships, vehicle service contract providers and salesmen.

II.   <u>REVIEW OF RELATED LITERATURE</u>

There are a number of studies that look at the effects and benefits of purchasing a vehicle service contract. Most of the models done by econometricians are fairly limited in scope because there is many possible reasons and variables that could go into choosing to purchase a vehicle.

A study by Ram C. Rao and V. Padmanabhan entitled "Warranty Policy and Extended Contracts: Theory and the Application to Automobiles" (1993) investigates manufacturer warranty policies, vehicle service contracts and their effect on consumer behavior. They obtain a random sample of manufacturer's warranty contracts, and then make connections the extended service contract. The model's implications for consumer behavior are examined using data obtained from a sample of recent buyers of new cars. Some independent factors used in their econometric analysis included: price of a new car, length of manufacturer's warranty, price of an extended service contract, average length of an extended service contract, percentage of single respondents, and percentage of risk-averse respondents . The role of risk in consumer behavior with respect to choice of extended service contracts, and the allocation of effort for maintenance are found to be consistent with the model's predictions. The analysis shows the main factor that put demand on extended service contracts is the extent of manufacturer warranty. The paper ends with a call for further study.

Other articles reviewed were excessively outside the scope of my project. Most were too explicit to be relevant here or too entangled in the legal side of service contracts. With this project I intend to go in a slightly different direction than Padmanabhan and Rao did with their paper. I will investigate more into the age and gender effects on the purchase of service contracts.

III. <u>MODEL</u>

The research analysis method used here is ordinary least squares (OLS). In this study,

data was gathered at one locally owned car dealership over a period of a few weeks in March and

April. The unit of observation is one transaction of a vehicle purchase. The dependent variable is

whether a customer purchased a service contract on their vehicle. The independent variables used

in this econometric analysis are described below, along with the prediction about the effect of

each on the dependent variable.

Value:

Estimated value of the vehicle purchased, measured in dollars (excluding tax, title and fees). All

values were estimated by Kelley Blue Book (www.kbb.com),I expect that this variable will have a

positive effect on the sale of service contracts because the higher the price of vehicle , the more you

would want to protect your investment. Positive coefficient expected.

Age:

Determine if age is a significant factor. The intuition behind this factor is that usually with age,

comes the financial resources to purchase a service vehicle contract, to have sense of security that

service contracts provide. Positive coefficient expected. Measured in years.

Gender:

This is a dummy variable with males omitted. Perhaps females are more likely to purchase

contracts to avoid the risk of the vehicle breaking down.

NEW/USED :

Is the car purchased new or used? Most times a brand new car already comes with a

manufacturer's warranty, so maybe a customer buying a used vehicle is more likely to buy a

service contract.

Trade In (TRADEIN) :

Did the customer trade in a vehicle? ("No" omitted) The instinct here is that trading in a vehicle

will alleviate the price of the car and the customer becomes more financially able to purchase a

service contract. Positive coefficient expected.

Down Payment (PYMT):

Does the amount of the down payment, in dollars, affect the decision to purchase vehicle

contract? Possibly, a large down payment indicates the customer readiness to purchase the contract at

the time of the vehicle's purchase. Therefore, the customer is more likely to consider a service

contract. Positive coefficient expected. Measured in dollars.

Vehicle's Age (V_AGE):

Perhaps customers are most likely to purchase a service contract on an older vehicle. Negative coefficient expected. Measured in years.

Omitted Variables:

Some variables were omitted deliberately omitted from this model because the data was hard to obtain. Controls for income and credit score were not obtainable but the variable "Value" was included in model to soak up the omitted variable bias. Ideally, a variable that control for the customer's past vehicle repairs and troubles would have been included. A variable for whether

the customers had any co-buyers, spouses or children was unobtainable. Variables for the number of previous owners a used car had, and if the vehicle was luxury or not were omitted because the data collection was unreliable. A control to account for how risk averse the customer was omitted because it turned out to be psychological, immeasurable factor.

The linear probability model can be expressed by the equation:

$$(Di) = \beta 1 \, (VALUE) - \beta 2 \, (AGE) - \beta 3 \, (FEMALE) + \beta 4 \, (TRADEIN) + \beta 5 \, (PYMT) + \beta 6(V\_AGE)$$

IV. DATA

All of the data for this project was gathered at a locally owned car dealership in Savannah, GA. Information was using a summary sheet about a vehicle's transaction. 50 observations were collected. The data is summarized in the table below with some useful descriptive statistics

Descriptive Statistics Table (for the numerical data only):

	MEAN	STD DEV	MEDIAN	MIN	MAX
VALUE	$21,479.75	$7,397.19	$21,195.37	$45,480	$6,600
AGE	43.46	15.08	39.5	18	80
PYMT	$2,842.75	$2,346.45	$2,043.5	0	$20,500
VEHICLE'S AGE	2.89	2.83	2.42	0	12

V. RESULTS

Variables in the Equation

	B	S.E.	Wald	Sig.
Constant	-3.868	2.209	3.067	.080
VALUE	.000	.000	.940	.332
GENDER	.485	.668	.528	.467
AGE	.020	.018	1.210	.271
NEW/USED	.172	1.242	.019	.890
PYMT	.000	.000	.637	.425
TRADE IN	.602	.742	.658	.417
V AGE	.321	.216	2.213	.137

*Statistically Significant at 10% level

Hosmer-Lemeshow Test

Chi-square	df	Sig.	R^2
10.026	8	.263	.238

The data indicate that the regression has a R^2 of .238, which is fairly high for a linear

probability model (since the dependent variable is a dummy variable, it's almost impossible for a

linear probability to get an R^2 much higher than .70). For the linear probability model,

 the Hosmer-Lemeshow test (similar to the F-test) is a statistical test used for goodness of fit. This

test assesses whether or not the observed event rates match expected event rates in the model

population using chi-squared values. In the Hosmer-Lemeshow test, the model is heteroskedastic

by construction because the test always uses robust standard errors.

At .263, the P- value of the Hosmer-Lemeshow statistic does not confirm the overall

validity of the model. Although the Hosmer- Lemeshow test shows the model not to be significant, I

will interpret the coefficients. The first linear probability model ran included all of the variables

outlined and defined. None of the seven variable was statistically significant at the ten percent level.

Upon reviewing the multicollinearity correlations, it was discovered that "Vehicle's Age"

 had high multicollinearity with "Value" (-.77) and "NEW/USED" (.852). The second linear

 probability model removes "Value" and "NEW/USED". With this model I am checking for

dramatic changes to the P value of the Hosmer-Lemeshow test. With the changes from model one to model two, there is only a five percent in the P-value which is step in the right direction.

The second model is used to interpret the coefficients. "Vehicle's age" is the only statistically significant variable. On average, holding all else constant, each year older the vehicle is increases the probability of the customer purchasing service contract by 19 percent. This suggests that the older the vehicle, the more likely that a customer will buy a service contract, which is to be expected. Although the "Trade IN" variable is not considered significant, it was the strongest predictor on the dependent variable,surprisingly. I suspect this is because of omitted variable bias. On average, holding all else constant, the probability of a customer purchasing a vehicle service contract increases by 87 percent. "Gender", "Age", "Pymt" are also not statistically significant. "Gender" had a coefficient of .485, indicating that the probability of purchasing a service contract increases by 48.5 percent if a female is the primary buyer on the vehicle. When the age of customer increases by one year, the probability of purchasing a service contract increases by 1.9%.

VI. <u>CONCLUSION</u>

In conclusion, my model attempts to investigate the effects of a customer's gender and age on purchasing a vehicle service contract but the results fall short of significant. However, it was learned that the vehicle's age was one of the factors that increased the likelihood of buying a vehicle service contract. Additional testing with more observations and more obtainable explanatory variables should build a better model.

There are several issues that need to be addressed in future research. My work has focused on analysis of consumer data. It would be useful to examine vehicle's past reliability scores to better understand the role of warranty of the makes and models play in the customer.

WORKS CITED

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