

Might I Interest You in an Extended Warranty?

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Federal Trade Commission-Marketing Science Workshop

September 16, 2016

Warranties and Extended Service Contracts/Extended Warranties

*If you're buying a car, an electronic device, or a major appliance, you may be offered the chance to buy an "extended warranty" or service contract. Both service contracts and warranties provide repair or maintenance for a specific time. But there's an important difference: **a warranty is included in the price of an item; a service contract costs extra.** It's an add-on that might not be worth the price. Some service contracts **duplicate the warranty coverage that the manufacturer provides**; some cover only part of the product; and some make it nearly impossible to get repairs when you need them.*

Source: U.S. Federal Trade Commission

Warranties in the U.S. Automobile Industry

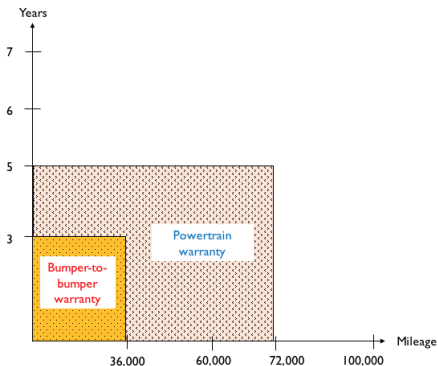


Figure: Manufacturer-Backed Warranties

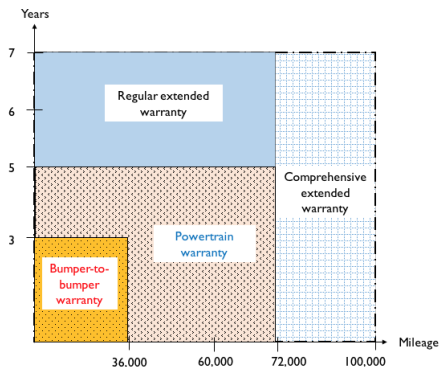


Figure: Extended Warranties

Why should we care?

1. Customers:

- ▶ Spent **\$14.7B** on extended warranties (EWs)
- ▶ **40%** of auto buyers purchase extended warranties (Warranty Week 2010).
- ▶ **86%** of extended-warranty buyers purchase the extended warranty at the point of purchase of their vehicle (Consumer Reports 2012).

2. Auto dealer:

- ▶ **20%** of auto dealers' profits come from selling EWs.
- ▶ Market EWs after buyers commit to the purchase of the vehicle (Abito and Salant 2015; Soberman 2003)

3. Warranty underwriters:

- ▶ **50%** of the EW buyers never file a claim.
- ▶ Among those who do, the median out-of-pocket savings is **69%** of their extended warranty premiums (avg. price \$1,213).

Marketing of Extended Warranties



VERY URGENT AND TIME SENSITIVE

YOUR VEHICLE'S WARRANTY MAY BE ABOUT TO EXPIRE OR HAS RECENTLY EXPIRED
BASED ON AGE OR MILEAGE.

DEADLINE: 02/25/2014

Carol,

This is our FINAL ATTEMPT to inform you that the factory warranty on your 2006 FORD that you purchased has expired or is about to expire. PLEASE CALL WITHIN 72 HOURS; as this notice will expire by the deadline date. Please call us as soon as possible to see what your options are to extend coverage. If you go without coverage, you will be responsible for all repairs in the event of a breakdown. If you do not contact us by the deadline date, you risk not being able to extend coverage.

Please Call
1-855-646-4277

HOURS:
Monday through Friday 8:00 a.m. - 6:00 p.m. CST
Saturday 9:00 a.m. - 1:00 p.m. CST

DIRECT AGENT - Motor Vehicle Services Department

FL License # W168178

Research Questions

1. WHEN are auto buyers purchasing extended-warranty coverage?
 - ▶ Are they more likely to buy extended-warranty coverage before or after their manufacturer-backed warranty expires?
2. WHAT economic motives justify their extended-warranty purchases?

Importance to regulators:

- ▶ Insights could be used to extrapolate what types of policy interventions could be most useful and when?

Importance to dealers and underwriters:

- ▶ Targeted Marketing: Should extended warranties be marketed more aggressively to auto buyers before or after their manufacturer-backed warranty expires?
- ▶ How far before/after?

Empirical Setting: Used-Vehicle Market

1. Used-vehicle sales constitute the lion's share of B2C & B2B auto transactions in the U.S. (55% ~ 79%).
2. Rich natural variation in the availability and size of residual manufacturer-backed warranties

Threats to identification:

1. **Sorting amongst buyers**

The demand for used vehicles can vary systematically pre- and post-expiry of manufacturer-backed warranties.

2. **Selection on unobservables**

Other variables like transacted price of used vehicles, trade-in values, and extended-warranty premiums can be correlated with unobservables that systematically vary pre- and post-expiry of manufacturer-backed warranties.

Empirical Strategy: Sharp Regression Discontinuity (RD)

Appropriateness

- ▶ Treatment assignment (pre- or post-expiry of manufacturer-backed warranties) is deterministic and pre-determined (exogenous).
- ▶ Mitigates the role of unobservables and makes them random to the treatment assignment in the “local” region (within RD bandwidth)

Validity Tests

- ▶ Manipulation of treatment/strategic sorting: Assesses smoothness of the outcome variable at cutoffs
- ▶ Assesses discontinuities of covariates to test for endogenous “jumps” in baseline covariates at the cutoffs

Design Limitation

- ▶ External validity

Data

- ▶ Full dataset contains every vehicle purchased at 50 randomly selected dealers across GA, NC, SC, TN, and VA, from July 2009 to July 2014
- ▶ Limited to B2C used-vehicle sales
- ▶ Top 15 brands (make-model combinations): account for 84.75% of all the used-vehicle sales
- ▶ Estimation sample consists of 20,817 observations: spans 41 dealers, covers 15 brands, and includes 2,216 unique make-model-dealer combinations
- ▶ Obtained terms of the manufacturer-backed warranties from Cars.com and automaker websites

% Pre Bumper-to-Bumper Expiry	47.45
% Post Bumper-to-Bumper Expiry and Pre Powertrain Expiry	36.75
% Post Powertrain Expiry	15.80

Calibration Steps

Step 1: Bandwidth selection (h_n) as proposed by Imbens and Kalyanaraman (2012) (IK) and Calonico et al. (2014) (henceforth CCT)

- ▶ Bumper-to-Bumper : IK 14,848; CCT 12,021
- ▶ Powertrain@60K miles: IK 21,047; CCT 18,320
- ▶ Powertrain@100K miles: IK 61,569; CCT 43,981

Calibration Steps

Step 2: For observations in the “local” bandwidth region, calibrate a logit transformation of conditional probability of the buyer i of a used vehicle j , buying an extended warranty for her vehicle from dealer d at time t , and parameterized as:

$$\begin{aligned} \text{logit}(\Pr(Y_{ijdt} = 1 | \text{Mileage}_{ijdt}, X_{ijdt})) &= \log\left(\frac{\Pr(Y_{ijdt} = 1 | \text{Mileage}_{ijdt}, X_{ijdt})}{1 - \Pr(Y_{ijdt} = 1 | \text{Mileage}_{ijdt}, X_{ijdt})}\right) \\ &= \beta_0 + \beta_1 * D_{ijdt} + \beta_2 * \text{Mileage}_{ijdt} \\ &\quad + \beta_3 * D_{ijdt} \cdot \text{Mileage}_{ijdt} \\ &\quad + \gamma * X_{ijdt} + \varepsilon_{ijdt}, \quad h_n \leq \text{Mileage} \leq h_n \end{aligned}$$

where

- ▶ D_{ijdt} is an indicator variable that takes on value 1 when $Z_{basic/power-train\ cutoff} \leq \text{Mileage}_{djt} \leq h_n$, and 0 otherwise
- ▶ Mileage_{ijdt} is the odometer mileage of the used car
- ▶ h_n is the bandwidth proposed by IK and/or CCT, and
- ▶ X_{ijdt} includes other vehicle, dealer and buyer-market characteristics.

Formally Allay Threats to Identification

1. Unobservable Targeted Marketing Effort

- ▶ Data bunching (to the left or right of the cutoff)
- ▶ McCrary test for smoothness of the density of our data
 - ▶ Rules out discontinuities in the density of our data

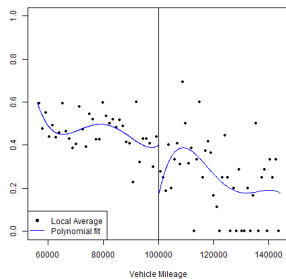
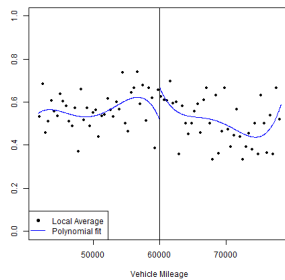
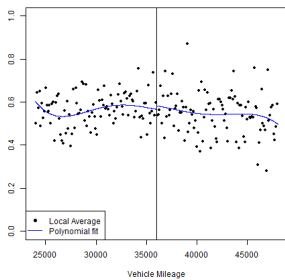
2. Dealers might be endogenously setting marketing-mix elements

- ▶ Smoothness of the density of covariates
- ▶ Conduct non-parametric RD regressions of our covariates with odometer mileage as the running variable
 - ▶ Rules out discontinuities in transacted prices, EW premiums, product availability, etc.

3. Placebo Tests

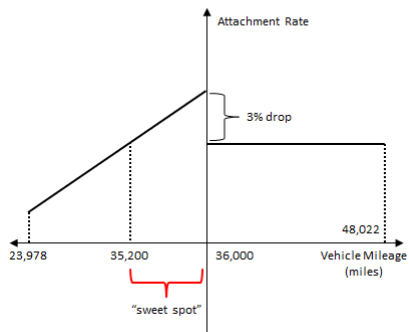
- ▶ Rules out discontinuities in other locations but the manufacturer-warranty expiry marks

RD Plots w/o Covariates



Results

Basic warranty mark (36k-mile)



Powertrain warranty mark (60k-mile)



Four Economic Roles of Warranties

Excellent review of literature on warranties (e.g., Chu and Chintagunta 2011; Emons 1989)

- ▶ Insurance motive
- ▶ Signaling motive
- ▶ Incentive motive
- ▶ Sorting motive

Insights for Marketing Managers and Policy Makers

1. Manufacturer-backed warranties and extended warranties act like complements in the region “local” to the expiry of the bumper-to-bumper warranty.
 - ▶ Insurance and sorting motives dominate signaling motive.
 - ▶ Consumers who buy used vehicles with mileages between 35,200K and 36K miles are the most likely to adopt extended warranties.
2. Manufacturer-backed warranties and extended warranties act like substitutes in the region “local” to the expiry of the powertrain warranty.
 - ▶ Signaling motives dominate insurance and sorting motives.
 - ▶ Consumers who buy used vehicles with mileages between 60K and 63,700 miles are the most likely to adopt extended warranties.

Thanks

Extra Slides

Sharp RD: Local Average Effect

- ▶ Local continuity condition allows comparison of average outcomes just above and below the manufacturer-warranty thresholds

Identify the local average treatment effect for units close to the running variable/covariate cutoff value.

$$\begin{array}{l|l} -h_n \leq X_i < c : & c \leq X_i \leq h_n : \\ Y_i = \alpha_- + (X_i - c) \cdot \beta_- + \varepsilon_{-,i} & Y_i = \alpha_+ + (X_i - c) \cdot \beta_+ + \varepsilon_{+,i} \end{array} \quad (1)$$

Correspondingly, the treatment effect at the cutoff of the running variable is given by:

$$\hat{\tau}_{\text{SRD}}(h_n) = \hat{\alpha}_+ - \hat{\alpha}_- \quad (2)$$

Key idea: Once h_n is chosen, one needs to approximate regression functions for control and treatment units in the “local” region.