DECISION FOR INDIAN RETAILERS TO OFFER EXTENDED WARRANTIES: INSIGHTS FROM CONSUMER DECISION MAKING

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Motivation

• Durable goods market in India (consumer durables)
  – Increasing growth rate
  – Growth share by big retail outlets vs. small outlets
    • Remains fragmented
  – Big retailers launching their own private labels
    • 15-20% cheaper than branded goods

• Extended warranties
  – Presence of third-party insurers (Tata AIG, Reliance, eZone rolled back EW)
    • TPI offered by same firms that currently offer finance facilities
      – Tata Croma + Tata AIG
      – Reliance Digital + Reliance ResQ + Bajaj Finance
      – E-Zone + Future Capital
    – Covers all products sold within the store
    – Limitations on time of purchase
  – Manufacturers offering EW
    • Similar to maintenance contracts for automobiles
      – Flexibility on the time of purchase
    • Accidental damage protection for technology products
    • Service contracts for consumer appliances (washer)

• After-Markets for durable goods
  – Largely unorganized
Given the nature of consumer ownership, maintenance and replacement behavior, how are extended warranties valued by consumers?
Firm’s Decision on EW

Decision on coverage, scope and price

- Competition from (TPI) and cost-related factors influences the coverage decision
  - Minimal warranties in the presence of TPI (Lutz and Padmanabhan, 1995 )
    - TPI in consumer durables in India currently being offered only in large format retail outlets.
    - Another explanation for minimal warranties?

- Motivation to screen consumers influences the menu of EW.
  - Unobserved heterogeneity (effort, risk, usage) (Padmanabhan, 1995; Padmanabhan and Rao, 1993)
  - Attitude to risk and effort; Attitude to risk and usage rate
    - Assessing the validity of the findings in Indian context

Key Aspects

- Warranties are equivalent to deductibles
- Utility from consuming the durable is represented in equivalent monetary units
- Propositions tested using survey data
Firm’s Decision on EW

Representing durable as a flow of utility over planned ownership duration

Key Aspects

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Consumer’s Decision on EW

What do consumers decide

What influences the decision

- Buy or Not Buy EW
  - Risk-preferences
    - Probability-weighting and loss-aversion (Jindal, 2012)
    - Repair vs. Replace comparison
    - Reference point assumption
  - Peace-of-mind (Huysentruyt and Read, 2010)
  - Product specific and other factors (Shen, Kalra and Sun, 2010)

- Choose from menu of EW
  - What factors influence the choice?

- Decide on time of purchase of EW
  - Trade-off between experience and price of EW
  - What factors influence the decision?

How do consumers value the options in a menu of EW?

Relevant Literature

Consumer’s Decisions

- How are losses/repair costs perceived?
- How is the product being covered valued?

How does the purchase decision vary if the objective is to maximize the net utility over ownership duration?
Consumer Maintenance Decisions

- Mental Accounting
  - Mental book value of durable and decision to replace / trade-in (Okada, 2001; Kim, Rao et. al., 2011)
  - Loss-aversion till mental account is closed
  - Purchase decisions on add-ons (Erat and Bhaskaran, 2012)

- Age-Indexing and Expenditure Indexing
  - Repair decisions made with age and expenditure reference points (Meyer, 2003)

- Mental Depreciation
  - Value of the durable varies with time, usage frequency and usage quality (Heath and Fennema, 1996)

- Supports Reference Points
  - How does one determine?
    - Expectations as reference points (Koszegi and Rabin, 2006 and 2007)
    - Exogenously determined - status-quo, ownership duration etc.
  - Implications

EX-ANTE formation of reference points
Research Questions

- Given ownership, maintenance and replacement behavior, how do consumers value EW?
- If EW are maintenance contracts, then how does reference point formation help in explaining the purchase better?
- How are reference points formed/identified?
  - How do consumers choose from a menu of EW?
- Assuming that durables are characterized by a flow of utility over the ownership duration.
Propositions

• Individuals have expectations about the product performance over time
  – Age-indexing (Meyer, 2003)
  – Ex-Ante, they form the expectations based on several factors
    • Own usage, external information etc.

• Expectations form reference-points (time)
  – Formation of reference points
    • Reference points maximize the net utility from consumption
  – Identification of reference points

• Implications of reference points
  – Losses (repairs) are perceived with greater pain below the reference point
    • Diminishing sensitivity to losses
      – Consumers felt more pain if the repair incidence occurred just after the warranty expiration period, rather than long after.
      – Consumers felt more delighted if the repair incidence occurred long before the warranty expiration, rather than just before
  – Coverage period less (more) than reference time frame is perceived as a loss (gain).
  – Decision to buy EW above reference time frame depends on asymmetric price-time sensitivity
Preliminary Model Development

Utility from Consumption

• Durable good giving a flow of service \( s \) over time \( T \)
• Utility from consuming the durable over time \( U(t) = U(s_t) \)
  – Uniform service flow over time
    • \( s = f(q, t, \alpha) ; q: \text{quality}, \alpha: \text{Usage rate} \)
  – Concave utility

Disutility from Repair

• Probability of repair increases with time (Weibull) \( P_f = 1 - (\exp[-(t/\theta)^\beta]) \)
  – \( \beta > 1 \) for increasing failure rate with time.
• Constant repair costs : \( C_r \)
  – Disutility due to repair : \( D(C_r) \)
  – Convex disutility due to repair
    • Effort of maintenance increases in a convex way for the durable
• Expected repair costs : \( P_f \times C_r \)

Net Utility : \( U(t) - ED(C_r) \)
Preliminary Model Development

Warranty Purchase Decisions

To assure service flow over time

- Utility from service flow without warranty \( EU(s_{T \epsilon(0,tw)}) + EU(s_{T \epsilon(tw,\infty)}) \)
- Utility from service flow with warranty \( U(s_{tw}) + EU(s_{T \epsilon(tw,\infty)}) \)
  \[ t^*, U(s_{t^*}) = EU(s_{T \epsilon(0,t^*)}) \]

To avoid uncertain repair costs

- Uncertain repair costs
  - Expected disutility due to repair \( ED(C_r) = P_f * D(C_r) + (1-P_f) * D(0) \)
- Repair costs in a given time frame \( (t_1 - t_2) \)
  - Expected number of repairs in \( (t_1,t_2) \) * Repair costs = \( \left( \frac{t_1}{\theta} \right)^\beta - \left( \frac{t_2-t_1}{\theta} \right)^\beta \) * \( C_r \)
  - Warranties as maintenance contracts
  - Consumers minimize expected disutility
  - Buy warranty if it is priced \( \leq CE \) of uncertain repair costs
Preliminary Model Development

Assessing Reference Dependence

• Nature of reference point
  – Time till which the durable is expected to give repair-free service flow.
    • Testing in an experimental setup.
  – Differences from age-indexed and expenditure-indexed repair costs
  – If \( t_r \) is the reference point,
    • \( D(C_r) = D(C_{r}) \) for repairs occurring at \( t \) (after \( t \geq t_r \))
      \[ = -\lambda \ast (-D(C_r) \delta) \text{ till } (t < t_r) \]

• Testing the assumptions
  – Risk-aversion, loss-aversion, probability-weighting are time-invariant.
  – Presence of reference dependence, other than status-quo or no-purchase
  – Repair costs are perceived as losses.
Experiment Design

- Objectives
  - Testing reference dependence
  - Nature of preferences

- Method
  - CE approach of assessing utility
    - Possibility of alternate approaches (PE, trade-off etc.)

Preliminary Steps: Familiarizing the context

Step 1: Anticipated Ownership Time
  Fixing AOT to $U(AOT) = 1$

Step 2: Gambles of incurring (50-50) repair costs over time vs. warranty coverage over time
  Constant repair costs; Warranty priced at expected repair costs.
  Indifference value at 0.5
  Implies the respondent is indifferent between $t_{0.5}$ years of warranty coverage vs. 50:50 chance of incurring repair costs till time $t_1$

Step 3: Indifference value at 0.25
Step 4: Indifference value at 0.75
Experiment Design

Example of a gamble (50:50)
• Option A: Within time period $t_A$, there is a 50% chance that you will incur repair costs of Rs. $C_r$.
  Option B: Warranty coverage for $t_A$ years, costing $0.5*C_r$
• Change $t_A$ in Option B, till indifference point $t_{0.5}$
• $U(t_A) = 0.5$

Example of a gamble (p:1-p)
• $P_{0.5}$ corresponding to $t_{0.5}$
• Option A: Within time period $t_{0.5}$, there is a $P_{0.5}$% chance that you will incur repair costs of Rs. $C_r$.
  Option B: Warranty coverage for $t_{0.5}$ years, costing ($P_{0.5}/100*$)$C_r$
• Change $t_{0.5}$ in Option B, till indifference point $t_{0.25}$
• $U(t_{0.25}) = (P_{0.5}/100)*U(t_A) + (1 - (P_{0.5}/100)) * U(0)$. 
Preliminary Results

Checking for reference dependence

Interpreting the shape of the curve:

i) Individuals exhibit risk aversion on utility from service flow, till some point in time.
ii) After a point in time, individuals prefer the gamble to the certain outcome.
Implications

- What does it mean if consumers exhibit reference-dependence?
  - Alternative explanation for minimal warranties?
    - Even in the absence of competition from TPI
    - How does it influence when there is strong after-market (unorganized)?
- Screening based on risk-aversion alone

Not allowing for reference-dependence will lead to different menu options.
Further Implications

- Reasons for allowing flexibility in the purchase time window
  - For ex: Automobile manufacturers have different pricing for EW based on the time of purchase
  - Reference points at the time of purchase vs. reference points formed from experience
  - Decisions from description (ex-ante EW purchases) vs. Decisions from experience (ex-post EW purchases)

- Decisions from experience results in updated beliefs of probability of failure
  - Asymmetric effect due to positive and negative experiences

- Given ownership, maintenance and replacement behavior, how do consumers value EW?
  - Reference time for assured repair-free service flow

- If EW are maintenance contracts, then how does reference point formation help in explaining the purchase better?
  - WTP for EW varies with the time of coverage

- How are reference points formed/identified?
  - Endogenously determined
Thank You!

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