# The Effect of Product Misperception on Economic Outcomes: Evidence from the Extended Warranty Market

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# Extended warranty market

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- Price is often not observable prior to buying the good
- Conventional wisdom: dubious value
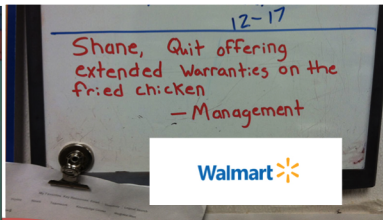
# Extended warranty market

**EW business is highly profitable**

- **US:** Analysts estimated EWs accounted for almost half of BestBuy's operating income in 2003 and that profit margins on EWs ranged from 50%-60%

- **UK:** Competition Commission estimated top five electronics retailers earned more than £100M annually on the sale of EWs in the early 2000s

- Some surprising (and not so surprising) facts from our data:
  - Non-trivial volume: 1 out of 4 TV buyers purchased an EW for the TV

  - Non-trivial margin: TV failure rate < 7%; EW price > 0.22 * (TV price) → margin of 67% assuming repair cost = TV price

# Extended warranty market

**EW market has caught the attention of consumer protection and competition authorities in the US and the UK**

- "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...You may not benefit from a service contract if the product isn't likely to need repairs or if the potential cost of repairs is low. Check websites that offer information about products that are most likely to need expensive — or extensive — repairs." (FTC, 2012)

- "There is insufficient competition and information to ensure that consumers get good value" in the EW market (OFT, 2003)

# Research questions

**Why is the EW business so profitable?**

- Market power, risk aversion, probability distortions

**What drives probability distortions?**

- Overestimation, overweighting

**What tools can be used to enhance consumer welfare in this market?**

- Competition policies, consumer policies

# Why is the EW business so profitable?

# Data

**ISMS Durables Panel Dataset 1**

- Comes from a major US electronics chain with 1176 stores
- About 45K transactions that involve a potential purchase of EW
  - Made by 20K households between 1998 and 2004
  - EW attachment rate is 29%
  - EW-product price ratio is 24%
- Focus on TVs for which failure rates are available from Consumer Reports
  - Attachment rate of 27%, EW-product price ratio of 22%, average failure rate of 7%

# Data

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- Focus on TVs for which failure rates are available from Consumer Reports
  - Attachment rate of 27%, EW-product price ratio of 22%, average failure rate of 7%
  - *Note:* Price ratio has not changed much since then. We recently manually checked a few TVs at BestBuy and the EW-TV price ratio for 5-year EW is between 20% and 24%. Recall failure rates dropped and are now at around 5%.

# Model

**Buyers are risk-averse expected utility maximizers who may distort failure probabilities**

- Barseghyan, Molinari, O'Donaghue and Teitelbaum (2013)

- Utility of buying EW at price $t$: $V_{EW} = u(W - t; r)$

- Utility of not buying EW:

$$V_{NW} = \omega(\phi)u(W - p; r) + (1 - \omega(\phi))u(W; r)$$

$$\leq \omega(\phi)E(u(W - X; r)) + (1 - \omega(\phi))u(W; r)$$

- **Estimate** standard risk aversion $r$ and probability distortion $\omega(\cdot)$

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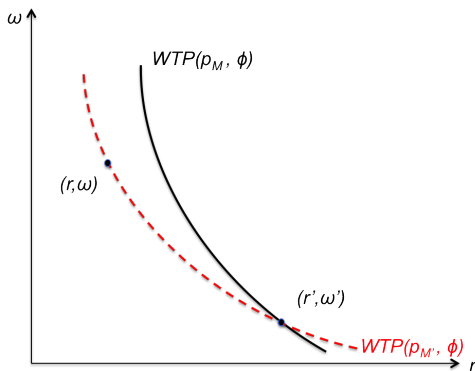- **Estimate** standard risk aversion $r$ and probability distortion $\omega(\cdot)$

**Sellers have monopoly power in selling EW**

- Ellison (2005) add-on pricing model $\rightarrow$ set monopoly EW price

- **Estimation:** use monopoly FOC to estimate sellers' expected marginal cost of servicing the EW

# Identification

- Consider two buyers with the same WTP for EW on TV $(p_{M'}, \phi)$. Suppose increase repair cost (or TV price) to $p_M > p_{M'}$. Then the buyer with a larger increase in WTP is more risk averse.

- **Key idea:** As long as utility function satisfies single-crossing property (Barseghyan et al 2018), we can use variation in repair costs (or prices) for TVs that have the same failure rate to uniquely identify buyer $(r, \omega)$
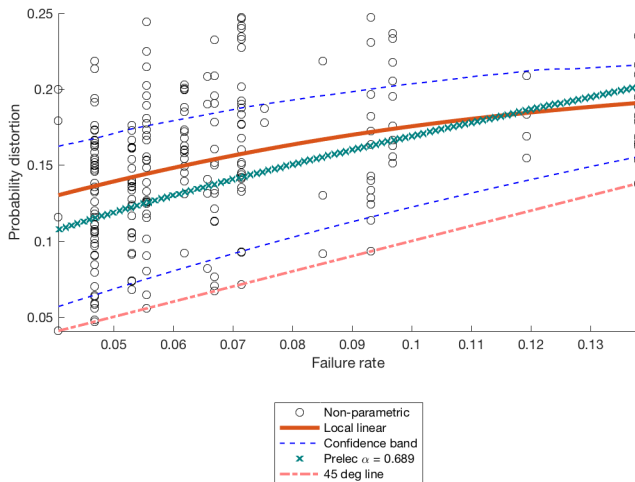
Figure: Single-crossing iso-WTP curves

# Results

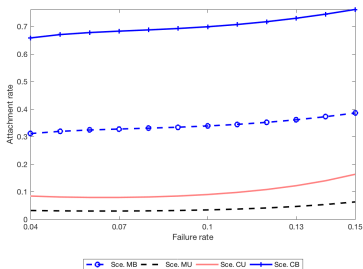Probability distortions drive consumer behavior (not standard risk aversion)
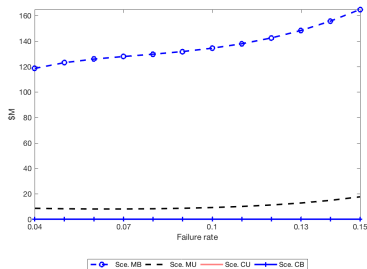
- Example: $\omega(5\%) \approx 13\%$

# Results

## Shutting down distortions significantly reduces demand and profit

- Profit goes down by more than 90%



(a) Quantity



(b) Profit

MB = monopoly/biased; MU = monopoly/unbiased; CU = competitive/unbiased; CB = competitive/biased

11

What drives probability distortions?

# Overestimation vs Overweighting

- **Overestimation**: buyers don't know failure probabilities and overestimate them

- **Overweighting**: buyers know failure probabilities but overweigh them when making decisions (Prospect Theory)

We conduct two **experiments** to study mechanism

- About 2000 participants who performed > 500 tasks on M-turk with approval rate > 90%

- 56% males, 43% females; Median age: 25-34; Median household income $40,000-$49,999

# Experiment 1: Elicit WTP of informed and uninformed

"Imagine you just bought a TV for $600. The TV is by LG, and has a 50" screen and Ultra HD technology."

**WTP-First:** Participants were asked to complete the following sentence:

*"The maximum amount in dollars that I am willing to pay for a protection plan that will cover all the repair costs of this TV in the next three years is _____"*

They were then asked:

*"In your opinion, what is the likelihood in percentages that this TV will need a repair in the next three years?"*

**Likelihood-First:** Reverse order of questions

**Information-First:** Prior to reporting WTP, participants get the following information:

*"You are told by an expert friend that the likelihood the TV will need a repair within the next three years is 5%."*
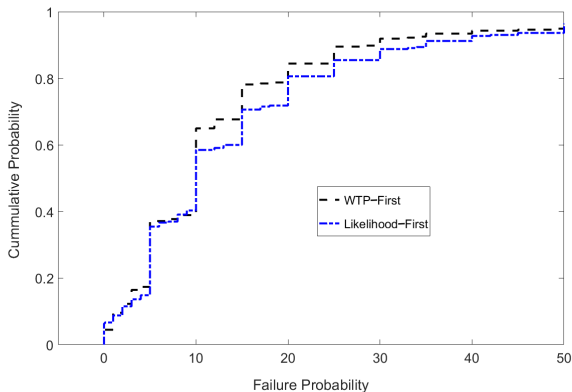
# Experiment 1: Elicit WTP of informed and uninformed

**Result:** WTP drops when information is provided.
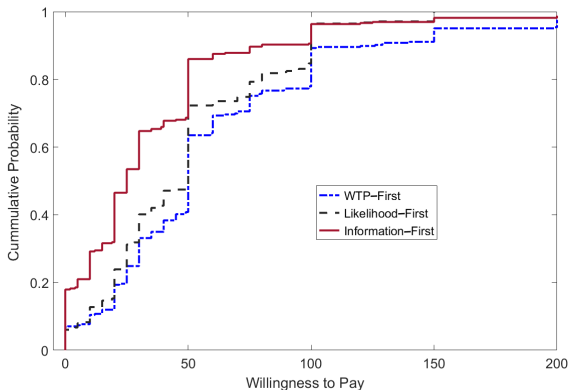


| Treatment | WTP-First ($N = 334$) | Likelihood-First ($N = 330$) | Information-First ($N = 337$) |
|---|---|---|---|
| Mean WTP | 73.01 (5.88) | 53.69 (2.68) | 42.73 (4.15) |
| Median WTP | 50 | 50 | 25 |

# Experiment 1: Elicit WTP of informed and uninformed

**Result:** Failure probabilities are overestimated.



| Treatment | WTP-First ($N = 334$) | Likelihood-First ($N = 330$) |
|---|---|---|
| Mean failure rate | 13.49 (0.81) | 15.12 (0.86) |
| Median failure rate | 10 | 10 |

# Experiment 2: Elicit WTP of informed for TVs with different prices

- Use the identification strategy to estimate probability distortions and risk aversion among informed participants

- Interpret "remaining" probability distortion as reflecting overweighting

  **Main result:** Probability distortions due to overweighting are minimal

- $r \approx 0$

- $\omega(5\%) = 6.3\%$ and not statistically distinguishable with 5%

# What tools can be used to enhance consumer welfare in this market?

# Competition and consumer policies

**Competition policies:** aim to intensify market competition

- Example: Retailers should post the warranty price next to the TV price

**Consumer policies:** aim to enhance consumer decision making

- Example: Retailers should post the failure probability of TV next to its price

# Competition and consumer policies

- Banning EWs increases consumer welfare with uninformed buyers

- Intensifying EW market competition actually decreases consumer welfare
  - Positive effect of lower prices is dominated by the entry of new consumers with true WTP below price who buy EWs because of overestimation

- EW market is an example in which consumer policies are potentially more effective than competition policies
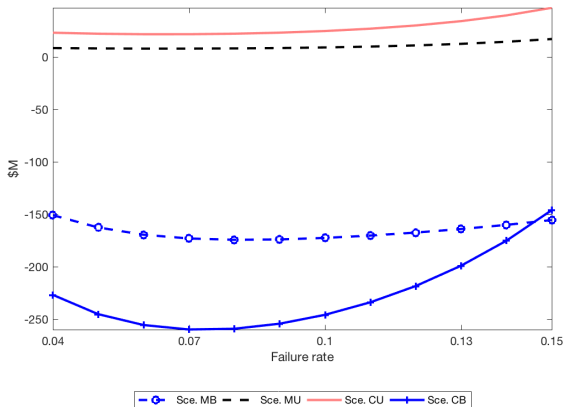
# Conclusion

- High profits in the EW market are driven mostly by probability distortions
- The mechanism for the distortion is mostly overestimation hence giving rationale and scope for intervention
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## THANK YOU!