Protecting Consumers Through Mandatory Disclosures: An Experimental Investigation of Extended Warranties

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PROTECTING CONSUMERS THROUGH MANDATORY
DISCLOSURES: AN EXPERIMENTAL INVESTIGATION OF
EXTENDED WARRANTIES

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IMAGINE that you go to a consumer electronics store and buy a large-screen television for $1,499. At the checkout counter, the cashier asks if you also wish to purchase an extended warranty for $249, which will provide you three additional years of coverage beyond the manufacturer's one-year warranty. Would you buy the extended warranty? What would drive your decision?

If you are like most consumers, you would make this decision with little idea of the probability that the television will break down during the extended warranty's coverage period and the cost of repairing it. But how would your decision and motivations change if the cashier told you there is only a 3% chance of the television needing repair during the first four years you own it and that the average cost of repairing the television is $300? These questions are the focus of this Article.

Extended warranties are important products for firms and consumers. It is estimated that over $21 billion of extended warranties were sold on consumer electronics, appliances, computers, and phones in 2017.[1] For companies, particularly in the low-margin, consumer electronics business, extended warranties are low-risk cash cows. Extended warranties contribute heavily to retailers' income through high profit margins and so are important members of their product portfolio.[2] For consumers, extended warranties provide value by insuring against the financial and emotional costs of product failure. Specifically, they cover the financial costs of repairing the product and provide peace of mind for consumers who are concerned about the product breaking down.[3]

Although extended warranties are popular with consumers, consumer advocates routinely discourage people from buying them because ex-

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1. *Service Contract Market Size*, WARRANTY WK. (Feb. 1, 2018), http://www.warrantyweek.com/archive/ww20180201.html [https://perma.cc/N5CH-WTYV].

2. Tao Chen, Ajay Kalra & Baohong Sun, *Why Do Consumers Buy Extended Service Contracts?*, 36 J. CONSUMER RES. 611, 611 (2009); David A. Soberman, *Simultaneous Signaling and Screening with Warranties*, 40 J. MARKETING RES. 176, 176 (2003).

3. Chen, Kalra & Sun, *supra* note 2, at 611.

tended warranties generally are poor deals for consumers.[4] The probability that a product will need repair during the extended warranty coverage period is low. Also, in the unlikely event that the product fails, the cost of a repair often is approximately the price of the extended warranty anyway, so extended warranties often are not money-saving products even when consumers end up using them.[5]

Thus, some policymakers and prominent legal scholars have proposed using mandatory disclosures to reduce extended warranty purchases. They have proposed requiring extended warranty sellers to disclose to consumers information regarding the repair rate on the covered product during the extended warranty's coverage period.[6] Similarly, legislation might also require disclosure of the average cost of repairing the product.

Such proposals are examples of the recent interest in nonrestrictive regulatory interventions that "nudge" people toward certain desirable behaviors while still allowing them to choose less desirable behaviors.[7] Nonrestrictive regulations, such as the mandatory disclosures examined in this Article, are attractive to lawmakers and scholars because, compared to

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4. *Id.* ("[M]ost consumer magazines and experts advocate consumers not buy [extended warranties] because they provide little value. . . ."); Eric Arnum, *Extended Warranties: Something Worth Buying or Something to Avoid?*, Warranty Wk. (Feb. 17, 2003), http://www.warrantyweek.com/archive/ww20030217.html [https://perma.cc/FZQ8-8SXW] ("Those few [consumer] advice columns that don't warn against extended warranties are frequently affiliated with their sellers in some way.").

5. Randall Stross, *A Chance To Keep Up With New Technology (for a Price)*, N.Y. Times (Feb. 19, 2011), http://www.nytimes.com/2011/02/20/business/20digi.html [https://perma.cc/F2P4-F7GN] (citing Mark Kotkin, director of survey research at Consumer Reports).

6. Barry Nalebuff & Ian Ayres, Why Not?: How to Use Everyday Ingenuity to Solve Problems Big and Small 181 (2003) (suggesting that extended warranty sellers be required to disclose to consumers the probability that the extended warranty will be used: "Circuit City or Ford could tell you the odds of actually making a claim against an extended warranty"); Oren Bar-Gill & Franco Ferrari, *Informing Consumers About Themselves*, 3(2) Erasmus L. Rev. 93, 109 (2010) (encouraging lawmakers to consider mandating that extended warranty sellers provide consumers "information on the probability that an extended warranty would be invoked"); S. 66, 2015 Leg., Reg. Sess. (N.Y. 2015), http://www.nysenate.gov/legislation/bills/2015/s66 [https://perma.cc/Q3PA-QQB6] (proposed legislation includes requirement that sellers of extended warranties to consumers post on their websites "statistical data, compiled annually, of how many times the extended warranty has been utilized by consumers for each product for which an extended warranty is offered, together with an explanation as to the reason the extended warranty was utilized . . . .").

7. For example, the book *Nudge: Improving Decisions About Health, Wealth, and Happiness*, which called for adoption of nonrestrictive regulatory approaches, was a *New York Times* bestseller. Richard H. Thaler & Cass R. Sunstein, Nudge: Improving Decisions About Health, Wealth, and Happiness (2008).

other regulatory approaches, these regulations interfere less with free-market principles and better preserve consumer autonomy.[8]

In addition, these disclosures are an intuitively appealing approach to reducing extended warranty purchases. When provided information about a product's low repair rate and/or relatively low repair cost, consumers should realize that the extended warranty is a bad deal financially for them and thus choose not to buy it.

However, whether these disclosures would be effective is unclear. Previous research on warnings and disclaimers in other domains show that their effects are context specific and difficult to predict.[9] Some disclosures, such as on-product safety warnings, can be effective.[10] Other warning disclosures, however, are ineffective[11] or can even perversely increase the undesirable behaviors they are meant to prevent.[12]

Because of the uncertainty regarding the effect of these extended warranty disclosures, this issue is ripe for empirical examination. This Article presents the results of our experiment that seeks to answer two questions: Would the proposed disclosures change consumers' decisions of whether to purchase extended warranties? Would the proposed disclosures affect consumers' motivations for their decisions?

Data are generated through a controlled experiment on over 800 American consumers. Participants are presented a scenario in which they are purchasing a big-screen television and are given the opportunity to also buy a four-year extended warranty on the television. We test the effect of two types of disclosures. One disclosure—the "Repair Rate Disclosure"—informs consumers of the probability that the television will need repair during the extended warranty period. Specifically, this disclosure states that "the likelihood that the TV will need repair during the first 4 years is 3% [or 8%]." The other disclosure—the "Repair Cost Disclosure"—informs consumers of the relatively low average cost of a repair

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8. Cass R. Sunstein & Richard H. Thaler, *Libertarian Paternalism Is Not an Oxymoron*, 70 U. CHI. L. REV. 1159, 1162 (2003).

9. David W. Stewart & Ingrid M. Martin, *Intended and Unintended Consequences of Warning Messages: A Review and Synthesis of Empirical Research*, 13 J. PUB. POL'Y & MARKETING 1, 1–2 (1994).

10. Eli P. Cox III, Michael S. Wogalter, Sara L. Stokes & Elizabeth J. Tipton Murff, *Do Product Warnings Increase Safe Behavior? A Meta-Analysis*, 16 J. PUB. POL'Y & MARKETING 195, 201 (1997).

11. Omri Ben-Shahar & Carl E. Schneider, *The Failure of Mandated Disclosure*, 159 U. PA. L. REV. 647, 665–79 (2011); Kesten C. Green & J. Scott Armstrong, *Evidence on the Effects of Mandatory Disclaimers in Advertising*, 31 J. PUB. POL'Y & MARKETING 293, 302 (2012); Molly Mercer, Alan R. Palmiter & Ahmed E. Taha, *Worthless Warnings? Testing the Effectiveness of Disclaimers in Mutual Fund Advertisements*, 7 J. EMPIRICAL L. STUD. 429, 429–30 (2010).

12. Molly Mercer & Ahmed E. Taha, *Unintended Consequences: An Experimental Investigation of the (In)effectiveness of Mandatory Disclosures*, 55 SANTA CLARA L. REV. 405, 440–41 (2015); Debra Jones Ringold, *Boomerang Effects in Response to Public Health Interventions: Some Unintended Consequences in the Alcoholic Beverage Market*, 25 J. CONSUMER POL'Y 27, 51–52 (2002); Stewart & Martin, *supra* note 9, at 12–13.

even if the consumer doesn't buy the warranty. Specifically, the disclosure states that "if the TV needs repair, the average cost of repair is $300."

The experiment's results indicate that the Repair Rate Disclosure would reduce extended warranty purchases, but primarily by consumers with a relatively high degree of numeracy (i.e., numerical literacy). Unfortunately, however, the least numerate consumers are most likely to buy extended warranties. Thus, the disclosure is an ineffective nudge for the consumers who most need protection. Also, the experiment's results indicate that the Repair Cost Disclosure would not significantly affect warranty purchases.

The experiment also provides insight into why the Repair Rate Disclosure would reduce extended warranty purchases by more numerate consumers. The disclosure causes these consumers to focus more on the high cost of the warranty relative to the limited financial benefits it provides, and to focus less on the peace of mind that the warranty offers. Because the extended warranty is a poor deal financially, this change in focus makes consumers less likely to buy the warranty. This is especially true for consumers with a high degree of numeracy, likely because they are best able to understand the type of numerical information that is provided in the Repair Rate Disclosure.

The rest of this Article develops these ideas more thoroughly. Part I discusses the market for extended warranties and why consumers buy them. Part II presents an experiment testing whether requiring sellers of extended warranties to disclose information about the covered products' repair rates and/or repair costs would reduce purchases of extended warranties. Finally, Part III discusses the experiment's results and their implications for regulating extended warranties.

I. Background and Theory

A. *The Market for Extended Warranties*

An extended warranty is a service contract that covers certain repairs or services for a product after the manufacturer's basic warranty expires. In addition, extended warranties often offer broader coverage than does a standard manufacturer's warranty, for example, by covering damage caused by heat, moisture, and normal wear and tear.[13] An extended warranty's duration is usually between one and four years, depending upon the product category.[14]

Consumers typically buy extended warranties at the same time they purchase the covered product. Thus, although third-party insurers di-

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13. Tao Chen & Baohong Sun, Essays on Extended Service Contracts: An Empirical Investigation of Consumer Purchases and Intertemporal Pricing of Retailers' Extended Service Contracts 47, 49 (2009) (unpublished manuscript) (on file with author).

14. Chen, Kalra & Sun, *supra* note 2, at 611.

rectly offer extended warranties,[15] consumers generally buy warranties from the retailer that sold them the covered product.[16] Retailers that sell extended warranties generally do not themselves provide the warranty protection. Rather, they sell the warranties on behalf of insurance companies that provide the coverage.[17] The retailer keeps a sales commission, which has been estimated to be on average approximately half the warranty's price.[18]

An extended warranty's price generally is based on its term and the type and price of the product it covers.[19] The warranty's price usually is an additional 15% to 25% of the product's price,[20] however, it varies widely by retailer. For example, a survey of 25 retailers found that four- and five-year extended warranties on the same television set (which had an average price of $1,560) ranged from 8% to 41% of the set's price.[21] In other words, prices for these extended warranties ranged from approximately $112 to $656.

Extended warranty sales data is sparse because retailers are reluctant to disclose their revenue and profits from these warranties. However, it is estimated that over $21 billion of extended warranties were sold on consumer electronics, appliances, computers, and phones in 2017.[22] In addition, a study of one retailer in 2003–2004 found that 33% of electronic durables purchasers also bought an extended warranty.[23]

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15. Nancy A. Lutz & V. Padmanabhan, *Warranties, Extended Warranties, and Product Quality,* 16 INT'L J. INDUS. ORG., 463, 464 (1998).

16. Nat Pope, Chiharu Ishida, Peter Kaufman & Frederick W. Langrehr, *Extended Warranties in the U.S. Marketplace: A Strategy for Effective Regulation,* 33 J. INS. REG. 67, 69–70 (2014).

17. *Extended Warranties*, WARRANTY WK. (Nov. 1, 2005), http://www.warrantyweek.com/archive/ww20051101.html [https://perma.cc/35WT-HSL9].

18. *Id.*

19. Chen, Kalra & Sun, *supra* note 2, at 611 ("For example, the [extended warranty] for televisions below $199.99 costs $39.99, whereas that for televisions priced between $200 and $499.99 would be $59.99, and so on. Therefore [extended warranty] prices vary across price tiers but not across products or brands within a tier.").

20. Marianne Goldstein, *Are Extended Warranties Worth the Money?,* CBS NEWS (Aug. 10, 2007, 3:36 PM), http://www.cbsnews.com/2100-500200_162-3156565.html [https://perma.cc/4HAM-NYWZ]; Chen, Kalra & Sun, *supra* note 2, at 615 (study of one retailer found extended warranties were priced at an average of 17.4% of the product price).

21. *Extended Warranty Shopping,* WARRANTY WK. (Nov. 28, 2008), http://www.warrantyweek.com/archive/ww20071128.html [https://perma.cc/VA3P-JACJ].

22. *Service Contract Market Size,* WARRANTY WK. (Feb. 1, 2018), http://www.warrantyweek.com/archive/ww20180201.html [https://perma.cc/9F4N-TZL3].

23. Chen, Kalra & Sun, *supra* note 2, at 615.

B.   *Extended Warranties Generally Are Poor Deals for Consumers*

Although extended warranties are popular, they are generally poor deals for consumers. Indeed, consumer advocates and organizations routinely discourage buying extended warranties.[24] The probability that a product will need repair during the extended warranty's coverage period is low.[25] For example, repair rates for new camcorders and digital cameras during the first three years of ownership are only 8%.[26] Also, an extended warranty usually partially overlaps with the manufacturer's warranty. For example, a consumer who buys a three-year extended warranty on a camera often already has coverage for the first year under the manufacturer's warranty. So the consumer is largely only really receiving two additional years of coverage from the extended warranty.[27] In addition, many credit cards automatically extend the manufacturer's warranty for a year on purchases made with those credit cards.[28] Thus, for such purchases, an extended warranty provides even less additional benefit.

Also, even if the product fails during the extended warranty period, the price of the extended warranty is often approximately equal to the repair cost.[29] In other words, even a consumer who ends up using the extended warranty will often still not save money. Furthermore, especially for consumer electronics, over time the prices of many products fall rapidly and their capabilities increase, so the benefit of repairing a product when it breaks rather than just buying a new model falls substantially over time.[30]

Extended warranties' high cost to consumers is reflected in their great profitability for retailers.[31] Retail industry analysts estimate that retailers' average profit margin for extended warranties is between 50% and 60%, approximately 18 times that of regular products.[32]

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24. Chen, Kalra & Sun, *supra* note 2, at 611.

25. Nancy Marshall-Genzer, *Are Extended Warranties Worth It?*, Am. Pub. Media: Marketplace (Dec. 14, 2010), http://www.marketplace.org/topics/business/are-extended-warranties-worth-it [https://perma.cc/S2RR-25YG].

26. Goldstein, *supra* note 20.

27. As noted above, however, extended warranties sometimes cover damage from sources (such as accidental misuse) that are not covered by the manufacturer's warranty. Thus, during the period of overlap with the manufacturer's warranty, the extended warranty sometimes provides broader coverage for the consumer. Chen & Sun, *supra* note 13, at 47, 49.

28. *Don't Buy Extended Warranties,* Consumer Rep. (Aug. 26, 2016), https://www.consumerreports.org/shopping/dont-buy-extended-warranties/ [https://perma.cc/P7UK-2MEH].

29. Stross, *supra* note 5 (quoting Mark Kotkin, director of survey research at Consumer Reports).

30. David M. Cutler & Richard Zeckhauser, *Extending the Theory to Meet the Practice of Insurance, in* Brookings-Wharton Papers on Financial Services: 2004 1, 25–28 (Robert E. Litan & Richard J. Herring eds., 2010).

31. Chen, Kalra & Sun, *supra* note 2, at 611.

32. *Id.*; Chen & Sun, *supra* note 13, at 48.

Retailers often rely upon extended warranties' high profitability. For example, in fiscal year 2004, extended warranty sales accounted for approximately 45% of Best Buy's operating profit.[33] Similarly, in fiscal year 2004, extended warranties accounted for 3.3% of Circuit City's sales, yet all of its operating profits.[34]

More recent data on extended warranties' profitability are difficult to find because retailers have reduced their financial disclosures regarding them.[35] Industry analysts indicate that retailers have decreased their disclosure of their extended warranties business because they "don't want to disclose to J.Q. Public how much money they are making on these contracts."[36] However, there is no reason to believe that extended warranty sales have become less important to retailers. Indeed, consumer electronics retailers have been suffering from historically low margins and are dependent on sales of extended warranties to remain profitable.[37]

Interestingly, the country's largest retailer, Wal-Mart, did not sell extended warranties until late 2005,[38] when it finally began offering extended warranties on consumer electronics in response to demand from relatively upscale customers.[39] This delay is rumored to have resulted from Wal-Mart's founders' belief that extended warranties did not provide good value to consumers.[40] Indeed, Wal-Mart began selling extended warranties generally for less than half the price of its competitors.[41] In addition, Wal-Mart's extended warranties did not take effect until after the manufacturer's warranties expired, eliminating extended warranty coverage that is largely duplicative of the manufacturer's warranty.[42]

C.   *Why Do Consumers Buy Extended Warranties?*

If extended warranties are bad deals, why do so many consumers buy them? A number of possible explanations exist. First, many consumers might be very risk averse. An extended warranty is a type of insurance: consumers pay a certain amount to avoid possible repair costs in the fu-

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33. Robert Berner, *The Warranty Windfall*, BUS. WK. (Dec. 20, 2004), https://www.bloomberg.com/news/articles/2004-12-19/the-warranty-windfall [https://perma.cc/RW4Q-8PUN].

34. *Id.*

35. *Id.*

36. *Id.*

37. Stross, *supra* note 5.

38. Berner, *supra* note 33.

39. Robert Berner, *Watch Out, Best Buy and Circuit City*, BUS. WK. (Nov. 10, 2005), http://www.businessweek.com/bwdaily/dnflash/nov2005/nf20051110_5243_db016.html [Permalink unavailable].

40. *Extended Warranties, supra* note 17.

41. *Id.*; Berner, *supra* note 39. While most retailers charged 15% to 25% of a product's price for an extended warranty, Wal-Mart charged only 6% to 9% of the purchase price. Goldstein, *supra* note 20.

42. Goldstein, *supra* note 20; Berner, *supra* note 39.

ture. The insurance literature has identified the buyer's risk aversion as a major determinant of the decision to purchase insurance.[43]

However, although most consumers probably are risk averse regarding product repair costs, risk aversion likely cannot fully explain their purchase of extended warranties. As discussed above, extended warranties' prices usually are much higher than the expected repair costs (i.e., the probability of needing repairs multiplied by the costs of the repairs). In addition, the repair costs covered by extended warranties tend to be small and diversifiable. Indeed, the degree of risk aversion necessary to justify financially purchasing an extended warranty is often implausibly high. For example, a study of consumers' decisions regarding whether to buy an extended warranty on washing machines found that, for risk aversion to explain the choices, consumers would have to be so risk averse that they would reject a gamble that had a 50% chance of winning $100 and a 50% chance of losing $5 or less.[44]

Consumers might purchase extended warranties because they overestimate expected repair costs during the coverage period. Expected repair costs have two components: the probability that the product will need repair, and the cost of the repair if one is needed. Consumers who overestimate either of these should be more likely to purchase an extended warranty.

Evidence exists that consumers overestimate both of these. In two surveys in Belgium and the United Kingdom, consumers estimated the probability that a washing machine would break down in the second or third year after purchase.[45] Although there was only a 12% probability of such a breakdown, consumers' median estimates in the two surveys were 21% and 33%.[46] Consumers also overestimated the cost of repairing a washing machine by 12% and approximately 60%.[47] Thus, in total, their median estimate of the expected repair costs during an extended warranty coverage period was more than twice the actual expected costs.[48]

In addition to overestimating the probability that a product will need repair during the extended warranty's coverage period, consumers probably *overweight* this probability as well. According to prospect theory, in making decisions under uncertainty, people overweight low probability outcomes (such as a product needing repair) and underweight high probability outcomes.[49] Thus, even if consumers know the low probability

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43. Chen, Kalra & Sun, *supra* note 2, at 612 and sources cited therein.

44. Pranav Jindal, *Risk Preferences and Demand Drivers of Extended Warranties?,* 34 Marketing Sci. 39, 40–41 (2012).

45. Marieke Huysentruyt & Daniel Read, *How Do People Value Extended Warranties? Evidence from Two Field Surveys,* 40 J. Risk & Uncertainty 197, 201 (2010).

46. *Id.* at 201–02.

47. *Id.*

48. *Id.*

49. Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk,* 47 Econometrica 263, 281 (1979).

that they will use the extended warranty, they still might give that possibility disproportionate weight in deciding whether to buy the warranty.

Finally, many consumers likely buy extended warranties at least partly because of the emotional benefits they derive from the warranty, such as peace of mind. Indeed, two studies found that consumers who report greater emotional benefits from an extended warranty are more willing to purchase one.[50] Also, sellers of extended warranties often highlight peace of mind as a primary reason to buy them.[51] Consistent with this, consumers are more likely to purchase extended warranties for products providing relatively more hedonic rather than utilitarian benefits.[52] In our experiment, we also study the justifications consumers offer for buying or not buying an extended warranty and examine whether the proposed disclosures change those justifications.

Whatever the reasons, extended warranties are popular with consumers despite being poor financial deals. To discourage warranty purchases, policymakers and prominent scholars have proposed requiring sellers of extended warranties to disclose repair rate information on the covered products to consumers.[53] A related policy that might also discourage extended warranty purchases would be to require disclosure of the average cost of repairing the product if the extended warranty were not purchased.

There are reasons to suspect that such mandatory disclosures would reduce extended warranty purchases. First, if consumers are not aware that repair rates and repair costs are low then this new information could lead them to understand that an extended warranty's financial benefit (i.e., the saving of the expected repair cost during the coverage period)

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50. Huysentruyt & Read, *supra* note 45, at 197–98, 204, 211. The studies created an "emotional benefits index" created from the degree of participants' agreement or disagreement with multiple statements about the emotional benefits they derive from insurance or a hypothetical extended warranty. Examples of the statements are: "I buy insurance because it gives me peace of mind" and "If I didn't buy [the extended warranty] and the [product] broke down, I would feel a lot of regret." *Id.* at 200, 207.

51. *Id.* at 197, 198 n.2 (Google search demonstrating the prevalence of the phrase "peace of mind" in websites of companies selling warranties).

52. Chen, Kalra & Sun, *supra* note 2, at 621.

53. NALEBUFF & AYRES, *supra* note 6, at 181 (suggesting that extended warranty sellers be required to disclose to consumers the probability that the extended warranty will be used: "Circuit City or Ford could tell you the odds of actually making a claim against an extended warranty"); Bar-Gill & Ferrari, *supra* note 6, at 103 (encouraging lawmakers to consider mandating that extended warranty sellers provide consumers "information on the probability that an extended warranty would be invoked"); S. 66, 2015 Leg., Reg. Sess. (N.Y. 2015), http://www.nysenate.gov/legislation/bills/2015/s66 [https://perma.cc/Q3PA-QQB6] (proposed legislation includes requirement that sellers of extended warranties to consumers post on their websites "statistical data, compiled annually, of how many times the extended warranty has been utilized by consumers for each product for which an extended warranty is offered, together with an explanation as to the reason the extended warranty was utilized . . . .").

generally is small relative to the warranty's cost. Second, even if consumers are already aware that the repair rates and repair costs are low, and thus these disclosures do not provide new information, they might still be effective as reminders of extended warranties' limited financial benefits. Indeed, the purpose of warnings in other domains (e.g., "consumption of alcoholic beverages impairs your ability to drive a car or operate machinery"[54] and "smoking causes lung cancer, heart disease, emphysema, and may complicate pregnancy"[55]) is often less to inform consumers than to remind them of dangers they already know. In the next section of this Article, we present an experiment testing the effectiveness of these extended warranty disclosures.

II. The Experiment: Testing Warranty Disclosures

A. *Participants*

We recruited 820 adults in the United States from Amazon's Mechanical Turk and paid $0.50 each to participate in the experiment (442 men, 378 women, average age = 36.17, SD = 12.12). Six people voluntarily dropped out of the experiment before completing it and were not included in this Article's analyses.

Studies using participants recruited from Mechanical Turk have the same quality responses as do studies conducted in behavioral labs.[56] In addition, the Mechanical Turk population is more diverse and older than traditional (college-aged) behavioral lab participants[57] as is reflected in our sample statistics (see Table 1). Thus, our sample is more representative of ordinary consumers than are college students, increasing the generalizability of our results. Indeed, as of 2016, there were 249.7 million adults in the United States,[58] but only 19.8 million people were enrolled in colleges throughout the country.[59]

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54. Alcoholic Beverage Labeling Act, 27 U.S.C. § 215(a) (2012).

55. Cigarette Labeling and Advertising Act, 15 U.S.C. § 1333(a)(1) (2012).

56. Michael Buhrmester, Tracy Kwang & Samuel D. Gosling, *Amazon's Mechanical Turk: A New Source of Inexpensive, Yet High-Quality, Data?,* 6 Persp. Psychol. Sci. 3, 3, 5 (2011) (finding that data obtained from participants recruited from Mechanical Turk is at least as reliable as data obtained from participants recruited via traditional methods); Gabriele Paolacci & Jesse Chandler, *Inside the Turk: Understanding Mechanical Turk as a Participant Pool,* 23 Current Directions Psychol. Sci. 184, 186 (2014) (survey of existing research concludes that the data quality on Mechanical Turk is "good" and that "researchers can use [Mechanical Turk] for virtually any study that is feasible to conduct online").

57. Buhrmester, Kwang & Gosling, *supra* note 56, at 186–87.

58. *Total Population by Child and Adult Populations*, Kidscount Data Center, https://datacenter.kidscount.org/data/tables/99-total-population-by-child-and-adult#detailed/1/any/false/871,870,573,869,36,868,867,133,38,35/39,40,41/416,417 [https://perma.cc/BH8Q-VSAW] (last visited Aug. 22, 2018).

59. *U.S. College Enrollment Statistics for Public and Private Colleges from 1965 to 2016 and Projections up to 2027*, Statista, https://www.statista.com/statistics/183995/us-college-enrollment-and-projections-in-public-and-private-institutions/ [https://perma.cc/4BJX-J8U3] (last visited Aug. 22, 2018).

TABLE 1

DEMOGRAPHICS OF EXPERIMENTAL PARTICIPANTS

GENDER
Male	53.9%
Female	46.1%

AGE
18 to 44 years old	76.3%
45 - 64 years old	21.2%
65 and older	2.3%

FULL-TIME EMPLOYMENT
Yes	34.0%
No	66.0%

B.   *Experimental Design and Procedures*

1.   *Overview*

All participants completed the experiment online and on the same day. They were asked to read a hypothetical scenario in which they have decided to buy a particular 65-inch television from a particular local retailer for $1,499.99.[60] Participants read that the manufacturer's warranty for the television is one year. While at the checkout counter, the cashier also asked participants if they wished to purchase an extended warranty that, for the first four years they own the television, "covers mechanical and electrical failures from normal use, has 24/7 zero-hassle claims and free on-site service for large TVs, and covers all parts and labor with no deductibles."[61]

After reading this scenario, participants were asked whether they would purchase the extended warranty and about the reasons for their decisions. They were also asked a number of manipulation check and demographic questions. In addition, they were asked about their past extended warranty purchase behavior, and they were given a brief numeracy test.

Participants in our experiment appear to have been familiar with the experimental scenario of being offered an opportunity to buy an extended warranty when purchasing a television. Eighty-seven percent of the participants reported owning a television and 79% reported having purchased a television in the past five years. Seventy-four percent of the participants reported having had the opportunity to buy an extended warranty in the

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60. The television price was based on the price of a 65-inch television at Best Buy.   BEST   BUY,   https://www.bestbuy.com/site/samsung-65-class-led-curved-nu8500-series-2160p-smart-4k-uhd-tv-with-hdr/6213270.p?skuId=6213270 [Permalink unavailable] (last visited Jan. 9, 2019).

61. This wording is based on SquareTrade's advertising for its extended warranties on televisions. *Save Up to 45% on Protection for Your New TV.**, SQUARETRADE PROTECTION   PLANS,   https://www.squaretrade.com/708/tv-warranty   [https://perma.cc/TQ53-GYM4] (last visited Aug. 13, 2018).

past five years, and 25% of the participants reported having bought an extended warranty in that time period. In addition, the distribution of participants' numeracy is similar to that of the U.S. population with 37% on the more proficient end (versus 36% in the population overall), 25% (versus 30%) on the less proficient end, and 38% in the middle (versus 34%).[62] Thus, the participants were largely representative of typical consumers within the American marketplace and appropriate for this research.

2. *Experimental Conditions*

The experiment employs a 3 (Repair Rate: not disclosed, disclosed—low, disclosed—high) x 2 (Average Repair Cost: disclosed, not disclosed) x 2 (Warranty Price: low, high) full-factorial, between-participants design. In other words, each participant was randomly assigned to one of 12 experimental conditions.

Participants in the *Repair Rate Disclosed—Low* conditions read that "the cashier tells you that the likelihood that the TV will need repair during the first [four] years is 3%." In the *Repair Rate Disclosed—High* conditions, participants read that "the cashier tells you that the likelihood that the TV will need repair during the first [four] years is 8%." The 3% and 8% repair rates were based on the repair rates reported by Consumer Reports for relatively reliable and unreliable television brands, respectively.[63] We tested two repair rates to determine whether consumers would be more likely to buy the extended warranty if a higher repair rate were disclosed. In the *Repair Rate Not Disclosed* conditions, participants were not given any information regarding the television's repair rate.

Participants in the *Average Repair Cost Disclosed* conditions read that "the cashier tells you that the average cost to repair a TV of this size is $300." This figure was the approximate actual average cost of repairing a large-screen television.[64] Participants in the *Average Repair Cost Not Disclosed* conditions were not given any information regarding repair costs.

Finally, in the *Low Warranty Price* conditions, the extended warranty cost $249, and, in the *High Warranty Price* conditions, the extended warranty cost $349. These prices were based on the range of prices offered in the marketplace for extended warranties on televisions priced similarly to the television used in the experiment. The lower-priced retailers offered extended warranty prices that were, on average, about 30% lower than the

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62. *Understanding Literacy & Numeracy*, CTR. DISEASE CONTROL & PREVENTION, https://www.cdc.gov/healthliteracy/learn/UnderstandingLiteracy.html [https://perma.cc/R5D3-T9R6] (last visited Aug. 17, 2018).

63. *Best Brands*, CONSUMER REP., Dec. 2012, at 50.

64. *Repair or Replace it?*, CONSUMER REP., Aug. 2011, at 24, 27 (showing range of average repair costs of $262 - $379 for big-screen TVs).

higher-priced retailers. Also, we chose prices ending in "9" because of the popularity of this pricing strategy by retailers.[65]

3.   *Dependent Variables*

After reading a version of the scenario, participants answered a series of questions. The first questions asked participants about their warranty purchase intentions. First, they answered a yes or no question: "Would you buy the extended warranty?" (*Purchase Decision*). To measure the strength of the purchase intention, they were then asked to indicate "How likely you are to buy the extended warranty?" (*Purchase Likelihood*) using a response scale with endpoints labeled "Very Unlikely" (1) and "Very Likely" (7). Also, they were asked "How interested are you in purchasing the extended warranty?" (*Purchase Interest*) using a response scale with endpoints labeled "Very Uninterested" (1) and "Very Interested" (7). In addition, they were asked "How wise an idea is buying the extended warranty?" (*Purchase Wisdom*) using a response scale with endpoints labeled "Very Unwise" (1) and "Very Wise" (7). Because participants' responses to all these questions were highly correlated (α = .89), we focus our analysis on the Purchase Decision variable.

4.   *Justifications for Purchase Decision*

We also sought to determine why the disclosures did or did not have an effect, so we also asked participants the reasons for their warranty purchase decisions. In particular, to explain why they decided to purchase or not purchase the extended warranty, they indicated whether they agreed or disagreed with each of twenty possible justifications for buying or not buying the extended warranty, such as "I'd sleep much better with the extended warranty" and "The cost of the extended warranty is high relative to the chance of something going wrong."[66] Participants provided their agreement or disagreement with each possible justification using a

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65. Robert M. Schindler & Patrick N. Kirby, *Patterns of Rightmost Digits Used in Advertised Prices: Implications for Nine-Ending Effects,* 24 (2) J. CONSUMER RES. 192, 192 (1997); Karen Gedenk & Henrik Sattler, *The Impact of Price Thresholds on Profit Contribution — Should Retailers Set 9-Ending Prices?,* 75(1) J. RETAILING 33, 33–34 (1999).

66. A full list of the justifications is provided *infra* Table 3. These justifications were based on the justifications used in Hogarth and Kunreuther's study of extended warranty purchase behavior. That study conducted an experiment examining how people's extended warranty purchase behavior differs if they were informed that their pre-existing beliefs regarding the covered products' repair rates and repair costs are correct. Unlike our experiment, it did not examine the effect of informing consumers of the true, actual repair rates and repair costs. Robin M. Hogarth & Howard Kunreuther, *Decision Making Under Ignorance: Arguing with Yourself,* 10 J. RISK & UNCERTAINTY 15, 30 tbl. 5 (1995). Recall that surveys have found that consumers do not know product repair rates and repair costs. *See supra* notes 45–48 and accompanying text.

five-point scale: Strongly Disagree (1), Disagree (2), Neither Agree nor Disagree (3), Agree (4), and Strongly Agree (5).[67]

5. *Numeracy Test*

The disclosures we test in this Article are numerical; they provide the repair rate and the average repair cost for a product. However, consumers differ in their numeracy, which has been defined as "the ability to comprehend, use and attach meaning to numbers."[68] Much research has found that consumers' numeracy can affect their decision-making. For example, low numeracy has been found to be associated with distorted perceptions of risks and benefits of health screenings, impaired risk communication, reduced medication compliance, and adverse medical outcomes.[69] In addition, one study found that more numerate consumers use a more complete decision-making process in choosing between two deals on products and are more likely to choose the better deal.[70] This research indicates that consumer numeracy might affect whether and how the disclosures examined in this Article impact consumers' decisions of whether to buy an extended warranty. Thus, in our experiment, we also examined the effect of consumer numeracy.

To measure participants' numeracy, we gave them a brief test, based on a longer, commonly-used numeracy test.[71] In particular, we asked participants three questions:

"If the chance of getting a disease is 10%, how many people would be expected to get the disease out of 100?"
"In the BIG BUCKS LOTTERY, the chances of winning a $10 prize are 1%. What is your best guess about how many people

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67. In addition to responding to these specified justifications, participants were given an opportunity to provide other reasons they would or would not purchase the extended warranty. However, very few participants provided reasons that were not in the twenty possible justifications that they were presented already. Specifically, only fourteen participants wrote an additional justification. Those additional justifications fell into seven categories: (1) Because I have kids, *five respondents*; (2) Extended warranties are a scam, *two respondents*; (3) Because information came from a third-party source, *one respondent*; (4) To avoid the shame of not being able to fix my broken TV, *one respondent*; (5) Because I can afford it, *one respondent*; (6) Because warranties are convenient, *one respondent*; and (7) Because it is cheaper to purchase extended warranties in the long run, *one respondent*.

68. Michelle Graffeo, Luca Polonio & Nicolao Bonini, *Individual Differences in Competent Consumer Choice: The Role of Cognitive Reflection and Numeracy Skills,* 6 Frontiers Psychol. 1, 2 (2015).

69. Valerie F. Reyna, Wendy L. Nelson, Paul K. Han & Nathan F. Dieckmann, *How Numeracy Influences Risk Comprehension and Medical Decision Making,* 135 Psychol. Bull. 943, 943 (2009).

70. Graffeo, Polonio & Bonini, *supra* note 68, at 1, 12.

71. Valerie F. Reyna & Charles J. Brainerd, *Numeracy, Ratio Bias, and Denominator Neglect in Judgments of Risk and Probability,* 18 Learning & Individual Differences 89, 90 tbl.1 (2008).

would win a $10 prize if 1,000 people each buy a single ticket
from BIG BUCKS?"
"In the ACME PUBLISHING SWEEPSTAKES, the chance of win-
ning a car is 1 in 1,000. What percent of tickets of ACME PUB-
LISHING SWEEPSTAKES win a car?"

We measured each participant's numeracy by the number of ques-
tions (0 – 3) that he or she answered correctly.

6. *Results*

a. Extended Warranty Purchases

Figure 1 displays the percentage of participants in each experimental
condition who stated that they would purchase the extended warranty.
The lighter bars represent participants offered the lower-priced extended
warranty ($249), and the darker bars represent participants offered the
higher-priced extended warranty ($349). The averages across both war-
ranty prices are indicated by the black lines.

FIGURE 1   EXTENDED WARRANTY PURCHASE INTENTIONS
BY DISCLOSURE PROVIDED
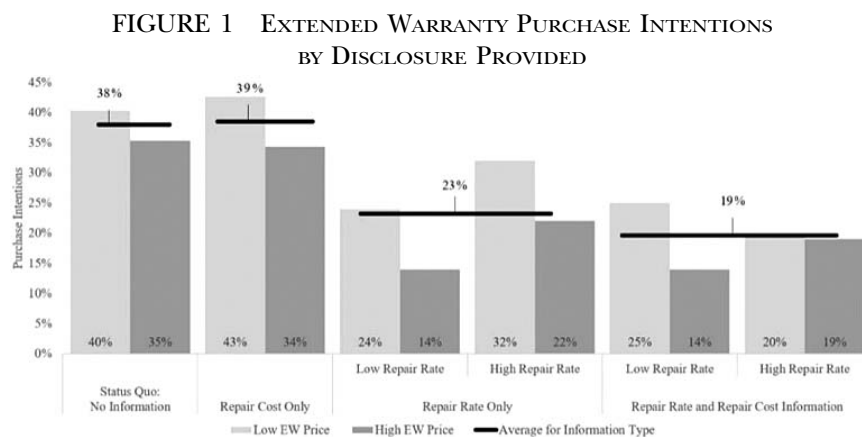
We used logistic regression to analyze the data.[72] The dependent va-
riable—Purchase Intention—had the value of 1 if the participants said
they would buy the extended warranty and the value of 0 if they said they
would not buy it. As independent variables, we used dummy variables to
indicate whether participants received a Repair Rate Disclosure and/or
the Repair Cost Disclosure and to indicate whether the disclosed repair
rate, if any, was high (8%) or low (3%). Specifically, the variable Repair
Rate was coded 1 if participants received any disclosure on the repair rate,
and 0 otherwise. Also, if participants received the high Repair Rate Disclo-
sure then both Repair Rate and the variable Repair Rate High were coded
1, but if participants received no or the low Repair Rate Disclosure then

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72. Logistic regression is appropriate because the dependent variable—
Purchase Intention—is binary (i.e., participants stated that they either would or
would not buy the warranty).

Repair Rate High was coded 0. In addition, the variable Repair Cost was coded 1 if participants received the Repair Cost Disclosure, and 0 otherwise.

The regression results show that the Repair Rate Disclosures reduced the proportion of participants who would buy the extended warranty. A significant main effect of Repair Rate emerged (β = -.95 SE = .20 Wald χ^2 = 23.11, df = 1, p <.001). Also, paired contrasts provide additional detail. Specifically, 38% of participants who did not receive any disclosure said they would buy the warranty (SE = .04 95% CI = .31, .45), but only 23% of the participants who received only a Repair Rate Disclosure said they would buy the warranty (SE = .03 95% CI: .18, .28), as did only 19% of the participants who received both a Repair Rate Disclosure and the Repair Cost Disclosure (SE = .03 95% CI: .14, .25). There was not a statistically significant difference in the behavior of participants who received the low (3%) Repair Rate Disclosure and the high (8%) Repair Rate Disclosure.

In contrast to the Repair Rate Disclosures, the Repair Cost Disclosure did not affect warranty purchases. No significant main effect of Repair Cost emerged (β = -.11 SE = .16 Wald χ^2 = .44, df = 1, p = .51). Indeed, 39% of participants who received only the Repair Cost Disclosure said they would buy the extended warranty (SE = .04 95% CI: .31, .46), which is not a statistically significant difference from the 38% of participants who received no disclosure who said they would do so. Nor was there an interaction between Repair Rate and Repair Cost. In other words, the Repair Cost Disclosure's lack of an effect did not depend on whether a Repair Rate Disclosure was also given. Recall that 19% of participants who received both the Repair Cost Disclosure and a Repair Rate Disclosure said they would buy the warranty, which is not a statistically significant difference from the 23% of participants who received only a Repair Rate Disclosure who said they would buy it.

Finally, the cost of the extended warranty affected consumer behavior. A significant main effect of Warranty Price emerged (β = -.20 SE = .08 Wald χ^2 = 6.34, df = 1, p =.01), indicating that a greater percentage of consumers purchased the extended warranty when its price was $249 rather than when it was $349. For example, when only a Repair Rate Disclosure was given, participants were almost 60% more likely to buy the warranty when it cost only $249 (28% of participants) rather than $349 (18% of participants).

b. Numeracy

Although the Repair Rate Disclosures reduced purchases of the extended warranties, the magnitude of this effect was highly correlated with participants' numeracy. As displayed in Figure 2, the Repair Rate Disclosures were much more effective in reducing warranty purchases of highly numerate consumers than of less numerate ones. Across all experimental

conditions, the Repair Rate Disclosures reduced the proportion of the less-numerate participants (i.e., those who answered zero or one of the numeracy questions correctly) who bought the warranty by only a statistically insignificant 18% (i.e., from 0.4 to 0.33). In contrast, the disclosures reduced the warranty purchases by about a third (i.e., from 0.39 to 0.26) for participants who answered two of the numeracy questions correctly, and by more than 70% (i.e., from 0.35 to 0.10) for participants who answered all three questions correctly.

Figure 2
Extended Warranty Purchase Intentions by Numeracy
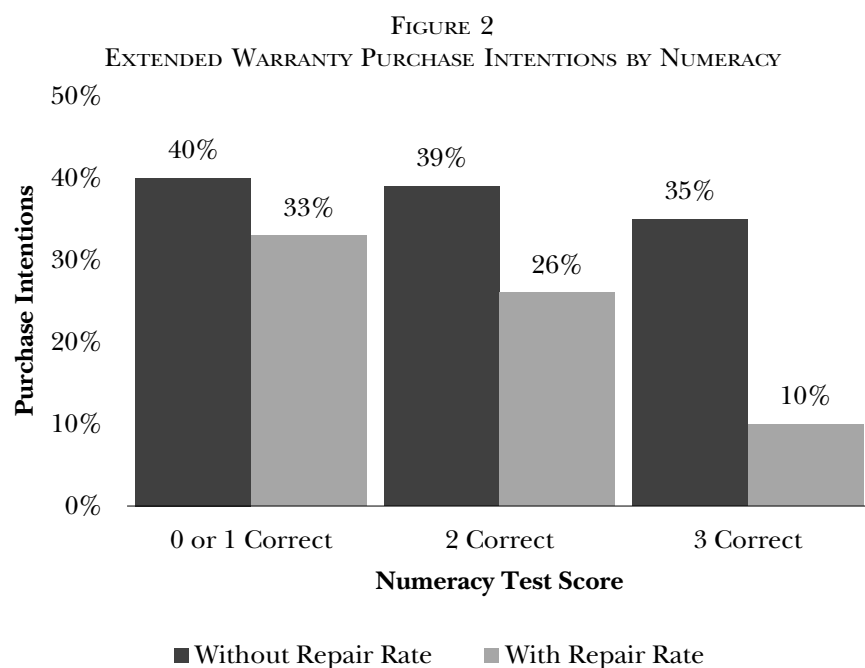
The finding that the Repair Rate Disclosure is much less effective in deterring consumers with low numeracy from buying an extended warranty is especially important because low-numeracy consumers are most likely to buy extended warranties in the first place. In our experiment, we asked participants several questions about their past real-world extended warranty purchases. Their responses are displayed in Table 2.

Participants with lower numeracy were more likely to have purchased an extended warranty on a television and on other products. The large magnitude of these differences is noteworthy. For example, compared to the most numerate participants, the least numerate consumers were about three times as likely to have purchased an extended warranty on a television in the past five years (21% versus 7%), and more than 85% more likely to have purchased an extended warranty on some product in the past year (24% versus 13%). This suggests that Repair Rate Disclosure will be least effective on those consumers who purchase the most extended warranties: less-numerate consumers.

TABLE 2   Participants' Prior Extended Warranty Purchases
by Numeracy

Numeracy Test Score (N per cell)	Descriptive Sstatistics	Have you ever pur-chased an extended warranty on a TV?	Have you purchased an extended warranty on a TV in the past 5 years?	Have you ever pur-chased an extended warranty on any product?	Have you purchased an extended warranty on any product in the past year?
0 or 1 (N=210)	Yes	25%	21%	61%	24%
	# of Responses	181	181	159	159
2 (N=310)	Yes	27%	18%	56%	20%
	# of Responses	288	288	274	274
3 (N=300)	Yes	13%	7%	48%	13%
	# of Responses	260	260	266	266

c. Justifications for Purchase Decisions

Recall that participants were asked the extent to which they agreed or disagreed with each of twenty possible justifications for buying or not buying the extended warranty. We examined participants' justifications for their warranty purchase decisions by submitting participants' responses to a factor analysis, which is a statistical analysis used to identify unobserved variables (i.e., factors) that give rise to the correlations among observed variables (e.g., the level of participants' agreement or disagreement with each of the twenty justifications). The factor analysis identified five distinct factors as underlying participants' decisions of whether to purchase the extended warranties. In order of importance, assessed by percentage of variance explained, these factors were:

Peace of Mind – e.g., extended warranty would allow participant to "sleep better at night" or avoid regret if the television were to need repair

Warranty's Cost – e.g., the warranty's cost is high or low, relative to the cost of the television and/or relative to the probability of the television needing repair

Experience – e.g., participant typically buys or doesn't buy extended warranties

TV's Value – e.g., the television is or isn't worth much to the participant

Optimism – e.g., the participant believes the television isn't likely to need repair.

Table 3 presents the specific items corresponding to each factor, the exact percentages of variance explained, and the component loadings in the factor analysis.

Thus, multiple motivations underlie consumers' decisions of whether to purchase extended warranties, such as the desire for peace of mind and the cost of the warranty, including its cost relative to the financial benefit it provides. For insight into why the disclosures were effective or ineffective, we also examined how the disclosures affected the justifications participants gave for their warranty-purchase decisions and whether these justifications were affected by participants' numeracy. To do this we conducted a mediation analysis.

TABLE 3   EXPLORATORY FACTOR ANALYSIS WITH VARIMAX ROTATION FOR JUSTIFICATION MEASURES

PEACE OF MIND 37.42%; α = .84	I'd sleep much better with the extended warranty.	0.66		
	I'd regret not having the extended warranty if the TV breaks down.	0.65		
	Even though the chance of the TV breaking down is small, I don't want to risk it.	0.64		
	The cost of repairing/replacing the TV would be much higher than the cost of the extended warranty.	0.62		
	I'm unlucky. Things I own seem to break down.	0.54		
	The cost of the extended warranty is not high relative to the chance of something going wrong.	0.56		
Costs 8.80%; α = .84	The cost of the extended warranty is small relative to TV's cost.	0.62		
	The cost of the extended warranty is high relative to the chance of something going wrong.	0.62		
	The extended warranty is expensive.	0.72		
	The extended warranty is expensive relative to the TV's cost.	0.76		
	The extended warranty is not expensive.	0.58		
Experience 6.88%; α = .81	I'd regret "wasting money" on the extended warranty if there was no breakdown.	0.63		
	I don't trust insurance and warranties. They don't cover everything and require you to keep track of lots of paper, etc.	0.64		
	I typically buy extended warranties.	0.70		
	I usually don't buy extended warranties.	0.76		
Value 6.33%; ρ = .73	The TV is worth a lot to me.		0.82	
	The TV is not worth a lot to me.		0.88	
Optimism 5.07%; ρ = .49	I'm lucky. Things like breakdowns don't seem to happen to me.			0.78
	The TV's nature makes it not likely to break down.			0.68

Mediation occurs when an independent variable affects a dependent variable through a third variable (a mediator). In other words, the independent variable affects the dependent variable because the independent variable affects a mediator and, in turn, the mediator affects the dependent variable.[73] Here, the disclosures could affect consumers' purchases of extended warranties by changing the weight that consumers give to certain justifications for buying or not buying the warranties.

Mediation analysis requires regression. We used three independent variables and their interactions: whether participants did (1) or did not (0) receive a Repair Rate Disclosure, regardless of whether it is low or high; whether participants did (1) or did not (0) receive the Repair Cost Disclosure; and the number of correct responses on the numeracy test (0, 1, 2, or 3).[74]

In the full model, the effects of peace-of-mind justifications on warranty purchase were positive ($\beta = 2.32$ SE $= .25$, Z $= 9.37$, p $< .001$), and the effects of cost-based justifications on warranty purchase were negative ($\beta = -.73$ SE $= .23$, t $= -3.15$, p $= .002$). This indicates that participants' using peace-of-mind justifications increases the likelihood of warranty purchase while using cost-based justifications decreases it. The analysis also holds when controls for the price of the extended warranty and receiving the high Repair Rate Disclosure are included.

The analysis also reveals evidence of moderated mediation.[75] Specifically, there was a significant negative interaction of numeracy and Repair Rate Disclosure on peace-of-mind justifications ($\beta = -.96$ SE $= .21$, p $< .001$), which indicates that as consumers' numeracy increases, a Repair Rate Disclosure decreases the impact of the desire for peace of mind on the decision of whether to purchase the extended warranty. Similarly, the analysis revealed a significant positive interaction of numeracy and a Repair Rate Disclosure on the use of cost-based justifications ($\beta = .75$ SE $= .33$, p $= .023$). This indicates that as consumers' numeracy increases, a Repair Rate Disclosure increases the impact of justifications related to the extended warranty's cost on the decision of whether to purchase the extended warranty.

Further, the indirect effects of the Repair Rate Disclosure and numeracy were not significant. When the effects of numeracy and the Repair
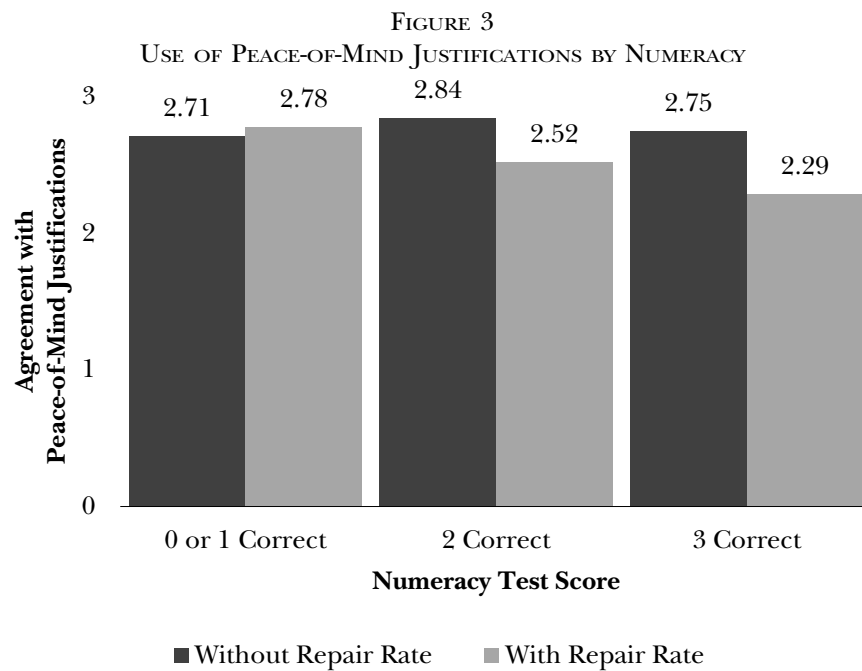
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73. Kristopher J. Preacher, Derek D. Rucker & Andrew F. Hayes, *Addressing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions*, 42 MULTIVARIATE BEHAVIORAL RES. 185, 186 (2007).
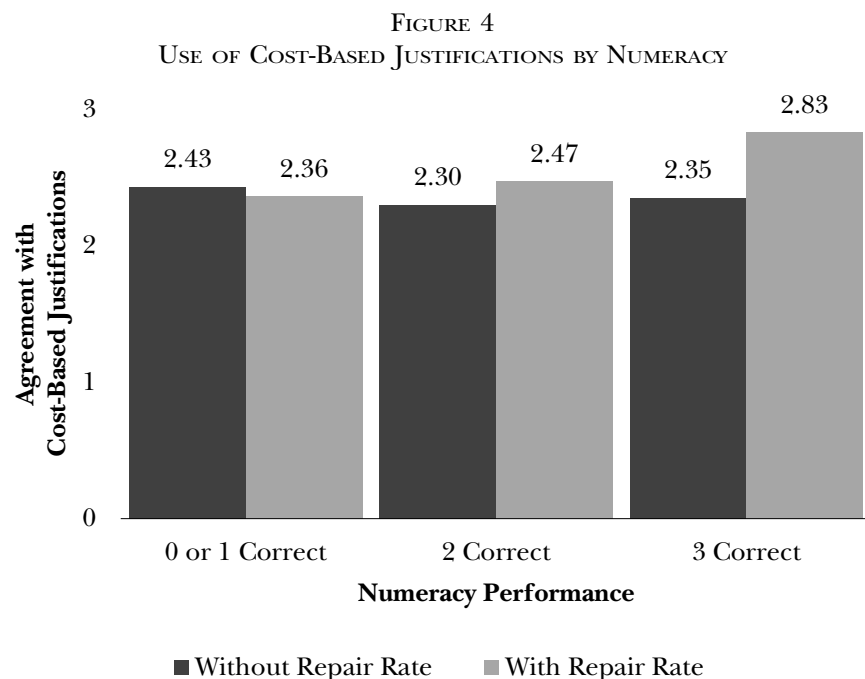
74. Before conducting the mediation analysis, we first confirmed that the data are appropriate for mediational analysis. Rik Pieters, *Meaningful Mediation Analysis: Plausible Causal Inference and Informative Communication*, 44 J. CONSUMER RES. 692, 692–93 (2017). The analysis confirming this appropriateness, and the complete mediation analysis are available from the authors.

75. Moderated mediation occurs when the effect of an independent variable on a dependent variable via a mediator variable differs depending on the level of another variable (the moderator variable). Preacher, Rucker & Hayes, *supra* note 73, at 193.

Rate Disclosure on the justifications are accounted for, the analysis revealed no additional impact of the interaction of numeracy and the Repair Rate Disclosure on the warranty purchase decision ($\beta = .28$ SE = 1.01, F = .28, p = ns).

How consumers' numeracy impacts the effect of the Repair Rate Disclosures can also be seen in Figures 3 and 4. Recall that participants rated their agreement or disagreement with each of twenty possible justifications for buying or not buying the extended warranty by using a five-point scale: Strongly Disagree (1), Disagree (2), Neither Agree nor Disagree (3), Agree (4), and Strongly Agree (5). Figure 3 displays the average level of agreement that participants expressed with the justifications related to peace of mind. Figure 4 displays the average level of agreement that participants expressed with the justifications related to the warranty's cost. Those figures show that the Repair Rate Disclosures significantly decreased the use of peace-of-mind justifications and increased the use of cost-based justifications by the most numerate participants. The Repair Rate Disclosures had similar, but smaller, effects for the participants in the middle-numerate group, but no such effect for the least-numerate group.

FIGURE 3
USE OF PEACE-OF-MIND JUSTIFICATIONS BY NUMERACY

Numeracy Test Score

■ Without Repair Rate   ■ With Repair Rate

Figure 4
Use of Cost-Based Justifications by Numeracy

In summary, the experiment provides evidence that the Repair Rate Disclosure changes the weight that some consumers give to peace of mind and cost considerations when deciding whether to purchase an extended warranty. In particular, providing the repair rate causes more numerate consumers' decisions to be driven more by the cost of the warranty and less by the desire for peace of mind. Thus, disclosing the repair rate alters the decision-making process toward more financial-cost-and-benefit-based reasoning for more numerate consumers, while the process remains more peace-of-mind focused for less-numerate consumers.

III.   Implications and Conclusion

Lawmakers and scholars often propose mandatory disclosures as a primary method of consumer protection. The reasoning behind this approach is that consumers armed with relevant information will make better decisions. Disclosures are also seen as being a less intrusive way of achieving policy goals than are other regulatory techniques. Past research has found, however, that the effectiveness of such disclosures greatly depends upon their context.

Because extended warranties are generally bad financial deals for consumers they have also become a target of potential disclosures. This Article presents evidence that requiring extended warranty sellers to disclose product repair rate information could somewhat reduce warranty

purchases, but disclosing average repair cost information would not impact purchases.

The experiment also provides insight into why repair rate information would reduce warranty purchases. Consumers who put more weight on the emotional benefits (peace of mind) offered by an extended warranty are more likely to purchase the warranty. In contrast, consumers who put more weight on the financial costs and benefits of the warranty are less likely to purchase it. This makes sense because extended warranties generally are poor financial deals for consumers.

The experiment found evidence that Repair Rate Disclosures impact some consumers' warranty purchase decision-making process by changing the weight that those consumers give to different justifications for buying or not buying the warranty. By informing or reminding consumers of the low probability that the product will break down during the warranty's coverage period, the Repair Rate Disclosure reduces consumers' need for the peace of mind that comes with an extended warranty. It also causes them to focus more on the cost of the extended warranty, which is high relative to the limited financial benefits it provides—the warranty only pays off in the unlikely event that the product needs repair during the warranty's coverage period. As a result, the Repair Rate Disclosure reduces purchases of the warranty.

The experiment also found that the disclosure is much more effective in discouraging warranty purchases by highly-numerate consumers than by less-numerate consumers. The Repair Rate Disclosure gives consumers information in percentage form: the probability that the product will need repair during the first few years of ownership. As the numeracy test in the experiment confirmed, many people have difficulty understanding percentages. Thus, it is unsurprising that the Repair Rate Disclosure is much more effective on consumers who are better able to understand it.

From a public policy perspective, however, the much smaller effect of the Repair Rate Disclosure on the least-numerate consumers is problematic. Less- numerate consumers are much more likely than more-numerate consumers to buy extended warranties. Thus, the disclosure provides the least protection for the most vulnerable consumers.

This problem is unlikely to be limited to extended warranties. Other products, such as prepaid credit cards, also appeal more to people with lower numeracy and decrease consumer welfare. Consumers with low numeracy are more prone to poor purchase decisions, such as those demonstrated in our experiment, and their post-purchase behaviors (e.g., in the subprime mortgage crisis) can be economically devastating.[76] Because of their numerical limitations, however, such consumers are difficult

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76. Kristopher Gerardi, Lorenz Goette & Stephan Meier, *Numerical Ability Predicts Mortgage Default,* 110 PROCEEDINGS NAT'L ACAD. SCI. 11267, 11267, 11271 (2013) (finding that, of borrowers who took out subprime mortgages, those with lower numerical ability were more likely to default on these mortgages).

to influence even using the straightforward Repair Rate Disclosure tested in our experiment. Thus, policymakers might need to be more creative in protecting such consumers, perhaps by developing simple graphics and language that are easier for these consumers to understand.[77]

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77. *See*, for example, Pope, Ishida, Kaufman & Langrehr, *supra* note 16, at 15 (encouraging regulators to "simplify [the] contractual language" of extended warranties); Madhubalan Viswanathan, José Antonio Rosa & James Edwin Harris, *Decision Making and Coping of Functionally Illiterate Consumers and Some Implications for Marketing Management,* 69 (1) J. MARKETING 15, 27–28 (2005) (encouraging retailers to use pictorial depictions of numerical product information to assist functionally illiterate consumers).