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A prospect theory approach to assessing changes in parameters of insurance contracts with an application to money-back guarantees

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ABSTRACT

Prospect theory has changed the way economists think about decision making under uncertainty – yet after so many years there have been few applications of the theory and those appearing mostly in finance. One of the barriers to applying the prospect theory is that it is not designed to be applicable (Barberis, 2013). This study applies prospect theory to the selection of money back guarantee (MBG) contracts. When consumers can choose from a menu of MBG contracts they are basically trading off risk with price in a way that resembles a choice of lotteries with multidimensional outcomes. Our application, which integrates reference based utility models with elements of prospect theory and the disappointment model, helps in explaining the large premium attached to MBG contracts that cannot be explained by the expected utility framework. We further show that the combination of probability weighting with disappointment aversion appears to provide a better explanation for consumers' high valuation of MBGs relative to each one when measured separately. We empirically test how consumers' valuation of the MBG option is affected by MBG duration, variation in the likelihood of returns, and return conditions that affect consumers' return cost. Our approach can be applied to model choices of risk reduction mechanisms such as extended warranties, demonstrations, and sampling.

1. Introduction

Empirical assessments of warranties suggest that they are overvalued by consumers beyond the degree warranted by the expected utility approach. For example, the annual costs of extended warranty contracts for household appliances exceed the average expected costs of repair by considerably more than what might be attributable to profit and overhead (Chen, Kalra and Sun, 2009). Consumers pay 15–25% premiums for 2-year, and 20–30% premiums for 3-year extended warranties. The large difference between these premiums and the expected value of repairs covered by the extended warranty contracts is inconsistent with expected benefit calculations and has been typically considered to reflect consumer judgment errors and asymmetric information (Bryant and Gerner, 1978; Center for Policy Alternatives, 1978).

In this paper we explore whether a similar overvaluation exists of another risk-reduction mechanism, the money-back guarantee (MBG). MBGs offer consumers the option to return a purchased product for a refund if the consumer is dissatisfied with the purchase for whatever reason. The U.S. National Retail Federation (NRF), estimated that 8.7% of purchases are returned under MBG, reflecting a total value of $174 billion of product returns, while Ofek, Katona and Sarvary (2010) estimate that 4–6% of products is returned. Anderson, Hansen and Simester (2009), who analyzed market data taken from a mail-order catalog company, calculate that MBGs had the effect of increasing sales by 53%, 16%, and 9% respectively for women's shoes, women's fashion items and men's apparel. They explain these variations in demand effects as reflecting differences in risk such that women shoes are more risky than the other two categories. In this paper we estimate consumer's willingness to pay for MBGs in one product category to see if these values represent exaggerated premiums for reducing risks in the face of uncertainty from an expected utility framework. Finding that indeed such exaggerated premiums exist, we evaluate whether a weighted value function, disappointment aversion or both might explain these risk reduction premiums.

There are two distinct approaches for incorporating psychological response to losses and gains into models of decision making. One approach incorporates expected losses and gains into the framework

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of expected utility theory by decomposing the utility into that of consumption and the utility from loss or gain (Bell, 1982; Gul, 1991). Embedded in this approach is the assumption that people maximize their expected utility and that disappointment (happiness) from an outcome that falls (is higher) from a reference level is a separable argument that is concave in gains and convex in losses (Kőszegi and Rabin, 2006, 2007, 2009; Shalev, 2000). The second approach deviates from the expected utility (EU) framework, suggesting that people do not really maximize expected utility, but are instead guided by their (limited) cognitive system. Perhaps the most prominent model of this approach is prospect theory (Kahneman and Tversky, 1979). The core assumptions of the prospect theory model are that outcomes are compared to a certain reference point, which is usually zero, and that the absolute subjective value of losses (i.e., values that fall short of the reference point) is larger than the subjective value of equivalent gains while extended expected utility models allow for non-zero multiple reference points. The cost that is attributed to losses depends on their context (Ert and Erev, 2013) and they are likely to increase when they are attributed to making mistakes (Chua et al., 2009).

In the current paper we develop a prospect theory framework for assessing consumers' valuation of a popular risk-reduction mechanism: the money back guarantee (MBG), considering product returns and the loss from being stuck with a purchased product that turns out to not fit the consumer's needs (non-fit) as disappointment. Prospect theory was originally designed to describe risky choices between two-outcome gambles, and as such it evaluates the subjective values of monetary outcomes and their probabilities (Kahneman and Tversky, 1979). It was later generalized to capture choice between multiple outcome gambles (Tversky and Kahneman, 1992; Wakker, 1994), but has not been used to explain consumers' choice of MBG, perhaps because it is difficult to apply (Barberis, 2013). In order to fill this void we develop an extension of the prospect theory model that can assess discrete choices and choices between continuous alternatives at the same time and relates to outcomes that are more complex than win–lose scenarios. For example, our model allows for one state where the uncertainty is resolved and the benefit (loss) is realized, and another where the uncertainty has not been resolved yet. The analysis allows us to assess how the premium for various risk management contracts depends on a contract's characteristics as well as on mental costs.

While we apply the methodology to MBGs, its applicability is much wider and can be used to estimate the value of various tools that reduce consumer risk, such as warranties, price guarantees, second hand markets, product sampling, leasing, trade-ins and product demonstrations.

MBGs are ex post guarantees that provide the buyer a put option to return the purchased product for any reason. The standard MBG in the U.S. is a 30-day guarantee that enables customers to return the product for any reason for a full refund of the purchase price. In the EU the law specifies 14 days for online purchases while the refund policy of goods bought in stores varies across stores and countries. In addition, the EU retailer bears the shipping costs of returns, while in the U.S. shipping costs are generally paid by the consumer. There are many variations of MBGs that include partial MBGs (the buyer pays restocking fees and or shipping costs for returned products), time varying MBGs (the restocking fees are increasing with the duration of the return), and lifetime MBGs (the guarantee has no time limit, e.g. Nordstrom) and returns being allowed only for products that have not been used (in the EU).

Studies of MBGs as risk management strategies have modeled consumers' choices between buying with and without an MBG, employing either the expected net benefits (Davis, Gerstner and Hagerty, 1995; Heiman et al., 2002; Matthews and Persico, 2005) or expected utility of benefits (Che, 1996) models. In particular, consumers' benefit from an MBG is assumed to be the reimbursement of the product price if it is returned, while the costs of the guarantee are the consumers' return costs if the product is returned, and the price premium paid for bundling the MBG option with the product if the product is not returned. It is typically assumed that the duration of the MBG contract is long enough to resolve fit uncertainty—an assumption that has not been validated yet empirically. Notably, this approach does not account for the consumer's psychological costs of anticipating loss such as the disappointment and regret when they consider the forgone alternative (Loomes and Sugden, 1982) that can result from either buying too short of an MBG if the product did not deliver the expected benefit, or from paying too much if a long MBG contract was purchased and the product provides high benefit. Our proposed extension of the prospect theory framework enables us to estimate and explain consumers' valuation of the MBG.

In this paper we develop an extension of a prospect theory framework that can assess multiple dimensions that vary in nature: some discrete (e.g., whether or not the product fits consumer's idiosyncratic needs) and others continuous (e.g., duration of the return period). The analysis further allows us to assess how the premium for various MBG contracts depends on the contract characteristics and other parameters (return costs). We use this approach to model the MBG contract and develop testable hypotheses about the parameters of interest. From survey data, we calculate individuals' willingness-to-pay premiums (or accept discounts) for better (or worse) MBG terms and estimate the implicit loss from disappointment. The value of disappointment is interpreted here as an extra loss, in addition to the product price, that a consumer experiences when she is stuck with a product that does not fit her needs and this poor fit is discovered only after the MBG expired. Thus the reference point for a consumer buying a given product is the expectation that the product will fit her needs, and the unexpected ex-post realization that these needs were not satisfied generates a psychological sense of loss which can only be eliminated if the consumer receives a reimbursement when the product is returned under an MBG. Our modeling of disappointment as a separable component in the consumer's benefit is consistent with the aforementioned literature. Disappointment is integrated in our model together with the notion of a weighting function drawn from Kahneman and Tversky's prospect theory. The combined disappointment and weighting functions result in valuations of MBGs that are different from those implied by using the expected net benefit criterion, both because of the extra valuation given to potential disappointment from a bad decision, as well as the weighting of probabilities that gives bigger weights than merited to small likelihood outcomes. Because return probabilities are relatively small, consumers may overweight them, and that may lead to higher premiums for MBGs relative to the standard expected net benefits model. In interpreting the empirical results, we compare the estimated premiums for MBGs when consumers use their actual return probabilities to assess MBG contracts with the estimated premiums when we assume weighted probabilities, and see how the weighting and disappointment together increase the "expected" cost of a loss should the product not be a fit.

In the next section we develop and present the extended prospect theory model. In Section 3 we present the survey design, and in Section 4 we estimate behavior with micro-level data to calibrate empirically what the behavioral parameters would need to be in order to use disappointment aversion as an explanation. In this context, we estimate the perceived value of MBGs to consumers and provide an explanation for how consumers generate these MBG valuations. In particular, we test whether prospect theory is a relevant framework for valuing the MBG. We conclude with a discussion of the implications of our findings.

2. Modeling consumes choice

2.1. The value and properties of MBG contract

In this section we build a simple model, which is based on expected utility principles, and show that the basic properties of