

Rediscovering Risk

Eric J. Johnson, Special Issue Editor

Somehow, consumer research has forgotten about risk. Much research has focused on frequently purchased packaged goods, and so it might be understandable that the concept of risk has lingered in the shadows. The major burst of interest surrounding the concept of perceived risk (Bauer 1960) was the last time that risk was conceptualized systematically as a driver of consumer behavior and not used simply as an additional explanatory variable. The idea seems to be that a consumer, in purchasing packaged goods, can be sure of the attributes associated with the product: A container of orange juice will deliver the advertised amount of vitamin C; a breakfast cereal will certainly contain the promised oats.

This seems to be shortsighted, even for packaged goods. The orange juice may offer calcium, which prevents the onset of osteoporosis, and the breakfast cereal may contain genetically modified grains, which some people believe have consequences for the environment. The recent news of the discovery of bovine spongiform encephalopathy (i.e., mad cow disease) and the specter of its variant, Creutzfeldt-Jakob disease, in a single cow in the United States have affected consumers' decisions to order Big Macs as well as the stock prices of major beef providers and fast-food chains.

Although risk is involved in the purchase of packaged goods, it is minor compared with that in other domains of much greater economic consequence: For most consumers in developed countries, decisions about where to live and how to invest for retirement are the two largest economic decisions they will make. The decision to buy a new personal video recorder may depend on the future financial health of the company that provides the service. The insurance industry is all about risk management, with consumers making decisions about mitigating the risk associated with owning cars and houses and maintaining their health. Yet for the most part, risk is simply another predictor variable that is focused mostly on medical and health applications. Neither "risk" nor "perceived risk" are keywords used by *Journal of Consumer Research*.

This special issue will not remedy this neglect, but I want to introduce briefly some of the relevant literature in the hopes that some people will be inspired by the fine set of articles contained herein and that a few guideposts will be helpful starting points. I provide a brief sketch, focusing on pointers to more complete introductions, and draw illustrations from the domain of insurance decisions.

Risks as Gambles

Fortunately, there are theoretical and conceptual frameworks easily applied to risk. Foremost among these is expected utility (EU), which has been the dominant model applied to risk in public policy and economics. The canonical form that has dominated research applies this formulation to gambles, which are defined as the series of outcomes,

$x_1 \dots x_n$, each of which can occur with a corresponding probability of $p_1 \dots p_n$. The expected value of the gamble is $\sum p_i x_i$ and the EU is $\sum p_i u(x_i)$. Utility functions, $U()$, normally reflect that money has decreasing value as a person accumulates more of it, which implies risk aversion. A major development in the past 50 years is the realization that an EU framework is a good *normative* model that describes how decisions should be made, but it is an inadequate *descriptive* model to describe how decisions are actually made. Originally, it was hoped that EU would be adequate for both tasks, but five decades of research have disabused researchers of that notion (Luce 2000; for an excellent historical overview, see Wu, Zhang, and Gonzalez 2004).

The major alternatives to EU that have emerged are prospect theory and closely related ideas that make use of rank dependence. These approaches share two properties with EU: The first is a key distinction between uncertainty and outcomes, and the second is the idea that the two components are combined by weighting the outcomes by uncertainty. Prospect theory has been widely applied and, in some cases, perhaps applied too ambitiously to a range of consumer behavior phenomena. Prospect theory has had an enormous impact and is the most cited "export" of psychology (Tetlock and Mellers 2002; for thorough introductions and a review of field and laboratory studies, see Camerer 2000; Kahneman and Tversky 2000).

In the sections that follow, I briefly review the two components and then move on to discuss newer developments that call into question the entire idea of weighted models.

Risk and Uncertainty

Historically, risk applied to cases in which objective probabilities are available and are often based on historical observations of the frequency of occurrence. Consider insurance, for example: There might be a historical record of the frequency of hurricanes that hit coastal North Carolina. Uncertainty applies to cases in which the probability is subjective, such as the probability of a severe acute respiratory syndrome (i.e., SARS) outbreak in the United States in 2004. Both EU and subjective EU (Savage 1954) imply that probabilities are weights: To evaluate a branch of a gamble, the (transformed) outcome should be weighted by the probability.

A major modification made by prospect theory (Kahneman and Tversky 1979; Tversky and Kahneman 1981) in dealing with risk was modification of this assumption, replacement of the probability with a π function, and transformation of p before weighting the outcome, $\pi(p_i)$. The basic idea is that the impact of a probability on choice is a function not only of the likelihood of the event but also of the perception of that probability. Thus, the weighting function captures the way the decision maker uses the stated probability. This function reflects people's choices and indicates that small probabilities are overweighted and large

probabilities are underweighted, with a crossover (the point at which probabilities change from being overweighted to underweighted) that has often been estimated to be between .3 and .4.

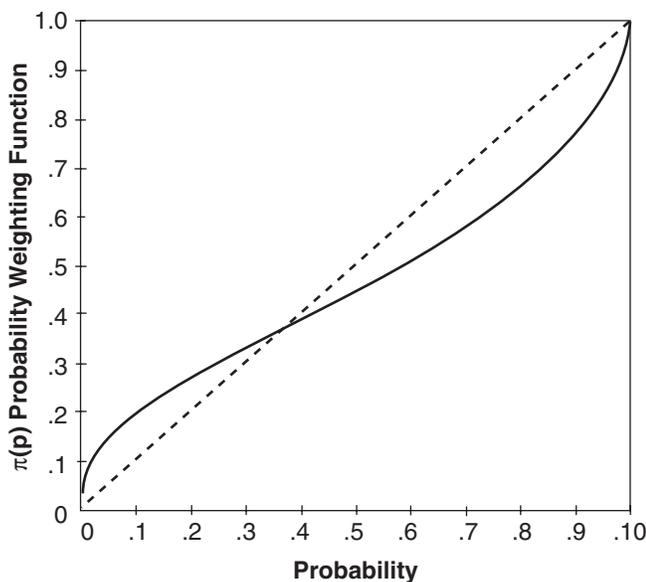
The empirical success of prospect theory has led to a large amount of work that examines both choices among simple gambles and elicitation of the prices that subjects would pay to buy and sell such gambles. A set of stylized facts emerged, extending the results first noticed by Allais (1953): Observations of risk attitude depend on both the sign of the outcome and the size of the probabilities. To explain this enriched set of observations, Tversky and Kahneman (1992) proposed a cumulative weighting function, which has the same approximate shape as that in Figure 1 but is applied to the cumulative probabilities (which can differ for gains and losses) when the options have been ordered by size of the outcomes.

Note that near zero and one, all bets are off. As is shown in Figure 1, there are two inflection points, which can result in different behavior in moves from large probabilities to certainty or from small probabilities to impossibility.

The idea that the impact of probability is not a linear function of the probability has great implications for understanding consumers' reactions to risk, though most applications have been in decision research, not in consumer research. Consider the following example based on Figure 1: People seem to dislike any insurance policy that does not reduce the risk of loss completely. I suspect that the value of an auto insurance policy that covers the insured on only odd-numbered days would be much less than half the value of one that provides coverage on both odd and even days.

However, the case of uncertainty, in which the probabilities are not stated, seems to be much more relevant to consumer research, and it presents a richer, if messier, picture.

Figure 1. A Typical Probability Weighting Function



Notes: Adapted from Wu, Zhang, and Gonzalez (2004).

Here, the question is how consumers might come up with estimates of uncertainty. A significant amount of research suggests that judgments of probability are influenced by how easily cases come to mind, which in turn is often influenced by the amount of media coverage and other factors (Lichtenstein et al. 1978a). For example, consider that people would be willing to spend an average of \$14.12 to buy a \$100,000 terrorism life insurance policy to cover a flight to London, but they would be willing to pay only \$12.13 for the same policy if it covered all potential causes of death (Johnson et al. 1993). Although terrorist acts are a (small) subset of the possible causes of death covered by a larger policy, they are much more available in memory (even in 1993), which renders the policy more valuable. In the same article, Johnson and colleagues (1993) show that people's willingness to pay for insurance that covers hospitalization caused by diseases (\$89.10) or accidents (\$69.55) is much greater than their willingness to pay for the same policy that covers them for any reason (\$41.53). The results are quite consistent with support theory (Rottenstreich and Tversky 1997; Tversky and Koehler 1994), a theory of subjective probability, which seems to be widely applicable to consumers' decisions.

Recent work has demonstrated a result that has potentially important implications for understanding consumers' reactions to risk. Most prior research on the weighting function, with its characteristic underweighting and overweighting, has concentrated on stated, not experienced, probabilities. However, consider the impact of a .2 probability, not the experience of winning or losing two times out of ten. Recent work by Weber, Shafir, and Blais (2004) shows that stated versus experienced probabilities reverse the usual pattern: When outcomes are experienced sequentially, such as by drawing cards from a deck, the impact of objective probabilities on choices is reversed: Low-probability events are underweighted, and high-probability events are overweighted. The explanation of the result is that the encoding process of observing the series of events tends to produce an internal representation that reflects this pattern. This is of great relevance, because consumers—as do the other species studied by Weber, Shafir, and Blais—most often experience good and bad outcomes and are seldom treated to stated probabilities. An important topic for further research is how this result might occur when the opportunities to experience and learn occur at longer intervals than in lab studies, such as the monthly or quarterly feedback in a brokerage statement. Here, the connection between availability and the impact of probability might also contribute to the impact of probabilistic learning.

Outcomes

Reference Effects

In a marked departure from utility theory, current descriptive theories of decision under risk and uncertainty suggest that consumers judge value relative to a reference point and often use a myopic mental account. Consider the decision to buy one of two forms of auto insurance: (1) Policy A has a discount if the consumer waives the right to sue for pain and suffering; (2) Policy B charges an additional premium to acquire the right to sue. Although the two policies may be

economically equivalent, they provoke different consumer responses. Because consumers perceive the additional premium in Policy B as a loss, they consider it much less attractive, even if the discount offered by Policy A is identical to the surcharge required by Policy B. In questionnaires and a quasi experiment run inadvertently by the insurance commissions of New Jersey and Pennsylvania, this framing manipulation had a large effect and resulted in a billion dollar difference in the amount of insurance sold (Johnson et al. 1993). Similar effects have been found in consumers' decisions about pension plans (Madrian and Shea 2001), Internet privacy policies (Johnson, Bellman, and Lohse 2002), choice of health plans (Samuelson and Zeckhauser 1988), and even whether to become an organ donor (Johnson and Goldstein 2003).

Framing

Reference dependence has already attracted quite a bit of attention in studies of consumer decision making outside the risk domain. However, the main idea is that many different frames can describe any set of outcomes and that the frames may have a significant effect on which outcome is chosen. The portrayal of outcomes as gains and losses, as I showed previously, is just one possibility. Another possibility is the combination or separation of events, an area that has been called "mental accounting" (Thaler 1999). For example, events can be aggregated over different time periods (Read, Loewenstein, and Rabin 1999; Thaler and Johnson 1990), which influences both the outcome and the stated probability. For example, to encourage seat belt use, the probability might be aggregated over many years, not just one: This influences the perceived *probability* of a loss and moves the probability to the area of the weighting function (see Figure 1) in which the most overestimation occurs, an idea that Paul Slovic has suggested (Slovic, Fischhoff, and Lichtenstein 1978). Other demonstrations of the impact of framing on decisions to mitigate risk include demonstrations that even though deductibles are necessary to make policies incentive compatible and to prevent moral hazard, insurance buyers are particularly averse to them and seem to overpay for insurance as a result (Johnson et al. 1993).

Representing Risks

Although the idea that risk can be modeled as choice between gambles yields important insights, it also has some obvious shortcomings, one of which is that it does not address the construction of the decision maker's alternatives. What outcomes are considered? What dimensions are used? How are they weighted? This seems to be an important question given that a decision maker's list of potential risks is often incomplete and significantly affected by the list of risks provided (Fischhoff, Slovic, and Lichtenstein 1978a; Russo and Kolzow 1994). A conclusion that emerges from this research area (Fischhoff et al. 1978b; Lichtenstein et al. 1978b; Slovic, Fischhoff, and Lichtenstein 1979) is that risks have many components, not all of which represent objectives. The basic result is that inclusion of these measures, such as psychometric dimensions (e.g., dread), helps explain reactions to risk in ways that a simple analysis of more objective factors cannot. In addition, the factors con-

sidered can depend on the task used to elicit them (Johnson and Tversky 1984). More recently, it has become clear that there are significant and important individual and group differences in the weighting of these dimensions (Finucane et al. 2000b).

New Approaches

Affect

A major departure from the standard analysis has been an emphasis on affect as a determinant of reactions to risk. Although it has been known for many years that affect can influence risk perception (Johnson and Tversky 1983), affect has moved to the forefront of research in risk (Finucane et al. 2000a; Loewenstein et al. 2001), and researchers have identified more specific ways that affect can bias such judgments (Forgas 1995; Lerner and Keltner 2001; Pham et al. 2001; Russell 2003). Particularly when combined with advances in physiological and neuroscience methods, analyses of risk from an affective perspective would be a particularly compelling development.

Individual Differences

Most of the preceding analysis focuses on "average" reactions to risk. However, much as it is for the idea of a "representative consumer" in economic models, this focus is a potentially dangerous simplification. For example, when the probability weighting function is estimated at the individual level, a fair amount of individual variance in functional forms emerges (Wu, Zhang, and Gonzalez 2004). The characteristic of overweighting small probabilities is true, in the aggregate, but there are important individual differences, including people who underweight the probabilities. I suspect that the same is true for the amount of loss aversion, with substantial individual differences in the degree of loss aversion for any single attribute and differences in the amount of loss aversion across attributes. An appropriate prototype derives from the risk perception literature, that is, the "white male" effect (Finucane et al. 2000b). Compared with women and nonwhite men, white men differ in how they weight risk dimensions and perceive many activities as having less risk. For example, white men have lower faith in the government's role in risk regulation and tend to trust in technology more. Description and exploration of the origins of these differences seem to be important issues for further research. From a policy perspective, this realization potentially complicates things: No one-size-fits-all policy will maximize everyone's utility. The positive aspect of this is that measures can be targeted to people who are most at risk.

Risk and Public Policy

I previously used the example of seat belts to illustrate how a change in risk presentation might change behavior. Note that this suggestion was well intentioned but manipulative: Instead of using instruction to communicate correct perceived probabilities, it used the overweighting of small probabilities to accomplish a desirable outcome: the increased use of seat belts. However, one might be uncomfortable with this: In some real but partial sense the driver did not make the decision, the policymaker deciding how to present the information contributed to the outcome. It is

tempting to consider this a small effect, and in this case, it is an effect that had little influence on behavior. Ultimately, changes in law produced marked changes in behavior.

However, for many of the effects I have described, the outcomes are much larger. Consider the role of defaults: In choosing a default, to a large extent, a policymaker can influence the revealed preference. This is true even when the decision is important, as it is for pension plans or organ donation. Should policymakers take this responsibility? Must they take this responsibility? This question has begun to attract significant interest in both economics and law, where it can be argued that ignoring the effects lowers social welfare (Camerer et al. 2003; Thaler and Sunstein 2004). This is a vital question, because whereas such defaults may increase social welfare as a whole, some people may be worse off. Doing nothing and maintaining the status quo may be an inferior option, but the omission bias favors it (Baron and Ritov 1994).

Return for a moment to the discussion of individual differences, and consider the adoption of air bags in autos. On average, air bags result in a reduction of fatalities but not without a shift in risk: People of small stature are at greater risk of injury as a result of the air bags' deployment (Graham et al. 1998). Although compulsory air bags save lives, it is possible that a default customized to the primary driver would further increase social welfare. Such customized defaults may be the best possible resolution to the quandary presented by the literature briefly reviewed herein.

Articles in the Special Issue

The articles in this issue exemplify the kind of research that can be done when risk, marketing, and public policy meet. They also illustrate many of the themes in this introduction. Jonathan Baron provides a nice overview of a decision-making approach to information provision, demonstrating that this affects both firms *and* individual people. Sara L. Eggers and Baruch Fischhoff illustrate some of these ideas in a case study of potential nutrition claims. Although the two articles are independently developed, they are quite complementary. Sankar Sen provides an analysis of the effect of HIV testing on protective behavior, illustrating how an EU model can predict unanticipated consequences. Sen also illustrates how such models can be extended to behaviorally more realistic applications. The articles by Joseph C. Nunes, Christopher K. Hsee, and Elke U. Weber as well as Peggy Sue Loroz and Donald R. Lichtenstein provide nice illustrations of the importance of cultural and individual differences to an understanding of the psychology of risk perception. Finally, at a more macro level, Yong Liu and Charles B. Weinberg examine the role of nonprofits, which are major players in managing risk in competitive markets.

Although the articles span a diverse set of interests, they are integrated in two senses: First, they all apply to the models that have at their roots the interface between economics and psychology, models that can be applied to many areas and that have clear, testable implications. Second, the implications include recommendations and prescriptions for public policy and should be of interest outside of academia. Because all the articles share more realistic behavioral

bases, I hope that readers find the prescriptions reflective of an appreciation of the complexity of the underlying phenomena. The tension between broadly applicable models and behaviorally realistic (and at times domain specific) assumptions and advice has been a major motivating theme in the area of risk. I believe that in rediscovering risk, the marketing field can benefit from appreciating this tension.

In closing I would like to thank the authors for their hard work and responsiveness; Joel Cohen for providing much more help, advice, and hard work than any guest editor deserves; and Brook Hubner for her extraordinary assistance.

References

- Allais, Maurice (1953), "Le comportement de l'homme rationel devant le risque, critique des postulats et axiomes de l'école Américaine," *Econometrica*, 21 (4), 503–546.
- Baron, Jonathan and Ilana Ritov (1994), "Reference Points and Omission Bias," *Organizational Behavior and Human Decision Processes*, 59 (3), 475–98.
- Bauer, Raymond A. (1960), "Consumer Behavior as Risk Taking," in *Dynamic Marketing for a Changing World*, Robert S. Hancock, ed. Chicago: American Marketing Association, 389–400.
- Camerer, Colin F. (2000), "Prospect Theory in the Wild: Evidence from the Field," in *Choice, Values, and Frames*, Daniel Kahneman and Amos Tversky, eds. Cambridge, UK: Cambridge University Press, 288–300.
- , Samuel Issacharoff, George Loewenstein, Ted O'Donoghue, and Matthew Rabin (2003), "Regulation for Conservatives: Behavioral Economics and the Case for 'Asymmetric paternalism,'" *University of Pennsylvania Law Review*, 151 (3), 1211–54.
- Finucane, Melissa L., A. Alhakami, Paul Slovic, and Stephen M. Johnson (2000a), "The Affect Heuristic in Judgments of Risks and Benefits," *Journal of Behavioral Decision Making*, 13 (1), 1–17.
- , Paul Slovic, C.K. Mertz, James Flynn, and Terre A. Satterfield (2000b), "Gender, Race, and Perceived Risk: The 'White Male' Effect," *Health Risk & Society*, 2 (2), 159–72.
- Fischhoff, Baruch, Paul Slovic, and Sarah Lichtenstein (1978a), "Fault Trees: Sensitivity of Estimated Failure Probabilities to Problem Representation," *Journal of Experimental Psychology: Human Perception and Performance*, 4, 330–44.
- , ———, ———, Stephen Read, and Barbara Combs (1978b), "How Safe Is Safe Enough: Psychometric Study of Attitudes Towards Technological Risks and Benefits," *Policy Sciences*, 9 (2), 127–52.
- Forgas, Joseph P. (1995), "Mood and Judgment: The Affect Infusion Model (Aim)," *Psychological Bulletin*, 117 (1), 39–66.
- Graham, John D., Kimberly M. Thomson, Sue J. Goldie, Maria Segui-Gomez, and Milton C. Weinstein (1998), "Cost-Effectiveness of Air Bags in Motor Vehicles: Reply," *Journal of the American Medical Association*, 279 (7), 506–507.
- Johnson, Eric J., Steven Bellman, and Gerald L. Lohse (2002), "Defaults, Framing, and Privacy: Why Opting In-Opting Out," *Marketing Letters*, 13 (1), 5–15.
- and Daniel Goldstein (2003), "Medicine: Do Defaults Save Lives?" *Science*, 302 (5649), 1338–39.

- , John Hershey, Jacqueline Meszaros, and Howard Kunreuther (1993), "Framing, Probability Distortions, and Insurance Decisions," *Journal of Risk and Uncertainty*, 7 (1), 35–51.
- and Amos Tversky (1983), "Affect, Generalization, and the Perception of Risk," *Journal of Personality and Social Psychology*, 45 (1), 20–31.
- and ——— (1984), "Representations of Perceptions of Risks," *Journal of Experimental Psychology: General*, 113 (1), 55–70.
- Kahneman, Daniel and Amos Tversky (1979), "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica*, 47 (March), 263–91.
- and ———, eds. (2000), *Choice, Values, and Frames*. Cambridge, UK: Cambridge University Press.
- Lerner, Jennifer S. and Dacher Keltner (2001), "Fear, Anger, and Risk," *Journal of Personality and Social Psychology*, 81 (1), 146–59.
- Lichtenstein, Sarah, Paul Slovic, Baruch Fischhoff, Mark Layman, and Barbara Combs (1978a), "Judged Frequency of Lethal Events," *Journal of Experimental Psychology: Human Perception and Performance*, 4, 551–78.
- , ———, ———, ———, and ——— (1978b), "Judged Frequency of Lethal Events," *Journal of Experimental Psychology: Human Learning and Memory*, 4 (6), 551–78.
- Loewenstein, George F., Elke U. Weber, Christopher. K. Hsee, and Ned Welch (2001), "Risk as Feelings," *Psychological Bulletin*, 127 (2), 267–86.
- Luce, R. Duncan (2000), *Utility for Gains and Losses: Experimental Approaches*. New York: Lawrence Erlbaum Associates.
- Madrian, Brigitte C. and Dennis F. Shea (2001), "The Power of Suggestion: An Analysis of 401(k) Participation and Saving Behavior," *Quarterly Journal of Economics*, 116 (4), 1149–87.
- Pham, Michel T., Joel B. Cohen, John W. Pracejus, and G. David Hughes (2001), "Affect Monitoring and the Primacy of Feelings in Judgment," *Journal of Consumer Research*, 28 (2), 167–88.
- Read, Daniel, George Loewenstein, and Matthew Rabin (1999), "Choice Bracketing," *Journal of Risk and Uncertainty*, 19 (1–3), 171–97.
- Rottenstreich, Yuval S. and Amos Tversky (1997), "Unpacking, Repacking, and Anchoring: Advances in Support Theory," *Psychological Review*, 104 (2), 406–415.
- Russell, James A. (2003), "Core Affect and the Psychological Construction of Emotion," *Psychological Review*, 110 (1), 145–72.
- Russo, J. Edward. and K.J. Kolzow (1994), "Where Is the Fault in Fault-Trees," *Journal of Experimental Psychology: Human Perception and Performance*, 20 (1), 17–32.
- Samuelson, William and Richard Zeckhauser (1988), "Status Quo Bias in Decision-Making," *Journal of Risk and Uncertainty*, 1, 7–59.
- Savage, L.J. (1954), *The Foundation of Statistics*. New York: John Wiley & Sons.
- Slovic, Paul, Baruch Fischhoff, and Sarah Lichtenstein (1978), "Accident Probabilities and Seat Belt Usage: A Psychological Perspective," *Accident Analysis and Prevention*, 10 (2), 281–85.
- , ———, and ——— (1979), "Rating the Risks," *Environment*, 21 (3), 14–20.
- Tetlock, Philip E. and Barbara A. Mellers (2002), "The Great Rationality Debate," *Psychological Science*, 13 (1), 94–99.
- Thaler, Richard H. (1999), "Mental Accounting Matters," *Journal of Behavioral Decision Making*, 12 (3), 183–206.
- and Eric J. Johnson (1990), "Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice," *Management Science*, 36 (6), 643–60.
- and Cass R. Sunstein (2004), "Libertarian Paternalism Is Not an Oxymoron," *University of Chicago Law Review*, forthcoming.
- Tversky, Amos and Daniel Kahneman (1981), "The Framing of Decisions and the Psychology of Choice," *Science*, 211 (4481), 453–58.
- and ——— (1992), "Advances in Prospect-Theory: Cumulative Representation of Uncertainty," *Journal of Risk and Uncertainty*, 5 (4), 297–323.
- and Derek J. Koehler (1994), "Support Theory: A Nonextensional Representation of Subjective-Probability," *Psychological Review*, 101 (4), 547–67.
- Weber, Elke U., Shari Shafir, and Ann-Renee Blais (2004), "Predicting Risk Sensitivity in Human and Lower Animals: Risk as Variance or Coefficient of Variation," *Psychological Review*, 111, forthcoming.
- Wu, George, Jiao Zhang, and Richard Gonzalez (2004), "Decision Under Risk," in *Blackwell Handbook of Judgment and Decision Making*, Nigel Harvey and Derek Koehler, eds. London: Blackwell Publishing, forthcoming.

Copyright of Journal of Public Policy & Marketing is the property of American Marketing Association and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.