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Predicting health behaviors with an experimental measure of risk preference

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ABSTRACT

We conduct a large-scale economics experiment paired with a survey to examine the association between individual risk preference and health-related behaviors among adults aged 18–87 years. Risk preference is measured by the lottery choice experiment designed by Holt and Laury [Holt, C.A., Laury, S.K., 2002. Risk aversion and incentive effects. The American Economic Review 92(5), 1644–1655]. Controlling for subject demographic and economic characteristics, we find that risk aversion is negatively and significantly associated with cigarette smoking, heavy drinking, being overweight or obese, and seat belt non-use. In additional specifications, we find that risk aversion is negatively and significantly associated with the likelihood a subject engaged in any of five risky behaviors and the number of risky behaviors reported.

1. Introduction

Risk preference influences a variety of economic behaviors under uncertainty, such as investment, portfolio choice, job change, and migration. In the field of health economics, attitudes toward risk are likely to affect the purchase of health insurance, the use of preventive medical care, and the propensity to engage in behaviors that either increase or decrease mortality risk, such as cigarette smoking or seat belt use. Despite the importance of individual-specific risk preference, there is no consensus on how best to measure it or control for its contribution to economic behaviors. Recent studies have employed various survey questions dealing with hypothetical gambles (e.g., Barsky et al., 1997), hypothetical willingness to pay for risky assets (e.g., Guiso and Paiella, 2005), and self-reported attitudes toward risk (e.g., Dohmen et al., 2005). These survey-based measures of risk preference have shown the expected relationship with risky health-related behaviors in some, but not all, such studies. One concern about survey questions is that choices made in hypothetical situations may not reflect actual behaviors when real money is at stake. Further, evidence from experimental economics suggests that respondents' reports of their own attitudes do not always reflect their actual behaviors (e.g., Glaeser et al., 2000). These issues motivate the use of economics experiments to generate additional measures of subject-specific risk preference.

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The primary contribution of this paper is a methodological one. We pair a widely used economics experiment designed to measure risk preference (the lottery choice experiment designed by Holt and Laury (2002)) with a survey that measures several risky health-related behaviors, and we use the resulting data to test whether risk preference measured by the experiment is associated with surveyed behaviors. This general approach has been reported in only a few prior studies, and ours is the first study to focus exclusively on health behaviors. Our methodological contribution is enhanced by the use of a subject pool that is both large and diverse when compared to those derived from most economics experiments, many of which consist of undergraduate students. Using data from one of the largest replications of the lottery choice experiment, we examine a sample of more than a thousand adult subjects ranging from 18 to 87 years of age. All subjects in our experiment received immediate financial payments based on their decisions, so that the stakes in the lotteries were not simply hypothetical.

Our empirical results show that an experimental measure of risk preference is significantly associated with several risky health behaviors measured in our survey. Controlling for a number of subject demographic and economic traits, we find that laboratory-measured risk aversion is negatively and significantly associated with cigarette smoking, heavy episodic drinking, being overweight or obese, and seat belt non-use. In other specifications, we find that the experimental measure of risk aversion is negatively and significantly associated with the likelihood of reporting any of five risky behaviors, the number of risky behaviors reported, and a factor-analysis-based measure of subjects' underlying propensity to engage in risky behavior. Thus, our findings provide additional evidence that certain health behaviors are influenced in a consistent manner by preferences toward risk. Because two of the behaviors significantly associated with our experimental measure of risk aversion are smoking and seat belt non-use, our results also offer additional support for the use of these behaviors as proxies for risk preference. Finally, our findings demonstrate the potential benefits of linking experimental tasks to household surveys.

2. Measuring individual-specific risk attitudes

Before introducing our methodological approach, we first describe existing techniques for measuring individual-specific attitudes toward risk. The literature review makes several points relevant to our work. First, there is no single or standard choice of proxy for risk preference. Second, only a small number of studies have used experimental measures to generate a measure of risk preference and examine its relation to risky behaviors. Third, compared to these prior studies, our work has a unique focus on health behaviors and draws on a subject pool that is both exceptionally large and diverse in age.

Past research studies have measured individual-specific attitudes toward risk with measures of hypothetical behaviors, actual behaviors, and self-reported attitudes. Among the measures involving hypothetical scenarios, the most common deals with hypothetical gambles. For example, questions on the 1992 Health and Retirement Study (HRS) ask respondents to choose between two jobs, one with a certain income and another with a 50% chance of doubling income and a 50% chance of reducing income by one-third, one-fifth, or one-half. Based on their job choices, respondents can be classified into one of four categories ranging from least risk tolerant to most risk tolerant[1]; alternatively, it is possible to construct a cardinal measure of risk tolerance from the responses as is done in Barsky et al. (1997). Variations of these questions have also appeared in the Panel Study of Income Dynamics (PSID) (e.g., Luoh and Stafford, 2007), a 1997 survey of French households (e.g., Arrondel, 2002) and a 1998 survey of Dutch households (e.g., Kapteyn and Teppa, 2002). In all cases, the questions offered subjects the choice of a safe job with certain earnings of Y and a risky job with expected earnings greater than Y. As a result, the questions can be used to classify subjects at different levels of risk aversion, but not as risk-loving or risk neutral.

Measures derived from hypothetical gamble questions have been used to predict health-related risky behaviors in a number of studies.[2] For example, controlling for age, sex, race, and religion, Barsky et al. (1997) reported that respondents in the HRS with larger parameter values of risk tolerance were more likely to smoke, drink, and not own health insurance. In contrast, Picone et al. (2004) found that the coefficient on a risk tolerance parameter was either statistically insignificant or significant and of the wrong sign in models of the demand for preventive medical tests. Sloan and Norton (1997) reported insignificant coefficients on categorical dummies for risk aversion in a model of long-term care insurance demand. Lahiri and Song (2000) reported that a categorical dummy for risk aversion had a negative and significant effect in a model of smoking initiation but an insignificant effect in a model of smoking continuation. Finally, Dave and Saffer (2007) found that a categorical dummy for risk aversion had a negative and significant coefficient in models of alcohol consumption.

Individual risk preference has also been measured with questions on other hypothetical behaviors. For example, Guiso and Paiella (2005) used hypothetical willingness to pay for a risky asset to examine decision making in the 1995 Bank of

[1] In later waves of the HRS, additional questions increase the number of categories to six.

[2] Additional studies have employed the hypothetical gamble questions to control for risk preferences in models of behaviors unrelated to health. Using the HRS, these include Lusardi (1998) on precautionary saving behavior, and Kimball et al. (2007) on asset allocation. Using the PSID, Charles and Hurst (2003) examined investment decisions, Kan (2003) examined mobility, Brown and Taylor (2007) modeled educational attainment and wages, and Schmidt (2007) studied marriage and childbearing. Kapteyn and Teppa (2002) and Arrondel (2002) examined wealth and investment using Dutch and French household data, respectively.