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Children's rationality, risk attitudes and field behavior

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ABSTRACT

We investigate the relationship between risk attitudes, choice consistency and field behavior of children by conducting economic experiments with 1275 8th graders. Choices are not completely consistent with any of the economic theories we consider, however, they are not random either. We use our experimental data to structurally estimate risk preferences and correct for decision error. Using a measure constructed from the estimates and individual choices, we find that risk preferences do predict future field behavior. Children who are more risk averse are less likely to receive disciplinary referrals one and two years after the experiment and are more likely to complete high school, even controlling for economic rationality, family background, scholarly achievement and past misbehavior. Accounting for decision error turns out to be important as a simple aggregate measure of risk is not found to be correlated with field behavior.

1. Introduction

According to the Center for Disease Control (CDC), 29,551 individuals aged 15–24 died in 2010. Of those deaths, 20.7% were due to accidental discharge of firearms, accidental poisoning, exposure to noxious substances, and assault. By comparison, the frequency of these causes of death in the rest of the population is 1.5%. As reported by childrenstats.gov, the percent of 8th graders who admit using drugs is 7.7% , and of the 47.4% who say they have had sex, three-quarters did not use contraceptives and 40% did not use a condom. While many of these behaviors may be viewed as imprudent, some could be considered economically rational if, for example, the returns to illegal activities are high or a child is willing to take risks. We investigate these type of behaviors more generally by asking two questions: (1) Are children's choices over risky outcomes rational, in that they are consistent with economic theory? and (2) Do risk preferences predict field behavior? We address these questions by collecting experimental and field behavior on 1275 8th graders.

Several reasons motivate studying the nature of children's preferences and their relationship with field behavior. First, children make many decisions on their own, independent of their parents, and these decisions have important consequences for future economic outcomes. For instance, recent studies from labor economics show that misbehavior during childhood and adolescence have long term consequences on earnings (Heckman et al., 2006; Segal, 2013). Second, economic theory

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(Freeman, 1999) suggests that children's behavior must respond to both the relative costs to human capital accumulation and their preferences. So, examining the link between risk preferences and field behavior should be fruitful. Third, measurement error may be important when relating experimental estimates of preferences to outcomes. Misbehavior and high school completion are relevant outcomes that can be used to test the extent of the error and our proposed methodology to correct for it.

We aim to improve our understanding of risk preferences, economic rationality and field behavior by using several data collection methods. Information on the child's household environment is gathered with a survey. High school completion, past and future misbehavior come from school records, and risk preferences are measured using incentivized economic experiments. Measuring preferences with experiments is advantageous because this allows us to observe the behavior of children from various backgrounds over identical choice sets. Similarly, data on household environment are potentially informative of the barriers some children might face in attempting to accumulate human capital.[1] An important component of our study is a brief survey on family structure completed by children participating in the experiment. This drastically reduces the loss of information due to non-response from mailed surveys to parents and allows us to control for variables that might be correlated with behavior in the experiment and the field. To control for the influence of cognitive and non-cognitive abilities (Heckman et al., 2006), we use standardized test scores and disciplinary referrals prior to the experiment.[2]

We look at the effect of children's risk preferences on field behavior, as measured by disciplinary referrals one to two years after the experiment and high school completion five years later. While field behavior is likely to be influenced by many factors that are difficult to measure, we add various controls to reduce the potential for omitted variables.

Before relating measures of risk preferences to field behavior, however, it is crucial to determine what these experimental measures of risk reveal. It would be inappropriate to interpret choices in experiments as a measure of preferences if they are made randomly and are not consistent with theory. Even if children possess well-behaved preferences over risky prospects, they might be distorted in experiments because the child is not paying attention or makes execution mistakes. This measurement error could make it difficult to detect a relationship between preferences and field behavior even if one exists. To address these issues, our experimental design is constructed specifically to detect rational behavior through a series of lottery decisions. The generated data permit us to structurally estimate a decision model and identify whether children's choices are consistent with various theories of decision-making under risk and to what extent choices are noisy. We test consistency with expected utility theory, but also with less restrictive models of behavior such as Neilson (1992a), Diecidue et al. (2004), and cumulative prospect theory.

We have several key results. First, children's choices systematically deviate from decision patterns predicted by the theories of decision-making under risk we consider, including expected utility, as well as non-expected utility theory. While choices are not completely consistent with these theories, children are not choosing randomly. Using the approach of Harless and Camerer (1994), we find that, once we allow for errors in decision making and compare across theories, expected utility is as good as other models at explaining behavior (Vuong, 1989).

Second, we introduce a new estimate of risk preferences that corrects for measurement error due to decision mistakes. Assuming an expected utility model of decision making, we structurally estimate the conditional probability that a child has a certain set of preferences given the pattern of errors in the population and the actual choices made by the child in the experiment. The estimates from the structural model are then used to construct a risk preference measure that corrects for decision error.

Third, when our constructed risk preference measure is correlated with field behavior, we find that a child who is more risk averse is less likely to have future disciplinary referrals and more likely to complete high school. This holds even controlling for economic rationality, past disciplinary referrals, scholastic performance and family background. The magnitude of the effect of risk preferences on completing high school is large (e.g. equivalent to a one standard deviation change in 8th grade math scores). It is worth noting that the disciplinary referrals we use in the analysis occurred one and two years after the children completed our experiment and high school completion occurred five years later. This means that our results show a relationship between an estimated risk preference measure and future behavior.

Finally, having a measure of preferences that accounts for decision error turns out to be crucial to uncover a relationship with field behavior. The correlation between risk aversion and disciplinary referrals is only statistically and economically significant if we use our estimate of risk preferences that corrects for measurement error. If we ignore error and use an aggregate measure of lottery choices or each separate lottery decision to explain discipline, we find no significant correlation. Similar correlation patterns exist for high school completion as well. These results highlight that experimental measures could be imprecise due to measurement error (see Beauchamp et al., 2011; Gillen et al., 2015; Kimball et al., 2006; 2008).

Very little is known about whether children's decisions under risk are consistent with economic theory. Harbaugh et al. (2002) examine the risk attitudes of children and test for deviations from expected utility, but they do not test for consistency with other economic theories of decision-making under uncertainty. Our findings are consistent with studies using adults (Harless and Camerer, 1994) and a similar instrument to measure risk preferences. As in previous research

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[1] For instance, children in two-parent households might face higher costs to misbehaving. While personality might also be important in explaining behavior, we do not have these measures. Instead, we control for household environment and past misbehavior.

[2] While disciplinary referrals and test scores are imperfect measures of cognitive and non-cognitive abilities (Heckman et al., 2006), achievement tests have been found to be correlated with personality traits (see Borghans et al., 2011). A comprehensive approach would take into consideration measurement error in risk preferences as well as skills (Cunha et al., 2010). We examine measurement error in the former but not the latter.