Risk Preferences over Correlated Risks: Insights on Demand for Index Insurance from a Lab Experiment in Ghana

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Extended Abstract

Do risk preferences remain stable across lotteries with different structure? We investigate this question in a lab experiment comprising a series of lotteries conducted with smallholder farmers in rural Ghana. In each lottery, payout is determined by random draws from a bag with differently colored balls. Before each lottery draw, participants are asked whether they would prefer to forgo the lottery in favor of a certain payout over a range of possible certainty values. We calculate the risk tolerance implied by participants' revealed preferences over lotteries and certain payouts, and then test whether risk preferences remain consistent through changes in complexity and correlation between draws.

Variations in the lottery structure allow for four main comparisons. First, we introduce correlation in outcomes across participants within a session to test whether social preferences or other external interactions affect preferences over experimental outcomes. Such considerations may be especially strong in this setting because participants within a session belong to the same community and regularly interact in daily life. Nevertheless, we find correlation with others' lottery outcomes has no effect on a participant's certainty equivalent for their own lottery draw.

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Second, we vary lottery complexity by manipulating the number of ball draws used to calculate the final payout. Prior work has demonstrated aversion to complex and compound lotteries in similar lab settings (Carter and Elabed 2015). We find the opposite pattern, that participants behave more tolerant of risk when the lottery structure is more complex. However, within a given lottery structure, participants are the most risk averse before any draws are made and become more risk tolerant as more information is revealed.

Third, in some lotteries where the outcome is based on multiple draws, we induce negative correlation between subsequent draws. This manipulation lowers the variance of outcomes, but the resulting distribution requires greater cognitive burden to compute relative to a series of uncorrelated draws. As before, participants appear more willing to accept risk as the difficulty of calculating underlying outcome probabilities increases.

Finally, we introduce complexity in the certain payout by asking eliciting certainty preferences for each ball draw independently rather than the lottery outcome as a whole. This variation tests whether more complexity lowers the value participants place on the certain payout, or whether it increases aversion to the lottery altogether. We find participants display greater risk aversion when complexity is added to the certain payout calculation.

Results from this experiment suggest two competing pressures in how complexity affects responses to risk: complexity may lead decision-makers to behave more cautiously as they consider the possibility of making mistakes in calculating outcome probabilities, or it may lead actors to default to decision rules based on simple heuristics. This latter behavior is most evident in the fact that in 15% of cases, participants reject all but the most favorable certain alternative. This type of extreme strategy is most common in lotteries where other participants display greater risk tolerance.

Our findings can inform agricultural insurance contract design. Agricultural insurance has long been promoted by economists as a tool for rural development, but takeup among smallholder farmers remains low. We identify features of how risk and insurance are presented that may affect the willingness to insure risk among a relevant population of smallholder farmers.

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