

# **Deliberately Stochastic: Random Choice and Preferences for Hedging**

## **Extended Abstract**

Random (or stochastic) choice is a well-documented behavioral phenomenon, according to which individuals often make different choices from the same set of options. The two common interpretations of stochastic choice are (i) random utility, which postulates that individuals always choose the best option as determined by their preferences, but these preferences are subject to random shocks and thus change stochastically; and (ii) mistakes, which suggest that individuals have well-defined preferences, but they give different answers due to errors. A third explanation is that subjects are deliberately choosing to randomize their answers, either because they do not know what they would like to choose, or because their preferences violate expected utility in a way that leads to a desire to randomize (e.g., when preferences are convex). Recent experiments show that subjects who exhibit random choice also appear to have a deliberate desire to randomize their answers.

The goal of this paper is to develop axiomatically two models of stochastic choice as the outcome of deliberate randomization. We consider the setup of stochastic choice over sets of lotteries over monetary outcomes, where a stochastic choice function assigns to any set of lotteries a probability distribution over its elements. First, we provide conditions under which the decision maker has a preference relation over lotteries, and the stochastic choice from any set is the one that induces the best feasible lottery over outcomes according to those preferences. This model is general, as it does not impose any assumption on the underlying preferences except monotonicity in payoffs and the fact that the decision maker only cares about the distribution over final outcomes rather than on the procedure in which this distribution is obtained. We show that this model is characterized by a simple rationality-type axiom, reminiscent of acyclicity conditions in revealed preferences from finite data sets.

We then turn to study a special case of the model above in which the preference relation that the decision maker maximizes is convex --- and thus display (weak) preference for randomization --- and admits the cautious expected utility representation of [Cerrei-Vioglio, Dillenberger, and Ortleva \(2015\)](#). This model, which we term the cautious stochastic choice model, captures a rationale for choosing randomly that emerges from the individual's subjective uncertainty of how to evaluate each lottery; she may benefit from hedging between existing ones in a way similar way to that in which an ambiguity-averse individual may benefit from hedging between existing options. The cautious stochastic choice model is characterized from stochastic choice by positing—together with the rationality axiom of our first theorem, continuity, and risk aversion—that the individual sees no gains from hedging with a degenerate lottery (similarly to the observation that an ambiguity averse individual sees no gain from hedging with a constant act).