Journal of Economic Psychology 60 (2017) 7–20

Contents lists available at ScienceDirect

Journal of Economic Psychology

journal homepage: www.elsevier.com/locate/joep

Intertemporal stability of uncertainty preferences

Peter Duersch [a], Daniel Römer [b,*], Benjamin Roth [a]

[a] Heidelberg University, Bergheimer Str. 58, 69115 Heidelberg, Germany
[b] Centre for European Economic Research (ZEW), L7, 1, 68161 Mannheim, Germany

ARTICLE INFO

Article history:
Received 1 September 2016
Received in revised form 9 January 2017
Accepted 30 January 2017
Available online 9 February 2017

JEL-Codes:
C91
D81

PsycINFO Classification:
2229
2260

Keywords:
Ambiguity
Risk
Stability of preferences
Experiment

ABSTRACT

We analyze the stability of ambiguity preferences experimentally, by repeatedly eliciting ambiguity attitudes towards multiple 3-color Ellsberg urns over a period of two months. 57% of the choices show stable preferences over this time period. This is significantly higher than random choices would suggest, but significantly lower than the level of consistency when measures are taken back-to-back (75%). Over the same time frame, we do not find a significant change in the consistency of risk preferences. For subjects who are able to recall their ambiguity decision after two months correctly, the share of consistent choices does not drop significantly over time.

1. Introduction

In any model that makes predictions based on preferences, an often unmentioned but important assumption is the stability of said preferences. To draw conclusions from previous observations to future behavior, we have to assume that an individual chooses according to the same rules at both points in time. When designing policies, for example in the context of the choice of pension plans or climate protection, we can only observe choices today while the payoffs realize in the future, often involving different kinds of uncertainty. People who prefer alternatives with known probabilities over alternatives with unknown probabilities are ambiguity averse. Lab experiments with real subjects and incentives typically confirm the thought experiment of Ellsberg (1961) and show that a majority of subjects are indeed ambiguity averse (see Camerer & Weber, 1992; Etner, Jeleva, & Tallon, 2012; Oechssler & Roomets, 2015; Trautmann & van de Kuilen, 2015). As a consequence, ambiguity is increasingly taken into account to better explain real world phenomena and to make better predictions (see Epstein & Schneider, 2008; Weitzman, 2009 or Millner, Dietz, & Heal, 2012). However, experimental research into the stability of preferences has so far focused on the stability of risk preferences (Zeisberger, Vrecko, & Langer, 2012). In this

* Corresponding author.
E-mail addresses: peter.duersch@awi.uni-heidelberg.de (P. Duersch), droemer@gmx.de (D. Römer), benjamin.roth@awi.uni-heidelberg.de (B. Roth).

http://dx.doi.org/10.1016/j.joep.2017.01.008
0167-4870/

paper, we provide one of the first analyses of choice stability under ambiguity and, at same time, compare this to the stability of risky choices.

If subjects possess preferences about uncertainty, and if those preferences are stable, we would expect choices to be consistent. That is, we would expect subjects to reveal identical preferences at two different points in time. Since it is impossible, so far, to directly "read out" these preferences from the subject's mind, we repeatedly use standard tools of the literature, the 3-color Ellsberg urn (Ellsberg, 1961) and a list of risky choices (Holt & Laury, 2002), to classify and compare behavior over time. Our experimental design allows us to study preference stability under different conditions. In our main comparison, we analyze stability of ambiguity preferences by comparing choices for two 3-color Ellsberg urns over a period of two months. To apply the strictest possible test, we use a design that allows us to obtain two measures of ambiguity aversion using the same elicitation procedure for the same urn. This is contrasted with risky choices using the same time lag. Moreover, we also look at two variations where the time interval between choices is reduced to a few minutes only. In the first variation, we repeat the same elicitation procedure directly after the first choices to test for the effect of time on stability. In a second variation, we keep the shorter time interval, but additionally delay the draws and the payoffs for one urn by two months to study the effect of deferred payoffs.

Overall, we find that individual choices are more stable than random choices would suggest. However, far from all subjects are consistent across choices. Moving payoffs to the future does not significantly impact stability, but separating choices by two months' time leads to lower consistency. For the case of risk preferences there is no such effect of time. Interestingly, for subjects recalling their ambiguity choices after two months, we do not find time effects on stability.

Section 2 briefly reviews the related literature. Section 3 explains the experimental design. Section 4 presents the results. Finally, Section 5 discusses the findings.

2. Literature

There is a large number of studies that address the general question of preference stability. With respect to preferences on uncertainty, the majority of papers deals with expected utility theory and prospect theory (see Zeisberger et al., 2012 for a more detailed survey on this literature). To study stability, most papers compare choices at two different points in time. Wehrung, Maccrimmon, and Brothers (1984) elicit hypothetical investment decisions of 90 business men with a delay of one year. They find a small but highly significant positive correlation ($\rho = 0.36$) for the corresponding personal risk measures. Smidts (1997) elicited Dutch farmers' certainty equivalents for 50/50 lotteries concerning the market price for potatoes in two consecutive years. Comparing the Arrow-Pratt measures of absolute risk aversion across the two years he observes a positive and significant correlation ($\rho = 0.44$). Harrison, Johnson, McInnes, and Rutström (2005) conduct lab experiments and elicit risk preferences according to the Holt and Laury (2002) framework twice, with a delay of 20–28 weeks in between. By using a structural maximum likelihood model, they estimate coefficients of constant relative risk aversion and do not find any significant difference of the aggregate parameter between both points in time. Note, however, that they do not study individual stability. Andersen, Harrison, Lau, and Rutström (2008) elicit risk preferences over a 17-month period from a representative sample of the adult Danish population, using four different elicitation tasks. They find a positive and significant correlation (ranging from $\rho = 0.34$ to $\rho = 0.58$, depending on the actual task), but do not identify a general tendency for risk attitudes to change over time in aggregate. In a related paper, Baucells and Villasís (2010) study the stability of risk preferences in a prospect theory framework. They observe a stable pattern of preferences on the aggregate level, while the percentage of individuals that change their responses across sessions is quite high (63%).

There are only few studies that address the stability of ambiguity aversion. None of them systematically investigates identical situations over distinct points in time. Eliaz and Ortoleva, 2016 elicit multiple ambiguous decisions with one decision appearing three times in the same session. Here, 71% of subjects give consistent answers while the remaining 29% change their view when faced with the decision for the second or third time.[1] However, there is no variation in the time dimension in this study. Some other papers test for the stability of ambiguity aversion across different choice situations.[2] Stahl (2014) compares both classical variants of the Ellsberg urn and finds a lower number of ambiguity averse subjects in the 3-color urn (55%) than in the 2-color urn (70%). Moreover, he shows that the number of ambiguity averse choices drops as the relative payoffs of the ambiguous urn rises. Based on the observed choices in these different situations, he classifies 60% of the subjects to be choosing "almost random", while 26% of choice patterns are consistent with expected utility and only 12% represent ambiguity averse choices. Binmore, Stewart, and Voorhoeve (2012) also analyze decision behavior in different conditions and test the explanatory power of different theories. They find only weak evidence for consistent ambiguity aversion and explain this result by a stricter consistency requirement as they analyze two different (but related) comparisons in choices. Dimmock et al. (2011) compare ambiguity attitudes from different elicitation tasks and find at least 35% inconsistent classifications across the tasks. Summarizing, the literature suggests that choices under ambiguity contain a large share of randomness, at least when comparing behavior across different tasks.

[1] In the experimental literature on ambiguity aversion, broader classifications (averse, neutral, loving) are more common than the estimation of a more specific parameter, which makes the use of a correlation coefficient less meaningful.

[2] Note that this approach cannot rule out the possibility that observed instabilities are driven by differences in the tasks and sources applied.