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A simulated financial savings task for studying consumption and retirement decision making

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ABSTRACT

We describe a simulated financial decision making task that requires the participant to make decisions, over the course of a life cycle, regarding how much of their income to consume immediately and how much to save for a later retirement phase in which no income will be generated. The savings task was developed to be readily understood and performed online by members of a diverse participant population. A preliminary study ($N = 165$) involving such a population was conducted in which performance on the savings task was observed as length of retirement phase and the presence of a consumption-smoothing goal were experimentally manipulated. Results suggested that most participants understood the task and responded sensibly; for example, they saved a greater portion of current income for later consumption when faced with a long, compared to a short, retirement phase. Responsiveness of saving levels during the task to retirement length was found to be correlated with an independent measure of participants' financial risk attitudes. Consumption smoothing during the task was found to be correlated with a measure of individual differences among participants in temporal delay discounting. Compared to experimental savings tasks developed in previous research, the task described here may offer some practical advantages in requiring less extensive participant instructions, providing a user-friendly graphical interface, being readily performed online, and potentially being more accessible as a consequence to participants with limited education or financial sophistication.

1. Introduction

Deciding how much money to save, whether to buffer against unexpected expenses or for later consumption during retirement, can be difficult. Economists and psychologists, among other social scientists, are interested in how, and how well, people make such decisions. One methodological challenge is that real-life financial decisions can be investigated observationally but not, generally speaking, experimentally, because key variables such as income, expenses, and length of working and retirement periods are not readily subject to experimental manipulation. Experiments investigating decisions in simulated financial environments, then, may serve as an informative complement to observational research investigating corresponding decisions in real financial environments.

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By now there exists a small body of such experiments (e.g., Ballinger, Palumbo, & Wilcox, 2003; Brown, Chua, & Camerer, 2009; Carbone & Hey, 2004; Fehr & Zych, 1998; Hey & Dardanoni, 1988). Researchers have noted that life-cycle models of consumption and savings in economics are typically optimized using computationally intensive methods, naturally raising the question of how closely human performance approximates the optimal benchmark (Benartzi & Thaler, 2007; Brown et al., 2009; Winter, Schlafmann, & Rodepeter, 2012). Indeed, a number of experiments on savings decisions have revealed suboptimal performance, in some cases arising from systematic departures in how people make savings decisions relative to the optimized savings model, such as overconsumption and undersaving (Ballinger et al., 2003; Brown et al., 2009; Carbone & Hey, 2004; Fehr & Zych, 1998; Hey & Dardanoni, 1988). These results suggest that savings experiments can provide insights into corresponding behavioral shortcomings in real-life financial decisions.

A major complication in identifying suboptimal financial decision making, whether in the field or in the lab, is heterogeneity in the utility derived from consumption and savings due, for instance, to individual differences in risk attitude and time preference. Lab experimenters have developed a convenient methodological solution in the form of induced utility, in which simulated consumption during the savings task yields utility "points" (or experimental currency, which is later converted into a payment) according to a function that is fixed for all participants. In theory, participant preferences are experimentally equated via the method of induced utility, and performance can then be evaluated against a common optimal benchmark.

The goal of researchers conducting savings experiments, to investigate the role of various key variables in the life-cycle model (e.g., income shocks, habit formation, longevity risk, etc.), coupled with the use of the induced utility methodology, has led to the construction of experimental savings tasks that are, on the one hand, quite sophisticated but, on the other, potentially confusing and difficult to explain to participants. Instructions can run to many pages (or require extensive one-on-one instruction from the experimenter), involving tables and the use of calculators or spreadsheets for relevant utility calculations (e.g., Ballinger, Hudson, Karkoviata, & Wilcox, 2011; Brown et al., 2009; Hey & Dardanoni, 1988). Due to their complexity, furthermore, these tasks can require lengthy experimental sessions (e.g., 45–60 min of training followed by a main task taking 75–90 min in Fehr & Zych, 1998; and approximately 90 min for training and task completion in Brown et al., 2009). In some settings, such as one-on-one in-lab sessions involving students from selective universities, use of a task with intensive computational and time demands is not necessarily a barrier to collection of instructive, meaningful data. In other settings, however, such demands may be prohibitive.

The goal of the present research was to develop a simplified savings task that requires less time, detailed instructions, and participant education to complete, and that as a consequence can be readily administered to large numbers of demographically diverse participants in an online setting (e.g., Amazon Mechanical Turk). One step we took to simplify our savings task, relative to those used in previous savings experiments, was to reduce some forms of uncertainty (e.g., income shocks), to eliminate certain complicating factors (e.g., habit formation), and to largely remove the need for observational learning (e.g., to infer relevant probability distributions). Another, possibly more radical, step we took was to abandon the use of an induced utility function. Instead, participants were either left to rely entirely on their own exogenous preferences, facets of which would presumably be revealed by their choices during the savings task, or at most were given only the broad, qualitative goal of smoothing their simulated lifetime consumption. Because we did not try to eliminate, using an induced utility function, the impact on task performance of heterogeneity among individuals in risk attitudes and time preference, we instead attempted to measure these constructs with scales administered following the savings task. Indeed, one of our research questions was whether individual differences in risk attitude and time preference would correlate with performance measures derived from the savings task.

Below, we describe the savings task we developed, and then report the results of a preliminary study in which we examined how participants completing the task responded to changes in the anticipated length of the "retirement" phase for which they were saving. Of particular interest was the extent to which participants attempted to smooth their discretionary income consumption over the simulated life cycle. To this end, we compared the spontaneous behavior of one group completing the task to another group that was explicitly encouraged to engage in consumption smoothing. The study was largely exploratory, with the main goal to examine whether participants could understand the savings task and perform it in a sensible manner that yielded meaningful data.

2. Savings task

Participants played several rounds ("lives") of a savings task, referred to as a "Game of Life," that would require them to make decisions about how much to spend and save over simulated life-cycles of work and retirement. The complete set of task instructions is included in Appendix A of the supplementary materials.[1]

Each round (simulated life) consisted of 24 periods, divided into work and retirement phases. Income was received during periods in the work phase but not in the retirement phase. Participants were informed, at the outset of the round, how many periods there were to be (i.e., there was no uncertainty regarding how long the simulated life would last), how much income each work period would bring, and at which period they would retire and no longer receive any income. This information was presented graphically in a grid (see Fig. 1 for a screenshot). Income varied from 10 to 32 units per period, and increased

[1] A working version of the savings task can be accessed at http://arts.uwaterloo.ca/~dkoehler/savingsgame. Please contact the authors for a copy of the program code, which was written in PHP and JavaScript.