Pre-Registration and Pre-Analysis Plan for Unemployment Insurance and Investment in Task-specific Skills: experimental evidence

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Experimental protocol

Subjects will participate either in a laboratory-based or online experiment with the following protocol. Subjects are paid a participation fee (paid on completion in the online experiment). They are informed that they are paricipating in an experiment in decision-making and that in addition to the participation fee they will be paid any additional money they accumulate during the experiment at its conclusion. They are informed that earnings are denominated in an artificial currency (ECU), that they will begin the experiment with a fixed amount of money in an "account," and that they can earn further ECU during the experiment. They are also informed about the conversion rate into £ at the conclusion of the experiment.

Subjects are then informed about a series of tasks they will be asked to perform. They are provided with the following information (where N refers to the number of sliders used for the experiment, which will depend on trial runs).

"This experiment will consist of 15 rounds and a practice round. In each of the 15 rounds you will undertake a task to earn additional ECU. Each round will last 60 seconds.

The task you do may change during the experiment, but you will start with the Slider Task. In the Slider Task you will be shown a screen with N sliders. An example slider appears on this screen. Each slider is initially positioned at random position between 0 and 100. The computer will tell you your target for each slider. You can use the mouse in any way you like to move each slider. You can readjust the position of each slider as many times as you wish. Your score in the task will be the percentage of the sliders on that page positioned at the target values at the end of one minute."

An example slider appears on this screen and the following screen tells the subject that they will have a one minute practice test, which then follows.

Following the practice test, the screen then shows the ECU earnings that correspond to correctly moving a given proportion of sliders and tells the subject how much they would have earned given their performance on the practice test. It also notes that the final earnings from the test will be decided by an average of the amounts earned during a random draw of three of the 15 rounds.

The next screen tells the subject that before the experiment begins they will have the choice of whether to invest (all of) their initial account of ECU. If they choose to invest, they are told that they will face half the initial number of sliders and be paid according to the proportion they correclty position. They are then informed how much their performance in the practice test would have earned had they made the investment. They are informed they must choose whether to make the investment before starting round 1 and that their choice will be fixed for the whole experiment.

The next screen informs the subject that before each round (after the first round) the computer will randomly decide whether they are eligible to participate in the task according to a given probability - this probability, we refer to as the unemployment rate p and will be one of the two treatments with possible values of 10 percent and 25 percent. The information screen notes that this probability is independent of task performance or previous ineligiblity. It also informs the participant that if they are ineligible to participate in the task they may receive some percentage of their earnings from their most recent round working at a task. This is our second treatment variable and takes the following values: zero percent, twenty-five percent, and seventy-five

percent. If the treatment is a zero percent replacement rate, the screen simply indicates that during the period of ineligibility no payment will be made. This screen thus presents the core information used to define the treatments of the experiment (unemployment rate and replacement rate).

The next screen notes that following an ineligible period, with the same probability p of unemployment they will remain inlegible in the next round and with a probability $1-p$ they will be eligible to perform a task once more. However, the screen also notes that with a probability $(1-p)/2$ they will perform the original slider task (where the investment produces double the ECU reward per slider) and with probability $(1-p)/2$ they will perform a different task, where earnings are unrelated to the investment. The subjects are simply told that this task involves solving N problems, where ECU earnings are again proportional to the percent of N problems correctly answered. Subjects are also informed that if either task is selected they can choose to refuse it and remain ineligible in the next round.

Finally, before starting the rounds, subjects are shown a quiz asking them (a) the size of their account, (b) the probability of they will be ineligible to play a given round, (c) the percentage of their last round's earnings they will earn if ineligible, (d) and the multiple of earnings they will receive in the slider task should they choose to invest their account. Subjects must answer the quiz correctly to proceed.

The next screen asks them to decide whether to keep the ECU in their account or to invest it. The task then begins with the slider task in round one and follows the pattern outlined above.

Following 15 rounds. the subject completes a survey, which begins with a question eliciting risk preferences which provides a gamble over a small amount of ECU before moving to a series of demographic questions. Following completion of the survey, ECU are paid out according to (a) whether the account was invested or kept, (b) the average of earnings in three randomly drawn rounds, and (c) the risk aversion gamble.

Measurement and variables

Outcome variables

We will look at three outcome variables: whether subjects invest in the task-specific skill; whether subjects who are subjected to unemployment voluntarily extend their unemployment; and task effort.

- *Investment*: This is the primary outcome outcome of interest. We will measure this as a binary variable that takes on a value of 1 for subject i if the subject chooses to give up the initial endowment for better "skills" at the slider task.
- *Waiting*: This variable is only defined for subjects who experience a spell of unemployment. We will measure this in two ways. First, we will measure the number of times a subject chooses to prolong their unemployment duration as a percent of the total number of times a subject is exposed to a choice of whether to extend her unemployment spell. Second, we will use a binary indicator taking the value of 1 if a subject ever voluntarily extends any of her unemployment spells and 0 for those who always choose to end their unemployment spell at the first opportunity.
- *Effort*: We will measure task effort in two ways: First, the number of items attempted in a round. Second, the number of accurate responses in a round.

Covariates

Two variables will randomized at the individual respondent level: the "unemployment rate" and the generosity of the unemployment insurance scheme.

The unemployment rate, p, is the fixed and known probability that a subject will lose an earnings round. This rate will be set randomly with equal probability for each respondent to one of "low" ($p = 0.10$) or "high" ($p = 0.25$).

The UI generosity, u, is the fixed and known proportion of a subject's last earnings round that she will receive in rounds in which she finds herself unemployed. We will set this randomly with equal probability for each respondent to one of "none" ($u = 0$), "minimal" ($u = 0.25$) or "generous" ($u = 0.75$).

One covariate will encode the experimental context which will be "lab" or "mTurk".

Other covariates to be included in subsequent analysis will be measured using a survey administered after the experimental sessions. These covariates are:

- Age
- Gender
- Education (5-level scale)
- Employment status (7 categories)
- Household income (In rough quintiles)
- Frequency of video game play (5 categories)
- Type of municipality (5 categories)
- Race (White/non-white)
- Risk preference - a choice between a sure amount of ECU and a series of 50:50 gambles between lower and higher amounts of ECUs. This will alter the final amount of money received by the subject but will not be drawn from their earnings in the game.

Hypotheses

We will test the following hypotheses:

1. The more generous the unemployment scheme the more likely are subjects to invest in skills. We expect the proportion investing when UI is none to be less than the proportion investing when UI is minimal to be less than the proportion investing when UI is generous.
2. Subjects will be less willing to invest in high unemployment compared to low unemployment.
3. The effect of UI generosity on investment proportion will be bigger when unemployment is high compared to when it is low.
4. Subjects will be less likely to wait under high unemployment than under low unemployment.
5. The more generous the unemployment scheme the more likely are subjects to wait, but this effect will only be visible among those who chose to invest.
6. Effort will be unrelated to UI generosity and unemployment.

Analysis and Inference Procedures

Basic analysis will involve comparing group averages across treatment categories and calculating standard errors around those quantities. We will also employ regression analysis. We will report point estimates, standard errors, and associated p-values under the adjustments described below. We will allow readers to decide whether a particular estimate is "important" but we will present findings with reference to the social science convention of 95% confidence.

For *investment*, we will compare the proportion of subjects in each of the 6 treatment categories who choose to invest in skills. For regression analysis we will analyze this outcome using both logistic and OLS regression. We will construct 3 models for each: the first includes only the treatment category indicators as covariates; the second also includes all covariates above save risk preferences; the third includes all covariates named above. Standard errors will be clustered by treatment category-context (e.g, high-generous-mTurk).

For *effort* we will average effort levels (for each measure) within subjects across all her employed rounds and then average those quantities across subjects within a treatment group and compare across the 6 treatment

categories. We will also do the same comparison only averaging over the first and last 5 employed rounds, respectively. For regression analysis across all these outcome we use OLS regression. We will construct 3 models for each outcome: the first includes only the treatment category indicators as covariates; the second also includes all covariates above save risk preferences; the third includes all covariates named above. Standard errors will be clustered by treatment category-context (e.g, high-generous-mTurk).

For *waiting* we will calculate the average number of waited rounds across all subjects in a treatment category who faced the choice of whether to wait. We will also calculate the proportion of subjects in a treatment category who waited among all those who faced the choice of whether to wait. For regression analysis we will analyze the average number of waited rounds using negative binomial regression, adjusting for the number of opportunities to wait. We will also use OLS. For the binary wait variable we will use both logistic and OLS regression. Models and covariates will be as for other outcomes. Standard errors will be clustered by treatment category-context (e.g, high-generous-mTurk).

Power Calculations

```
library(powerAnalysis)

#test for difference in proportions for investment
#assume 20% uptake in control group and 30% uptake in treatment
h<-ES.proportions(p1=.2, p2=.3)  #calc effect size
power.invest<-power.proportions(h=h$h, power=.8, type="two")
per.group.n<-round(power.invest$n/2)
per.group.n #n per cell necessary to detect a difference of 0.1 w/ 80% power
```

```
## [1] 146
```

```
#Assuming total of 690 subjects/6 conditions = 115 subjects per cell
#from Fell grant proposal
power.invest.proposed<-power.prop.test(n=115, p1=.2, power=.8)
power.invest.proposed$p2-power.invest.proposed$p1 #minimum diff in props detectable with 80% power
```

```
## [1] 0.1655627
```

```
# For waiting DV
#probability of getting at least one spell of unemployment in 15 rounds
lup<-1-.9^15  #low unemployment
hup<-1-.75^15  #high unemployment
en.lu<-lup*2*per.group.n
en.hu<-hup*2*per.group.n
power.wait.l<-power.proportions(n=en.lu, h=h$h, type="two")
power.wait.l  #power for detecting a diff in prop of .1, u low
```

```
##
##      Difference of proportion power calculation for binomial distribution (arcsine transformation)
##
##               n = 231.8798
##           power = 0.7046934
##               h = 0.2319843
##       sig.level = 0.05
##
## NOTE: same sample sizes, n is the total sample size
```

```
power.wait.h<-power.proportions(n=en.hu, h=h$h, type="two")
power.wait.h  #power for detecting a diff in prop of .1, u high
```

```
##
##      Difference of proportion power calculation for binomial distribution (arcsine transformation)
##
##               n = 288.0979
##           power = 0.7951222
##               h = 0.2319843
##       sig.level = 0.05
##
## NOTE: same sample sizes, n is the total sample size
```

```
power.wait.proposed.l<-power.prop.test(n=115*lup, p1=.2, power=.8)
power.wait.proposed.l$p2-power.wait.proposed.l$p1 #minimum diff in props detectable with 80% power, low
```

```
## [1] 0.1876571
```

```
power.wait.proposed.h<-power.prop.test(n=115*hup, p1=.2, power=.8)
power.wait.proposed.h$p2-power.wait.proposed.h$p1 #minimum diff in props detectable with 80% power, low
```

```
## [1] 0.1667322
```