

DISCUSSION PAPER SERIES

IZA DP No. 11763

**Relative Income and Happiness:  
An Experiment**

John Ifcher  
Homa Zarghamee  
Dan Houser  
Lina Diaz

AUGUST 2018

## DISCUSSION PAPER SERIES

IZA DP No. 11763

# Relative Income and Happiness: An Experiment

**John Ifcher**

*Santa Clara University and IZA*

**Homa Zarghamee**

*Barnard College*

**Dan Houser**

*George Mason University*

**Lina Diaz**

*George Mason University*

AUGUST 2018

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

## ABSTRACT

---

# Relative Income and Happiness: An Experiment<sup>1</sup>

John Stuart Mill claimed that “men do not desire merely to be rich, but richer than other men.” Do people desire to be richer than others? Or is it that people desire favorable comparisons to others more generally, and being richer is merely a proxy for this ineffable relativity? We conduct an online experiment absent choice in which we measure subjective wellbeing (SWB) before and after an exogenous shock that reveals to subjects how many experimental points they and another subject receive, and whether or not points are worth money. We find that subjects like receiving monetized points significantly more than non-monetized points but dislike being “poorer” than others in monetized and non-monetized points equally, suggesting relative money is valued only for the relative points it represents. We find no evidence that subjects like being “richer” than others. Subgroup analyses reveal women have a strong(er) distaste for being “richer” and “poorer” (than do men), and conservatives have a strong(er) distaste for being “poorer” (than do progressives). Our experimental-SWB approach is easy to administer and can provide some insights a revealed-preference approach cannot, suggesting that it may complement choice-based tasks in future experiments to better estimate preference parameters.

**JEL Classification:** C91, D31, D63, I31

**Keywords:** subjective well-being, relative income, others’ income, income comparisons, happiness, experiments

**Corresponding author:**

John Ifcher  
Department of Economics  
Santa Clara University  
500 El Camino Real  
Santa Clara, California, 85053  
USA  
E-mail: jifcher@scu.edu

---

<sup>1</sup> Financial support from Barnard College is gratefully acknowledged.

## 1. Introduction

John Stuart Mill is credited with the claim that “men do not desire merely to be rich, but richer than other men.”<sup>2</sup> This claim raises two fundamental questions. Do people actually desire to be richer than others? And if so, why? Empirical evidence regarding the first question is mixed. While subjective well-being (SWB) scholars have assembled substantial empirical evidence from large observational datasets of a negative relationship between others’ income and one’s own SWB, identification is often confounded. For example, some studies have found that cost-of-living explains the negative relationship, while others have estimated a positive relationship. A simple answer to the second question is that people care about relative consumption—that is, they want to consume more than others. Another plausible explanation that has not been explored in the SWB literature, though, is that people want to compare favorably to others in a more general sense, and being richer than others proxies for this ineffable relativity. In this case, being richer may only matter in the absence of other measures of relativity.

In this paper, we attempt to address these two questions using an experiment. Specifically, we measure subjects’ SWB before and after an exogenous relative-rewards shock in which subjects learn the number of experimental points they and another subject receive (2 or 10), and whether each experimental point is monetized (worth \$1) or non-monetized (worth \$0). This design enables us to compare the SWB-change of two subjects receiving the same experimental points who differ only in the points they learn another subject receives. Comparison of the impact of monetized and non-monetized points allows us to identify the impact of others’ money on one’s SWB and to determine whether non-monetized points generate the same observed relativity. To illustrate the nuance of this approach, consider a less nuanced version wherein a subject learns that she receives \$2 and another subject receives \$10. SWB may change because the subject learns that she is receiving \$8 less than the other subject, but it may also be affected by learning that: (i) she is receiving \$2; (ii) the other subject is receiving \$10; (iii) there is a metric on which she is in worse relative standing than the other subject by 8 units; or (iv) she is receiving \$4 less than she expected when agreeing to participate in the experiment. Our design attempts to rule out explanations (i) - (iv).

First, we find that it is not SWB-improving to learn that the other subject receives a smaller—in comparison to an equal—number of monetized points, suggesting that subjects do not prefer to be “richer” than other subjects *ceteris paribus*. Second, we find that while it is SWB-diminishing to learn that the other subject receives a larger—in comparison to an equal—number of monetized points, it is statistically indistinguishably SWB-diminishing when points are non-monetized. This suggests that others’ money impacts own SWB only insofar as it proxies for others’ points; that is, subjects only care about being “poorer” because it means they receive fewer points than others, not because they receive less money than others. In contrast, subjects do seem to value receiving money themselves, and not just for the points that money represents: while it is SWB-improving to receive non-monetized points, it is significantly more SWB-improving to receive monetized points.

---

<sup>2</sup> Pigou (1920) attributes this quotation to Mill (Luttmer, 2005), but its authorship is contested by Mill scholars (see Rees (1956)).

## 2. Literature Review

SWB scholars have found evidence of a negative relationship between others' income and one's own SWB that is attributed to a "relative income effect" (RIE): income comparisons cause SWB to decrease with others' income, *ceteris paribus*. The RIE has important implications, for example, regarding the potential benefits of economic growth. Some SWB researchers believe that the RIE helps explain the Easterlin Paradox: the empirical observation that over time in many countries, average national SWB does not increase with real per capita GDP (Easterlin, 1974; 2010; Easterlin et al., 2013). Luttmer (2005) reports a negative relationship between regional median income and SWB that is at least as big as the positive relationship between own income and SWB, implying that shared economic growth would not be associated with improved SWB.

Identification of the RIE, though, is often confounded. First, observational studies do not generally account for selection (e.g., into neighborhoods or occupations). Indeed, the studies with the most credible exogenous relative-income shocks--the Moving to Opportunities for Fair Housing demonstration and the Dutch Postcode Lottery--do not find a negative effect of neighbors' income on one's SWB (Ludwig et al., 2012; Kuhn et al., 2011). Second, *ceteris paribus* is easily violated in observational studies. With additional controls, Ifcher et al. (2018) find that the negative relationship between others' income and own SWB can be explained by cost-of-living. Further, the sign of the others-income-own-SWB relationship is positive in some contexts. A positive relationship has been identified in immediate neighborhoods and has been attributed to local public goods (Ifcher et al., 2018; Brodeur & Fleche, 2015; Deaton & Stone, 2013; Ludwig et al., 2012; Clark et al., 2009) or to altruism (Kingdon & Knight, 2007). A positive relationship has also been identified in periods of rapid economic growth and has been attributed to "the tunnel effect," whereby others' income serves as a signal of one's future income (Hirschman & Rothschild, 1973; Senik, 2008; 2004).

These violations of *ceteris paribus* illustrate that others' income can impact SWB through channels other than the RIE. They do not, however, prove or disprove the existence of the RIE itself, as the sign of the relationship between others' income and own SWB represents a net effect of an indeterminate set of channels. For example, Clark et al. (2009) find that, controlling for own income, neighborhood median income and own SWB are positively correlated, which the authors attribute to local public goods. At the same time, controlling for own income and neighborhood median income, they find that one's income-rank within one's neighborhood is positively correlated with own SWB, which they attribute to the RIE.

These confounds render compelling the control afforded by an experimental analysis. To our knowledge, the only such experiment with real-money rewards is McBride (2010), who attempts to identify RIE in a single-player, multiple-round, penny-matching game played against a computer. In each round, subjects are informed of the computer's randomized probability of choosing heads or tails (there are five possible types) and then choose heads or tails. Subjects learn their own payment in that round and, depending on treatment, either: (i) no further

information, (ii) the average payment of all other subjects, or (iii) the average payment of subjects by probability-type. Subjects then report their satisfaction with the results of that round. Satisfaction with a round's results significantly decreases with the average payment of other subjects in (ii) and only with the average payment of subjects with the same probability-type in (iii). While these results appear consistent with the RIE, there are features of the experiment that confound identification. The measure of SWB is not general but is specific to satisfaction with a particular round's results. This focuses attention inorganically and may result in obscuring the effects on general SWB of factors other than the results, like procedural considerations. Also, because subjects have agency, their satisfaction (dissatisfaction) may not be due to income per se but to feelings of relative success or self-congratulations (failure or self-criticism).<sup>3</sup>

### 3. Experimental Design

#### 3.1. Discovery and pilot studies

Like the main online experiment, the goal of the discovery study was to identify the SWB-impact of an exogenous relative-rewards shock. A more general ambition was to determine whether the control afforded by laboratory experimentation could be leveraged to study SWB (as measured in large observational datasets and increasingly in national accounts) and its determinants, especially income. The discovery study was necessary to determine SWB's sensitivity to money-rewards of the size paid in experiments. This required testing the many different measures of SWB available in the literature, and varying payment-sizes. As such the discovery study, while similar in methodology to the online experiment, includes much longer SWB surveys and more rewards-shocks. Details and discussion of the discovery study are presented in Appendix B.

While the discovery study enabled us to refine the SWB survey and revelation mechanism, the pilot study enabled us to test the revised methodology and help estimate the number of subjects that were needed for the online experiment. Appendix B also includes details and discussion of the pilot study.<sup>4</sup>

#### 3.2. Online experiment

To identify the RIE, we conducted an online experiment in December 2017. Prospective subjects were recruited on Amazon Mechanical Turk (mTurk). They were informed that participation would take less than 20 minutes, that they would be paid for their participation

---

<sup>3</sup> It warrants mention that other experiments have found evidence supportive of the RIE using choices over hypothetical scenarios (Johansson-Stenman et al., 2002; Solnick & Hemenway, 1998; Zeckhauser, 1991). Also supportive of the RIE, Smith et al. (1989) document higher SWB with a given hypothetical wage when it is from a distribution with a lower mean. Further, there are three economic experiments in which relative real-money payments vary and SWB is measured. The correlation between others' payments and subjects' SWB is consistent with the RIE in Bosman & van Winden (2002) and Konow & Earley (2008) and inconsistent with the RIE in Charness & Grosskopf (2001). That said, these experiments are not designed to test the RIE so attempts to attribute the correlations to the RIE are beset by endogeneity and other identification issues.

<sup>4</sup> Columns (1) and (2) of Appendix Table 1 present the results of pooling the pilot study and online experiments, using the methods presented in Section 4.2 below; results are materially unchanged.

(minimum, average, and maximum payments of \$3.00, \$7.00, and \$11.00), and that the payment-amount would be determined randomly. Each recruited subject received a link to Qualtrics, where she received an exogenous relative-rewards shock (revelation) and completed pre- and post-revelation SWB surveys, allowing for measurement of the SWB-effect of the revelation. Subjects entered a survey-completion code generated by Qualtrics into mTurk to receive their payments. 996 subjects completed the experiment in 10 minutes on average and were paid a minimum, average, and maximum of \$3.00, \$7.27, and \$11.00.<sup>5</sup> Screenshots are included in Appendix A.

### 3.2.1. Pre- and post-revelation SWB surveys

The pre- and post-revelation SWB surveys each included the Mood Short Form (MSF), which enables a quick measurement of subjects' experiential SWB (Peterson & Sauber, 1983).<sup>6</sup> The MSF includes the following four items, with a five-point Likert response-scale for each item ("Strongly disagree" =1, "Disagree" =2, "Neither agree nor disagree" =3, "Agree" =4, and "Strongly agree" =5):

- "Currently I am in a good mood."
- "As I answer these questions, I feel very cheerful."
- "For some reason I am not very comfortable."
- "At this moment I feel 'edgy' or irritable."

MSF scores are calculated by summing the four responses with the response-scale reverse-coded for the last two items. Possible scores range from 4 (worst possible mood) to 20 (best possible mood).

In an attempt to reduce the propensity of subjects to anchor their post- to pre-revelation MSF responses, items from the Basic Psychological Need Satisfaction Scale (BPNSS) were included in both surveys. The BPNSS is a 21-item instrument that measures needs for competence, autonomy, and relatedness (Deci & Ryan, 2000; Gagné, 2003). Responders evaluate statements (e.g., "Often, I do not feel very confident," and "People in my life care about me") on a seven-point scale in which "Not at all true" =1, "Somewhat true" =4, and "Very true" =7. The pre- and post-revelation SWB surveys included 11 and 10 BPNSS items, respectively.

To further reduce the propensity to anchor, the order of all items in the pre-revelation SWB survey was randomized by subject. The post-revelation items were randomized in two strata:

---

<sup>5</sup> Of 1,180 individuals who clicked the Qualtrics link, 128 did not complete the survey, and another 56 completed the survey but either entered an incorrect survey-completion code or none at all. These individuals could not be paid and are not included as subjects in our analyses.

<sup>6</sup> Three dimensions of SWB have been identified in the literature. Experiential SWB measures moods and affects experienced currently or in the recent past. Evaluative SWB measures how people assess their lives as a whole or particular domains of their lives (e.g., finances or family). Eudaimonic SWB measures the extent to which people have purpose or meaning in their lives. For a thorough survey of the three dimensions of SWB, and their shared versus distinct correlates, refer to the National Academy of Sciences report (Stone & Mackie, 2013).

the first contained the four MSF items randomized by subject, and the second contained the 10 BPNSS items also randomized by subject. The stratified randomization ensured that the post-revelation MSF items were presented immediately after the revelation, thus reducing concerns that the impact of the revelation may have worn off.

### 3.2.2. Revelation Mechanism

The revelation mechanism was designed to provide an unconfounded relative-rewards shock. Prior to the pre-revelation SWB survey, in an attempt to standardize expectations, the instructions fully informed subjects about the revelation mechanism. Each subject was informed that:

- She would be paid a \$1 reward for completing the study.<sup>7</sup>
- She would be randomly assigned to a two-person group.
- The other subject in the group (hereafter Participant X) could be any other subject in the study.
- She would never learn Participant X's identity and vice versa.
- She and Participant X would be allotted 2 or 10 experimental points each, creating four possible allocations of points:
  - She receives 2 points, and Participant X receives 2 points.
  - She receives 2 points, and Participant X receives 10 points.
  - She receives 10 points, and Participant X receives 2 points.
  - She receives 10 points, and Participant X receives 10 points.

Below, we refer to these allocations as low-low (LL), low-high (LH), high-low (HL), and high-high (HH), respectively.

Subjects were then randomly informed of being in one of two treatments. Each subject in the "points-money (pts\$) treatment" was informed that each experimental point was worth \$1. Each subject in the "points (pts) treatment" was informed that she and Participant X would receive a \$6 payment regardless of the number of experimental points. Subjects were presented with neither the allotment nor the treatment terminology. Also, subjects in the pts\$-treatment did not know about the pts-treatment, and vice versa.

After completing the pre-revelation SWB survey, subjects were reminded, as appropriate, that either "the number of points you and Participant X receive will not affect your bonus payments," or "you and Participant X will receive a bonus payment of a dollar for each point you receive." Subjects were also reminded that they were randomly assigned to one of the four possible allocations of points. To reveal the allocation of points, subjects had to press an "OK" button. They were then informed of the number of points they and Participant X received.

---

<sup>7</sup> In mTurk, a flat payment that all subjects receive is called a "reward;" and a payment that can vary by subject is called a "bonus." It should be noted that our payments are sizeable for mTurk, where workers' median hourly rewards have been estimated to be \$2, and only 4% of workers earn more than \$7.25 per hour (Hara et al., 2018).

### 3.2.3. Screening questions, questionnaire, and end of experiment

The experiment also included four screening items to test subjects' attentiveness:

- After reading the instructions and before answering the pre-revelation SWB survey, subjects were asked what year it was; there were five possible responses: "1990," "2017," "2000," "2018," and "2019."
- After completing the pre-revelation SWB survey, subjects were presented with the following statement: "Currently, the year is 2025." The response scale was the same five-point Likert scale used with the MSF items.
- In the post-revelation SWB survey (after completing the MSF items and before completing the BPNSS items), subjects were asked the following two items:
  - "Please indicate the value of the bonus you will receive (in addition to the \$1 reward you will receive for completing this study)." Possible responses were "\$2," "\$6," and "\$10."
  - "Please indicate the value of the bonus Participant X will receive (in addition to the \$1 reward Participant X will receive for completing this study)." Possible responses were "\$2," "\$6," and "\$10."

After the post-revelation SWB survey, subjects completed a 15-item questionnaire (including demographic characteristics and political views), entered their survey-completion codes, and were paid.

### 3.3. Own- and relative-rewards shocks

Our experiment yields 8 distinct cells from a 4 (allocations of 2 or 10 pts to the subject and 2 or 10 pts to Participant X) X 2 (pts-\$- versus pts-treatment) design:  $LL_{pts\$}$ ,  $LH_{pts\$}$ ,  $HL_{pts\$}$ ,  $HH_{pts\$}$ ,  $LL_{pts}$ ,  $LH_{pts}$ ,  $HL_{pts}$ , and  $HH_{pts}$  (see Table 1). The design enables identification of both relative-rewards and own-rewards shocks by comparing cells that hold all other factors constant.

For example, let's compare the HL and HH cells by treatment. Each subject in the  $HL_{pts\$}$  cell was told that she would receive 10 pts worth \$1 each and that Participant X would receive 2 pts worth \$1 each, whereas each subject in the  $HH_{pts\$}$  cell was told that she and Participant X would each receive 10 pts worth \$1 each. In these two cells, each subject's realized pts- and \$-rewards are constant (10 pts and \$10). Further, as the instructions disclosed all possible revelations, each subject's expected pts- and \$-rewards should be 6 pts and \$6 for both herself and Participant X. Thus, the  $HL_{pts\$}$  and  $HH_{pts\$}$  cells differ only in Participant X's realized pts- and \$-rewards (2 pts and \$2 versus 10 pts and \$10). By comparing the MSF-change (post- minus pre-revelation) of  $HL_{pts\$}$  and  $HH_{pts\$}$  subjects, we can identify *ceteris paribus* the differential impact on a subject's mood of Participant X receiving 2 pts and \$2 rather than 10 pts and \$10:  $\Delta MSF_{HL,pts\$} - \Delta MSF_{HH,pts\$}$ . We refer to this as the impact of an *advantageous* relative-pts-\$ shock. In relative-rewards-shock comparisons, "advantageous" indicates that the subject receives greater rewards than Participant X, rather than the same rewards as Participant X.

Let's now consider the analogous cells of the pts-treatment: because pts have no value and the realized \$-rewards are constant in the HL<sub>pts</sub> and HH<sub>pts</sub> cells,  $\Delta MSF_{HL,pts} - \Delta MSF_{HH,pts}$  identifies *ceteris paribus* the differential impact on a subject's mood of Participant X receiving 2 pts rather than 10 pts. We refer to this as the impact of an advantageous relative-pts shock. Therefore, we can capture the impact of Participant X receiving \$2 rather than \$10 by subtracting the impact of an advantageous relative-pts shock from the impact of an advantageous relative-pts-\$ shock:  $(\Delta MSF_{HL,\$} - \Delta MSF_{HH,\$}) = (\Delta MSF_{HL,pts\$} - \Delta MSF_{HH,pts\$}) - (\Delta MSF_{HL,pts} - \Delta MSF_{HH,pts})$ . We refer to this difference as the impact of an advantageous relative-\$ shock.

In relative-rewards-shock comparisons, "disadvantageous" indicates that the subject receives lesser rewards than Participant X, rather than the same rewards as Participant X. By comparing LH and LL cells, we can identify the impact of disadvantageous relative-pts-\$ ( $\Delta MSF_{LH,pts\$} - \Delta MSF_{LL,pts\$}$ ), relative-pts ( $\Delta MSF_{LH,pts} - \Delta MSF_{LL,pts}$ ), and relative-\$ ( $(\Delta MSF_{LH,\$} - \Delta MSF_{LL,\$}) = (\Delta MSF_{LH,pts\$} - \Delta MSF_{LL,pts\$}) - (\Delta MSF_{LH,pts} - \Delta MSF_{LL,pts})$ ) shocks.

Similarly, we can identify the impact of an *advantageous* own-pts-\$ shock by comparing HH<sub>pts\$</sub> to LL<sub>pts\$</sub> cells:  $\Delta MSF_{HH,pts\$} - \Delta MSF_{LL,pts\$}$ . Subjects in the HH<sub>pts\$</sub> (LL<sub>pts\$</sub>) cells are told that they and Participant X will each receive 10 pts (2 pts) worth \$1 each. In both cells, subjects and Participant X receive the same rewards, thus the RIE should not explain the impact of the advantageous own-pts-\$ shock. Therefore, in own-rewards-shock comparisons, "advantageous" indicates that the subject receives greater rewards than expected, rather than lesser rewards than expected (recall that expected rewards are 6 pts and \$6 for all subjects).<sup>8</sup>

Comparing the analogous cells of the pts-treatment, we can identify the impact of an advantageous own-pts shock by comparing HH<sub>pts</sub> and LL<sub>pts</sub> cells:  $\Delta MSF_{HH,pts} - \Delta MSF_{LL,pts}$ . Because pts have no value and the realized \$-rewards are constant, subjects in these cells differ only in the pts-rewards that they and Participant X receive (10 pts each versus 2 pts each). Therefore, we can capture the impact of the subject receiving \$10 rather than \$2 by subtracting the impact of an advantageous own-pts shock from the impact of an advantageous own-pts-\$ shock:  $(\Delta MSF_{HH,\$} - \Delta MSF_{LL,\$}) = (\Delta MSF_{HH,pts\$} - \Delta MSF_{LL,pts\$}) - (\Delta MSF_{HH,pts} - \Delta MSF_{LL,pts})$ . We refer to this difference as the impact of an advantageous own-\$ shock. In Panel A of Table 2, we provide a complete list of the relative- and own-rewards shocks and, in Panel B, the formulae we use to identify their impacts.<sup>9</sup>

### 3.4. Experimental predictions

#### 3.4.1. Relative-rewards-shock predictions

<sup>8</sup> This interpretation of the impact of an advantageous own-pts-\$ shock is potentially confounded if Participant X's rewards impact subjects' SWB through channels other than the RIE. This is because, while subjects' rewards relative to Participant X are the same in the HH<sub>pts\$</sub> and LL<sub>pts\$</sub> cells, Participant X's absolute rewards vary.

<sup>9</sup> The impact of disadvantageous own-rewards shocks are not listed, as they can be calculated by multiplying the impact of the corresponding advantageous own-rewards shocks by negative one.

Making no further assumptions, the RIE yields two unambiguous predictions about the impact of relative-rewards shocks:

- Positive impact of the advantageous relative-pts-\$ shock:
  - $\Delta MSF_{HL,pts\$} - \Delta MSF_{HH,pts\$} > 0$
- Negative impact of the disadvantageous relative-pts-\$ shock:
  - $\Delta MSF_{LH,pts\$} - \Delta MSF_{LL,pts\$} < 0$

These predictions can be inferred from the definition of the RIE, as both comparisons hold constant the subject's monetized pts and vary Participant X's, with smaller (larger)--in comparison to an equal--number of monetized pts for Participant X associated with higher (lower) values of  $\Delta MSF$ .

Predicting the impact of the other relative-rewards shocks requires assumptions about MSF-scores' responsiveness to non-monetized pts. We will consider two alternative assumptions: (a) *strict RIE*, whereby the RIE applies to monetized but not non-monetized pts, versus (b) *generalized RIE*, whereby the RIE applies equally to monetized and non-monetized pts. Under strict RIE, the impacts of both advantageous and disadvantageous relative-pts shocks are predicted to be zero, and this yields the prediction that \$-shocks will have the same impact as their corresponding pts-\$-shocks. Specifically:

- Zero impact of the advantageous relative-pts shock:
  - $\Delta MSF_{HL,pts} - \Delta MSF_{HH,pts} = 0$
- Zero impact of the disadvantageous relative-pts shock:
  - $\Delta MSF_{LH,pts} - \Delta MSF_{LL,pts} = 0$
- Equal impacts of the advantageous relative-\$ and advantageous relative-pts-\$ shocks:
  - $\Delta MSF_{HL,\$} - \Delta MSF_{HH,\$} = \Delta MSF_{HL,pts\$} - \Delta MSF_{HH,pts\$}$
- Equal impacts of the disadvantageous relative-\$ and disadvantageous relative-pts-\$ shocks:
  - $\Delta MSF_{LH,\$} - \Delta MSF_{LL,\$} = \Delta MSF_{LH,pts\$} - \Delta MSF_{LL,pts\$}$

Under generalized RIE, the impacts of the advantageous and disadvantageous relative-pts shocks are predicted to equal the impacts of the corresponding pts-\$ shocks, and this yields the prediction that the relative-\$ shocks will have no impact.

- Equal impacts of the advantageous relative-pts and advantageous relative-pts-\$ shocks:
  - $\Delta MSF_{HL,pts} - \Delta MSF_{HH,pts} = \Delta MSF_{HL,pts\$} - \Delta MSF_{HH,pts\$}$
- Equal impacts of the disadvantageous relative-pts and disadvantageous relative-pts-\$ shocks:
  - $\Delta MSF_{LH,pts} - \Delta MSF_{LL,pts} = \Delta MSF_{LH,pts\$} - \Delta MSF_{LL,pts\$}$
- Zero impact of the advantageous relative-\$ shock:
  - $\Delta MSF_{HL,\$} - \Delta MSF_{HH,\$} = 0$
- Zero impact of the disadvantageous relative-\$ shock:

- $\Delta MSF_{LH,\$} - \Delta MSF_{LL,\$} = 0$

### 3.4.2. Own-rewards-shock predictions

Assuming that subjects prefer receiving more to fewer monetized pts, and/or that, relative to expectations, subjects prefer gains of monetized pts to losses, the following prediction obtains:

- Positive impact of the advantageous own-pts-\$ shock:
  - $\Delta MSF_{HH,pts\$} - \Delta MSF_{LL,pts\$} > 0$

Additional predictions about own-rewards shocks require additional assumptions. If we assume that, analogous to the strict RIE, MSF-scores do not respond to own non-monetized pts, then an advantageous own-pts shock is predicted to have no impact, and an advantageous own-\$ shock will have the same impact as an advantageous own-pts-\$ shock:

- Zero impact of the advantageous own-pts shock:
  - $\Delta MSF_{HH,pts} - \Delta MSF_{LL,pts} = 0$
- Equal impacts of the advantageous own-\$ and advantageous own-pts-\$ shocks:
  - $\Delta MSF_{HH,\$} - \Delta MSF_{LL,\$} = \Delta MSF_{HH,pts\$} - \Delta MSF_{LL,pts\$}$

If we assume that, analogous to the generalized RIE, MSF-scores respond equally to own non-monetized and monetized pts, then an advantageous own-pts shock is predicted to have the same impact as an advantageous own-pts-\$ shock, and an advantageous own-\$ shock will have no impact:

- Equal impacts of the advantageous own-pts and advantageous own-pts-\$ shocks:
  - $\Delta MSF_{HH,pts} - \Delta MSF_{LL,pts} = \Delta MSF_{HH,pts\$} - \Delta MSF_{LL,pts\$}$
- Zero impact of the advantageous own-\$ shock:
  - $\Delta MSF_{HH,\$} - \Delta MSF_{LL,\$} = 0$

## 4. Results

Of the 996 subjects who completed the experiment, 136 completed at least one of the screening items incorrectly and were dropped from the analysis.<sup>10</sup> Table 3 presents the demographic characteristics of the sample. Table 4 presents the pre- and post-revelation MSF-scores and  $\Delta MSF$  for each cell.

---

<sup>10</sup> 2 subjects did not indicate that the year was “2017;” 9 subjects did not “Disagree” or “Strongly Disagree” that the current year was 2025; 53 (45) subjects indicated the incorrect payment for themselves (Participant X) in the pts\$-treatment; and 56 (64) subjects indicated the incorrect payment for themselves (Participant X) in the pts-treatment. The main results, using the methods presented in Section 4.2 below, hold if we do not drop these subjects (see columns (3) and (4) of Appendix Table 1). It can be argued that keeping these subjects in the analysis may be preferred, as it may be more reflective of a general population in which some individuals do not pay close attention to their own and/or others’ income; thank you to Alan Kirman for pointing this out.

#### 4.1. Difference-of-means tests<sup>11</sup>

In Table 5, we present the estimated impacts of all relative- and own-rewards shocks.<sup>12</sup> Considering the latter, we observe that the impact of advantageous own-pts-\$, own-pts, and own-\$ shocks are positive, statistically significant, and economically meaningful. For example, the impact of the advantageous own-\$ shock is 2.17 MSF-points. In other words, controlling for the impact of own pts, subjects who receive \$10 rather than \$2 experience a mood-improvement of roughly 14% of the pre-revelation sample-mean MSF-score (= 2.17/15.25). The impact of the advantageous own-pts shock being positive and significant indicates that subjects' mood is impacted by receiving non-monetized pts. The impact of the advantageous own-\$ shock being positive and significant indicates that the impact on subjects' mood of monetized pts exceeds the impact of receiving equivalent non-monetized pts.

Turning to the advantageous relative-rewards shocks, there is no support for the RIE. Table 5 shows that the impacts of the advantageous relative-pts-\$, relative-pts, and relative-\$ shocks are all negative. This suggests that subjects do not prefer to be "richer" than other subjects. The estimated impacts of the disadvantageous relative-rewards shocks, though, favor the generalized version of the RIE. The impacts of the relative-pts-\$ and relative-pts shocks are negative and significant. Further, they are statistically indistinguishable from each other, yielding an insignificant impact of the disadvantageous relative-\$ shocks. This suggests that being "poorer" than other subjects in monetized points is only as mood-diminishing as is being "poorer" in non-monetized points.

Comparing the impacts of the own-rewards and relative-rewards shocks reveals two interesting asymmetries. First, people seem to value their own money--but not others' money--more than the points the money represents. Second, people have a distaste for being behind others but not a taste for being ahead.

#### 4.2. Regression and subgroup analyses

To analyze the MSF-effects of relative-rewards shocks while controlling for demographic characteristics, we estimate the following equation:

$$(1) \Delta MSF = \beta_0 + \beta_1 I_{2pts\$} + \beta_2 I_{10pts\$} + \beta_3 I_{10pts} + \beta_4 I_{X10pts} + \beta_5 I_{2pts\$,X10pts\$} + \beta_6 I_{10pts\$,X10pts\$} + \beta_7 I_{10pts,X10pts} + \delta Y + \epsilon$$

The indicator variable  $I_{2pts\$}$  ( $I_{10pts\$}$ ) equals one if the subject receives 2 pts (10 pts) worth \$1 each. The indicator variable  $I_{10pts}$  ( $I_{X10pts}$ ) equals one if the subject (Participant X) receives 10 pts. The indicator variable  $I_{2pts\$,X10pts\$}$  ( $I_{10pts\$,X10pts\$}$ ) equals one if the subject receives 2 pts (10 pts) worth \$1 each and Participant X receives 10 pts worth \$1 each. The indicator variable

---

<sup>11</sup> All p-values reported in this section are from two-tail difference-of-means tests.

<sup>12</sup> Columns (5) and (6) of Appendix Table 1 show, using the methods from Section 4.2 below, that the relative- and own-rewards shocks did not impact BPNSS scores.

$I_{10pts, X10pts}$  equals one if the subject receives 10 pts and Participant X receives 10 pts. The vector Y contains demographic characteristics.<sup>13</sup> Robust standard errors are calculated.

The constant term  $\beta_0$  captures the MSF-change experienced by subjects in the  $LL_{pts}$  cell. Regression coefficients can be used to recover the impacts of relative- and own-rewards shocks; the formulae are presented in Panel C of Table 2 and the corresponding estimates are reported in Table 6. Column (1) of Table 6 excludes vector Y and replicates the corresponding results in Table 5. Column (2) includes vector Y, yielding results similar to column (1).

Turning to subgroup analyses, we investigate differences that are suggested by the literature. For example, Alesina et al. (2004) find that conservatives' SWB is unaffected by--while progressives' SWB decreases with--income inequality in the US; this may be due to conservatives being more likely to attribute success to hard work and talent, and progressives to luck (Frank, 2016). Kamas & Preston (2015) identify gender-differences in social preferences, with women more likely to be inequity averse and men more likely to be social-surplus maximizers. Ifcher et al. (2018) and Alesina et al. (2004) find that the negative income-inequality-SWB relationship is significantly stronger for high- than low-income Americans, with no significant relationship for low-income subgroups in some specifications. Kuziemko et al. (2014) find that "last-place aversion" is particularly strong for conservatives and individuals with low income. Subgroup analyses by political orientation, gender, and income are presented in columns (3) - (8) of Table 6.

The most notable difference by political orientation is that the disadvantageous relative-pts-\$ shock is significantly MSF-diminishing for conservatives and has no significant MSF-effect for liberal/progressives. Further, the MSF-effects for conservatives and liberal/progressives are marginally significantly different (-2.260 versus -0.106, p-value = 0.056). Because the MSF-effects of the disadvantageous relative-pts shocks are similar by political orientation, the MSF-effects of the disadvantageous relative-\$ shocks are marginally significantly different for conservatives and liberal/progressives (-2.101 versus 0.608, p-value = 0.107).<sup>14</sup> In fact, the disadvantageous relative-\$ shock for conservatives is the only relative-\$ shock with even a marginally significant impact. In sum, an interesting asymmetry is revealed by political orientation: being "richer" does not affect conservatives and liberal/progressives differently, but being "poorer" does. This finding is consistent with Kuziemko et al. (2014) and may be explained by conservatives' strong last-place aversion.

---

<sup>13</sup> Demographic characteristics include gender (female, male, other, prefer not to answer), age (bottom-quartile (< 29 years) and top-quartile (> 42 years) indicator-variables), race (American Indian/Alaska Native, Asian, Black/African American, Hispanic, Native Hawaiian/other Pacific Islander, White, other, prefer not to answer), religion (Atheist/Agnostic, Buddhist, Christian, Hindu, Jewish, Muslim, other, prefer not to answer), political leaning (conservative, liberal/progressive, moderate, prefer not to answer), household income (\$0-\$25K, \$25K-\$50K, \$50K-\$75K, \$75K-\$100K, \$100K-\$125K, \$125K-\$150K, \$150K+, prefer not to answer), education (some high school, completed high school, some college, completed college, some grad/professional school, completed grad/professional school, prefer not to answer), and employment status (employed, full-time; employed, part-time; not employed, looking for work; not employed, not looking for work; retired; student; prefer not to answer).

<sup>14</sup> In Table 6, a number of p-values of two-sided tests are between 0.10 and 0.11, so we decided to identify estimated coefficients with p-values < 0.11 as marginally significant to highlight these.

Subgroup analyses by gender reveal that the impact of the advantageous relative-pts-\$, advantageous relative-pts, and disadvantageous relative-pts-\$ shocks are significantly MSF-diminishing for women but not men. Further, the MSF-effect of the advantageous relative-pts shock is significantly greater in magnitude for women than men (-1.435 versus -0.296, p-value = 0.031), and the MSF-effect of the disadvantageous relative-pts-\$ shock is marginally significantly greater in magnitude for women than men (-1.748 versus -0.293, p-value = 0.104). In sum, there is evidence that being both “richer” and “poorer” is MSF-diminishing for women but not for men. This finding is consistent with Kamas & Preston (2015) and may be explained by women being more inequity-averse than men. There is also evidence of gender differences in the MSF-effects of own-pts versus own-\$ shocks: while the impact of the advantageous own-pts-\$ shock is similar for men and women, the impact of the advantageous own-pts shock is marginally significantly more MSF-improving for women than men (1.901 versus 0.915, p-value = 0.078), and thus the impact of the advantageous own-\$ shock is marginally significantly less MSF-improving for women than men (1.236 versus 2.710, p-value = 0.105). These are the only own-rewards shocks that differ even marginally significantly by subgroup.

Lastly, the only notable difference by income-subgroups is that the disadvantageous relative-pts-\$ shock is significantly MSF-diminishing for individuals with household income in the top-quartile and not for those in the bottom 3 quartiles.<sup>15</sup> This finding is consistent with Ifcher et al. (2018) and Alesina et al. (2004), but not Kuziemko et al. (2014).

## 5. Discussion

In an experiment designed to test for the RIE, we find no support for an interpretation of the RIE that applies strictly to income; this is because we find that the impact of being “richer” or “poorer” in experimental points is the same when points are worth money and when they are worthless. This cannot be explained by subjects’ indifference toward money and points in the experiment, as receiving more money than expected makes subjects significantly happier than receiving equivalently more points than expected. Further, we find only partial support for an interpretation of the RIE that applies generally to income and non-income relative concerns alike; this is because we find evidence of a distaste for being “poorer” than others, but no evidence of a taste for being “richer” than others.

Our attempt to disentangle the RIE’s income from non-income relativity concerns is novel. Further, we do so with an extreme counterfactual: non-income relativity is manipulated using a worthless but cardinal “good.” How does this relate to evidence of the RIE from observational studies? As noted in the literature review, the SWB-impact of factors like cost-of-living may be misattributed to others’ income in the absence of proper controls. Our findings suggest that,

---

<sup>15</sup> The advantageous relative-pts shock does not significantly impact the MSF of individuals with household income in the top quartile, but it is significantly MSF-diminishing for those in the bottom 3 quartiles. While this may seem like an important difference, the similar magnitudes of the point-estimates (-0.776 versus -0.855, p-value = 0.909) suggest that it is likely due to variant sample sizes (n = 200 versus 646).

even if the RIE is identified, income itself may not be driving it. Because of its numerical and/or material salience, income may be used as a proxy for ineffable factors in social comparisons that, if defined and concretized, would weaken relative income's relationship to SWB. For example, suppose SWB's only determinant is feeling like a productive member of society, and that people use income as a proxy for this in the absence of a more direct measure. If a more direct measure of productivity became available, the relationship between relative income and SWB would be eliminated. Because the RIE literature has not considered the role of money per se, prior evidence regarding the RIE implicitly measures the impact of something akin to our relative-pts-\$, rather than relative-\$, shocks.<sup>16</sup>

Another novel contribution of our research is our use of SWB-change as the outcome of interest rather than observed choice. A benefit of this approach is that it allows us to capture preference-magnitudes more so than would a revealed-preference approach. For example, our approach suggests a preference for  $HH_{pts\$}$  over  $LL_{pts\$}$  that is of significantly greater magnitude than the preference for  $HH_{pts}$  over  $LL_{pts}$ ; if subjects instead faced choices of HH versus LL, estimation of how much more they prefer HH in the pts\$- than pts-treatment would rely on binary data and be less precise.

Our approach, of course, begs the question of whether SWB-change is predictive of choice, and whether a revealed-preference approach would result in the same patterns we observe. In Benjamin et al. (2014b), medical students report their choice-rankings of residency programs, along with their anticipated-SWB rankings and the features they expect each program to have. The preferences over program-features implied by choice-rankings differ substantially from those implied by anticipated-SWB rankings, with the preferences implied by anticipated-evaluative-SWB rankings closer to those implied by choice than are the preferences implied by anticipated-experiential-SWB rankings. While this is relevant in that it addresses the relationship between SWB and revealed-preference, the SWB is only considered anticipatorily and not contemporaneously. We are currently conducting an experiment to directly address whether our SWB-change approach is compatible with a revealed-preference approach in the context of social preferences. If so, it could substitute for revealed-preference in other contexts, like identifying preferences for earned versus unearned income, or estimating parameters related to loss aversion, time-, risk-, or competitive-preferences. If not, it could potentially complement revealed-preference. For example, it may be that our approach, being emotionally based, reflects System-1 thinking while revealed-preference, being deliberative, reflects System-2 thinking, and that preferences may be best understood using a combination of the two approaches (Kahneman, 2011).

## References

---

<sup>16</sup> Other evidence of money's protean nature comes from the experimental psychology literature that shows that priming the concept of money increases self-sufficiency (Vohs et al., 2006), tolerance for physical pain (Zhou et al., 2009), work and productivity (Mogilner, 2010); and decreases the savoring of experiences (Quoidbach et al., 2010), willingness to volunteer or donate (Pfeffer & DeVoe, 2008; Chatterjee et al., 2013), socializing and happiness (Mogilner, 2010), and anxiety and fear of death (Zaleskiewicz et al., 2013).

Alesina, A., Di Tella, R., & MacCulloch, R. (2004). Inequality and happiness: are Europeans and Americans different? *Journal of Public Economics*, 88: 2009-2042.

Benjamin, D.J., Heffetz, O., Kimball, M.S., & Rees-Jones, A. (2014). Can marginal rates of substitution be inferred from happiness data? Evidence from residency choices." *American Economic Review*, 104(11): 3498-3528.

Bosman, R., & van Winden, F. (2002). Emotion hazard in a power-to-take experiment. *Economic Journal*, 112(476): 147-169.

Brodeur, A., & Fleche, S. (2015). Neighbors, income and well-being: Evidence from a multi-scale analysis. Working Paper

Charness, G., & Grosskopf, B. (2001). Relative payoffs and happiness: an experimental study. *Journal of Economic Behavior & Organization*, 45(3): 301–328.

Chatterjee, P., Rose, R. L., & Sinha, J. (2012). Why money meanings matter in decisions to donate time and money. *Marketing Letters*, 1-10.

Deaton, A., & Stone, A.A. (2013). Two happiness puzzles. *American Economic Review*, 103(3): 591-97.

Deci, E.L., & Ryan, R.M. (2000). The “what” and the “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227–268.

Easterlin, R.A. (1974). Does economic growth improve the human lot? Some empirical evidence P.A. David, M.W. Reder (Eds.), *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*, Academic Press Inc., New York.

Easterlin, R.A., McVey, L.A., Switek, M., Sawangfa, O., & Zweig, J.S. (2010). The happiness-income paradox revisited. *Proceedings of the National Academy of Sciences of the United States of America*, 107: 22463-22468.

Easterlin, R.A. (2013). Happiness, growth, and public policy. *Economic Inquiry*, 51: 1-15.

Frank, R.H. (2016). *Success and Luck: Good Fortune and the Myth of Meritocracy*. Princeton and Oxford, Princeton University Press.

Gagné, M. (2003). The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion*, 27(3): 199-223.

- Hara, K., Adams, A., Milland, K., Savage, S., Callison-Burch, C., & Bigham, J. (2018). A data-driven analysis of workers' earnings on Amazon Mechanical Turk. *Proceedings of the 2018 ACM Conference on Human Factors in Computing Systems*, [arXiv:1712.05796](https://arxiv.org/abs/1712.05796).
- Hirschman, A.O., & Rothschild, M. (1973). The changing tolerance for income inequality in the course of economic development: With a mathematical appendix. *Quarterly Journal of Economics*, 87(4): 544-566.
- Ifcher, J., Zarghamee, H., & Graham, C. (2018). Local neighbors as positives, regional neighbors as negatives: Competing channels in the relationship between others' income, health, and happiness. *Journal of Health Economics*, 57: 263-276.
- Johansson-Stenman, O., Carlsson, F., & Daruvala, D. (2002). Measuring future grandparents' preferences for equality and relative standing. *Economic Journal*, 112(479): 362–383.
- Kahneman, D. (2011). *Thinking Fast and Slow*. New York, Farrar, Strauss, and Giroux.
- Kamas, L., & Preston, A. (2015). Can social preferences explain gender differences in economic behavior? *Journal of Economic Behavior & Organization*, 116: 525-539.
- Kuziemko, I., Buell, R.W., Reich, T., & Norton, M.I. (2014). "Last-place aversion": Evidence and redistributive implications. *Quarterly Journal of Economics*, 129(1): 105-149.
- Kingdon, G.G., & Knight, J. (2007). Community, comparisons and subjective well-being in a divided society. *Journal of Economic Behavior & Organization*, 64(1): 69-90.
- Konow, J., & Earley, J. (2008). The Hedonistic Paradox: Is *homo economicus* happier? *Journal of Public Economics*, 92: 1-33.
- Kuhn, P., Kooreman, P., Soetevent, A., & Kapteyn, A. (2011). The effects of lottery prizes on winners and their neighbors: Evidence from the Dutch Postcode Lottery. *American Economic Review*, 101(5): 2226-224.
- Ludwig, J., Duncan, G.J., Gennetian, L.A., Katz, L.F., Kessler, R.C., Kling, J.R., & Sanbonmatsu, L. (2013). Long-term neighborhood effects on low-income families: Evidence from Moving to Opportunity. *American Economic Review: Papers & Proceedings*, 103(3): 226-231.
- Luttmer, E.F. (2005). Neighbors as negatives: relative earnings and well-being. *Quarterly Journal of Economics*, 120(3): 963-1002.
- McBride, M. (2010). Money, happiness: and aspirations: an experimental study. *Journal of Economic Behavior & Organization*, 74: 262-276.

- Mogilner, C. (2010). The pursuit of happiness: Time, money, and social connection. *Psychological Science*, 21(9), 1348-1354.
- Peterson, R.A., & Sauber, M. (1983). A mood scale for survey research. In *American Marketing Association Educator's Proceedings*. Eds. Patrick Murphy et al. American Marketing Associations, Chicago, Illinois: 409-414.
- Pfeffer, J., & DeVoe, S.E. (2009). Economic evaluation: The effect of money and economics on attitudes about volunteering. *Journal of Economic Psychology*, 30(3), 500-508.
- Pigou, A.C. (1920). *The Economics of Welfare*. London, MacMillan.
- Quoidbach, J., Dunn E.W., Petrides, K.V., & Mikolajczak, M. (2010). Money giveth, money taketh away: The dual effect of money on happiness. *Psychological Science*, 21: 759-763.
- Rees, J.C. (1956). *Mill and His Early Critics*. Leicester, University College.
- Senik, C. (2004). When information dominates comparison: learning from Russian subjective panel data. *Journal of Public Economics*, 88(9): 2099-2123
- Senik, C. (2008). Ambition and jealousy: income interactions in the 'Old' Europe versus the 'New' Europe and the United States. *Economica*, 75(299): 495-513
- Smith, R.H., Diener, E., & Wedell, D.H. (1989). Intrapersonal and social comparison determinants of happiness: A range-frequency analysis. *Journal of Personality and Social Psychology*, 56(3): 317-325.
- Solnick, S.J., & Hemenway, D. (1998). Is more always better?: A survey on positional concerns. *Journal of Economic Behavior and Organization*, 37(3): 373-383
- Stone, A., & Mackie, C. (2013). *Subjective Well-Being: Measuring Happiness, Suffering, and Other Dimensions of Experience*. Washington D.C., The National Academies Press.
- Vohs, K.D., Mead, N.L., & Goode, M.R. (2006). The psychological consequences of money. *Science*, 314(5802), 1154-1156.
- Zaleskiewicz, T., Gasiorowska, A., Kesebir, P., Luszczynska, A., & Pyszczynski, T. (2013). Money and the fear of death: The symbolic power of money as an existential anxiety buffer. *Journal of Economic Psychology*, 36: 55-67.
- Zeckhauser, R.J. (1991). The strategy of choice, In: *Strategy and Choice*, Zeckhauser, R.J. (Ed.), MIT Press, Cambridge, MA: 1-21.

Zhou, X., Vohs, K.D., & Baumeister, R.F. (2009). The symbolic power of money: Reminders of money alter social distress and physical pain. *Psychological Science*, 20(6), 700-706.

Table 1: 4X2 treatment-design, with own, Participant X's, and relative rewards by cell

Cell	pts-\$-Treatment			pts-Treatment		
	Self	Participant X	Relative rewards	Self	Participant X	Relative rewards
LL	\$2 2 pts	\$2 2 pts	0 0	\$6 2 pts	\$6 2 pts	0 0
LH	\$2 2 pts	\$10 10 pts	-\$8 -8 pts	\$6 2 pts	\$6 10 pts	0 -8 pts
HL	\$10 10 pts	\$2 2 pts	+\$8 +8 pts	\$6 10 pts	\$6 2 pts	0 +8 pts
HH	\$10 10 pts	\$10 10 pts	0 0	\$6 10 pts	\$6 10 pts	0 0

Notes: As the instructions disclosed all possible revelations, the subject's expected pts- and \$-rewards are 6 pts and \$6 for both herself and Participant X for all cells. Relative rewards are own minus Participant X's rewards.

Table 2: Relative- and own-rewards shocks and formulae used for estimation

A. Shocks	B. Difference-of-means estimators	C. Regression estimators
Advantageous relative-pts-\$	$\Delta\text{MSF}_{\text{HL,pts}\$} - \Delta\text{MSF}_{\text{HH,pts}\$}$	$-(\beta_4 + \beta_6 + \beta_7) = (\beta_0 + \beta_2 + \beta_3) - (\beta_0 + \beta_2 + \beta_3 + \beta_4 + \beta_6 + \beta_7)$
Advantageous relative-pts	$\Delta\text{MSF}_{\text{HL,pts}} - \Delta\text{MSF}_{\text{HH,pts}}$	$-(\beta_4 + \beta_7) = (\beta_0 + \beta_3) - (\beta_0 + \beta_3 + \beta_4 + \beta_7)$
Advantageous relative-\$	$(\Delta\text{MSF}_{\text{HL,pts}\$} - \Delta\text{MSF}_{\text{HH,pts}\$}) - (\Delta\text{MSF}_{\text{HL,pts}} - \Delta\text{MSF}_{\text{HH,pts}})$	$-\beta_6 = -(\beta_4 + \beta_6 + \beta_7) + (\beta_4 + \beta_7)$
Disadvantageous relative-pts-\$	$\Delta\text{MSF}_{\text{LH,pts}\$} - \Delta\text{MSF}_{\text{LL,pts}\$}$	$\beta_4 + \beta_5 = (\beta_0 + \beta_1 + \beta_4 + \beta_5) - (\beta_0 + \beta_1)$
Disadvantageous relative-pts	$\Delta\text{MSF}_{\text{LH,pts}} - \Delta\text{MSF}_{\text{LL,pts}}$	$\beta_4 = (\beta_0 + \beta_4) - \beta_0$
Disadvantageous relative-\$	$(\Delta\text{MSF}_{\text{LH,pts}\$} - \Delta\text{MSF}_{\text{LL,pts}\$}) - (\Delta\text{MSF}_{\text{LH,pts}} - \Delta\text{MSF}_{\text{LL,pts}})$	$\beta_5 = (\beta_4 + \beta_5) - \beta_4$
Advantageous own-pts-\$	$\Delta\text{MSF}_{\text{HH,pts}\$} - \Delta\text{MSF}_{\text{LL,pts}\$}$	$-\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_6 + \beta_7 = (\beta_0 + \beta_2 + \beta_3 + \beta_4 + \beta_6 + \beta_7) - (\beta_0 + \beta_1)$
Advantageous own-pts	$\Delta\text{MSF}_{\text{HH,pts}} - \Delta\text{MSF}_{\text{LL,pts}}$	$\beta_3 + \beta_4 + \beta_7 = (\beta_0 + \beta_3 + \beta_4 + \beta_7) - \beta_0$
Advantageous own-\$	$(\Delta\text{MSF}_{\text{HH,pts}\$} - \Delta\text{MSF}_{\text{LL,pts}\$}) - (\Delta\text{MSF}_{\text{HH,pts}} - \Delta\text{MSF}_{\text{LL,pts}})$	$-\beta_1 + \beta_2 + \beta_6 = (-\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_6 + \beta_7) - (\beta_3 + \beta_4 + \beta_7)$

Table 3: Demographic characteristics, n = 860

	mean
Gender	
Female	0.45
Male	0.54
Other / prefer not to answer	0.01
Age	36.48
Are you a citizen or permanent resident of the United States?	
Yes	1.00
No	0.00
Prefer not to answer	0.00
Rate your English	
Native	0.98
Fluent	0.02
Proficient	0.00
What race/ethnicity do you identify yourself as?	
American Indian and Alaska Native	0.00
Asian	0.08
Black or African	0.07
Hispanic	0.05
White	0.77
Other / prefer not to answer	0.02
What religion do you consider yourself?	
Atheist / agnostic	0.47
Buddhist	0.02
Christian	0.42
Hindu	0.00
Jewish	0.02
Muslim	0.00
Other / prefer not to answer	0.07
How would you characterize your political views?	
Conservative	0.20
Liberal / progressive	0.50
Moderate	0.28
Prefer not to answer	0.02
What is the total (gross) income last year of your household?	
\$0-25,000	0.18
\$25,000-50,000	0.30
\$50,000-75,000	0.24
\$75,000-100,000	0.15
\$100,000-125,000	0.05
\$125,000-150,000	0.03
\$150,000+	0.04
Prefer not to answer	0.02
What is your highest level of education?	
Some high school	0.00
Completed high school	0.10
Some college	0.28
Completed college	0.44
Some grad / professional school	0.04
Completed grad / professional school	0.14
Prefer not to answer	0.00
Please indicate your employment status:	
Employed, full-time	0.67
Employed, part-time	0.15
Not employed, looking for work	0.06
Not employed, not looking for work	0.06
Retired	0.02
Student	0.03
Prefer not to answer	0.02

Table 4: Pre- and post-revelation MSF-scores and  $\Delta$ MSF by cell

Cell	MSF-score	pts- $\xi$ -Treatment	pts-Treatment
LL	pre-revelation	15.081 *** (0.347)	15.495 *** (0.291)
	post-revelation	13.97 *** (0.397)	15.495 *** (0.329)
	change	-1.11 *** (0.275)	0.000 (0.176)
	observations	99	103
LH	pre-revelation	14.92 *** (0.334)	15.055 *** (0.327)
	post-revelation	12.77 *** (0.416)	14.312 *** (0.358)
	change	-2.16 *** (0.304)	-0.743 *** (0.249)
	observations	103	109
HL	pre-revelation	15.40 *** (0.280)	16.056 *** (0.311)
	post-revelation	17.29 *** (0.270)	16.539 *** (0.290)
	change	1.89 *** (0.223)	0.483 *** (0.153)
	observations	123	89
HH	pre-revelation	15.03 *** (0.302)	15.139 *** (0.350)
	post-revelation	17.29 *** (0.254)	16.337 *** (0.321)
	change	2.26 *** (0.203)	1.198 *** (0.170)
	observations	133	101

Notes: Robust standard errors in parenthesis. \*, \*\*, \*\*\* represents p-values < 0.1, 0.05, and 0.01, respectively.

Table 5: Estimated impacts of relative- and own-rewards shocks on  $\Delta MSF$

Shocks	Formulae	
Adv own-pts-\$	$\Delta MSF_{HH,pts\$} - \Delta MSF_{LL,pts\$}$	3.367 <sup>***</sup> (0.342)
Adv own-pts	$\Delta MSF_{HH,pts} - \Delta MSF_{LL,pts}$	1.198 <sup>***</sup> (0.245)
Adv own-\$	$(\Delta MSF_{HH,pts\$} - \Delta MSF_{LL,pts\$}) - (\Delta MSF_{HH,pts} - \Delta MSF_{LL,pts})$	2.169 <sup>***</sup> (0.421)
Adv rel-pts-\$	$\Delta MSF_{HL,pts\$} - \Delta MSF_{HH,pts\$}$	-0.361 (0.302)
Adv rel-pts	$\Delta MSF_{HL,pts} - \Delta MSF_{HH,pts}$	-0.714 <sup>**</sup> (0.228)
Adv rel-\$	$(\Delta MSF_{HL,pts\$} - \Delta MSF_{HH,pts\$}) - (\Delta MSF_{HL,pts} - \Delta MSF_{HH,pts})$	-0.354 (0.378)
Disadv rel-pts-\$	$\Delta MSF_{LH,pts\$} - \Delta MSF_{LL,pts\$}$	-1.044 <sup>**</sup> (0.422)
Disadv rel-pts	$\Delta MSF_{LH,pts} - \Delta MSF_{LL,pts}$	-0.743 <sup>**</sup> (0.305)
Disadv rel-\$	$(\Delta MSF_{LH,pts\$} - \Delta MSF_{LL,pts\$}) - (\Delta MSF_{LH,pts} - \Delta MSF_{LL,pts})$	0.301 (0.521)

Notes: Robust standard errors in parenthesis. \*, \*\*, \*\*\* represents p-values < 0.1, 0.05, and 0.01, respectively.

Table 6: Regression estimates of the impacts of relative- and own-rewards shocks on  $\Delta$ MSF

Shocks	All (1)	All (2)	Conservative (3)	Liberal / Progressive (4)	Female (5)	Male (6)	Income in top quartile (7)	Income in bottom 3 quartiles (8)
Panel A: Impacts of advantageous relative-rewards shocks								
Adv rel-pts-\$	-0.361 (0.302)	-0.431 (0.313)	-0.780 (0.671)	-0.554 (0.496)	-0.991 ** (0.490)	-0.076 (0.449)	-0.369 (0.673)	-0.311 (0.346)
Adv rel-pts	-0.715 *** (0.228)	-0.800 *** (0.242)	-0.953 *** (0.553)	-0.463 (0.339)	<u><b>-1.435</b></u> *** (0.437)	<u><b>-0.296</b></u> (0.295)	-0.776 (0.631)	-0.855 *** (0.285)
Adv rel-\$	0.354 (0.378)	0.370 (0.395)	0.173 (0.841)	-0.091 (0.602)	0.445 (0.659)	0.220 (0.549)	0.406 (0.943)	0.544 (0.448)
Panel B: Impacts of disadvantageous relative-rewards shocks								
Disadv rel-pts-\$	-1.044 ** (0.422)	-1.026 ** (0.432)	<u><b>-2.620</b></u> ** (1.176)	<u><b>-0.106</b></u> (0.590)	<u><b>-1.748</b></u> *** (0.664)	<u><b>-0.293</b></u> (0.598)	-1.975 ** (0.925)	-0.788 (0.503)
Disadv rel-pts	-0.743 ** (0.305)	-0.665 ** (0.318)	-0.518 (0.538)	-0.714 * (0.405)	-0.686 (0.511)	-0.500 (0.413)	-0.708 (0.607)	-0.520 (0.399)
Disadv rel-\$	-0.301 (0.521)	-0.361 (0.537)	<u><b>-2.101</b></u> * (1.294)	<u><b>0.608</b></u> (0.718)	-1.061 (0.822)	0.207 (0.702)	-1.267 (1.120)	-0.268 (0.647)
Panel C: Impacts of advantageous own-rewards shocks								
Adv own-pts-\$	3.367 *** (0.342)	3.392 *** (0.353)	2.934 *** (0.660)	4.136 *** (0.562)	3.136 *** (0.484)	3.625 *** (0.542)	2.820 *** (0.711)	3.548 *** (0.415)
Adv own-pts	1.198 *** (0.245)	1.294 *** (0.256)	1.208 ** (0.508)	1.167 *** (0.350)	<u><b>1.901</b></u> *** (0.445)	<u><b>0.915</b></u> *** (0.337)	0.898 * (0.543)	1.369 *** (0.327)
Adv own-\$	2.169 *** (0.421)	2.098 *** (0.433)	1.726 ** (0.845)	2.969 *** (0.643)	<u><b>1.236</b></u> * (0.650)	<u><b>2.710</b></u> *** (0.637)	1.922 ** (0.886)	2.179 *** (0.529)
Vector Y included	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	860	860	175	434	391	463	200	646

Notes: Robust standard errors are reported in parenthesis. \*, \*\*, \*\*\* indicate p-value < 0.11, 0.05, and 0.01, respectively. Coefficients that are underlined and italicized (bolded) are significantly different from each other with p-value < 0.11 (0.05). Vector Y includes controls for gender, age, race, religion, political leaning, household income, education, and employment status.

Appendix Table 1: Regression estimates of the impacts of relative- and own-rewards shocks on  $\Delta$ MSF when including dropped subjects and when including pilot-study subjects, and on post-revelation 10-item BPNSS score

Shocks	Include subjects from pilot study (1)	Include subjects from pilot study (2)	Include dropped subjects (3)	Include dropped subjects (4)	Post-revelation BPNSS score (10 items) (5)	Post-revelation BPNSS score (10 items) (6)
Panel A: Impacts of advantageous relative-rewards shocks						
Adv rel-pts-\$	-0.400 (0.269)	-0.429 (0.313)	-0.118 (0.278)	-0.118 (0.284)	0.092 (0.124)	0.114 (0.127)
Adv rel-pts	-0.595 *** (0.200)	-0.801 *** (0.242)	-0.622 *** (0.235)	-0.677 *** (0.251)	0.115 (0.131)	0.118 (0.124)
Adv rel-\$	0.195 (0.335)	0.371 (0.395)	0.504 (0.364)	0.559 (0.375)	-0.023 (0.180)	-0.004 (0.176)
Panel B: Impacts of disadvantageous relative-rewards shocks						
Disadv rel-pts-\$	-1.019 *** (0.388)	-1.026 ** (0.432)	-0.990 ** (0.396)	-0.939 ** (0.400)	-0.152 (0.158)	-0.186 (0.154)
Disadv rel-pts	-0.497 * (0.256)	-0.663 ** (0.318)	-0.631 ** (0.291)	-0.484 * (0.300)	-0.066 (0.148)	-0.085 (0.148)
Disadv rel-\$	-0.522 (0.465)	-0.363 (0.537)	-0.359 (0.491)	-0.454 (0.500)	-0.087 (0.216)	-0.101 (0.212)
Panel C: Impacts of advantageous own-rewards shocks						
Adv own-pts-\$	3.187 *** (0.315)	3.392 *** (0.353)	3.100 *** (0.314)	3.137 *** (0.321)	-0.015 (0.149)	-0.048 (0.148)
Adv own-pts	1.104 *** (0.213)	1.297 *** (0.257)	1.285 *** (0.236)	1.366 *** (0.248)	0.182 (0.141)	0.201 (0.138)
Adv own-\$	2.083 *** (0.380)	2.096 *** (0.434)	1.814 *** (0.393)	1.771 *** (0.400)	-0.197 (0.205)	-0.248 (0.202)
Vector Y included	No	Yes	No	Yes	No	Yes
Observations	1,054	1,054	996	996	860	860

Notes: Robust standard errors are reported in parenthesis. \*, \*\*, \*\*\* indicate p-value < 0.11, 0.05, and 0.01, respectively. Vector Y includes controls for gender, age, race, religion, political leaning, household income, education, and employment status.

## Introduction

### ***A STUDY OF DECISION MAKING - INFORMED CONSENT***

#### **RESEARCH PROCEDURES**

This research is being conducted to study decision making. The experiment will last for up to 30 minutes. In addition to the \$1 reward for completing this assignment, you will receive a bonus with a minimum value of \$2, a maximum value of \$10, and an average value of \$6, depending on a series of random choices made by the computer. You will receive your reward and bonus within 3 days of completing the study. If you do not complete the study, you will receive no payment—that is, you will not receive the reward and you will not receive a bonus. This study does not involve any deception. Deception is not permitted in economic experiments.

#### **RISKS**

There are no foreseeable risks for participating in this research.

#### **BENEFITS**

There are no direct personal benefits to you as a participant, other than the payment.

#### **CONFIDENTIALITY**

The data in this study will be confidential. You will not be asked to identify yourself. No person-identifiable information will be collected. While it is understood that no computer transmission can be perfectly secure, reasonable efforts will be made to protect the confidentiality of your transmission.

#### **PARTICIPATION**

You must be 18 or over to participate. Your participation is voluntary, and you may withdraw from the study at any time and for any reason. There are no costs to you or any other party.

#### **CONTACT**

This research is being conducted by Professor Homa Zarghamee at Barnard College of Columbia University. Professor Zarghamee may be reached at [hzargham@barnard.edu](mailto:hzargham@barnard.edu) for questions or complaints. You may also contact the Barnard College Institutional Review Board at [irb@barnard.edu](mailto:irb@barnard.edu) if you have questions or comments regarding your rights as a participant in the research.

This research has been reviewed according to Barnard College's procedures governing research participation.

By clicking here you agree to participate in the study.

By clicking here, you agree to participate in the study.



## INSTRUCTIONS

Thank you for participating in this study. You and everybody else in this study have been randomly assigned to groups of two people. The other member of your group (hereafter referred to as Participant X) could be anybody participating in this study. You and Participant X will never learn each other's identities.

During this session you will answer a questionnaire. Then you will be informed how many experimental points (**either 2 or 10 points**) will be allotted to each member of your group (that is, to you and Participant X). There are four possible outcomes, and one of them will be randomly chosen for your group:

- You receive 2 points, and Participant X receives 2 points.
- You receive 2 points, and Participant X receives 10 points.

- You receive 10 points, and Participant X receives 2 points.
- You receive 10 points, and Participant X receives 10 points.

Next, you will answer a second questionnaire and lastly a demographic survey. **Your bonus will be \$6 regardless of how many experimental points you receive. The same is true for Participant X.**

The questions will be presented one at a time on your computer monitor. To answer a question you must indicate your answer by clicking **BOTH** your choice **AND** the **OK** button. Please make sure to read each question closely as the available response-categories vary.

The first question is a practice question intended to familiarize you with the interface.

If you are ready, please click the **OK** button.

## INSTRUCTIONS

Thank you for participating in this study. You and everybody else in the session have been randomly assigned to groups of two people. The other member of your group (hereafter referred to as Participant X) could be anybody participating in this study. You and Participant X will never learn each other's identities.

During this session you will answer a questionnaire. Then you will be informed how many experimental points (**either 2 or 10 points**) will be allotted to each member of your group (that is, to you and Participant X). There are four possible outcomes, and one of them will be randomly chosen for your group:

- You receive 2 points, and Participant X receives 2 points.
- You receive 2 points, and Participant X receives 10 points.
- You receive 10 points, and Participant X receives 2 points.
- You receive 10 points, and Participant X receives 10 points.

Next, you will answer a second questionnaire and lastly a demographic survey.

**You and Participant X will receive a bonus payment of \$1 for each experimental point you receive.**

The questions will be presented one at a time on your computer monitor. To answer a question you must indicate your answer by clicking **BOTH** your choice **AND** the **OK** button. Please make sure to read each question closely as the available response-categories vary.

The first question is a practice question intended to familiarize you with the interface.

If you are ready, please click the **OK** button.

What year is it?

*Please enter your answer and click OK to proceed.*

- 1990
- 2017
- 2000
- 2018
- 2019

## Survey Part 1

Please indicate your agreement or disagreement with the following statement:

**For some reason I am not very comfortable.**

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Please indicate your agreement or disagreement with the following statement:

**At this moment I feel "edgy" or irritable.**

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Please indicate your agreement or disagreement with the following statement:

## Currently, I am in a good mood.

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Please indicate your agreement or disagreement with the following statement:

### **As I answer these questions, I feel very cheerful.**

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

### **I feel like I am free to decide for myself how to live my life.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**Often, I do not feel very competent.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**People I know tell me I am good at what I do.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**I pretty much keep to myself and don't have a lot of social contacts.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life,

and then indicate how true it is for you. Use the following scale to respond.

**I consider the people I regularly interact with to be my friends.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**In my daily life, I frequently have to do what I am told.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**Most days I feel a sense of accomplishment from what I do.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**In my life I do not get much of a chance to show how capable I am.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5

- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**I feel like I can pretty much be myself in my daily situations.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**I often do not feel very capable.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2

- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**People are generally pretty friendly towards me.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

## **Screeners 1**

Please indicate either strong agreement or strong disagreement with the following statement:

**Currently, the year is 2025.**

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

## Revelation

**Remember, the number of points you and Participant X receive will not affect your bonus payments.**

**Recall that the four possible outcomes are the following:**

- **You receive 2 points, and Participant X receives 2 points.**
- **You receive 2 points, and Participant X receives 10 points.**
- **You receive 10 points, and Participant X receives 2 points.**
- **You receive 10 points, and Participant X receives 10 points.**

**You were randomly assigned to one of these outcomes. To find out which one, please click the OK button.**

**Remember, you and Participant X will receive a bonus payment of a dollar for each point you receive.**

**Recall that the four possible outcomes are the following:**

- **You receive 2 points, and Participant X receives 2 points.**
- **You receive 2 points, and Participant X receives 10 points.**
- **You receive 10 points, and Participant X receives 2 points.**
- **You receive 10 points, and Participant X receives 10 points.**

**You were randomly assigned to one of these outcomes. To find out which one, please click the OK button.**

**Remember, the number of points you and Participant X receive will not affect your bonus payments.**

- **You receive 2 points, and Participant X receives 2 points.**

**Remember, the number of points you and Participant X receive will not affect your bonus payments.**

- **You receive 2 points, and Participant X receives 10 points.**

**Remember, the number of points you and Participant X receive will not affect your bonus payments.**

- **You receive 10 points, and Participant X receives 2 points.**

**Remember, the number of points you and Participant X receive will not affect your bonus payments.**

- **You receive 10 points, and Participant X receives 10 points.**

**Remember, you and Participant X will receive a bonus payment of a dollar for each point you receive.**

- **You receive 2 points, and Participant X receives 2 points.**

**Remember, you and Participant X will receive a bonus payment of a dollar for each point you receive.**

- **You receive 2 points, and Participant X receives 10 points.**

**Remember, you and Participant X will receive a bonus payment of a dollar for each point you receive.**

- **You receive 10 points, and Participant X receives 2 points.**

**Remember, you and Participant X will receive a bonus payment of a dollar for each point you receive.**

- **You receive 10 points, and Participant X receives 10 points.**

**MSF**

Please indicate your agreement or disagreement with the following statement:

**For some reason I am not very comfortable.**

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Please indicate your agreement or disagreement with the following statement:

**At this moment I feel "edgy" or irritable.**

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Please indicate your agreement or disagreement with the following statement:

**Currently, I am in a good mood.**

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Please indicate your agreement or disagreement with the following statement:

**As I answer these questions, I feel very cheerful.**

*Please enter your answer and click OK to proceed.*

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

## Screeners 2

Please indicate the value of the bonus you will receive (in addition to the \$1 reward you will receive for completing this study).

- \$2.00
- \$6.00
- \$10.00

Please indicate the value of the bonus Participant X will receive (in addition to the \$1 reward Participant X will receive for completing this study).

- \$2.00

- \$6.00
- \$10.00

## Survey Part 2

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**I really like the people I interact with.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**I feel pressured in my life.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**I get along with people I come into contact with.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**I generally feel free to express my ideas and opinions.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**I have been able to learn interesting new skills recently.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life,

and then indicate how true it is for you. Use the following scale to respond.

**People in my life care about me.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**People I interact with on a daily basis tend to take my feelings into consideration.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**There are not many people that I am close to.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**The people I interact with regularly do not seem to like me much.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6

7 Very true

Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond.

**There is not much opportunity for me to decide for myself how to do things in my daily life.**

*Please enter your answer and click OK to proceed.*

- 1 Not true at all
- 2
- 3
- 4 Somewhat true
- 5
- 6
- 7 Very true

## Questionnaire 1

What is your gender?

- Female
- Male
- Other, please specify
- Prefer not to answer

What is your age (in years)?

*Please enter 0 if you prefer not to answer.*

Are you a citizen or permanent resident of the United States?

- Yes
- No
- Prefer not to answer

Rate your English:

- Native
- Fluent
- Proficient
- Less than proficient
- Prefer not to answer

What race/ethnicity do you identify yourself as:

- White (having origins in any of the original peoples of Europe, the Middle East, or North Africa)
- Black or African (having origins in any of the Black racial groups of Africa)
- Hispanic (having origins in Mexico, Central or South America)

- American Indian and Alaska Native (having origins in any of the original peoples of North, Central, or South America and maintaining tribal affiliation or community attachment)
- Asian (having origins in any of the original people of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam)
- Native Hawaiian and Other Pacific Islander (having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands)
- Some other race, please specify
- Prefer not to answer

What religion do you consider yourself?

- Atheist / Agnostic
- Buddhist
- Christian (including Catholic, Protestant, and all other Christian denominations)
- Hindu
- Jewish
- Muslim
- Other
- Prefer not to answer

If you identified a religion in the previous question, are you practicing that religion?

- Practicing
- Not practicing
- Prefer not to answer

How often do you attend religious services?

- Never
- Less than once a year
- Once a year
- Several times a year
- Once a month
- Two to three times a month
- Nearly every week
- Every week
- More than once a week
- Prefer not to answer

How would you characterize your political views?

- Conservative
- Moderate
- Liberal / Progressive
- Prefer not to answer

## Questionnaire 2

What is the total (gross) income last year of your household? Please choose a single response:

- \$0 to less than \$25,000
- \$25,000 to less than \$50,000

- \$50,000 to less than \$75,000
- \$75,000 to less than \$100,000
- \$100,000 to less than \$125,000
- \$125,000 to less than \$150,000
- \$150,000 or more
- Prefer not to answer

Distribute 100 points among the five goals listed below to indicate their relative importance to you:

Financial success

A satisfying family life

Helping others

Global welfare

Doing work you enjoy

Total

What is your highest level of education?

- No high school
- Some high school
- Completed high school
- Some college
- Completed college
- Some grad/professional school
- Completed grad/professional school
- Prefer not to answer

Please indicate your employment status:

- Employed, full-time
- Employed, part-time
- Not employed, looking for work
- Not employed, not looking for work
- Student
- Retired
- Prefer not to answer

Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use the scale below to indicate how much freedom of choice and control you feel you have over the way your life turns out:

- 1. None at all
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10. A great deal
- Prefer not to answer

In the space provided below, please try to describe what you believe to be the purpose of the study:

Powered by Qualtrics

## Appendix B

Appendix B unfolds as follows. First, we present a description of the discovery study. Second, we discuss what we learned from the discovery study and how its design was modified in the subsequent pilot study. Third, we discuss what we learned from the pilot study.

### 1. Discovery-study experimental design

The discover study's experimental protocol followed the same steps as the online experiment's. Subjects:

- Read and signed an informed consent form
- Read instructions
- Completed a pre-revelation SWB survey
- Learned:
  - The number of experimental points they and other subjects received and one of the following:
    - They would not receive any more money for the experimental points they received, and would receive a flat payment of \$15
    - They would receive \$1 for each experimental point they received
- Completed a post-revelation SWB survey
- Completed a questionnaire that included demographic and other items
- Received their payments and exited the session

#### 1.1. Pre- and post-revelation SWB surveys

As in the online experiment, we were concerned that subjects might anchor their post-revelation-survey responses to their pre-revelation responses. If subjects did this, then estimated SWB-effects would be biased to zero. In an attempt to reduce the propensity to anchor, and to obscure the purpose of the study, we took the following steps. We compiled a comprehensive list of SWB items that had been previously used in the SWB literature, including eudaimonic, evaluative, and experiential measures; these came from oft-cited SWB datasets (e.g., the World Values Survey), and contained popular SWB measures (e.g., Cantril's Ladder) and scales (e.g., Positive Affect Negative Affect Scale). If two items were very similar to one another, we included only one. Twenty of these items were chosen based on the research team's expertise as the most central while representative of all three dimensions of SWB. For these twenty "salient" items we wanted within-subject comparisons so they were included in both the pre- and post-revelation surveys. The remaining SWB items were randomized into the pre- or post-revelation survey. We also included items from non-SWB psychological scales (items from the Narcissistic Personality Index and Machiavellian Personality Test were randomized into the pre- or post-revelation survey; items from the Money Attitude Scale appeared only in the post-revelation survey). A set of items relating to material well-being, money-aspirations, and justice were included in the questionnaire.

The order of the items in the pre- and post-revelation surveys were randomized. Note that, similar to the online experiment, the randomization of the questions in the post-revelation survey was stratified. The salient items made up the first stratum and appeared first in the post-revelation survey, and the rest of the post-revelation items followed. Table B.1 provides a complete list of the items that were included in the pre- and post-revelation surveys, plus the source of each item. In total, the pre- and post-revelation SWB surveys each included 106 items.

## 1.2. Revelation mechanism

The revelation mechanism varied in a few important ways from the revelation mechanism in the online experiment. First, it included groups of three subjects. Second, subjects were not fully informed regarding the possible outcomes of the revelation mechanism prior to completing the pre-revelation survey. Third, it included 12 cells--including high-versus-low variance and high-versus-low average payment cells. Table B.2 presents the 12 cells and indicates number of experimental points each member of the three-subject group received. For example, in the high variance and high average payment cell: one subject received 10 points, another received 20 points, and the last one received 30 points.

The revelation mechanism unfolded as follows. Prior to the pre-revelation SWB survey, subjects read instructions that informed them that they would be:

- Randomly assigned to a three-person group
- Completing a survey
- Informed of how many experimental points they and the two other members of their group would receive
- Paid \$5 for answering all, or almost all, items in the pre- and post-revelation surveys
- Paid in cash at the end of the session

Subjects were also informed of being in one of two treatments. Each subject in the “points-money (pts\$) treatment” was informed that each experimental point was worth \$1. Each subject in the “points (pts) treatment” was informed that she would receive a \$15 payment regardless of the number of experimental points. Subjects were not presented with the treatment terminology. Also, subjects in the pts\$-treatment did not know about the pts-treatment, and vice versa.

After completing the pre-revelation SWB survey, subjects read a series of statements that were listed one below the other on their computer screen. Each statement was first presented in **bold**. After reading each statement, subjects had to press a button labeled, “I HAVE READ THIS AND I’M READY TO CONTINUE,” to proceed to the next statement; note the new statement was presented in **bold**; all prior statements remained on the screen but were not bolded. Below is the series of statements:

- Your subject ID during this session is ...
- Each member of your group starts the session with 3 points

- For pts\$-treatment subjects only: “Remember, you will be paid a dollar for each point at the end of the session”
- For pts-treatment subjects only: “Remember, the number of points you will receive will not affect your payment at the end of the session”
- Your subject ID was randomly assigned to one of the rows in the table below
- Your points changed by the amount indicated in the third column of the table below
- The last column indicates your total points for this session

Table B.3 provides a screenshot of a sample final revelation screen for one of the 12 cells. The final revelation screens for the remaining 11 cells are analogous, but indicate the appropriate number of experimental points each subject received and the appropriate reminder regarding whether the points were worth a \$1 or not.

### 1.3. Implementation

Experimental sessions were conducted at the Interdisciplinary Center for Economic Science (ICES) lab at George Mason University during 2014-2016. The experiment was programmed and conducted with the software z-Tree (Fischbacher, 2007). Subjects were recruited using a web-based system in which students voluntarily sign up to participate in experiments. 399 subjects participated.

### 2. Discovery-study discussion and pilot-study design-modifications

In analyzing the data from the discovery study, we learned some important lessons. First, and most importantly, we realized that our revelation mechanism did not provide adequate power to identify the SWB-impact of an exogenous relative-rewards shock. Our initial, and naive, identification strategy was to compare subjects within a cell, e.g., the SWB-changes of those who received 30 experimental points to those who received 10 experimental points in the high-variance, high-average-payment, pts-treatment. We realized that such a comparison was confounded, as not all else was equal: such a comparison not only includes relative-income effects, but also absolute-income effects.

Our next, and less naive, identification strategy was to compare subjects who each received 10 experimental points and who only varied in how many experimental points other group members received. That is, we compared subjects across cells. While this approach enabled us to identify the SWB-effects of relative-rewards shocks, it only allowed us to use 4 of 12 cells (shaded in Table B.2) for such comparisons, or data from 175 out of 399 subjects. It should be noted that once we realized this problem (about two-thirds through administering the experiment), we thereafter only ran subjects in these 4 cells.

Second, we learned that the pre- and post-revelation surveys were too long. Sessions often lasted over 90 minutes. Further, it seemed to the experimenter that some subjects were getting frustrated by the length and/or monotony of the surveys. Third, we learned that the mood short form (MSF) items were most responsive to the revelation mechanism.

In response to these lessons we modified the revelation mechanism as well as the pre- and post-revelation surveys. Considering the revelation mechanism, our primary goal was to increase power to identify the SWB-effects of an exogenous relative-rewards shock. To accomplish this we needed to generate as many comparisons as possible between subjects that received the same rewards and only differed in the rewards that members of their group received. To that end, we implemented the following changes: first, we reduced the number of subjects in each group from 3 to 2. Before doing this we examined--and could not find--any measurable differences in comparisons that involved subjects who received 20 versus 30 experimental points. Second, we reduced the number of cells from 12 to 8, settling on one average payment (\$15 in the pilot study and \$6 in the online experiment) and without two levels of variance. Third, in the discovery study we could only examine the SWB-effects of a disadvantageous relative-rewards shock, in the the pilot study and the online experiment, we created cells that enabled us to identify the SWB-effects of an advantageous relative-rewards shock.

Considering the pre- and post-revelation surveys, we kept the basic framework of randomizing the pre-revelation items in one stratum and the post-revelation items in two strata with the salient items first and the remaining items second. However, we reduced the number of items to just the MSF items (as these were most responsive to the revelation in the discovery study), along with the BPNSS items as filler (as these were unresponsive to the revelation in the discovery study).

The last substantive change we made was to inform subjects of the possible allocations of experimental points in the instructions prior to completing the pre-revelation survey. This was done so that subjects had shared expectations prior to completing the pre-revelation survey: that they should expect themselves and others to receive 6 pts and \$6.

### 3. Pilot-study discussion

Experimental sessions were conducted at the ICES lab at George Mason University in 2017. The experiment was programmed and conducted with Qualtrics. Subjects were recruited using a web-based system in which students voluntarily sign up to participate in experiments. 194 subjects participated.

The primary difference between the pilot study and the online experiment is the number of experimental points that were allocated to subjects and Participant X. In the pilot study subjects and Participant X were allotted either 5 or 25 experimental points; in the online experiment subjects and Participant X were allotted either 2 or 10 experimental points. The number of experimental points was reduced for the online experiment as subject payments are generally lower when experiments are administered online. The only other differences between the pilot study and the online experiment is that the wording of the instructions was modified to make them appropriate for each setting, and 4 screening items were added to the online experiment in

an attempt to identify subjects who were not paying attention. Thus, the pilot study served as an excellent test of the Qualtrics program and the experimental protocol in general.

The results of the pilot study provided guidance regarding predicted MSF-changes by cell and the standard deviation of the MSF-change for the entire sample. In the pilot, the MSF-effect that aligned with the RIE was that a disadvantageous relative-pts-\$ shock was MSF-diminishing. The effect size was -0.91 MSF-points ( $p$ -value = 0.37). That this coefficient is insignificant is not surprising given the sample size ( $n = 23$  for each cell). However, given that the sample standard deviation of the MSF-change was a bit over 2, cells with over 100 observations each would translate into power over 0.8. Thus, we decided to run 1,000 subjects in the online experiment in an effort to ensure over 100 subjects in each of the 8 cells. Lastly, the SWB-effects of an advantageous relative-pts\$ shock was negative as well (effect size = -0.48 MSF-points). This is the opposite direction of that predicted by the RIE.

#### 4. References

Bradburn, N.M. (1969). *The Structure of Psychological Well-Being*. Chicago: Aldine Publishing Company.

Cantril, H. (1965). *The Patterns of Human Concern*. New Brunswick, N.J.: Rutgers University Press.

Charness, G., & Grosskopf, B. (2001). Relative payoffs and happiness: an experimental study. *Journal of Economic Behavior & Organization*, 45(3): 301–328.

Christie, R. & Geis, F. (1970). *Studies in Machiavellianism*. New York: Academic Press.

Deci, E.L., & Ryan, R.M. (2000). The “what” and the “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11: 227–268.

Diener, E., Emmons, R.A., Larsen, R.J., & Griffin, S. (1985). The Satisfaction with Life scale. *Journal of Personality Assessment*, 49(1): 71–75.

Fischbacher, U. (2007). z-Tree: Zurich Toolbox for Ready-made Economic Experiments. *Experimental Economics*, 10(2), 171-178.

Fordyce, M. (1988). A review of research on the happiness measures: a 60 s index of happiness and mental health. *Social Indicators Research*, 20: 355–381.

Furnham, A. (1984). Many sides of the coin: The psychology of money usage. *Personality and Individual Differences*, 5(5): 501-509.

Lyubomirsky, S., & Ross, L. (1997). Hedonic consequences of social comparison: a contrast of happy and unhappy people. *Journal of Personality and Social Psychology*, 73: 1141–1157.

Radloff, L. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1: 385-401.

Raskin, R.N., & Hall, C.S. (1979). A narcissistic personality inventory. *Psychological Reports*, 45(2): 590.

Srivastava, A., Locke, E.A., & Bartol, K.M. (2001). Money and subjective well-being: It's not the money, it's the motives. *Personality Processes and Individual Differences*, 80(6): 959-971.

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, 54(6): 1063-1070.

Table B.1: Complete list of the items that were included in the pre- and post-revelation surveys, plus the source of each item

<b>SALIENT ITEMS</b>	
British Household Panel Survey	Would you say that you are more satisfied with life, less satisfied, or feel about the same as you did a year ago? <i>More satisfied, Less satisfied, About the same</i>
Self-Anchoring Ladder (Cantril, 1965)	Please imagine a ladder with steps numbered from zero at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time? <i>0, ... , 10</i>
Charness & Grosskopf (2001)	Compared to an average person, how would you describe yourself in terms of your average happiness? Please check the one (and only one) statement that best describes your average happiness compared to that of an average person. <i>Much more happy than the average person, Slightly more happy than the average person, Just about as happy as the average person, Not quite as happy as the average person, Much less happy than the average person</i>
Fordyce (1988) <sup>^</sup>	Use the list below to answer the following questions. <i>Extremely happy (feeling ecstatic, joyous, fantastic!); very happy (feeling really good, elated!); pretty happy (spirits high, feeling good); mildly happy (feeling fairly good and somewhat cheerful); slightly happy (just a bit above neutral); neutral (not particularly happy or unhappy); slightly unhappy (just a bit below neutral); mildly unhappy (just a little low); pretty unhappy (somewhat "blue", spirits down); very unhappy (depressed, spirits very low); extremely unhappy (utterly depressed, completely down)</i>  In general, how happy or unhappy do you usually feel? Check the one (and only one) statement that best describes your average happiness.  How do you feel right now? Please check the one (and only one) statement that best describes your momentary happiness.
Lyubomirsky & Ross (1997) <sup>^</sup>	Compared to most of my peers, I consider myself: <i>1 less happy, ..., 7 more happy</i>
Mood Short Form (MSF) (Peterson & Sauber, 1983)	Please indicate your agreement or disagreement with the following statements: <i>1 strongly disagree, 2 disagree, 3 neither agree nor disagree, 4 agree, 5 strongly agree</i>  For some reason I am not very comfortable.  At this moment I feel "edgy" or irritable.  I am in a good mood.  As I answer these questions, I feel very cheerful.

<p>Flourishing Scale (FS) (Diener et al., 2009)</p>	<p>Using the 1–7 scale below, indicate your agreement with the following statement. I lead a purposeful and meaningful life. <i>7-Strongly agree, 6-Agree, 5-Slightly agree, 4-Neither agree nor disagree, 3-Slightly disagree, 2-Disagree, 1-Strongly Disagree</i></p>
<p>World Values Survey</p>	<p>All things considered, how satisfied are you with your life as a whole these days? <i>1 dissatisfied, ..., 10 satisfied</i></p>
<p>Positive and Negative Affect Schedule (PANAS), positive affects (Watson et al., 1988)</p>	<p>Please indicate the number on the scale that best describes how you feel right now: <i>1. You do not feel even the slightest bit of the emotion, ..., 10. You feel the most of the emotion you have ever felt in your life</i></p> <p>Joyful</p> <p>Cheerful</p> <p>Happy</p> <p>Lively</p> <p>Proud</p>

<p>PANAS, negative affects (Watson et al., 1988)</p>	<p>Please indicate the number on the scale that best describes how you feel right now: <i>1. You do not feel even the slightest bit of the emotion, ... , 10. You feel the most of the emotion you have ever felt in your life</i></p> <p>Afraid<sup>^^</sup></p> <p>Nervous<sup>^^</sup></p> <p>Irritable<sup>^^</sup></p> <p>Guilty<sup>^^</sup></p> <p>Upset<sup>^^</sup></p> <p>Scared<sup>^^^</sup></p> <p>Jittery<sup>^^^</sup></p> <p>Hostile<sup>^^^</sup></p> <p>Ashamed<sup>^^^</sup></p> <p>Distressed<sup>^^^</sup></p>
--	---

**RANDOMIZED ITEMS**

<p>Basic Psychological Needs Satisfaction Scale (BPNSS) (Deci &amp; Ryan, 2000)</p>	<p>Please read the following item carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond. <i>1 not true at all, ..., 4 somewhat true, ..., 7 very true</i></p> <p>I really like the people I interact with.<sup>^^</sup></p> <p>Often, I do not feel very competent. <sup>^^</sup></p> <p>I feel pressured in my life. <sup>^^</sup></p> <p>People I know tell me I am good at what I do. <sup>^^</sup></p> <p>I get along with people I come into contact with. <sup>^^</sup></p> <p>I generally feel free to express my ideas and opinions. <sup>^^</sup></p> <p>I consider the people I regularly interact with to be my friends. <sup>^^</sup></p> <p>I have been able to learn interesting new skills recently. <sup>^^</sup></p> <p>In my daily life, I frequently have to do what I am told. <sup>^^</sup></p> <p>People in my life care about me. <sup>^^</sup></p> <p>Most days I feel a sense of accomplishment from what I do. <sup>^^</sup></p>
---	--

	<p>People I interact with on a daily basis tend to take my feelings into consideration. ^^</p> <p>I do not get much of a chance to show how capable I am. ^^</p> <p>I often do not feel very capable. ^^</p> <p>There is not much opportunity for me to decide for myself how to do things in my daily life. ^^</p> <p>I feel like I am free to decide for myself how to live my life. ^^</p> <p>I pretty much keep to myself and don't have a lot of social contacts. ^^</p> <p>There are not many people that I am close to. ^^</p> <p>I feel like I can pretty much be myself in my daily situations. ^^</p> <p>The people I interact with regularly do not seem to like me much. ^^</p> <p>People are generally pretty friendly towards me. ^^</p>
<p>Center for Epidepiological Studies Depressions Scale (Radloff, 1977)</p>	<p>Please tell me how often you have felt this way during the past week. <i>Rarely or none of the time (less than 1 day), Some or a little of the time (1-2 days), Occasionally or a moderate amount of time (3-4 days), Most or all of the time (5-7 days)</i></p> <p>I was bothered by things that usually don't bother me. ^^</p> <p>I could not shake off the blues even with help from my family or friends. ^^</p> <p>I felt I was just as good as other people. ^^</p> <p>I had trouble keeping my mind on what I was doing. ^^</p> <p>I felt that everything I did was an effort. ^^</p> <p>I felt hopeful about the future. ^^</p> <p>My sleep was restless. ^^</p> <p>I was happy. ^^</p> <p>I talked less than usual. ^^</p> <p>People were unfriendly. ^^</p> <p>I enjoyed life. ^^</p> <p>I had crying spells. ^^</p> <p>I felt sad. ^^</p> <p>I could not get "going." ^^</p> <p>I did not feel like eating; my appetite was poor. ^^</p>

	<p>I felt depressed. <sup>^^^</sup></p> <p>I thought my life had been a failure. <sup>^^^</sup></p> <p>I felt fearful. <sup>^^^</sup></p> <p>I felt lonely. <sup>^^^</sup></p> <p>I felt that people dislike me. <sup>^^^</sup></p>
<p>FS (Diener et al., 2009)</p>	<p>Using the 1–7 scale below, indicate your agreement with the following statement.  <i>7-Strongly agree, 6-Agree, 5-Slightly agree, 4-Neither agree nor disagree, 3-Slightly disagree, 2-Disagree, 1-Strongly Disagree</i></p> <p>My social relationships are supportive and rewarding. <sup>^^</sup></p> <p>I actively contribute to the happiness and well-being of others. <sup>^^</sup></p> <p>I am a good person and live a good life. <sup>^^</sup></p> <p>People respect me. <sup>^^</sup></p> <p>I am engaged and interested in my daily activities. <sup>^^^</sup></p> <p>I am competent and capable in the activities that are important to me. <sup>^^^</sup></p> <p>I am optimistic about my future. <sup>^^^</sup></p>
<p>Bradburn's Positive Affect (Bradburn, 1969)</p>	<p>Yes, No</p> <p>During the past few weeks did you ever feel pleased about having accomplished something? <sup>^^</sup></p> <p>During the past few weeks did you ever feel that things were going your way? <sup>^^</sup></p> <p>During the past few weeks did you ever feel proud because someone complimented you on something you had done? <sup>^^</sup></p> <p>During the past few weeks did you ever feel particularly excited or interested in something? <sup>^^^</sup></p> <p>During the past few weeks did you ever feel on top of the world? <sup>^^^</sup></p>
<p>Bradburn's Negative Affect (Bradburn, 1969)</p>	<p>Yes, No</p> <p>During the past few weeks did you ever feel depressed or very unhappy? <sup>^^</sup></p> <p>During the past few weeks did you ever feel upset because someone criticized you? <sup>^^</sup></p> <p>During the past few weeks did you ever feel so restless that you couldn't sit long in a chair? <sup>^^</sup></p> <p>During the past few weeks did you ever feel very lonely or remote from other</p>

	<p>people?<sup>^^</sup></p> <p>During the past few weeks did you ever feel bored?<sup>^^</sup></p>
<p>Satisfaction with Life Scale (Diener et al., 1985)</p>	<p>Using the 1-7 scale below, indicate your agreement with the following statement. Please be open and honest in your responding. <i>1 strongly disagree, 2 disagree, 3 slightly disagree, 4 neither agree nor disagree, 5 slightly agree, 6 agree, 7 strongly agree</i></p> <p>The conditions of my life are excellent.<sup>^^</sup></p> <p>So far I have gotten the important things I want in life. <sup>^^</sup></p> <p>If I could live my life over, I would change almost nothing. <sup>^^</sup></p> <p>In most ways my life is close to my ideal.<sup>^^</sup></p> <p>I am satisfied with my life. <sup>^^</sup></p>
<p>Machiavellianism Test (Christie &amp; Geis, 1970)</p>	<p>Indicate your agreement with the following statements. <i>1 strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree</i></p> <p>Never tell anyone the real reason you did something unless it is useful to do so.<sup>^^</sup></p> <p>One should take action only when sure it is morally right. <sup>^^</sup></p> <p>Most people are basically good and kind. <sup>^^</sup></p> <p>There is no excuse for lying to someone else. <sup>^^</sup></p> <p>Generally speaking, people won't work hard unless they're forced to do so.<sup>^^</sup></p> <p>All in all, it is better to be humble and honest than to be important and dishonest. <sup>^^</sup></p> <p>When you ask someone to do something for you, it is best to give the real reasons for wanting it rather than giving reasons which carry more weight. <sup>^^</sup></p> <p>Most people who get ahead in the world lead clean, moral lives. <sup>^^</sup></p> <p>Most people are brave. <sup>^^</sup></p> <p>P.T. Barnum was wrong when he said that there's a sucker born every minute. <sup>^^</sup></p> <p>It is hard to get ahead without cutting corners here and there. <sup>^^</sup></p> <p>People suffering from incurable diseases should have the choice of being put painlessly to death. <sup>^^</sup></p> <p>Most people forget more easily the death of their parents than the loss of their property. <sup>^^</sup></p> <p>The best way to handle people is to tell them what they want to hear.<sup>^^</sup></p> <p>It is safest to assume that all people have a vicious streak and it will come out when they are given a chance.<sup>^^</sup></p>

	<p>Honesty is the best policy in all cases. <sup>^^</sup></p> <p>Anyone who completely trusts anyone else is asking for trouble. <sup>^^</sup></p> <p>The biggest difference between most criminals and other people is that the criminals are stupid enough to get caught. <sup>^^</sup></p> <p>It is wise to flatter important people. <sup>^^</sup></p> <p>It is possible to be good in all respects. <sup>^^</sup></p>
<p>Narcissistic Personality Inventory (Raskin &amp; Hall, 1979)</p>	<p>Please choose the one item below that best matches you:</p> <p>I prefer to blend in with the crowd. <i>OR:</i> I like to be the center of attention. <sup>^^</sup></p> <p>I am no better or worse than most people. <i>OR:</i> I think I am a special person. <sup>^^</sup></p> <p>I like to have authority over other people. <i>OR:</i> I don't mind following orders. <sup>^^</sup></p> <p>I find it easy to manipulate people. <i>OR:</i> I don't like it when I find myself manipulating people. <sup>^^</sup></p> <p>I insist upon getting the respect that is due me. <i>OR:</i> I usually get the respect that I deserve. <sup>^^</sup></p> <p>I don't particularly like to show off my body. <i>OR:</i> I like to show off my body. <sup>^^</sup></p> <p>I can read people like a book. <i>OR:</i> People are sometimes hard to understand. <sup>^^</sup></p> <p>If I feel competent I am willing to take responsibility for making decisions. <i>OR:</i> I like to take responsibility for making decisions. <sup>^^</sup></p> <p>I just want to be reasonably happy. <i>OR:</i> I want to amount to something in the eyes of the world. <sup>^^</sup></p> <p>My body is nothing special. <i>OR:</i> I like to look at my body. <sup>^^</sup></p> <p>I try not to be a show off. <i>OR:</i> I will usually show off if I get the chance. <sup>^^</sup></p> <p>I always know what I am doing. <i>OR:</i> Sometimes I am not sure of what I am doing. <sup>^^</sup></p> <p>I sometimes depend on people to get things done. <i>OR:</i> I rarely depend on anyone else to get things done. <sup>^^</sup></p> <p>I expect a great deal from other people. <i>OR:</i> I like to do things for other people. <sup>^^</sup></p> <p>Compliments embarrass me. <i>OR:</i> I like to be complimented. <sup>^^</sup></p> <p>I have a strong will to power. <i>OR:</i> Power for its own sake doesn't interest me. <sup>^^</sup></p> <p>I don't care about new fads and fashions. <i>OR:</i> I like to start new fads and fashions. <sup>^^</sup></p> <p>I like to look at myself in the mirror. <i>OR:</i> I am not particularly interested in looking</p>

at myself in the mirror. ^^

I can live my life in any way I want to. *OR:* People can't always live their lives in terms of what they want. ^^

Being an authority doesn't mean that much to me. *OR:* People always seem to recognize my authority. ^^

I am going to be a great person. *OR:* I hope I am going to be successful. ^^

People sometimes believe what I tell them. *OR:* I can make anybody believe anything I want them to. ^^

I am a born leader. *OR:* Leadership is a quality that takes a long time to develop. ^^

I wish somebody would someday write my biography. *OR:* I don't like people to pry into my life for any reason. ^^

I get upset when people don't notice how I look when I go out in public. *OR:* I don't mind blending into the crowd when I go out in public. ^^

I am more capable than other people. *OR:* There is a lot that I can learn from other people. ^^

I have a natural talent for influencing people. *OR:* I am not good at influencing people. ^^

When people compliment me I sometimes get embarrassed. *OR:* I know that I am good because everybody keeps telling me so. ^^

The thought of ruling the world frightens the hell out of me. *OR:* If I ruled the world it would be a better place. ^^

I can usually talk my way out of anything. *OR:* I try to accept the consequences of my behavior. ^^

I will be a success. *OR:* I am not too concerned about success. ^^

I am not sure if I would make a good leader. *OR:* I see myself as a good leader. ^^

I am assertive. *OR:* I wish I were more assertive. ^^

Sometimes I tell good stories. *OR:* Everybody likes to hear my stories. ^^

I will never be satisfied until I get all that I deserve. *OR:* I take my satisfactions as they come. ^^

I really like to be the center of attention. *OR:* It makes me uncomfortable to be the center of attention. ^^

I would prefer to be a leader. *OR:* It makes little difference to me whether I am a leader or not. ^^

I am much like everybody else. *OR:* I am an extraordinary person. ^^

Modesty doesn't become me. *OR:* I am essentially a modest person. ^^

	I would do almost anything on a dare. <i>OR</i> : I tend to be a fairly cautious person. <sup>^^^</sup>
--	---

<b>POST-REVELATION SURVEY ITEMS</b>	
-------------------------------------	--

<p>Money Beliefs and Behavior Scale (Furnham, 1984)</p>	<p>Please rate the extent to which you agree with this statement by placing a tick in the appropriate numbered box. <i>1 never, ... , 4 sometimes, ... , 7 always</i></p> <p>I often buy things that I don't need or want because they are in a sale or reduced in a sale or reduced in price.</p> <p>I put money ahead of pleasure.</p> <p>I sometimes buy things that I don't need or want to impress people because they are the right things to have at the time.</p> <p>Even when I have sufficient money I often feel guilty about spending money on necessities like clothes etc.</p> <p>I often say " I can't afford it" whether I can or not.</p> <p>I know almost to the cent how much money I have in my purse, wallet or pocket.</p> <p>I often have difficulty in making decisions about money regardless of the amount.</p> <p>I feel compelled to argue or bargain about the cost of almost everything that I buy.</p> <p>I prefer to use money rather than credit cards.</p> <p>I am financially worse off than most of my friends think.</p> <p>I always know how much I have in my savings account (bank or building society).</p> <p>If I have money left over at the end of the month (week) I often feel uncomfortable until it is all spent.</p> <p>I sometimes "buy" friendship by being very generous with those I want to like me.</p> <p>I often feel inferior to others who have more money than myself, even when I know that they have done nothing of worth to get it.</p> <p>I often use money as a weapon to control or intimidate those who frustrate me.</p> <p>I sometimes feel superior to those who have less money than myself regardless of their ability and achievements.</p> <p>I firmly believe that money can solve all of my problems.</p> <p>I often feel anxious and defensive when asked about my personal finances.</p> <p>In making any purchase, for any purpose, my first consideration is cost.</p> <p>I believe that it is rude to enquire about a person's wage/salary.</p>
---	--

	<p>I feel stupid if I pay a little more for something than a neighbor.</p> <p>I often feel disdain for money and look down on those who have it.</p> <p>I prefer to save money because I'm never sure when things will collapse and I'll need the cash.</p> <p>The amount of money that I have saved is never quite enough.</p> <p>I feel that money is the only thing that I can really count on.</p> <p>Compared to most other people that I know, I believe that I think about money much more than they do.</p> <p>My attitude towards money is very similar to that of my parents.</p> <p>I believe that the amount of money that a person earns is closely related to his/her ability and effort.</p> <p>I always pay bills (phone, electricity, etc) promptly.</p> <p>I often give large tips to waiters/waitresses that I like.</p> <p>I believe that time not spent in making money is time wasted.</p> <p>I often spend money on myself when I am depressed.</p> <p>I prefer not to lend people money.</p> <p>I am financially better off than most of my friends think.</p> <p>I would do practically anything legal for money if it were enough.</p> <p>I am proud of my financial victories – pay, riches, investments, etc – and let my friends know about them.</p> <p>I often argue with my partner (spouse, lover, etc) about money.</p> <p>Most of my friends have more money than I do.</p> <p>I believe that I have very little control over my financial situation in terms of my power to change it.</p> <p>I worry about my finances much of the time.</p> <p>I often fantasize about money and what I could do with it.</p> <p>I am proud of my ability to save money.</p> <p>I believe that my present income is about what I deserve, given the job I do.</p> <p>I believe that my present income is far less than I deserve, given the job I do.</p> <p>I very rarely give beggars money when they ask for it.</p> <p>In America money is how we compare each other.</p>
--	---

	I believe that a person's salary is very revealing in assessing their intelligence.
<b>QUESTIONNAIRE ITEMS (AMONG OTHERS)</b>	
Material Well-Being (Konow & Earley, 2008)	<p>What is your best estimate of your total expenditures this school year? Please consider all expenses, even if some are covered by financial aid or grants, including tuition, housing, food, clothing, transportation, entertainment, etc. Indicate in whole dollars. \$ _____ <i>for the school year.</i></p> <p>What is the total (gross) income last year of your parents or guardians (or spouse, if married)? Exclude your own earnings. Please choose a single response, even if it is a guess. 1 \$0 to less than \$25,000; 2 \$25,000 to less than \$50,000; 3 \$50,000 to less than \$75,000; 4 \$75,000 to less than \$100,000; 5 \$100,000 to less than \$125,000; 6 \$125,000 to less than \$150,000; 7 \$150,000 or more.</p> <p>Please report your total annual income in each of the four following categories. Include cash transfers but also any money paid on your behalf for tuition, housing, food, clothing, transportation, entertainment, etc. <i>Money from family; Money from internship; Money from the college (e.g., scholarship); Money from other sources except the above three</i></p>
Money Aspirations (Srivastava et al., 2001)	<p>Please indicate the minimum salary you would be satisfied with 1 year after graduation.</p> <p>Please indicate the minimum salary you would be satisfied with 5 years after graduation.</p> <p>Please indicate the minimum net worth you would be satisfied with when you retire.</p> <p>Distribute 100 points among the five goals listed below to indicate their relative importance to you. <i>Financial success, A satisfying family life, Helping others, Global welfare, Doing work you enjoy</i></p>

Table B.2: 3X2X2 treatment-design, with subject number 1, 2, and 3 rewards by cell

Treatment	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: pts\$						
Subject 1	10 pts worth \$1 each	20 pts worth \$1 each	7.5 pts worth \$1 each	15 pts worth \$1 each	5 pts worth \$1 each	10 pts worth \$1 each
Subject 2	10 pts worth \$1 each	20 pts worth \$1 each	10 pts worth \$1 each	20 pts worth \$1 each	10 pts worth \$1 each	20 pts worth \$1 each
Subject 3	10 pts worth \$1 each	20 pts worth \$1 each	12.5 pts worth \$1 each	25 pts worth \$1 each	15 pts worth \$1 each	30 pts worth \$1 each
Panel B: pts						
Subject 1	10 pts	20 pts	7.5 pts	15 pts	5 pts	10 pts
Subject 2	10 pts	20 pts	10 pts	20 pts	10 pts	20 pts
Subject 3	10 pts	20 pts	12.5 pts	25 pts	15 pts	30 pts
Variance	No	No	Low	Low	High	High
Average payment	Low	High	Low	High	Low	High

Table B.3: Screenshot of a sample final revelation screen for no-variance, high-average-payment, pts-treatment cell

Your subject ID during this session is 1

Each member of your group starts the session with 3 points.

Remember, the number of points you receive will not affect your payment at the end of the session.

Your subject ID was randomly assigned to one of the rows in the table below.

Your points changed by the amount indicated in the third column of the table below.

**The last column indicates your total points for this session.**

I HAVE READ THIS AND I'M READY TO CONTINUE

Subject ID number	Initial points	Change in points	Total points
1	3	+ 17	20
11	3	+ 17	20
7	3	+ 17	20