

Pre-analysis Plan: Gender Discrimination in Response to Correct and Incorrect Advice

Research Design

Overview:

In order to mimic real-life decisions as much as possible, we design a lab experiment that involves participants making incentivized investment decisions for actual firms based on the recommendations of real-life advisers. First, we will recruit people to provide advice on whether to invest in actual start-up firms and to provide a justification for their decision. We create pairs of advisors that provide the same recommendation but differ by race and gender. Next, we recruit participants for the role of investors. Each participant is endowed with one dollar for each of the four investment rounds. The adviser provides her/his assessment and investment recommendation. The investor then decides how much to invest, and the outcome is revealed. Importantly, before and after receiving advice, we collect investors' beliefs about the chances that the project succeeds. Investors make a total of four decisions. One of the outcomes is randomly chosen for the payout. Investors are randomly assigned to one advisor for the first two rounds and to a different advisor for the third and fourth rounds.

Recruitment and matching of advisers:

We recruit a set of 50 people to act as advisers. To increase the probability that they are perceived to be competent, we restrict people to have at least ten years of private sector experience and hold a four year college degree. We ensured that the advisor sample is balanced across gender and race. Each advisor watches short videos of and receives some written information for eight start-up firms that were founded in the past decade. They are then asked to provide a binary investment recommendation (invest / no invest). Based on their recommendation, we provide them with a list of three (pre-scripted) potential justifications. These are one paragraph long and refer to either the product quality, competitors, or market demand. Instead of choosing one of those justifications, they can also provide their own (open-ended) justifications.

For each of the eight projects, we will select advisers with identical recommendations in order to isolate the effect of the adviser's identity. For example, to test gendered attribution of failure, we compare female and male advisers' investment recommendations in a project that fails.

Recruitment of participants (investors)

We recruit a nationally representative sample of study participants online through Prolific. Our total sample size is 1,150.

Randomization and Protocol:

Participants play a total of four investment rounds. The first two with one randomly assigned advisor and the following two with a different advisor. We first show a short video clip of the firm and ask about their perceived probability of success. They then receive advice. This page includes a picture of the advisor, the binary advice "Invest / Do not invest", and the justification. We also collect the time spent by participants on this page.

Participants can now update their perceived probability of success and make their investment decision. On the next page, they learn about the outcome – if the firm succeeds, they double the investment amount. If it fails, they lose their investment amount. The outcomes of each investment project were determined by whether startups succeeded commercially. Hence, every player has the same outcome for a given project. One of the four rounds is randomly chosen for the final payout.

After two rounds with a given advisor, participants rate the advisor on four attributes (e.g. experience). They are also informed that a subset has the chance to win an additional bonus and they can decide whether they want to be matched with the same or a randomly selected other advisor.

After all rounds are completed, we ask participants to complete a survey where we select demographic characteristics and data on attitudes.

Estimation:

Our data set will comprise of four observations for each participant i , each referring to a different investment round t . Variable y_{it} measures the outcome for participant i in investment round t .

As our first specification, we can estimate the following regression separately for each survey round:

$$y_i = \beta_1 Fem_i + \gamma_i X_i + \omega_j + \theta_j + \epsilon_i \quad (1)$$

Fem presents a binary variable for whether the advisor is female. X_i presents a vector of participant characteristics and ω_j is an indicator variable for the eight investment opportunities, and θ_j is an indicator variable for the specific pair of images we use. The coefficient β_1 can thus be interpreted as the average effect of being assigned a female advisor, holding the product, advisor image type, and advice content constant.

To increase precision, we also estimate the same regression across all survey waves pooled:

$$y_{it} = \beta_1 Fem_i + \gamma_i X_i + \omega_j + \theta_j + \lambda_t + \pi_i + \epsilon_i \quad (2)$$

and λ_t presenting survey wave dummies. π_i presents participants fixed effects and standard errors are clustered at the individual level. The coefficient β_1 should be interpreted as the average effect of advisor gender across the four investment rounds.

To test how the effect of advisor gender varies by subgroup S , we estimate:

$$y_i = \beta_1 Fem_i + \beta_2 Fem_i S_i + \beta_3 S_i + \gamma_i X_i + \omega_j + \theta_j + \epsilon_i \quad (3)$$

where S_i describes the subgroup of interest, described in more detail below. The coefficient β_2 measures how the effect of advisor gender varies by subgroup S . We can also estimate equation (2) analogously.

Estimating changes in behavior:

Next, we include regressions looking at the effect of participants' experience in the *previous* investment round under the *same* advisor.

We can estimate the following regression separately for each survey round:

$$\Delta y_{it} = \beta_1 Fem_i + \beta_2 Cor_{t-1} + \beta_3 Fem_i Cor_{t-1} + y_{i,t-1} + \gamma_i X_i + \omega_j + \theta_j + \epsilon_i \quad (4)$$

This specification looks at how behavior in round 2 and 4 depends on whether the recommendation of the (same) advisor in the previous was correct (captured by indicator variable Cor_{t-1}). Coefficient β_3 captures how advisor gender affects responses to (in)correct advice.

The effect of failed advice may differ depending on participants' outcomes of the previous round ($y_{i,t-1}$). For example, the effect of incorrect advice may be larger if participants invested a lot. To test this, we estimate:

$$\Delta y_{it} = \beta_1 Cor_{t-1} + \beta_2 y_{i,t-1} + \beta_3 y_{i,t-1} Cor_{t-1} + \gamma_i X_i + \omega_j + \theta_j + \epsilon_i \quad (5)$$

We will estimate this regression separately by advisor gender and then apply a test of equal coefficients for our coefficients of interest. E.g. comparing β_3 across specifications allows us to test whether participants reaction to incorrect advice for a given previous behavior varies by advisor gender. We will also estimate (5) separately for successful and failed projects.

Analogous to specification (2), these regression specifications can also be estimated pooling data from round 2 and 4 and clustering standard errors at the individual level.

Our preferred specification for all these regressions is OLS.

Outcomes

Here we describe the primary we will use in our analysis. We will also list secondary outcomes analyses that are more exploratory in nature.

- i) Primary outcomes (y)**
 - a. *Investment decision*: Amount invested (in cents)
 - b. *Attention to advisor*: Time spent on advice page (in seconds), winsorized at 5% level.
 - c. *Changing advisor*: Prefer to change advisor (binary)
 - d. *Change in chance of success*: Difference in probability of business succeeding before and after advice (in %)
 - e. *Assessment of advisor*: standardized index of our four assessment criteria (coded 0=far below average through 4=far above average).

- ii) Primary subgroups (S)**
 - a. *Participant gender*
 - b. *Advisor race*
 - c. *Gender role attitudes*: standardized index over two questions, split at median
 - d. *Support for gender quotas*: split at median

- iii) Secondary outcomes (y)**
 - a. Individual assessment categories

- iv) Secondary subgroups (S)**
 - a. *political leaning and*
 - b. *education*
 - c. *participant race*
 - d. *participant age*
 - e. *participant location characteristics*

Robustness

- 1) **Purpose of study:** We ask participants after the investment choices (and before our attitude survey) what they think was the purpose of the study. We will test whether results differ for the group that suspects that the study is about gender.
- 2) **Social desirability:** We categorize people based on questions on social desirability based on Crowne and Marlowe (1960). We will test whether results differ for the group that is more prone to give socially desirable answers.
- 3) **Estimation:** We will test robustness of results using probit estimators for binary outcomes and ordered logit estimators for Likert scales.