Appendix to
Herding, Social Preferences and (Non-)Conformity

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I Predictions for the herding game

I.A The Game

Consider a number of n individuals who have to choose sequentially one of m alternatives d. Before deciding, each individual i is informed about the decisions of his predecessors. We assume that only one alternative z pays a prize $Z > 0$ to each of the individuals who have chosen z, while all other alternatives pay nothing. The manifestation of z is not known to the players at the time of their decision, and the probability for each alternative to be randomly drawn is the same, i.e. $P(d = z) = 1/m \quad \forall d$. Let n_d, $0 \leq n_d \leq n-1$, be the (expected) number of other individuals j who have chosen alternative d.

I.B Inequality aversion

Bolton and Ockenfels (2000) model preferences in the utility function

$$v_i(y_i, \sigma_i) \text{ with } \sigma_i = \left\{ \begin{array}{c} y_i/c \text{ if } c > 0 \\ 1/n \text{ if } c = 0 \end{array} \right\} \text{ and } c = \sum_{j=1}^{n} y_j,$$

where y_i denotes the monetary payoff of individual i. The authors assume that $\frac{\delta v_i}{\delta \sigma_i} = 0$ for $\sigma_i = 1/n$ and $\frac{\delta^2 v_i}{\delta^2 \sigma_i} < 0$, which implies $\frac{\delta v_i}{\delta \sigma_i} > 0$ for $\sigma_i < 1/n$, and $\frac{\delta v_i}{\delta \sigma_i} < 0$ for $\sigma_i > 1/n$.

Let, for a moment, $n_d \leq n-2$, that means at least one other individual has chosen another alternative than d. Incorporating the model, for each individual the expected utility from choosing alternative d will be

$$\mathsf{E}v_i\left(d|n_d \leq n-2\right) = \frac{1}{m} v_i\left(Z, \sigma_i\right) + \frac{m-1}{m} v_i\left(0, 0\right) \text{ with } \sigma_i = \frac{1}{n_d + 1}.$$

Since $\sigma_i > 1/n$ and $\frac{\delta \sigma_i}{\delta n_d} < 0$, we derive $\frac{\delta \mathsf{E} v_i}{\delta n_d} > 0$. Thus, *ceteris paribus* the utility of each individual i is strictly increasing in the number of other individuals choosing the same alternative.

When $n_d = n - 1$, i.e. all other individuals have chosen alternative d, choosing alternative d is strictly preferred to choosing alternative d for any other n_d, including $n_d = 0$, as

$$\mathsf{E}v_i\left(d|n_d = n-1\right) = \frac{1}{m}v_i\left(Z, \frac{1}{n}\right) + \frac{m-1}{m}v_i\left(0, \frac{1}{n}\right) > \mathsf{E}v_i\left(d|n_d \leq n-2\right).$$

Fehr and Schmidt (1999) assume a utility function of the form

$$U_i\left(y\right) = y_i - \alpha_i \frac{1}{n-1}\sum_{j\neq i}\max\left\{y_j - y_i, 0\right\} - \beta_i \frac{1}{n-1}\sum_{j\neq i}\max\left\{y_i - y_j, 0\right\},$$

with y the vector of monetary payoffs y_i, $\beta_i \leq \alpha_i$ and $0 \leq \beta_i < 1$.

For an individual i in our game choosing alternative d, the expected utility from this choice will be

$$\mathsf{E}U_i\left(d\right) = \frac{1}{m}\left(Z - \frac{n-n_d}{n-1}Z\left(\alpha_i + \beta_i\right)\right).$$

It is easy to see that as long as $\alpha_i + \beta_i > 0$, i.e. as long individual i is minimal inequality averse, *ceteris paribus* the utility of choosing alternative d strictly increases with the number of other individuals choosing the same alternative, $\frac{\delta U_i}{\delta n_d} > 0$.

As both models state that (inequality averse) individuals prefer an alternative which the most of all other subjects have chosen, all individuals choosing the same alternative are the only subgame perfect equilibria of our sequential game in the model of Bolton and Ockenfels (2000), and in the model of Fehr and Schmidt (1999) under the assumption of $\alpha_i + \beta_i > 0 \quad \forall i$.

I.C The QRE model

Since in our baseline experiment players are indifferent in expected payoffs between the two alternatives, according to Goeree, Palfrey, Rogers and McKelvey (2004) they should choose randomly with equal probability.[1]

The application of the model to our robustness treatment with unequal

[1] See also footnote 9 in Goeree et al. (2004).

probabilities is straightforward. Let ϵ represent the logistically distributed difference of random disturbances on expected payoffs. As we have no informative decisions of predecessors and signals to consider in our game, the probability of choosing alternative B is then given by

$$P(B) = P(\mathsf{E}\pi_B + \epsilon > 1 - \mathsf{E}\pi_B) = P(\epsilon > 1 - 2\mathsf{E}\pi_B) = \frac{1}{1 + \exp(\lambda(1 - 2\mathsf{E}\pi_B))}.$$

Normalizing the prize Z to 1, we can directly calculate the best data-fitting λ from the probability that alternative B will be selected, p_B, and the observed frequency of choices for alternatives A and B, N_A and N_B, as

$$\lambda = \frac{\ln(N_A/N_B)}{1 - 2p_B}.$$

The parameter λ can be interpreted as a rationality measure: the higher its value, the less random are the observed decisions. For our data from the treatment with unequal probabilities, we derive a λ of 11.90 which almost doubles the one estimated by Goeree et al. (2004), indicating that our participants make *less* errors than their Caltech participants. However, the task in our game is much simpler. Furthermore, different experiments with different subject pools, incentives, instructions etc. might yield different error parameters.

References

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