219B – Problem Set 2 – Due in class on Wed. April. 9, 2014
Social Preferences and Overconfidence

Question #1 (Gift Exchange I)

Consider the gift exchange game in Fehr-Kirchsteiger-Riedl (QJE, 1993) in simplified format. At $t = 0$, a firm makes a take-it-or-leave-it offer to a worker by promising a pay $w \geq 0$, which the worker accepts or rejects. The worker's reservation wage is 0. The pay is unconditional on effort, that is, the contract is a flat wage. At $t = 1$, after observing w, the worker exerts effort $e \geq 0$. The firm payoff is $x_f = ve - w$, with $v > 0$, capturing the return to the firm of the worker effort e; the worker payoff is $x_w = w - ce^2/2$, with $c > 0$ parametrizing the cost of effort. The game is one-shot (given that workers and firms are re-matched every period).

a) Stepping back briefly, consider two persons s and o (s for $self$ and o for $other$) and associated monetary payoffs by π_s and π_o. Charness and Rabin (*QJE*, 2002) consider the following simple formulation of the preferences of $self$:

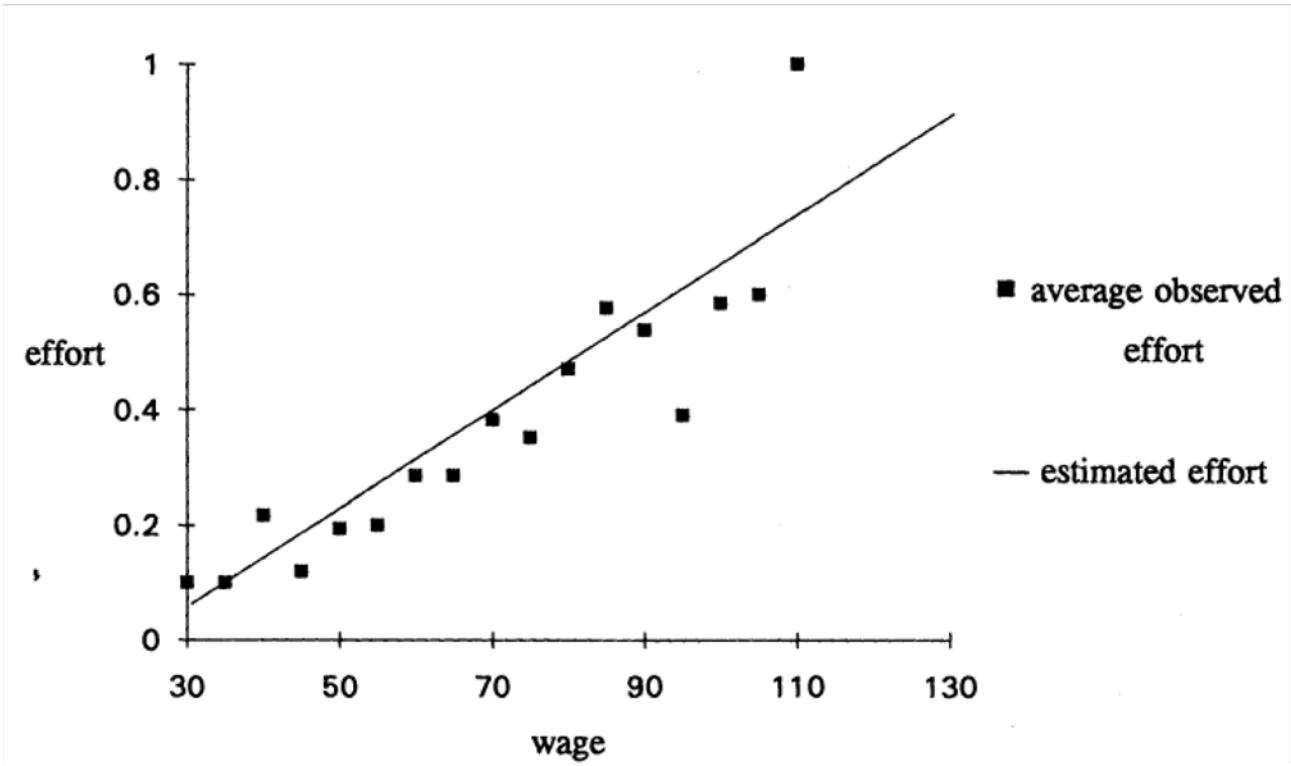
$$\begin{aligned} (1-\rho)\pi_s + \rho\pi_o \text{ if } \pi_s &> \pi_o \text{ and} \\ (1-\sigma)\pi_s + \sigma\pi_o \text{ if } \pi_s &< \pi_o. \end{aligned}$$

Explain how the parameters ρ and σ allow for a range of different types of social preferences. Discuss in particular the cases (i) $0 = \rho = \sigma$; (i) $0 < \rho = \sigma < 1$; (iii) $1/2 = \rho = \sigma$; (iv) $0 < \sigma < \rho$; (v) $\sigma < 0 < \rho$.

b) Consider now the gift exchange game in the selfish version with $\rho = 0$ and $\sigma = 0$; that is, the utility function of the firm is $U_f = x_f$ and the utility function of the worker is $U_w = x_w$. Solve for the sub-game perfect equilibrium in this game.

c) Solve for the 'efficient' w and e, that is, the ones that solve the utilitarian sum of utilities, that is, $x_f + x_w$. Compare this to the result of (b).

d) Consider the following Figure which plots the observed effort and wage in Fehr-Kirchsteiger-Riedl (FKR). Keep in mind that in FKR, the minimum effort is 0.1 and the reservation wage a little higher so the minimum acceptable wage is 30. Describe the observed patterns in the Figure and relate them to your answer to (a). Do the results support the predictions of the standard model?

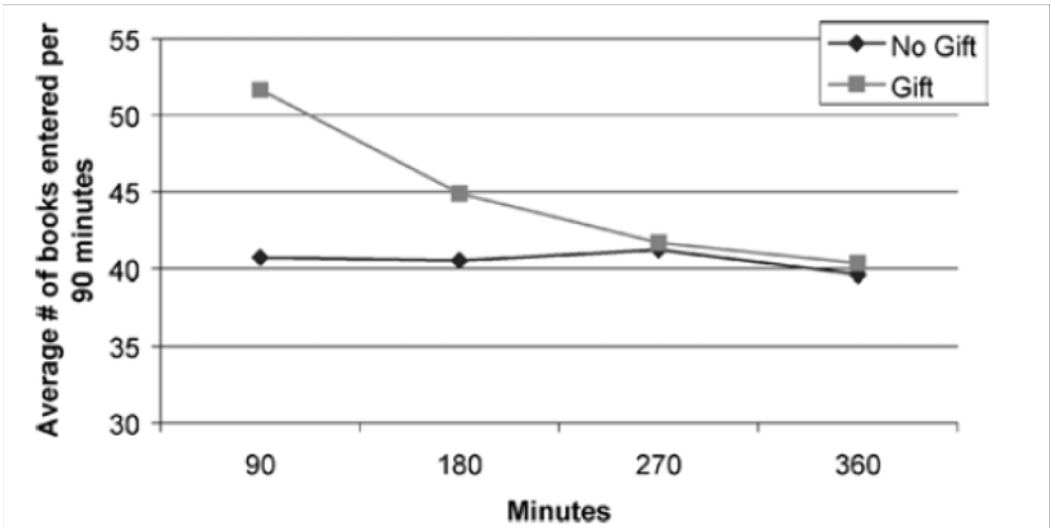


e) Now consider a Charness-Rabin / Fehr-Schmidt model with ρ and σ different from zero. To simplify, assume that the firm is still selfish, but the worker is characterized by the preferences in Question 1 with $\rho > 0$ and differential altruism if ahead ($\rho > \sigma$). To start with, also assume $\rho > 0 > \sigma$. Solve for the optimal wage w and effort e in this game. To the extent that you cannot solve it fully analytically, describe the qualitative solution. [Hint: Discuss the came when the worker is ahead and when the worker is behind] How does the solution vary with ρ, σ, v, and c?

f) Qualitatively (do not attempt to solve fully), discuss whether and how results would change if the firm also has inequity-averse preferences with the same parameters.

g) Now, assume that the firm, in addition to the payoffs of the gift-exchange game, has substantial income M from other projects. That is, the payoff of the firm is $x_f = M + ve - w$, where M is a very large, that is $M >> w - ce^2/2$ for any plausible e and w (I am not being precise here, but it's to simplify the solution). The payoffs of the worker do not change. Does this make a difference for the analysis of point (b) (where both firm and worker are selfish)? Does this make a difference for the analysis of points (e-f) (where the worker is inequity-averse)? Use your intuition here.

h) Let's now go to the field. Consider the Gneezy-List (Econometrica 2006) paper where an employer randomly varies the pay and pays (after hiring) some workers \$12 an hour and others \$20 an hour. Describe briefly the finding, summarized by this Figure.



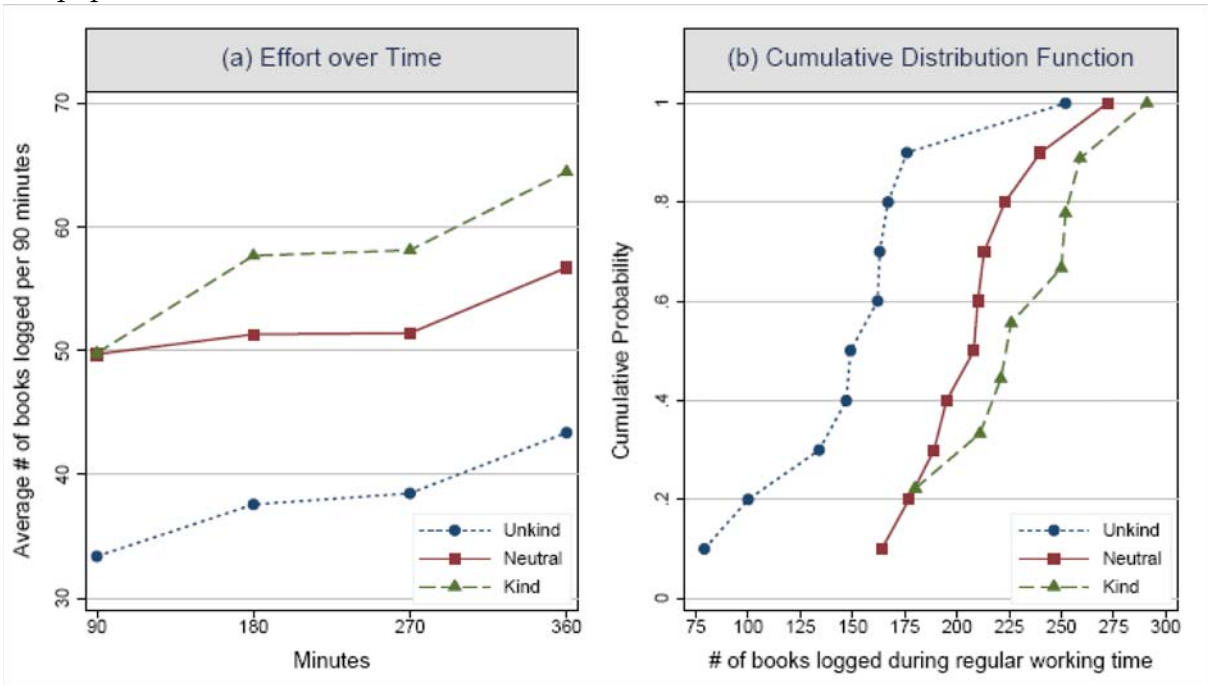
i) Setting aside the later decrease in effort, describe whether the following models can explain the initial effort increase in response to higher pay: (i) the standard model with no social preferences (point (b)); (ii) a model with inequity-averse workers (point (e)); (iii) a model with inequity-averse workers and rich firms (point (g)).

j) In light of this, is it likely that inequity aversion explains the observed gift exchange *in the field*?

Question 2 (Gift Exchange II):

Consider the gift exchange experiment of Kube, Marechal and Puppe (JEEA 2013). The authors hire students at a rate of 'presumably' 15 Euros per hour for a one-time 6-hour job. Then, after the subjects have shown up, they indeed pay 15 Euros per hour to the control group. But in the *Kind* treatment group they surprise subjects by paying 20 Euros per hour, while in the *Unkind* treatment group they surprise the subjects by paying 10 Euros per hour.

a. Describe in words the findings embedded in the Figure 1a. (first panel) below from the paper.



b. An earlier version of the paper included only Panel a. A referee writes 'I suspect that the difference between the *unkind* and *neutral* treatment is due just to 1 or 2 outliers.' Discuss in light of Figure 1b.

c. Assuming that effort is costly, describe the predictions of the standard model with no social preferences. How does that contrast with the data?

d. Consider the following model of the experiment above. Denote by w the worker earnings over 6 hours, and assume a cost of effort ce^{γ}/γ with $\gamma > 1$ and $c > 0$, where e is the number of units produced in 6 hours. For each unit of output produced e, the firm earns a return v. The worker maximizes

$$\max_{e} w - c\frac{e^{\gamma}}{\gamma} + \alpha\left[ve - w\right]. \tag{1}$$

What assumptions have we made to get to expression (1)? Discuss in particular the assumptions about social preference made for the last part of the utility function.

e. Derive the first-order conditions of problem (1) and solve for e^*. Is the solution unique? Discuss, providing intuition, how the solution depends on v, c, and w. Link to your answer to point (c).

f. Going back to the field experiment, consider now that the treatments vary the wage w, which equals $w_k > w_n > w_u$. Assuming first that the change in wage w between the treatments affect no other parameter, what does the model of social preferences (1) predict about the effort in the different conditions?

g. Consider now a (simplified) model of reciprocity. In a reciprocity model, the weight that i puts on j's utility function depends (positively) on how generous j was to i. Along these lines, generalize model (1) assuming that a change in the wage w_j can lead to a change in the altruism α of the worker towards the firm, which is now α_j with $j = k, n, u$. Rewrite the solution for e_j^* taking this into account. Define positive reciprocity as the difference $\alpha_k - \alpha_n \geq 0$ and negative reciprocity as the difference $\alpha_n - \alpha_u \geq 0$.

h. The finding of the Kube et al. paper is $e_k^* - e_n^* < e_n^* - e_u^*$. Using the solution for e_j^*, when is it correct to infer that '*The paper provides evidence supporting the laboratory findings that negative reciprocity is stronger than positive reciprocity*'. Relate to parameter values for c, γ, and v.

i. Suppose now that you have access to the data in Kube et al. (2013). Could you structurally estimate the parameters α_k, α_n, and α_u?

j. Suppose now that Kube et al. (2013) had informed subjects of the return for the employer v. Could you now structurally estimate the parameters α_k, α_n, and α_u?

k. Assume now that you run a two-stage version of Kube et al. (2013). In the first hour, the employees work for a piece rate $p = p_{LO}$, in the second hour they work for a piece rate $p = p_{HI} > p_{LO}$. This is all pre-announced, as well as the value of the work to the employer v. Then, for the next four hours there is no more piece rate, and there is a positive and negative gift treatment along the lines of Kube et al. (2013). (This is along the lines of ongoing work by Gautam, John, Stefano, and Ulrike) Suppose for the first two hours that the workers maximize

$$\max_e pe - c\frac{e^\gamma}{\gamma} + \alpha_n \left[ve - pe\right]. \tag{2}$$

Solve for the optimal solution e^* as a function of the parameters.

l. We observe e_1 (effort in period 1) and e_2 (effort in period 2). Is it now possible to structurally estimate from the data $\hat{c}$ and $\hat{\alpha}_n$? Argue qualitatively.

m. Now argue that, if we have estimated $\hat{c}$ and $\hat{\alpha}_n$, we can use the second part of the experiment to estimate $\hat{\alpha}_k$ and $\hat{\alpha}_u$.

Question #3 (Employee Overconfidence)

a) A sizeable share of rank-and-file employees in the US are paid stock options, in addition to a salary. These options pay if the stock of the company does well (that is, better than the issue price), and pay nothing otherwise. We analyze possible explanations for this phenomenon. A first possibility is that stock options are distributed to employees to incentivise them, similarly to how stock options incentivise the CEO and top managers. Is this a plausible explanation for why stock options are distributed to all employees in a company with thousands of workers? (United Airlines is a classical example) Discuss briefly.

b) Consider a simple model of compensation. At $t = 0$, United Airlines (UA) compensates its workers with $\$w$ wages and s units of stock options, with $w \geq 0$ and $s \geq 0$. Each stock option is worth \$1 if the stock price p_1 at $t = 1$ is higher than the price p_0 at $t = 0$, which occurs with probability π. The workers are risk-neutral and work for UA if their compensation package, which they value $w + \pi s$, is preferred to the alternative option $\bar{u} > 0$. The CEO maximizes profits, which are given by revenue R minus the wage bill w minus the value of the options granted (πs). In this simplified setting with no overconfidence, solve for the profit-maximizing combinations of w^* and s^* that the CEO of United Airlines sets. Compute the implied surplus for the workers and profits for the firm.

c) Assume now that workers are overconfident about the value of the firm and believe that the stock price will increase with probability $\tilde{\pi} > \pi$. The CEO instead is well-calibrated and believes that the probability of an increase in value is π, as in point b). Set-up the new maximization problem by the CEO and solve for the optimal w^* and s^*. Compute the implied surplus for the workers (both expected and true one) and profits for the firm.

d) Consider now the case in which the workers are overconfident about the value of the firm ($\tilde{\pi} > \pi$), but the CEO is even more so: the CEO believes that the value of the option is $\bar{\pi} > \tilde{\pi} > \pi$, and hence maximizes $R - w - \bar{\pi} s$. Solve for the optimal w^* and s^*. Compute the implied surplus for the workers (both expected and true one) and profits (true ones) for the firm.

e) In light of your discussion in points b)-d), what type of model, if any, is consistent with the assignment of stock options to rank-and-file workers?

f) Building on points b) and c), assume now that the firms is hiring new workers, and workers are heterogeneous in overconfidence: a fraction q of workers is well-calibrated (they expect stocks to increase with probability π) and the remaining fraction $1 - q$ is overconfident (the expect stocks to increase with probability $\tilde{\pi}$). The workers are otherwise equally productive. Assume that there is a long line of workers out the door so there is excess supply of workers of each type. Assume that the CEO is, as in points b) and c), well calibrated and is trying to maximizes firm profits. What type of contract will the firm offer to screen workers? Which types of workers will choose to apply to the company given the contract?

g) Use your results above to discuss this argument: 'A common result in Behavioral IO when consumers have non-standard beliefs is that (i) consumers' utility in equilibrium is below their reservation utility; (ii) Firm profits are higher compared to the case with consumers with standard beliefs; (iii) The presence of non-standard beliefs affects the contract design; (iv) sorting can accentuate biases in the field'. Relate to the findings above, where instead of consumers you have employees.

References

* Fehr, Kirchsteiger, and Riedl. 1993. "Does Fairness Prevent Market Clearing? An Experimental Investigation" Quarterly Journal of Economics, 108, pp. 437-459.

* Gneezy, Uri, and John List. 2006. "Putting Behavioral Economics To Work: Testing For Gift Exchange In Labor Markets Using Field Experiments", Econometrica, Vol. 74(5), pp. 1365–1384.

Sebastian Kube, Michel André Maréchal and Clemens Puppe. "Do Wage Cuts Damage Work Morale: Evidence From a Natural Field Experiment". Journal of the European Economic Association, Volume 11, Issue 4, pages 853–870, August 2013.