Psychology and Economics Field Exam
August 2013

There are 3 questions on the exam. Please answer the 3 questions to the best of your ability. Do not spend too much time on any one part of any problem (especially if it is not crucial to answering the rest of that problem), and don't stress too much if you do not get all parts of all problems.

Question 1:

Suppose that Jay ("J") will live for $T = 3$ periods (periods 1, 2, and 3). In each of these three periods he chooses whether to consume sugary drinks, $a_t = 1$, or not to consume sugary drinks, $a_t = 0$. Sugary drinks are addictive, and J (who can get such drinks for free and has no other source of pleasure or displeasure in life) has preferences in each of periods 1, 2, and 3 of the form:

$$u_t(a_t = 0|a_{t-1} = 0) = 0$$
$$u_t(a_t = 1|a_{t-1} = 0) = 1$$
$$u_t(a_t = 0|a_{t-1} = 1) = -\infty$$
$$u_t(a_t = 1|a_{t-1} = 1) = -1$$

These preferences capture the notion that consuming in the previous period makes J addicted: it means he gets less utility from continuing to consume sugary drinks than he does from consuming for the first time – he no longer gets the burst of pleasure and even gets a "hangover" – , but withdrawing is very unpleasant. J dies at the beginning of Period 4, and his utility from that point on doesn't depend on what he does in his lifetime. Importantly, assume that $a_0 = 0$ in all parts below: J is born unaddicted.

Suppose that J has (quasi-)hyperbolic discounting preferences with $\beta < 1$ and $\delta = 1$. J might be either sophisticated or naive. For all questions below, don't worry about specifying behavior for any knife-edge values of β that makes J indifferent among choices in any contingency.

a) What will J do in Period 3, as a function of β, whether he is sophisticated or naive, and whether he enters the period having chosen $a_2 = 0$ or $a_2 = 1$ in the previous period? Briefly give an intuition for you answer.

b) As a function of β, what pattern of drinking (a_1, a_2, a_3) will we observe J choosing if he is naive?

c) As a function of β what pattern of drinking (a_1, a_2, a_3) will we observe J choosing if he is sophisticated?

d) Briefly interpret and give an intuition for any similarities or differences in your answers to parts (b) and (c).

Now suppose that $\beta = 1$. But now J may suffer from projection bias in predicting his future preferences. In any period in which he drank last period ($a_{t-1} = 1$) J predicts his future utilities in all future periods are given by:

$$u_t(a_t = 0 | a_{t-1} = 0) = \alpha(-\infty) + (1-\alpha)0 = -\infty$$
$$u_t(a_t = 1 | a_{t-1} = 0) = \alpha(-1) + (1-\alpha)(1) = 1 - 2\alpha$$
$$u_t(a_t = 0 | a_{t-1} = 1) = -\infty$$
$$u_t(a_t = 1 | a_{t-1} = 1) = -1$$

and in any period (including period 1) in which he did not drink last period ($a_{t-1} = 0$) J predicts his future utilities in all future periods are given by:

$$u_t(a_t = 0 | a_{t-1} = 0) = 0$$
$$u_t(a_t = 1 | a_{t-1} = 0) = 1$$
$$u_t(a_t = 0 | a_{t-1} = 1) = \alpha(0) + (1-\alpha)(-\infty) = -\infty$$
$$u_t(a_t = 1 | a_{t-1} = 1) = \alpha(1) + (1-\alpha)(-1) = 2\alpha - 1$$

where $\alpha \in (0, 1)$.

e) Briefly discuss what the parameter α captures and why the above assumptions capture projection bias.

f) As a function of α, what pattern of drinking (a_1, a_2, a_3) will we observe J choosing? Don't worry about specifying behavior for knife-edge values of α where J might be indifferent in some contingencies. Briefly give an intuition for your answer.

Now suppose the mayor of the town J resides in, let's call him Mayor BB, has gotten wind from public health researchers that people may be overconsuming sugary drinks (even abstracting from negative downstream health consequences, like increased risk of diabetes) and is considering a ban. J is a representative agent of Mayor BB's town and the public health researchers have presented the mayor with perfect estimates of J's hedonic or experienced utility function, $u_t(\cdot)$ ($\forall\, t$).

g) What pattern of drinking (a_1, a_2, a_3) do the public health researchers inform the mayor is optimal, i.e., what pattern (a_1^*, a_2^*, a_3^*) maximizes $u_1 + u_2 + u_3$? Briefly compare this optimal pattern of drinking with the pattern you found in part (b), where you assumed J to be a naive hyperbolic discounter.

h) Continue to suppose J is a naive hyperbolic discounter. As a function of *J's pattern of drinking* (a_1, a_2, a_3) – importantly, *not* as a function of β – compare his experienced utility with his utility if sugary drinks were banned, in which case J would have to consume $a_1 = a_2 = a_3 = 0$. For which observed pattern of behavior absent the ban (a_1, a_2, a_3) does the Mayor calculate that a ban is optimal (with the help of the public health researchers' estimates of hedonic utility)?

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i) Would the answer to part (g) change if J is a sophisticated hyperbolic discounter? How about if he has projection bias?

j) Does your answer to part (h) suggest a response to the following question: Supposing Mayor BB knows J's pattern of drinking absent a ban (as well as the public health researchers' estimates of hedonic utility) then would he find it helpful to additionally know the details of J's underlying psychology that drive this pattern – e.g., whether he has projection bias or is a naive or sophisticated hyperbolic discounter – in order to calculate whether a ban is optimal? Please explain. (In your answer, feel free to discuss whether you think this question is misleading in some way.)

Question 2:

Consider the gift exchange experiment of Kube, Marechal and Puppe (JEEA). Remember that the authors hire students at a rate of 'presumably' 15 Euros per hour. Then ex post after 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. Remember that this is a one-time 6-hour job.

a. Describe in words the findings embedded in the Figure 1a. (first panel) below from the paper.
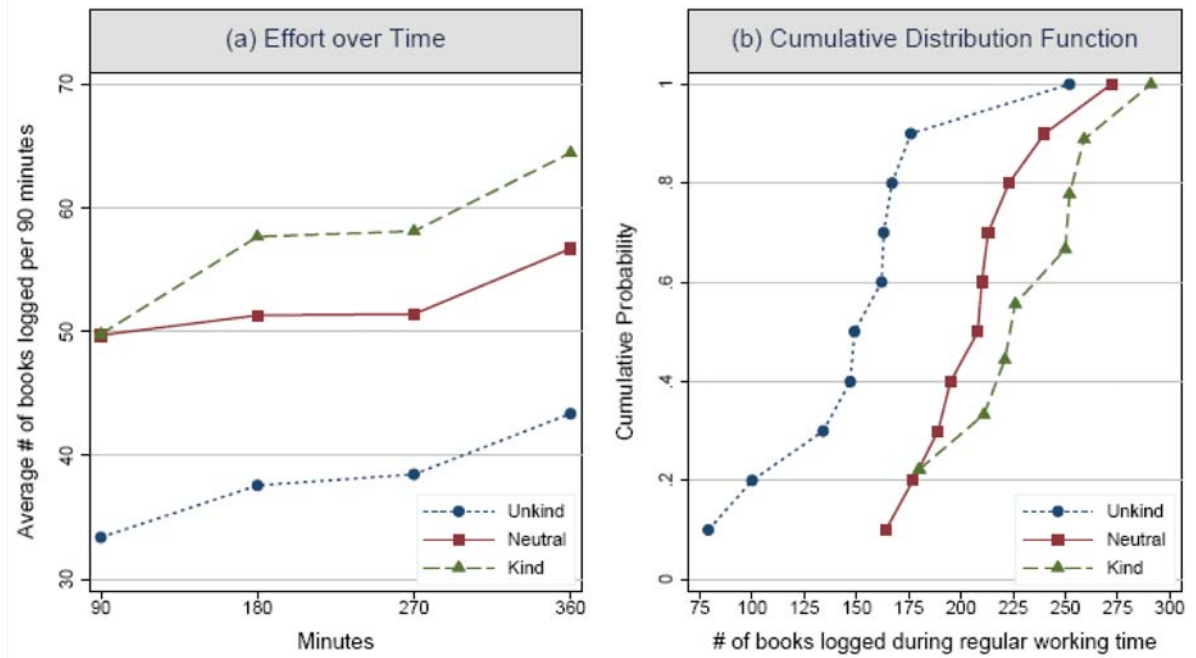
b. An earlier version of the paper included only Panel a. A referee writes 'I suspect that the difference between the *unkind* and *neutral* treatment is due just to 1 or 2 outliers.' Discuss in light of Panel B.

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. The authors of the paper write '*The paper provides evidence supporting the laboratory findings that negative reciprocity is stronger than positive reciprocity*'. Discuss making clear as precisely as possible the implicit assumptions made in this statement.

e. 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 the last part of the utility function.

f. 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).

g. 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?

h. 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 a_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 $\alpha_n - \alpha_u \geq 0$. Why can we think of this as a (simple) reciprocity model and how does it differ from the pure altruism case above?

i. Now we are ready to discuss quantitatively the statement in point (d). 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.

j. Can you think of additional experimental sessions for Kube et al. to identify the cost of effort parameters c and γ?

k. Assume that Kube et al. ran these additional sessions so they identified c and γ. Can they structurally estimate α_k, α_n, and α_u? If something is missing for the estimation, how could they get around the problem?

l. Building on your work, briefly discuss the promise and potential pit-falls of a more structural approach to behavioral models, aimed at identifying the underlying behavioral parameters, in this case the altruism coefficients. Can you think of other reduced-form field experiments (discussed in the lectures or otherwise) where one could supplement the study and identify the parameters?

Question 3. (Short Questions)

a) **Wage Rigidity.** Discuss how the figure below from Card and Hyslop provides evidence of wage rigidity. (Reminder: the figure plots the observed and counterfactual distribution of real wage changes, with the line indicating the negative of the inflation rate)
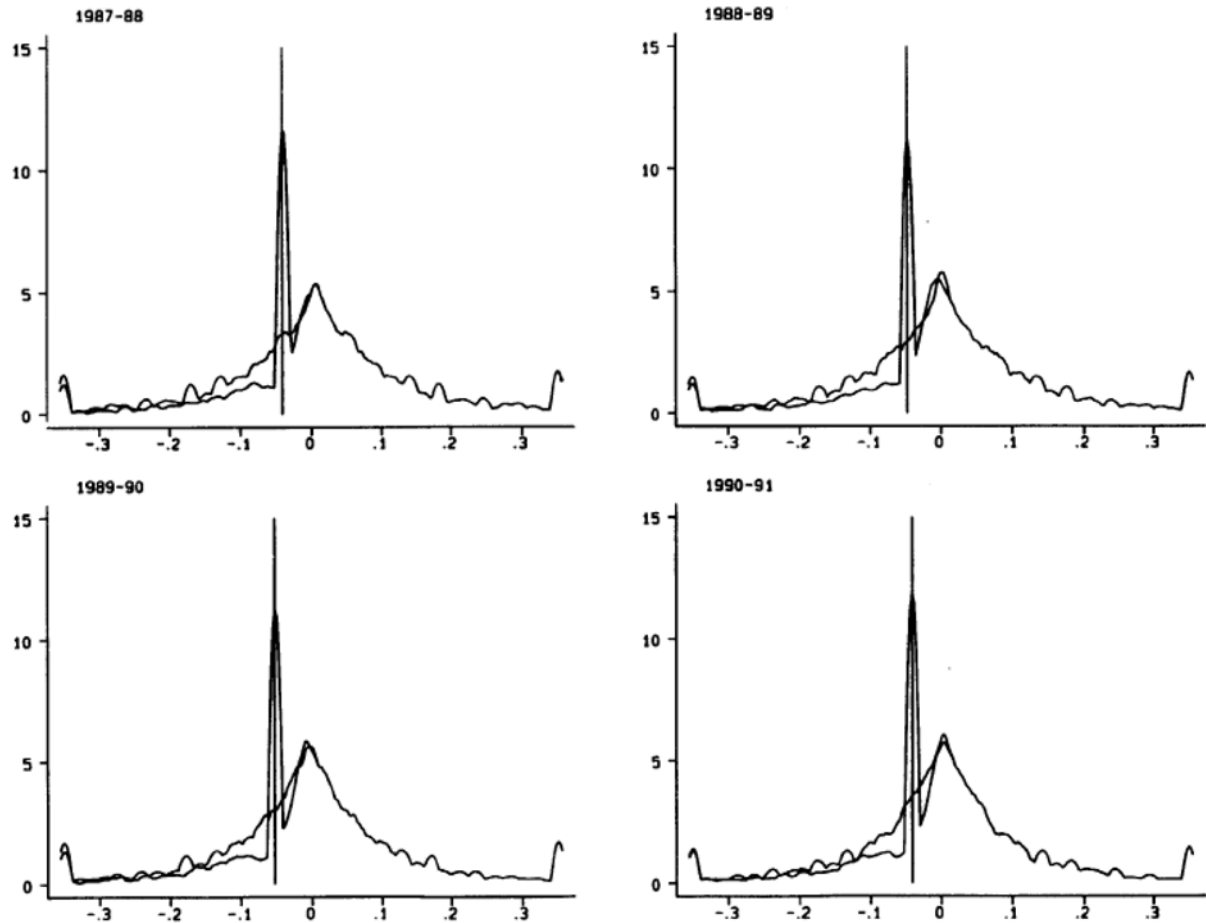

Figure 4 (Continued): Smoothed (Kernel) Estimates of Actual and Counterfactual Densities of Real Wage Changes, CPS Samples from 1987-88 to 1990-91

b **Limited Attention**. Sketch how the results of the Hossain and Morgan field experiment on shipping costs in eBay can be used to estimate a model of shipping costs. Start by describing the results in the attached table (Reminder: Treatment A has reserve price $r = \$4$ and shipping cost $c = \$0$, Treatment B has reserve price $r = \$.01$ and shipping cost $c = \$3.99$. Also, the revenue includes the shipping cost)

Table 3. Revenues from Low Reserve Treatments

CD Title	Revenues under Treatment A	Revenues under Treatment B	B - A	Percent Difference
Music	5.50	7.24	1.74	32%
Ooops! I Did it Again	6.50	7.74	1.24	19%
Serendipity	8.50	10.49	1.99	23%
O Brother Where Art Thou?	12.50	11.99	-0.51	-4%
Greatest Hits - Tim McGraw	11.00	15.99	4.99	45%
A Day Without Rain	13.50	14.99	1.49	11%
Automatic for the People	0.00	9.99	9.99	
Everyday	7.28	9.49	2.21	30%
Joshua Tree	6.07	8.25	2.18	36%
Unplugged in New York	4.50	5.24	0.74	16%
Average	*7.54*	*10.14*	*2.61*	*35%*
Average excluding unsold	*8.37*	*10.16*	*1.79*	*21%*

c) **Overconfidence.** Discuss how the Odean (1999) results on excessive trading relate to the literature on overconfidence. (Reminder: The returns results in Table 1 from trading do not include the trading costs)

TABLE 1—AVERAGE RETURNS FOLLOWING
PURCHASES AND SALES

Panel A: All Transactions

	n	84 trading days later	252 trading days later	504 trading days later
Purchases	49,948	1.83	5.69	−24.00
Sales	47,535	3.19	9.00	27.32
Difference		−1.36	−3.31	−3.32
N1		(0.001)	(0.001)	(0.001)
N2		(0.001)	(0.001)	(0.002)