

Psychology and Economics Field Exam August 2015

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.

Recall the Köszegi-Rabin (KR) model of expectations-based reference dependence. Consider individuals faced with a choice set \mathcal{D} over lotteries F that give a distribution of possible consumption outcomes. We denote the realized consumption vector from that distribution as c . The distribution of reference points (i.e., expectations of possible outcomes) is given by G and the realized reference points across consumption categories from that distribution are denoted r . The KR model establishes the utility of distribution F as the expectation:

$$U(F|G) = \int \int u(c|r) dF(c) dG(r) \quad (1)$$

KR define an Unacclimating Personal Equilibrium (UPE) as follows: A lottery choice $F \in \mathcal{D}$ is a UPE if

$$U(F|F) \geq U(F'|F) \quad \forall F' \in \mathcal{D}. \quad (2)$$

1. Explain briefly and in intuitive terms what the definition of UPE given in Equation 2 means.

Consider the classic endowment-effect experiments. Suppose that individuals have utility defined over both mugs, denoted as $m \in \{0, 1\}$ and money, denoted as w . As such, we can denote the consumption vector $c = (m, w)$ and the reference-point vector as $r = (r_m, r_w)$. We denote utility of a mug-money outcome given a particular reference-point vector as

$$u(c|r) = u(m, w|r_m, r_w) = m + \alpha w + \mu(m - r_m) + \mu(\alpha(w - r_w)), \quad (3)$$

where

$$\mu(x) = \begin{cases} \eta x & \text{if } x \geq 0 \\ \eta \lambda x & \text{if } x < 0. \end{cases}$$

2. Interpret Equation 3 in intuitive terms, making sure to discuss the interpretation of the parameters α , η and λ . Also briefly touch on the features of original prospect theory (if any) that are not captured in the utility specification given in Equation 3.
3. Consider a subject endowed with a mug and not money – a “seller”. Solve for an expression for the highest price, P_S , such that a seller can support a plan to keep the mug and not sell at that price in an Unacclimating Personal Equilibrium. [Technical note: we are assuming here that the seller is able to rationally forecast the available selling price with no uncertainty. Introducing uncertainty about the selling price complicates things, so do not go down that road.]
4. Consider a subject endowed with some money P and not a mug – a “buyer”. Solve for the lowest money endowment, P_B , such that a buyer can support a plan to keep her money endowment instead of trading it for a mug (i.e., not buy). [Technical note: again, assume that the buyer is able to forecast the price with no uncertainty when setting her plan.]
5. Compare P_S and P_B to each other and discuss how the comparison is in line with willingness-to-pay vs willingness-to-accept gap that is frequently observed in endowment-effect experiments. Make sure to also discuss the values of P_S and P_B when either $\eta = 0$ or $\lambda = 1$.

The result in (5) just above asked you to verify that the KR model can generate the endowment effect under personal equilibrium when “sellers” expect to retain the mug (not sell) and “buyers” expect to retain the money (not buy). The endowment effect itself, however, is not evidence in favor of the reference-points-as-expectations hypothesis in the KR model that is embodied in the personal equilibrium concept because a simple status-quo reference-point formulation of the model generates the same prediction.

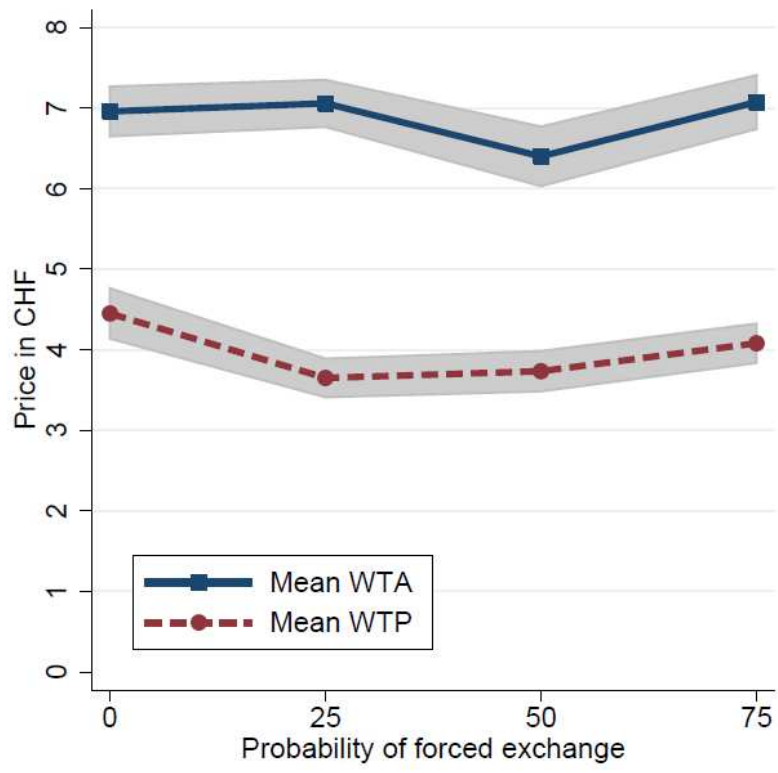
In order to more directly test the KR-model hypothesis that reference points are based on rational expectations of possible final outcomes, Goette, Harms and Sprenger (2015) propose a tweak to the standard endowment-effect experiment. In their experiment they institute a random probability π of forced exchange. So consider a possible transaction price z . A seller who plans not to sell at this price has an expectations-based reference lottery of a $(1 - \pi)$ of $m = 1$ and $w = 0$ and a π chance she will instead be forced to exchange and have $m = 0$ and $w = z$. Similarly a buyer who planned not to buy at that price now has a reference lottery of a $(1 - \pi)$ chance of $m = 0$, $w = z$ and a π chance of $m = 1$, $w = 0$.

6. Derive a new expression for the highest price, $P'_s(\pi)$, such that a “seller” can support a plan to keep the mug and not sell in an Unacclimating Personal Equilibrium given the probability of forced exchange π .
7. Derive a new expression for the lowest price, $P'_B(\pi)$, such that a “buyer” can support a plan to keep that amount of money and not buy a mug in an Unacclimating Personal Equilibrium given the probability of forced exchange π .
8. Verify that $P'_s(.5) = P'_B(.5)$, so that at forced exchange probability $\pi = .5$ the prediction of personal equilibrium is that there will be no willingness-to-pay/willingness-to-accept gap (i.e., no endowment effect).
9. Attempt to give a brief intuition for the result in (8) that at $\pi = .5$ there is no endowment effect under personal equilibrium.

The figure below shows the main experimental result from the Goette, Harms and Sprenger (2015) paper.

10. Based on your results in parts 7-9, discuss what these findings suggests about the nature of reference points generating the endowment effect. Specifically, what do these results say about the KR hypothesis that reference points are based on rational expectations about the distribution of potential final outcomes?

Figure 1: Mean Valuations with Forced Exchange



Question 2. (Charitable Giving)

a) **Charitable Giving.** Summarize qualitative features of charitable giving in the US, such as amount given annually, number of charities given to, crowding out.

b) **Charitable Giving, Altruism.** Does a pure-altruism model of charitable giving fit well with observed patterns of giving? For pure altruism, consider a model like

$$\max_{g_i \geq 0} u(W - g_i) + \alpha f(g_i + G_{-i}) \quad (1)$$

where W is the pre-giving wealth, g_i is giving by person i , $u()$ is the utility of private consumption, $f()$ is the production function of the public good, and G_{-i} is the giving by others. What does α capture? Explain the predictions of this model qualitatively with equation (1).

c) **Charitable Giving, Warm Glow.** Does a warm glow model of charitable giving fit well with observed patterns of giving? For warm glow, consider a model like

$$\max_{g_i \geq 0} u(W - g_i) + a\phi(g_i) \quad (2)$$

where $\phi()$ is the warm glow function which we assume increasing and concave in g_i , with $\phi(0) = 0$. What is $\phi()$ supposed to capture? Explain discussing qualitatively with equation (2). Stress at least one key different prediction between the warm glow model and the pure altruism model.

d) **Charitable Giving, Social Pressure.** Does a social pressure model of charitable giving fit well with observed patterns of giving? For social pressure, consider a model like

$$\max_{g_i \geq 0} u(W - g_i) - S\mathbf{1}_{\{g_i < \bar{g}\}} \quad (3)$$

where \bar{g} is a minimum acceptable level of donation. What does S capture? Discuss the qualitative solution of (3) Explain discussing qualitatively the solution of this social-pressure problem. What is a key difference relative to the two models above?

Question #3 (Self-control and Procrastination)

The starting point for this question is the paper by Hanming Fang and Dan Silverman on the decision of single mothers to apply for welfare - or not. Single mothers have three possible choices – they can work (*Work* –in which case they will obviously not get welfare), they can stay at home and get welfare (*Welfare*), or stay at home but not get welfare (*Home*). The next Table from the paper reports the transition probability from each of the three states in year $t - 1$ to year t . So 84.3% for example is the probability that a mother who in year $t - 1$ is on welfare will also be on welfare in year t .

Choice at $t - 1$	Choice at t		
	Welfare	Work	Home
<u>Welfare</u>			
Row %	84.3	3.5	12.3
Column %	76.7	6.3	17.9
<u>Work</u>			
Row %	5.3	79.3	15.3
Column %	2.6	76.4	12.1
<u>Home</u>			
Row %	28.3	12.0	59.7
Column %	20.7	17.3	70.0

a) Describe the main features of the data in the above Table. In particular, what is the puzzle the authors seek to explain?

b) The authors estimate a model in which a single mother at home can apply for welfare. Applying for welfare benefits is associated with a one-time (immediate) stigma cost $-\phi$ and yields future benefits from the monetary receipt of benefits. A mother who is already on welfare pays no further stigma cost from staying on welfare. The author estimate ϕ , as well as time preference parameters β and δ . Each period is assumed to be one *year*, so an immediate payoff is one that refers to the current year, the next period is next year, etc. Similarly, δ is the yearly discount factor. To reiterate this aspect, a single mother decides each year whether to work, be on welfare, or stay at home not on welfare, and then decides again the next year. The next Table reports the estimates of the main parameters in the paper.

Parameters		(1)		(2)		(3)	
		Time Consistent		Present-Biased (sophisticated)		Present-Biased (Naive)	
		Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
<u>Preference Parameters</u>							
Discount Factors	β	1	n.a.	0.33802	0.06943	0.355	0.0983
	δ	0.41488	0.07693	0.87507	0.01603	0.868	0.02471
Net Stigma	$\phi^{(1)}$	7537.04	774.81	8126.19	834.011	8277.46	950.77
(by type)	$\phi^{(2)}$	10100.9	1064.83	10242.01	955.878	10350.20	1185.27
	$\phi^{(3)}$	13333.2	1640.18	12697.25	1426.40	12533.69	1685.92

Discuss the main features of the estimates in Column (1), in which β is set to 1. The amount for stigma ϕ is in \$ (the superscript refers to three types, as the model allows for heterogeneity – do not worry about the heterogeneity). Comment on the magnitude of the estimated parameters (δ and ϕ) relative to what are plausible values (explain here). Provide intuition for why such values of the parameters are needed to estimate the patterns in the transition matrix above.

c) Discuss now how the estimates change for a sophisticated present-biased single mother (Column 2). Again, are the magnitudes of the parameters (β , δ , and ϕ) plausible?

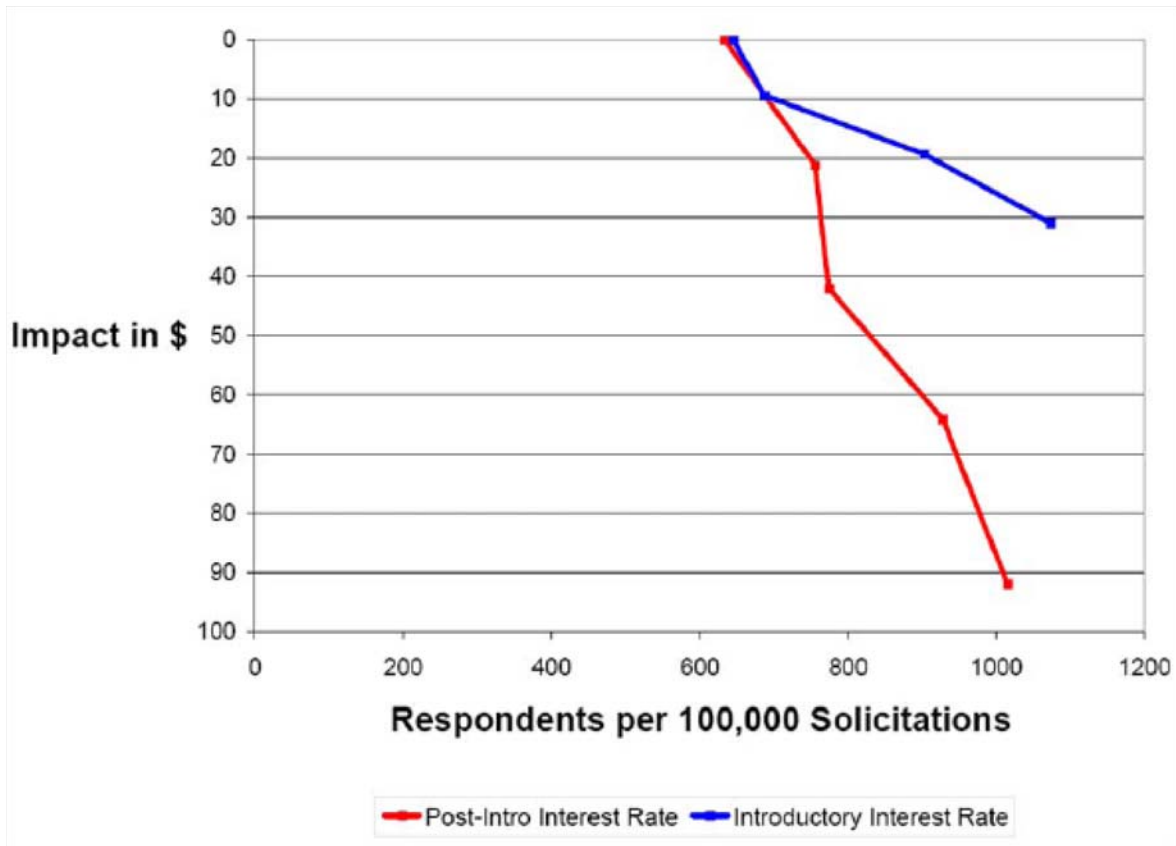
d) Discuss now how the estimates change for a (fully) naive present-biased single mother (Column 3). Again, are the magnitudes of the parameters (β , δ , and ϕ) plausible?

e) In short, in their estimation results the sophisticated and naive present-biased agents look nearly identical. Discuss one or more critical assumptions the authors make which imply the near-equivalence of naives and sophisticates. Guess what removing this assumption would imply for the estimation results.

f) Next, we turn to the results in Ausubel (1999), the field experiment by a credit card company which randomized the pre- and post-teaser interest rate. Describe briefly the experiment and the main results from Table 1 below; in particular, focus on the response rate.

TABLE 1: SUMMARY OF MARKET EXPERIMENTS					
MARKET EXPERIMENT	MARKET CELL	NUMBER OF SOLICITATIONS MAILED	EFFECTIVE RESPONSE RATE	PERCENT GOLD CARDS	AVERAGE CREDIT LIMIT
MKT EXP I	A: 4.9% Intro Rate 6 months	100,000	1.073%	83.97%	\$6,446
MKT EXP I	B: 5.9% Intro Rate 6 months	100,000	0.903%	80.18%	\$6,207
MKT EXP I	C: 6.9% Intro Rate 6 months	100,000	0.687%	80.06%	\$5,973
MKT EXP I	D: 7.9% Intro Rate 6 months	100,000	0.645%	76.74%	\$5,827
MKT EXP III	A: Post-Intro Rate Standard - 4%	100,000	1.015%	82.96%	\$5,666
MKT EXP III	B: Post-Intro Rate Standard - 2%	100,000	0.928%	77.69%	\$5,346
MKT EXP III	C: Post-Intro Rate Standard + 0%	100,000	0.774%	76.87%	\$5,167
MKT EXP III	D: Post-Intro Rate Standard + 2%	100,000	0.756%	76.98%	\$5,265
MKT EXP III	E: Post-Intro Rate Standard + 4%	100,000	0.633%	73.62%	\$5,095

g) Explain as clearly as you can how the numbers in this Table translate into the numbers in the key figure of the paper, reproduced below. It may help to remember that the average pre-teaser rate balance is \$2,000 and the average post-teaser rate balance is \$1,000. Also, borrowers are observed for 21 months, so that is how the impact of picking one card or another is calculated.



h) What do we learn from the fact that the two lines – the two demand curves – have very different slopes?

Ausubel and Shui (2009) write a model to explain the facts in Ausubel (1999). They assume that consumers have an existing credit card, and receive each quarter credit card offers which may be better than the existing one. Not unlike in the Fang and Silverman paper above, they assume an immediate cost of switching $-k$ and a delayed benefit of saving on borrowing costs (assuming they pick a better credit card). They assume that each period lasts a quarter and that consumers receive offers and at the beginning of each quarter decide whether to switch or not to a new credit card. The Table below reports the key estimated parameters.

Table 4: Estimated Parameters ^a

	Sophisticated Hyperbolic	Naive Hyperbolic	Exponential
β	0.7863 (0.00192)	0.8172 (0.003)	
δ	0.9999 (0.00201)	0.9999 (0.0017)	0.9999 (0.00272)
k	0.02927 \$293 (0.00127)	0.0326 \$326 (0.00139)	0.1722 \$1,722 (0.0155)

i) Comment on the findings in the last column for the ‘standard’ model (that is, $\beta = 1$). Are the magnitudes of the switching costs (captured by the \$ amount in the k row) plausible?

j) How do the estimated parameters change as we allow $\beta < 1$, both in the sophisticated and naive case?

k) Comment on the similarity between the naive and the sophisticated results – Can you single out an assumption which is critical to the results? Draw a parallel to the Fang and Silverman paper above if opportune.

l) Consider the set-up we discussed in class for signing-up for a 401(k) plan. There is an immediate one-time cost $-k$ followed by a delayed benefit b received on each day after the first period. While the time period is the day, the employer is allowed to take decisions only every T days. That is, if $T = 360$, only once a year, if $T = 1$ every day, etc. You showed in a problem set that a naive agent procrastinates if

$$\frac{\beta\delta T}{1-\beta} \lesssim k \leq \frac{\delta b}{1-\delta}$$

Provide as much intuition as you can on what the expression above indicates (including what ‘procrastination’ means in this context). How does the range in which there is procrastination change as T increases? Relate if opportune to the previous parts of the question.

m) For a sophisticated agent, we discussed how the different selves can engage in a war of attrition between selves, but that in any case one can derive a bound of the

longest delay L that a self will tolerate before investing right away. After solving, the delay L is:

$$L \approx k \frac{1 - \beta}{\beta b}.$$

Why does T not play a role in this formula? Compare with the naive case, and relate to the above parts of the question.