219B – Final Exam – Spring 2008

Question #1 (Contract Design and Self-Control)

This Question elaborates on the DellaVigna-Malmendier (QJE, 2004) paper. Assume that consumers have preferences $\left(\beta, \hat{\beta}, \delta\right)$ and they are interested in consuming an investment good which yields a payoff of $-c$ at $t = 1$ and a delayed payoff of $b > 0$ at $t = 2$. At $t = 0$, c is unknown, with a distribution $F(c)$; the realization c is realized at $t = 1$, before the consumer decides whether to consume the good. A monopolistic firm produces such investment goods for a marginal cost a (paid at $t = 1$) and intends to sell them to the consumer using a two-part tariff: L (paid at $t = 1$) is the lump-sum fee and p (also paid at $t = 1$) is the per-usage fee. The consumer alternative option yields a utility $\bar{u}$, realized at $t = 1$. The firm offers a contract (L, p) to the consumer at $t = 0$ and the consumer accepts it or rejects it also at $t = 0$. At $t = 1$, the consumer (if she accepted the contract) decides whether to consume the good.

a) Under what condition for c the consumer *actually* consumes at $t = 1$ (assuming that she signs the contract)? Under what condition for c the consumer *expects* to consume at of $t = 0$? Under what condition for c the consumer *would like* to consume at $t = 1$, as of $t = 0$? Relate to the notions of self-control and naiveté.

b) Write down the maximization problem for the monopolist at $t = 0$. The monopolist maximizes profits subject to the Individual Rationality constraint for the agent. (Remember: The firm is aware of the self-control problems of the agent) Solve for L from the IR constraint and substitute it into the maximization problem.

c) Derive the first-order condition and derive an expression for p^*. [Hint: You may need the rule $\frac{\partial}{\partial x}\left(\int_{g(x)}^{f(x)} h(x,z)\,dz\right) = \frac{\partial f(x)}{\partial x} h(x, f(x)) - \frac{\partial g(x)}{\partial x} h(x, g(x)) + \int_{g(x)}^{f(x)} \frac{\partial h(x,z)}{\partial x} dz$]

d) What type of pricing for p^* do you get for exponential agents ($\beta = \hat{\beta} = 1$)? Provide intuition on this result.

e) What type of pricing for p^* do you get for sophisticated agents ($\beta < \hat{\beta} = 1$)? Provide intuition on this result, commenting on the magnitude of p^*.

f) What type of pricing for p^* do you get for fully naive agents ($\beta < \hat{\beta} = 1$)? Provide intuition on this result.

g) So far we assumed homogeneity of consumers. Assume now that there are two groups of consumers. As share μ of consumers are fully naive with $\hat{\beta} = 1$, while a share $1 - \mu$ of consumers are exponential ($\beta = \hat{\beta} = 1$). The two consumers have the same δ and the same cost distribution $F(c)$. Set-up the firm maximization problem. [Hint: Argue that these consumers choose the same contract]

h) Derive the first-order conditions and solve for p^* for the case in point g). Compare the solution to the solutions that you derived in points d) (for exponentials) and f) (for naives).

i) Consider now the case of perfect competition, reverting back to the assumption of homogeneity among consumers. Instead of having just one company, there are multiple firms competing on the contracts, as in a Bertrand model. A way to solve the case of perfect competition is to maximize the perceived utility of consumers, subject to a condition that the firm profits equal zero. (Since we know that in equilibrium, profits will equal zero in a Bertrand-type competition). Set up this problem.

j) Solve for p^*_{PC} and compare to the p^* that you derived above. How does the optimal contract (L^*, p^*) differ under perfect competition and monopoly?

k) Going back to the monopoly case above, how would the problem change if the firm cannot offer a two-part tariff, but only a price p. Does self-control still matter in the determination of prices? Discuss.

Question #2 (Reference Dependence and Housing)

In this Question we consider the impact of reference dependence on the probability of selling a house for a gain or for a loss. We relate the model to the estimates in Genesove-Mayer (QJE, 2001).

Assume that sellers choose optimally price P at sale to trade off two forces: a higher price P lowers probability of sale $p(P)$ (hence $p'(P) < 0$), but it increases the utility of sale $U(P)$. Assume that, if no sale occurs, utility is $\bar{U} < U(P)$ (for all relevant P). Hence, the maximization problem of the agent is

$$\max_P p(P)U(P) + (1 - p(P))\bar{U}$$

a) Derive the first order conditions and provide an economic interpretation.

b) Plot the marginal benefit of increasing price $p(P)U'(P)$ and the marginal cost of increasing the price $-p'(P)(U(P) - \bar{U})$ as a function of price P. Determine the optimal P^*. Make the assumptions you need beyond the ones in the set-up. It can be helpful to assume $U(P)$ linear.

c) Using the graphical analysis, determine what happens to the optimal price P^* if $\bar{U}$ increases?

d) Now assume that the agent has reference-dependent preferences with reference price P_0. That is, the utility function is

$$U(P) = \begin{cases} P - P_0 & \text{if} \quad P \geq P_0 \\ \lambda(P - P_0) & \text{if} \quad P < P_0 \end{cases}$$

with $\lambda > 1$. Write the first-order condition for $P > P_0$ and for $P < P_0$.

e) Show graphically what happens when λ increases from 1 (standard case) to, say, 2 (loss aversion).

f) Examine graphically the impact of reference dependence on the price P^*. You will probably want to distinguish three cases.

g) Characterize intuitively then the impact of the reference price P_0 on the price of sale P^*

h) Genesove-Mayer (QJE, 2001) presents evidence in this regard. I have reproduced here their main specification:

$$L_{i,t} = \beta X_i + \delta_t + m 1_{\hat{P}_{i,t} < P_0} (P_0 - \beta X_i - \delta_t) + \varepsilon_{i,t}.$$

LOSS is $1_{\hat{P}_{i,t} < P_0} (P_0 - \beta X_i - \delta_t)$, that is, the difference between the original purchase price P_0 and the predicted sale price $\hat{P}_{i,t} = (\beta X_i + \delta_t)$ if this difference is positive, and zero otherwise. How do we interpret economically and in light of the model the coefficient 0.35 in Column 1?

TABLE II
LOSS AVERSION AND LIST PRICES
DEPENDENT VARIABLE: LOG (ORIGINAL ASKING PRICE),
OLS equations, standard errors are in parentheses.

Variable	(1) All listings	(2) All listings	(3) All listings	(4) All listings	(5) All listings	(6) All listings
LOSS	0.35	0.25	0.63	0.53	0.35	0.24
	(0.06)	(0.06)	(0.04)	(0.04)	(0.06)	(0.06)
LOSS-squared			−0.26	−0.26		
			(0.04)	(0.04)		
LTV	0.06	0.05	0.03	0.03	0.06	0.05
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Estimated value in 1990	1.09 (0.01)	1.09 (0.01)	1.09 (0.01)	1.09 (0.01)	1.09 (0.01)	1.09 (0.01)
Estimated price index at quarter of entry	0.86 (0.04)	0.80 (0.04)	0.91 (0.03)	0.85 (0.03)		
Residual from last sale price		0.11 (0.02)		0.11 (0.02)		0.11 (0.02)
Months since last sale	−0.0002 (0.0001)	−0.0003 (0.0001)	−0.0002 (0.0001)	−0.0003 (0.0001)	−0.0002 (0.0001)	−0.0003 (0.0001)
Dummy variables for quarter of entry	No	No	No	No	Yes	Yes
Constant	−0.77	−0.70	−0.84	−0.77	−0.88	−0.86
	(0.14)	(0.14)	(0.13)	(0.14)	(0.10)	(0.10)
R^2	0.85	0.86	0.86	0.86	0.86	0.86
Number of observations	5792	5792	5792	5792	5792	5792

i) The specification in Column 2 is

$$L_{i,t} = \beta X_i + \delta_t + \alpha \left(P_0 - \beta X_i - \delta_t\right) + m 1_{\hat{P}_{i,t} < P_0} \left(P_0 - \beta X_i - \delta_t\right) + \varepsilon_{i,t}$$

Can you explain intuitively why in this Column the authors include also the residual from the last sale price $(P_0 - \beta X_i - \delta_t)$?

j) If you relate this to the model, to what extent this represents a test of reference dependence and loss aversion?

k) The authors find a larger effect of LOSS on the asking price than on the final sale price. Discuss why this makes sense (or not).

l) Suggests a test of reference dependence suggested by the model that the authors could have implemented.

Question #3 (Gift Exchange and Projection Bias)

a) Falk (EMA, 2008) studies the impact of social preferences on charitable giving. In the context of a field experiment, he include 0, 1, or 5 cards in a mailing to raise funds for street children in Dhaka. What are the findings in Table 1, and how do they relate to the experiments on the gift exchange in the laboratory (Fehr-Kirchsteiger-Rield, QJE 1993)?

TABLE 1: DONATION PATTERNS IN ALL TREATMENT CONDITIONS

	No gift	Small gift	Large gift
Number of solicitation letters	3,262	3,237	3,347
Number of donations	397	465	691
Relative frequency of donations	0.12	0.14	0.21

b) Summarize at least one more empirical test of the gift exchange hypothesis. How does it relate to the laboratory evidence?

c) Overall, what do we learn from these field studies about social preferences?

d) Consider now the test by Conlin-O'Donoghue-Vogelsang (AER, 2006) of projection bias. Summarize the test helping your self with the next Table.

TABLE 3

Linear Regression Measuring the Effect of Temperature on the Probability Cold Weather Clothing is Returned: With and Without Household Fixed Effects

	Household Fixed Effects	No Household Fixed Effects
Order-Date Temperature	-0.00082** (0.00027)	-0.00039** (0.00013)
Receiving-Date Temperature	0.00017 (0.00029)	0.00002 (0.00015)
Clothing Type Fixed Effects	YES	YES
Item Fixed Effects	YES	YES
Month-Region Fixed Effects	YES	YES
Year-Region Fixed Effects	YES	YES
Household Fixed Effects	YES	NO
Observations	162,580	162,580
R-Squared	0.19	0.10

e) Do the results support projection bias?

f) Can you think of an alternative interpretation of the results?

g) The data set include multiple orders by a same household and on the same day. Why may it be important to cluster the standard errors by household? What kind of correlation can this capture? Explain as clearly as you can

h) What if one clustered the standard errors by date?

Question #4 (Lab and Field on Cell Phones and Accidents)

Two Berkeley graduate students, Saurabh Bhargava and Vikram Pathania have decided to examine the impact of cellular phone usage on car accidents. They exploit the fact that the pricing of phone calls exhibits a discontinuity at 9pm (for the recent years), when most plans start offering unlimited night minutes. Indeed, using data on cell phone calls, they document a substantial spike in calls at 9pm. Notice that the spike is much less pronounced in the weekend, when the pricing exhibits no such discontinuity.

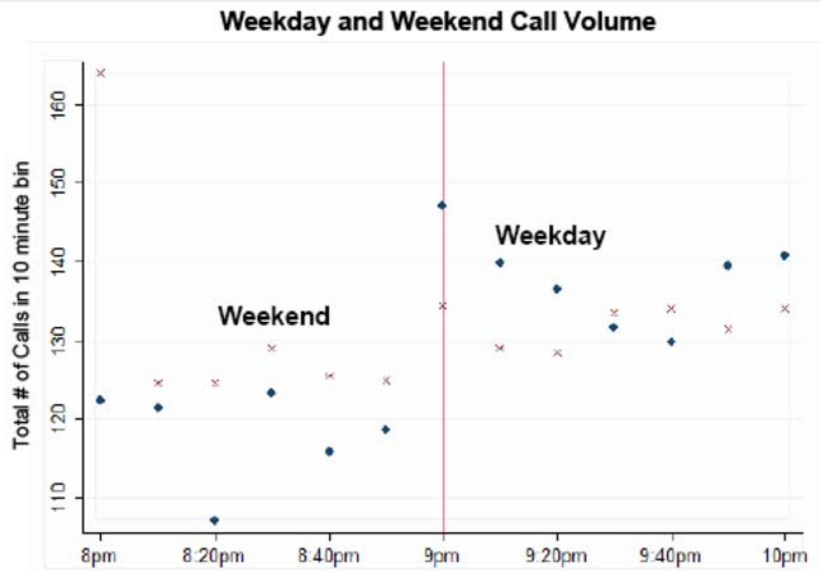

Figure 2, Outgoing Calls from 8pm – 10pm in 2005
(10 mn bins)

They then examine whether there is a corresponding spike in the number of accidents in those hours, and they find no such spike, as the next Figure illustrates. (Notice that more crashes are recorded at round numbers)

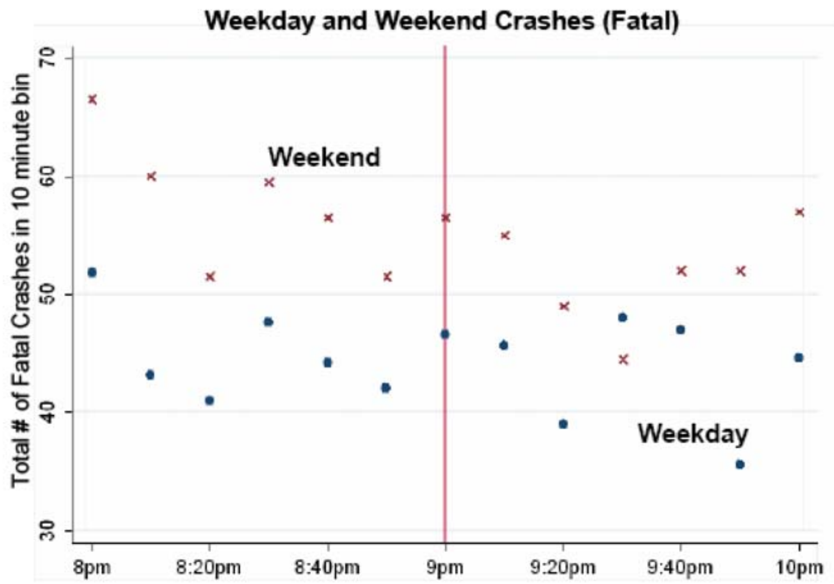

Figure 3, Fatal Crashes from 8pm – 10pm in 2005
(10 mn bins)

In sharp contrasts with these results, laboratory experiments where subjects are instructed to talk on a cellular phone while driving a simulated car witness a sharp increase in (simulated) crashes of about 10 percent.

a) Discuss in detail how it may be possible to reconcile the findings in the laboratory and the field. Provide at least two reasons for the observed difference.

b) Relate this to the debate in Levitt-List (JEP, 2007) and the results in Dahl-DellaVigna (2007).

c) What identification strategy does this paper follow in terms of the taxonomy we introduced in class? Discuss briefly this strategy and one more paper in which it is used.