

BEM/Ec 146
Winter 2007
Prof. Colin Camerer

Homework #2: Available Tuesday 13 February 4 pm, due Tuesday 20 February 230pm
(in my Baxter mailbox or email to TA Maggie McConnell
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Homework must be typed although mathematical symbols can be handwritten if that saves you time and if they are legible to the TA. **Think carefully before you write. Many questions only require a paragraph—essentially a one-phrase answer with some elaboration.** Some questions have 1 or ½ page limits; any material longer than these (12 point font, 1.5 line spacing) will be ignored. Late homework will be reduced in grade by 50% for each day late and not accepted after two days. The only standard exception is a medical excuse approved by me at least 24 hours in advance (and certified in writing by a health care professional). You can try to email me for other extensions but I am generally very unsympathetic to granting an extension for a reason that was foreseeable in advance. (For example, if you are on a recruiting or science trip that you knew about at the beginning of the term, I won't grant an extension.) The collaboration policy is to work alone.

1. Tournaments: In the theory of tournaments, players choose effort levels $e_i \geq 0$ (i.e. e_1 and e_2). Each person's output is measured by e_i plus some random luck (or measurement error) term x_i . In a two-person tournament, the person with the highest total wins a fixed prize H and the person with the second-highest total wins L . If they tie they win $(H+L)/2$ each.

Suppose the luck components are independent and identically distributed with a uniform distribution over $[-e, +e]$ (i.e., the partial distribution function $f(x)=1/(2e)$ for $-e \leq x \leq e$ and $f(x)=0$ elsewhere). And suppose the cost of effort is $c(e)=be^2$.

- a. (5 points) First compute the probability that player 1 wins if efforts are e_1 and e_2 . (Hint: Compute the distribution of the difference in the two luck components. The sum of this difference and $e_1 - e_2$ is what is crucial, because if $(e_1 + x_1) - (e_2 + x_2)$ is positive then player 1 wins).
- b. (10 points) Now assume that players are optimizing by maximizing the expected chance of winning the big and little prizes (H and L) and subtracting the cost of effort. Solve for the symmetric equilibrium in which they both exert the same effort e^* . (That is, find the effort e^* which balances marginal benefits from improving the probability of winning, and marginal cost $c'(e)$).
- c. (2 points each) How do the equilibrium efforts in (b) change if the amount of luck goes up (i.e., the luck bound e goes up) and if the prizes change?

- d. **Discrimination:** Now suppose that player 1 has an advantage A (where $0 \leq A \leq 2e$). The advantage means that player 1's total perceived output is measured as $e_1 + x_1 + A$. So even if her total output $e_1 + x_1$ is less than A units less than player 2's, she still wins (if player 1 is exactly A units worse than they are tied). Compute the equilibrium efforts for player 1 and player 2 for this case.
1. (15 points) How does an increase in A affect the two player's efforts?
 2. (3 points) Give an intuitive explanation for the result you derived in (1).
 3. (3 points) If you were running a firm and trying to get the most effort from workers, what value of A would you pick (holding e and b constant)?

2. (10 points, ½ page). **Fast food.** A national fast-food chain regularly adds new items to its menu. Its contracts with independently-owned franchisees, however, do not require the franchisees to add the items. The chain uses very expensive national roll-out advertising (i.e. advertising in many local markets at the same time, as on network TV shows which are broadcast widely) when it introduces new products. Why might the chain want to own a lot of stores, rather than franchise them?

3. (10 points) (10 points 1 page) **Makeup exam:** In department stores, many employees in different departments—sporting goods, shoes, electronics-- work on a small sales commission, say 10%. (For most of those products, by the way, the profit is a modest percentage of the sale price.) The cosmetics counters typically work differently. Many people working there are not employees of the department store at all— they actually work for the company whose counter they staff and they exclusively sell one line. For example, if you go to the sporting goods section, a Bloomingdale's employee will sell Callaway golf clubs, Taylormade clubs, and so forth. But if you go to the Estee Lauder counter in Bloomingdale's, a salesperson who works for Estee Lauder will help you. Furthermore, compared to other departments in a department store, in cosmetics a lot of sales are repeat sales (the customer comes back and asks for the same salesperson). The salespeople also are usually generous with free samples (small "trial" size samples) for their regular customers.

Speculate about why sporting goods salespeople are employees of the *department store*, while cosmetics counter salespeople are employees of the *cosmetics company*. Feel free to use any other information or impressions you have about these products and sales practices, or to give answers which make sense conditional on facts that you are not sure about.

4. (10 points, ½ page) **Drug dealing:** At a recent NIDA (National Institute of Drug Abuse) conference, several social scientists discussed their field research on the economic organization of drug dealing (e.g., for crack cocaine). Here are some background assumptions: (1) In street-level drug transactions, individual dealers stand around a street corner and wait for customers to approach; customers usually are buying a small amount of drug (one or a few vials). (2) A large percentage of the street-level operatives who handle the drug transactions use crack themselves. (2) It is common for

street-level dealers to have to throw away crack vials when police come. (3) Street-level dealers often get robbed by rivals or in other ways that they cannot verify or report (e.g. theft by police themselves).

Here is a stylized fact: None of the street-level dealers handle **both** the crack itself and cash. (That is, there is usually an organizational separation in which a buyer pays cash to one person and receives the crack from somebody else nearby.) Given the background facts above, speculate as to why the optimal “job design” separates handling of crack and cash by street-level dealers.

5. (10 points, ½ page). **Cars:** Ted delivers pizzas. When an order is taken by the company, it is conveyed to Ted who can decide whether to deliver the pizza or not. (He can turn it down if it will take too long to get there, if he thinks the neighborhood is dangerous, and so on.) Ted’s identical twin, Fred, works as a movie location scout. His work requires him to go to rugged and sometimes dangerous locations at strange hours (e.g., to take location photos at 3 a.m. to see how a street will look when it is being used for filming at night). Fred has no choice about where to go; if he refused to scout a location he’ll be fired. Which one of Ted or Fred is more likely to own the “tool” he uses—namely, his car or truck? Explain.

6. Explain whether the following skills are *general* or *firm-specific* human capital or a combination of the two:

- a. Speaking Spanish.
- b. Learning code numbers for sections of a company’s work manual (which is not used elsewhere).
- c. Knowing which people in the organization can really be trusted.
- d. Learning to make PowerPoint software presentations in a particular color scheme, for your boss who has an unusual kind of color blindness.
- e. Learning a secret recipe which your company uses, and other companies would love to have. (Assume nothing legally prevents you from using the recipe at another company if you left.)
- f. You work in a talent agency (e.g. representing film stars). You learn which of the stars are trustworthy, and which of the people those stars work with—directors, accountants, family and friends—can be trusted. If you switched jobs you would run into some of these other people occasionally even if the major star continued to be tied exclusively to your old firm.