

1. (10 points) Explain the intuition behind the result that enough informed consumers can force the limited-information market outcome to the competitive result (consider the tourist-native story). What implication might this have regarding a government subsidy of *Consumer Reports* (a magazine filled with product characteristics and price information)?
  
2. (30 points) Pretend for the moment that the movie studios own all the country's theaters; consequently they determine price as well as promotion (this is only slightly more severe than the way it was prior to the 1950s). You've been working closely with your good friend Christopher Nolan as a consultant to Warner Bros., and he recently called upon your economic expertise regarding his new movie *The Dark Knight*. Specifically, Nolan wanted you to find the best admissions price and advertising level for that particular movie. Pre-release research had estimated a demand of  $Q^D = 15 - p + .5A^{1/2}$ , where  $p$  is the admissions price (in dollars) and  $A$  is your advertising expenditures. Both  $A$  and  $Q^D$  are measured in millions. Technology has advanced to such an extent that the average and marginal costs of showing the movie are zero (i.e., all costs are fixed or sunk).
  - a. Does advertising's effect on demand suggest an informative role or a persuasive one? (Hint: examine the extreme cases of no advertising vs. an infinite level of advertising.)
  - b. Find the profit-maximizing price and advertising level. What are your maximized profits?
  - c. You notice that your first-order condition regarding advertising does not depend upon demand's intercept (15) or the coefficient on price (-1). These are the two figures in which we'd be most likely to observe the effect of high quality. Does their absence imply that the product's quality does not affect our level of advertising?
  - d. Suppose that the government strictly regulates each studio's total advertising for movies, and Sony has already spent its yearly allotment. Consequently  $A = 0$ . What are the profit-maximizing price and corresponding profits in this case?

3. (30 points) Different drug companies are competing with one another to find a cure for the new (always just around the corner) avian flu. Suppose that the government suspends the current race, and all past research is shared freely among all firms. This ensures that every firm starts on equal footing in the *new* race.

The new race can be described as follows: Firms work to find a cure in one year. The probability that some firm discovers the cure is directly related to the number of firms ( $n$ ) in the race, specifically

$$\text{Probability that cure is found} = 1 - (1/(n+1)) = (n/(n+1))$$

The gross benefit to society of finding the cure is \$720B. Each firm must incur a sunk cost of \$20B to compete in the race.

- a. Assuming that society is risk-neutral, what is the socially optimal number of firms who should enter this race? (Hint: welfare in this case will be expected benefits less expected costs. Your answer should be an integer.)
- b. Our government hopes to encourage the socially optimal number of firms to enter the competition by offering a prize. What amount should be offered? (Recall that all firms have equal chance of winning, thanks to the pre-race measures.)
- c. Given the scenario described in b), what is the expected net social benefit from this race?
- d. Assume now that no prize is given, but that instead the winning firm gets a patent, price discriminates, and reaps the full social benefit of \$720B. How many firms will enter the race?
- e. What are the expected net social benefits of the scenario described in d)?
- f. Where exactly is the latter situation differing from the optimal one?