**Econ 302:** Microeconomics II - Strategic Behavior

Problem Set #11 – Aug 2, 2016

1. Discuss the following phenomena in light of the intuition on moral hazard developed in class.

   a) In agriculture, farmers may work their own land, or landowners contract with farmers to work their land on a time-rate basis (hire by the hour/day) or a sharecrop basis (farmers split their crop with landowners). A recent study found that sharecrop workers and farm owners consume roughly 20 % more calories per day than time-rate workers.

   b) When taking out a loan, banks generally will ask for a collateral. Why? Moreover, low income households often have difficulty obtaining bank loans due to a lack of credit history and a collateral. Those households participate in the subprime market, where they can get a loan only if they pay more than "prime" customers.

2.* Pam recently got insured in a traffic accident and hires a lawyer, Shark, to sue for compensation. The jury's award at the conclusion of the trial is $R(e, \theta) = e + \theta$ and depend's on Shark's effort $e \geq 0$ and a random variable $\theta$ which is distributed normally with mean zero and variance $\sigma^2$ (you can think of $\theta$ as representing the unknown attitude of the jury, for example). Both Pam and Shark are risk neutral. Pam is only interested in money. Shark likes money but dislikes effort. His cost of exerting effort is $c(e) = \frac{1}{2}e^2$.

   a) Determine the pareto optimal amount of effort $e^*$

   b) Consider the following alternative contract arrangements. For each one, determine Shark's effort and the optimal contract for Pam.

      i) Pam pays Shark a fixed fee/salary $F$
      ii) Pam pays Shark a share $\alpha$ of the award $R$.
      ii) Shark pays Pam a fixed amount $T$ for the right to try the case, and collects the entire award himself.

   d) Which of these arrangements is the best one for Pam?

3. A manager can either work hard ($e = 1$) or be lazy ($e = 0$). There are two possible levels of revenue $x$, the probabilities of which depend on effort:

|          | $\underline{x} = 10$ | $\bar{x} = 50$ |
|----------|------|------|
| $e = 1$  | 0.3  | 0.7  |
| $e = 0$  | 0.8  | 0.2  |

The owner of the business is risk neutral and chooses the manager's wage to maximize his profit $\Pi = x - w$. The utility function of the manager is $u = \sqrt{w} - e$. The reservation utility of the manager is $\bar{u} = 1$.

a) Suppose first effort $e$ can be contracted upon. Determine the profit maximizing wage $w^*$ for the principal if i) he wants the manager to work hard and ii) he wants the manager to be lazy. Determine the owner's profit and the manager's utility in both cases. Which effort level is efficient/should the owner ask for?

b) Now suppose effort $e$ is not observable, but revenue is. The owner can therefore pay a bonus $b > 0$ on top of the wage $w^*$ (from a)) if revenue was high, $\bar{x} = 50$. What is the smallest bonus that the owner can choose so that the manager works hard? What is the smallest bonus the owner can choose so that the manger is lazy? Determine the owner's profit and the manager's utility in in both cases and compare to your answer in a). Discuss!

Further questions for review.

1. Old MacDonald produces hay. He has a single employee, Jack. Jack can either work hard all day for $e_H = 8$ hours or be lazy and work only for $e_L = 5$ hours. $e$ hours of work produces $e$ bales of hay and costs Jack $e^2/10$. Each bale sells for \$2 dollars. Jack's reservation wage is zero.

a) What is the efficient amount of hours for Jack to work?

b) Old MacDonald cannot observe the number of hours Jack works, but he does know how many bales of hay are produced. Give the least cost wage contract (contingent on hay production) that would make Jack work the efficient number of hours. How much profit will Old MacDonald make?

c) Now suppose hay production is not observable, so the contract in b) is no longer feasible. What are the equilibrium hay production, wage payment, and profits?

d)* Old MacDonald has a clever idea: he rents the hayfield out to Jack. As a renter, Jack receives the profits from hay production. How much hours of work will he put in? And what is the maximum rental price Old MacDonald could ask for? Compare your answer to b) and c) and discuss.

2. In the National Basketball Association (NBA), the owners share revenue but not cots. Suppose that one team, the LA Clippers, sells seats to a home game with the visiting Philadelphia 76ers (Sixers). The inverts demand for the tickets is $p = 100 - .004Q$, the Clipppers cost function for selling the tickets and running the Franchise is $C(Q) = 10Q$.

a) Find the Clippers' profit maximizing number of tickets sold, and the price if the Clippers must give 50% of their revenue to the Sixers. What is the Clipper's profit in this case? Determine joint profit (Clippers and Sixers)

b) Instead, suppose that the Sixers set the Clippers' ticket price, based on the same 50% revenue sharing rule. What are Clippers' profits in this case? Determine joint profit.

c) Now suppose that the Clippers must share their profit, not their revenue. The Clippers keep 45% of the profit and have to give 55% to the Sixers. Find the Clippers' profit maximizing quantity and price. Determine joint profit.

d) Explain why your answers in a), b) and c) differ. In your explanation, use the concepts of marginal revenue and marginal cost, as well as externalities.