EE 431/ EE438 Economics of Financial Markets and Institution

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Assignment 3: Suggested Solutions

1. **ME Chapter 7 Quantitative Problems: 1**

   You are willing to pay the average price. If the distribution of car values is symmetric, you are willing to pay $22,000 for a randomly selected car.

   ME Chapter 7 Quantitative Problems: 2

   You are willing to pay the average price upfront: $22,000. However, the dealer will know this, and only sell you a car worth between $20,000 and $22,000. But you know this. So you will only pay $21,000. And so on. This ends with you paying $20,000, and the car being worth $20,000. This is OK for you, but the dealer can never sell cars worth more than $20,000. The resolution, of course, is to get more information. This may include a test drive, mechanical inspection, warranty, etc.

   ME Chapter 7 Quantitative Problems: 3

   Let P be the percent of profits you pay Ricky.

   If Ricky is lazy, his expected payment is

   $$0.60 \times 10{,}000\,P + 0.40 \times 50{,}000\,P = 26{,}000\,P$$

   If Ricky works hard, his expected payment is

   $$0.20 \times 10{,}000\,P + 0.80 \times 50{,}000\,P - 1{,}000 = 42{,}000\,P - 1{,}000$$

   To induce Ricky to work hard, you need

   $$42{,}000\,P - 1{,}000 > 26{,}000\,P$$
   $$16{,}000\,P > 1{,}000$$
   $$P > 0.0625$$

   So, offer Ricky 6.25% of the profits, and this should induce him to work hard.

2. **Use asymmetric information problem presented in the slides. Find the minimum collateral necessary to align the incentives of the borrower with that of the lender. Hint: For the case of *ex ante* moral hazard, compare the payoffs from choosing each project with and without collateral and see the minimum collateral that requires for tilting the borrower's decision to the favorable way. Repeat for the case of cheating/honest under the assumption that collaterals are expropriated under cheating strategy.**

   With collateral, the borrower's expected payoff in risky project is

   $$\tfrac{1}{2}(230-110)+\tfrac{1}{2}(-c)$$

   where *c* is collateral. His payoff in risk-free project is 10. So

   $$\tfrac{1}{2}(230-110)+\tfrac{1}{2}(-c) \le 10$$
   $$100 \le c.$$

   For the case of ex-post moral hazard, we compare the payoff for cheating and honest payoff:

   $$0.4\times(100-c)+0.6\times(-c) \le 10$$
   $$30 \le c.$$