

# Final Exam: Econ 490 Compensation in Organizations

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Section 2: May 6, 2024 at 4pm

Name: \_\_\_\_\_ PID: \_\_\_\_\_

You have 3 hours to complete this exam. Please stop writing when told to do so. Write all answers in the space provided, and show work where possible. If you run out of room, make a note and use the additional pages attached at the end of the exam. This is a closed book exam. The only materials you may use are a pen and paper. By taking this exam, you agree to follow the UNC Chapel Hill honor code, in particular the standards of academic integrity. All academic dishonesty will be reported to the Office of Student Conduct and the Student Attorney General. Each reading question is worth 5 points. Each model question is worth 3 points. There are a total of 100 points.

# 1 Readings

Answer these questions in 3 sentences or less.

1. Describe the main finding in Fee and Hadlock (2003) “Raids, Rewards and Reputations in the Market for Managerial Talent.” Be brief.
  2. Describe one difference found between younger and older mutual fund managers in “Chevalier and Ellison (1998) “Career Concerns of Mutual Fund Managers.”

3. What two reasons do Oyer and Schafer (2005) “Why do some firms give stock options to all employees?” give for why firms give out stock options?
  4. In Gong, Zhang and Zhou (2023) “Retention Effects of Employee Stock Options,” what was the main finding?
  5. In Blair and Chung (2022) “Job Market Signaling through Occupational Licensing,” in what types of states does occupational licensing reduce the racial wage gap the most? Use one sentence.

## 2 Teamwork

### Setup

- There are  $N$  workers, indexed by  $i = 1, \dots, N$
- Each worker can exert effort  $e_i$  at cost  $c_i(e_i) = e_i^2/2$
- Output is the sum of everyone's effort:  $y(e) = \sum_{i=1}^N e_i$
- The firm can pay a wage to each worker based only on team output  $w_i(y(e))$

### Questions

1. Find the first-best effort for each worker (the amount of effort which maximizes total surplus).

\*\*\* Consider a wage scheme  $w_1(y(e)), \dots, w_N(y(e))$  that is a partnership (see the definition from class). You may assume that the wage is differentiable.

2. Setup the worker's utility maximization problem. Also write down the budget-balance condition for partnerships.

3. Find and simplify the worker's effort first-order condition.

4. Use your answers from (1) and (3) and the fact that in partnerships all money must be paid out to prove that we cannot get first-best effort.

\*\*\* Consider a wage scheme  $w_1(y(e)), \dots, w_N(y(e))$  that is a group bonus (see the definition from class) where the target is total first-best effort  $\bar{y} = \sum_{i=1}^N e_i^{FB}$  and the bonus amount is more than the effort cost  $b_i \geq c_i(e_i^{FB})$ .

5. Argue that each worker does not want to exert too little effort ( $e_i < e_i^{FB}$ ).

6. Argue that each worker does not want to exert too much effort ( $e_i > e_i^{FB}$ ).
  7. Find a group bonus that gives everyone the same bonus  $b_i = b$  and that achieves first-best effort.
  8. Give an example of an organization that might have trouble committing to a group bonus, and explain why.

### 3 Relational Contracts

#### Setup

- A firm and a worker both have discount rate  $\delta$  and interact for many periods ( $t = 1, \dots, \infty$ )
- At each period  $t$  the following occur:
  - First the firm offers a flat wage  $w_t$
  - Second the worker chooses high (H) or low (L) effort  $e_t$
- High effort has cost  $c > 0$ , low effort has cost 0.
- High effort yields revenue  $v$ , low effort yields revenue 0.
- Firm outside option is 0, worker outside option is  $\bar{u} > 0$ .
- Assume the firm wants to motivate high effort.

#### Questions

1. Guess an equilibrium strategy for the firm in words. Guess an equilibrium strategy for the worker in words. (Hint: guess the same strategy as in class)
2. Call the high wage  $w_H$  and the low wage  $w_L$ . Assume the strategy you guessed is being played. What value of  $w_L$  will the firm choose? What is the worker's payoff in any period where the firm posts a wage of  $w_L$ ? Justify your answers.

\*\*\* For the next two subquestions, suppose the worker is considering one shot deviations when they slacked in the past (so are now being offered  $w_L$  forever).

3. Consider two deviations: taking the job and exerting low effort and taking the job and exerting high effort. Argue either mathematically or verbally that one is a more attractive deviation.

4. Write down one inequality that captures when the worker has no incentive to make the more attractive deviation in the last subquestion. Make sure to simplify. When does it hold?

\*\*\* For the next two subquestions, suppose the worker is considering one shot deviations when they never slacked in the past (so are currently being offered  $w_H$  each period).

5. Consider two deviations: taking the job and exerting low effort and not taking the job. Argue either mathematically or verbally that one is a more attractive deviation.

6. Write down one inequality that captures when the worker has no incentive to make the more attractive deviation in the last subquestion. Make sure to simplify.
  7. Using the inequality you just derived, find the firm's optimal choice of  $w_H$  and profit.
  8. Suppose initially  $\delta = 0.5, v = 4, \bar{u} = 1, c = 1$ . Then, conditions change and  $\delta = 0.5, v = 7, \bar{u} = 4, c = 1$ . Explain what happens to profit and provide an economic example.

## 4 Career Concerns

### Setup

- There are two firms and one worker.
- The worker has a skill level  $a$  that no one knows.
- However, everyone knows that skills are distributed uniformly between  $[0, A]$ . That is,  $a \sim U[0, A]$
- The worker exerts unobserved, costly effort:  $c(e) = e^2/2$
- Revenue is equal to effort plus skill:  $y = e + a$
- The worker is hired and exerts effort in two periods.
- The worker is hired in each period by the firm that posts the highest wage, and if there is a tie they randomly pick a firm (Bertrand style)
- All outside options are 0.

### Questions

1. What is the first-best level of effort for a single period? That is, the  $e_{FB}$  that maximizes output less the cost of effort?
2. How much effort will the worker exert in period 2? Justify your answer.

3. Denote the effort the firm believes the worker exerts in period 1  $\tilde{e}_1$ . How can the firm recover the worker's skill using  $\tilde{e}_1$  and output  $y_1$ ?
4. What output levels  $y_1$  will the firm never observe if the worker does the effort that is expected ( $\tilde{e}_1$ )?
5. Suppose the firms believe skill is  $a$  in period 2. What wage will they bid in period 2? Justify your answer.

6. Solve for the worker's optimal effort.

7. What wage do the firms in period 1 bid? Justify your answer.

8. How does this effort compare to the effort in sub question 1? Why is the worker working hard?

9. Suppose  $A = 20$ . If a worker has skill 12, how does their wage change from period 1 to period 2?







