



Chapter 12: Teams

Economics 136

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Note: In the appendix, you are responsible for p. 343 only.



Key Questions

1. When should a firm set pay as function of team output?
2. How to overcome worker motivation problems in teams?
3. How to align incentives of workers with team goals?
4. Use of peer pressure and norms
5. How to structure teams to maximize profit?



1. When should a firm set pay as function of team output?

- If cannot easily attribute earnings to individual workers in a team
- If 'whole is greater than sum of parts' because worker inputs **complementary**
- If individual workers can become more efficient by specializing
- If workers have much to teach each other through transfer of knowledge
 - Likely conditions: If workers differ in their knowledge
 - If the info one worker has is valuable to others



When should a firm **NOT** use worker teams?

- Main reason not to use teams: weakens incentive to work hard
- Reason: “Free rider problem”: Worker gets only a small share of the revenues generated by an increase in his effort
- Free rider problems most likely if team is **large**, and if workers find it hard to monitor their colleagues’ **effort**
- Imagine that output Q depends on effort of n workers and that workers share revenues equally.



Worker exerts less than optimal effort if he shares revenues

- Worker 1 of n workers:
- $\max PQ(e_1, \dots, e_n)/n - c(e_1)$
- FOC: $(P/n)dQ/de_1 = c'(e_1)$
- This entails much less effort than if each worker were paid his actual VMP:
- FOC would be:
- $(P)dQ/de_1 = c'(e_1)$
- Conversely, if worker paid on basis of own output, he might help team-mates less than optimal



Summary

- Using teams most useful if:
 - Workers are complements rather than substitutes
 - Free rider problems not major
 - Team is small
 - Easy for workers to monitor other's effort
 - Gains from specialization
 - Gains from knowledge transfer
- Examples: Teams would work well for small manufacturing company which has many specific tasks (sales, accounting, design and overseeing) and output of worker in a given job is observable (so no free riding)



2. How to overcome worker motivation problems in teams?

- Related question:
- 3. How to align incentives of workers with team goals?
- Similar answers to these questions. Find ways to compensate individual in terms of productivity of entire team
- Two broad forms of incentives: explicit and implicit



Explicit incentives

- Bonuses for team
 - Share dollar bonus for meeting specific target
- Profit sharing
 - Not a good incentive unless small firm.
 - (Workers will feel their effort will be a “drop in the ocean”!)
- Stock and Stock Options



How Stock Options Work

- Sometimes firms will grant stock as reward but more typically grant stock options
- Useful only for senior employees who feel that their efforts could move stock price
- Stock call option: gives holder option to buy 1 share of company stock at “strike price” or “exercise price” K .
- Will grant “out of money” call option where current stock price $X < K$.
- Gives incentive to work hard: if π rises, stock price may rise until $X > K$. Then an option to buy one share at $\$K$ is worth $\$(X-K)$



Firms Can Grant Bonus in Variety of Ways

- Suppose stock price has equal chance of equaling \$90 and \$110 next year.
- Firm can grant call options to worker with expected value of \$1000 in infinite number of ways. Two examples:
 - 1000 call options at strike price of \$108
 - 100 call options at strike price of \$90
 - (In second case expected profit to worker is equal to $100\{ \frac{1}{2}*\$0 + \frac{1}{2}*\$20 \}$)



Firms Should Set High Strike Price to Create Biggest Incentive

- Suppose worker can increase effort such that stock price has equal chance of equaling \$91 and \$111 next year instead of \$90 or \$110.
- If firm sets higher strike price and grants more options, the worker will capture greater share of the profit she contributed:
 - 1000 options at strike price of \$108
 - Worker earns expected return of \$1500, an increase of \$500
 - 100 options at strike price of \$90
 - Worker earns expected return of $100 \times \frac{1}{2} \times \{\$1 + 21\} = \$1100$, an increase of \$100 only

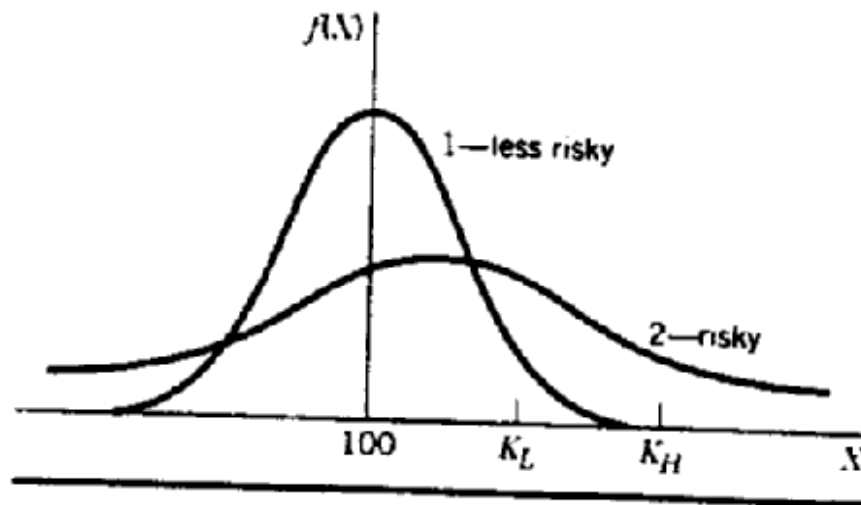


Setting Higher Strike Price Can Also Encourage Managers to Take More Risky Decisions

- Intuition: If you hold an option, you want to undertake risky strategy.
- If the price next year was completely certain not to change, and your company granted you an out of money option, it will remain out of money

If set strike price at K_H , manager will opt for riskier choice

FIGURE 12.5
PROBABILITY DISTRIBUTIONS OF
RETURNS FOR TWO
MANAGERIAL STRATEGIES





Could also force workers to accept put options

- Instead of reward for increase in stock price, could punish senior execs by forcing them to go “short” on a put option.
- If price of stock falls below exercise price, company can exercise put option, forcing manager to buy stock at price above current market price.
- Risk of loss for managers means that firm has to increase their base pay to keep their expected utility high enough

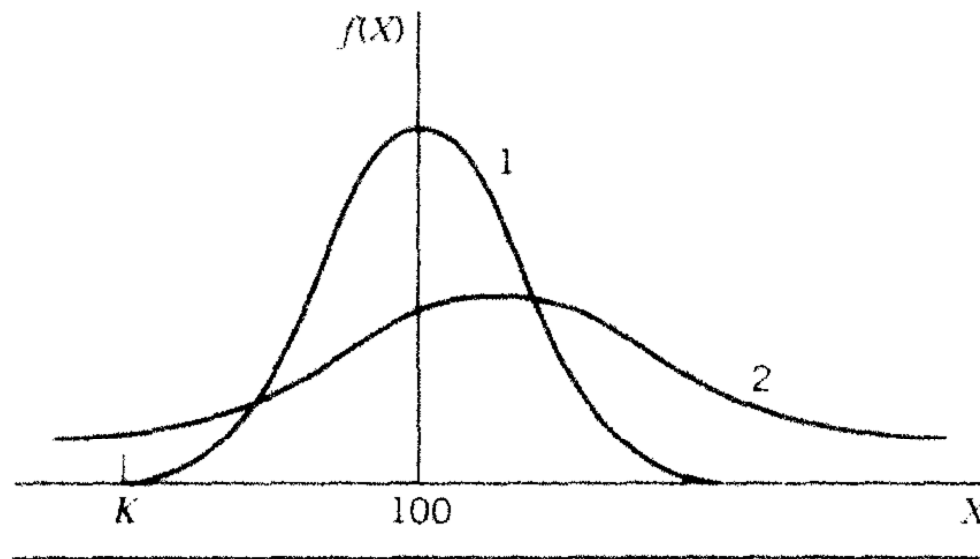


Managers short on put options would become more risk averse

- Perhaps this is why firms almost NEVER use this put option strategy
 - (Owners want managers to take more, not less, risk.)

At exercise price of K or less, put option would induce manager to prefer less risky option 1

FIGURE 12.6
TWO DISTRIBUTIONS OF INCOME



Manager is short put options at price K . Below $\$K$, these are “in the money” and cost manager money



Implicit Incentives

- Studies suggest U.S. firms DO use implicit incentives for whole work force.
- Don't make pay explicitly a function of team performance, but if profits rise, give bigger pay raises.
- More expensive than stock options because such wage hikes usually go to all workers, not just senior management

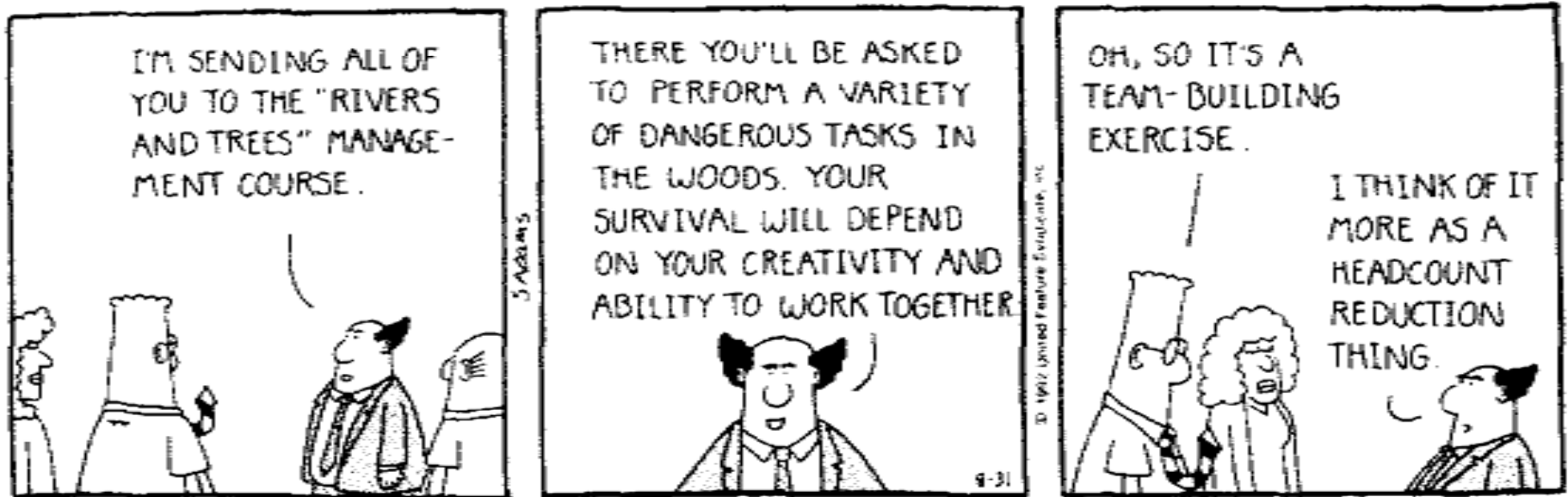
4. Use of peer pressure and norms

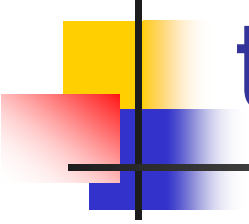


- Firm can establish “norms” of behavior that it expects of all workers.
- Not explicit rules, so workers can ignore norms. But if do, are punished by:
 - Lower wage hikes
 - Team bonus is taken away if anybody shirks. Creates **peer pressure** from other team members.
 - Criticism, shunning (ostracism) etc.

How to induce loyalty among team members?

- Need exercises to get workers to empathize with each other and the firm.
 - Outward Bound sorts of adventures





How to induce loyalty among team members? (part 2)

- Other ways to create empathy:
 - Team meetings/quality circles
- If worker can empathize with team members, less likely to “steal” from them by goofing off.



Demonstration that as cost of deviating from norm rises, effort rises (Appendix p. 343)

- Creation of group loyalty alters utility function so that if worker exerts effort $E < E^*$, he feels guilty and loses utility:
- $U = Y(E) - C(E) - \gamma(E^* - E)$ where Y and C are utility from consumption and disutility from effort, $Y' > 0$, $Y'' \leq 0$, $C' > 0$, $C'' > 0$.
- Worker's FOC:
- $\Gamma = Y'(E) - C'(E) + \gamma = 0$



Proof that $dE/d\gamma > 0$

- Use implicit function theorem to solve for impact of γ on effort E .
- If $\Gamma = Y'(E) - C'(E) + \gamma = 0$ then by implicit function theorem,
$$dE/d\gamma = -(\partial\Gamma/\partial\gamma)/(\partial\Gamma/\partial E)$$
$$= -1/(Y''(E) - C''(E)) > 0$$

5. How to structure teams to maximize profit?



- May want to rotate workers among tasks
 - 1) to learn where most productive and
 - 2) because of diminishing returns to info exchange among team members with time
- Give managers bonus if their workers later promoted to management and do well
 - Reduces risk that managers will have incentive not to promote best workers due to fear of competition from them



Problems between teams?

- Usually creating > 1 team leads to cooperation within teams and competition among teams
 - Put workers who need to cooperate on the same team
 - Encourage cooperation among related teams by pre-specifying that they must cooperate in order to earn full bonus



How to pick members for teams?

- If manager knows worker talents well, best for manager to do this
- But if workers know each other well, may be best for workers to sort themselves into teams.
 - Two methods:
 - Alternating draws (inefficient because team picking first through a coin toss may not be best place for their first pick)
 - Bidding for members
 - Alaska fishing example: best fishermen and fish spotters renegotiate and get larger share of the catch, or are hired away by other boats



Worker-owned firms: do they behave differently?

- Many examples e.g. United Airlines
- Economic theory says these firms should act as π -maximizing firms. Do they behave differently?
 - Tend to lay off fewer workers in recession
 - Profits tend to grow more slowly than regular firms
- This is probably inefficient behavior: workers pay a price (through lost profits and wages) in return for greater job security.