# Promotions as Tournaments

# Promotions

- Promotions are an important source of a worker's wage gains over his career. But sometimes promotions do not come with large changes in the nature of the tasks performed.
- Do wages always reflect productivity?
- Examples:
  - promotion from being an associate in a law firm to the partner of the firm brings about a substantial pay raise, but the productivity of the lawyer does not increase overnight
  - ditto for promotion from assistant professorship to associate professorship, though the pay raise is not substantial
  - salesperson of the year award
- Substantial wage gains for promotions that come with changes in nature of job duties can be understood through the assignment model

# Tournament Model

- There are two workers, Joe and Katie. Let

$$q_j = m_j + e_j$$
$$q_k = m_k + e_k$$

  - $q$ is output, $m$ is effort, and $e$ is a luck component
  - the cost of effort is $C(m)$, the value of output is $p$
  - workers are risk neutral

- Efficiency can be induced by paying workers a piece rate of $p$ dollars per unit of output. Workers will choose the optimal effort level $m^*$ such that $p = C'(m^*)$.

- But piece rate is not the only compensation system that can lead to efficiency. A suitably designed tournament can also produce the same results.

# Rank-Order Tournament

- Who "wins" in a contest depends only on the ranking of output, but not on the actual output levels of the two workers.
- If one worker produces more output than the other, the first worker "wins" and gets $W_h$, while the second gets $W_l$.
  - one can think of $W_h - W_l$ as the "prize" of winning
  - the prize can take the form of a bonus or a promotion

# Analysis

- Let $P$ represent the probability that Joe wins
- Joe chooses $m_j$ to maximize

$$PW_h + (1-P)W_l - C(m_j)$$

- The first-order condition is

$$(W_h - W_l)\frac{\partial P}{\partial m_j} - C'(m_j) = 0$$

# Probability of Winning

- Joe wins the tournament if and only if $q_j > q_k$. This can be written as $m_j + e_j > m_k + e_k$. Let $\eta = e_k - e_j$, and let $G(\cdot)$ and $g(\cdot)$ represent the c.d.f. and p.d.f. of $\eta$.
- The probability that Joe wins the contest is

$$P = \Pr[m_j - m_k > \eta] = G(m_j - m_k)$$

- Hence,

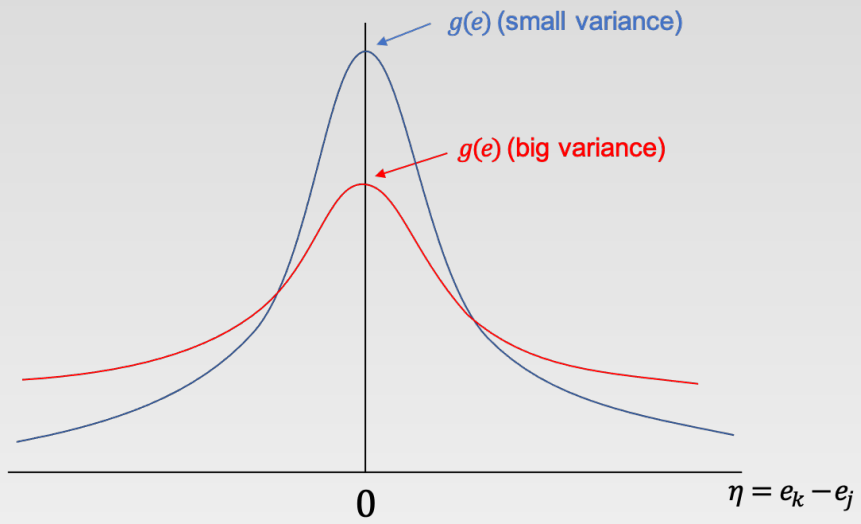
$$\frac{\partial P}{\partial m_j} = g(m_j - m_k)$$

- If Joe and Katie are identical, then $m_j = m_k$. This allows us to simplify the first-order condition into

$$(W_h - W_l)g(0) - C'(m_j) = 0$$

# What Determines Effort?

- The higher is the prize spread $W_h - W_l$, the higher is the effort level.
- Effort is higher when $g(0)$ is high.
  - the magnitude of $g(0)$ depends on the variance of the luck component. If the luck component has a large variance, then a marginal increase in effort may only increase the chance of winning slightly, and the tournament may not be very effective in encouraging effort
  - promotions may be more noisy in the U.S. than in Japan; therefore they are less effective in encouraging effort unless accompanied by a larger prize spread



# Optimal Prize Structure

- Recall that efficiency requires $p - C'(m^*) = 0$
- So if

$$p = (W_h - W_l)g(0)$$

  then workers will choose an effort level equal to $m^*$
- Zero-profit condition requires

$$2pm^* - W_h - W_l = 0$$

- These two equations allow us to solve for $W_h$ and $W_l$:

$$W_h = pm^* + \frac{p}{2g(0)}$$
$$W_l = pm^* - \frac{p}{2g(0)}$$

# Implications

- Optimal prize spread is
$$W_h - W_l = \frac{p}{g(0)}$$
  - the prize spread is larger if the value of output is larger or the variance of noise is larger
- The outputs of the workers are not equal to their wages. Yet the equilibrium is fully efficient.

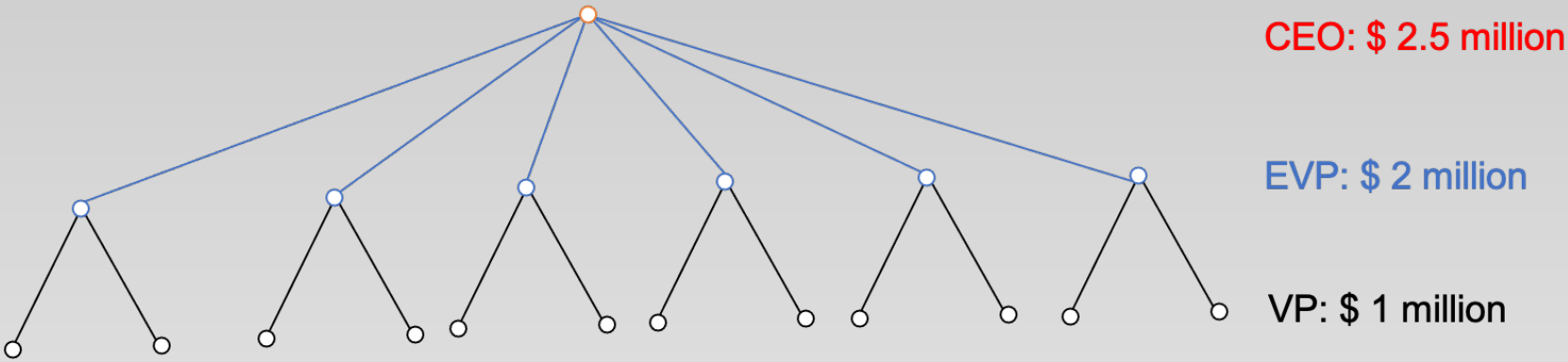
# Absolute vs. Relative Performance

- One advantage of the tournament over piece rates is that it requires only ordinal but not cardinal measure of output. In management level jobs, a cardinal measure of output is sometimes simply impossible.
- Another advantage of relative performance evaluation is that it eliminates that component of luck which is common to all contestants (e.g., weather, the state of the economy, overly generous or mean evaluators).
- One disadvantage of relative performance evaluation is that it could invite collusion among contestants.
- Alternatively, workers may also become too competitive among themselves and fail to cooperate.
  - president of AT&T was chosen from presidents of regional Bell companies rather than from senior executives at headquarters
- The same (efficient) outcome can also be achieved by giving a bonus to workers whose output exceeds a certain fixed standard.
  - however, firms would have an incentive to claim that the standard has not been met

# Empirical Evidence

- The same golfer achieve better scores on the same course when prize spread is greater.
- Absenteeism falls when firms give larger raises upon promotion.
- Do professors slack off once they obtain tenure?

# Implications for Organizational Design




- What is wrong with this organizational structure?

# Heterogeneous Workforce

- When worker ability is not symmetric, the effort level of both may fall. (Why?)
- If workers can change their effort during the contest, workers may slack off when they find that the distance between the contestants is too far.
- The firm may want to group workers in such a way that they may have similar chances of winning within their group.
- The firm may want to provide some reward at every level of promotion to prevent workers from giving up.
- External recruitment may dilute the incentives of internal contestants.
- Promotion is often associated with a different kind of tasks to be performed. To the extent that tournaments select a more able worker (instead of just a worker who puts in more effort), it performs the selection function as well.

# Remark on Peter Principle

- The Peter Principle says the people are promoted to their level of incompetence
- Often, the Peter principle is interpreted in a multifactor context. Individuals who are good in one job are not necessarily good in the job into which they are promoted.
- But the tournament model suggests that promotion is at least partly due to luck (and partly due to the person's ability and effort).
- Effort will fall if there are no further promotion possibilities.
- Regression to the mean implies that promoted individuals' performance falls, on average, relative to their pre-promotion performance.
- Firms that take the decline into account adjust their promotion rule accordingly, but this does not negate the observation that ability declines after promotion.