

# Lecture 7: Relative Performance Evaluation

Compensation in Organizations

Jacob Kohlhepp

January 29, 2026

Discussion: Gibbons and Murphy (1990)

# Relative Performance Evaluation is Not Teamwork

- ▶ Sometimes multiple people's effort goes into the final product
- ▶ When we only observe total output ( $y = e_1 + e_2$ ) and we cannot tell how much each person contributed
- ▶ We call this teamwork and study it after the midterm but not now.
- ▶ We care about when we observe output for each but with uncertainty
- ▶ For example:  $y_1 = e_1 + \epsilon_1$ ,  $y_2 = e_2 + \epsilon_2$
- ▶ Question: what is the point of grouping the workers at all?

## Relative Performance Evaluation: A Model

- ▶ Suppose there are two workers labeled 1 and 2 with the same cost of effort  $c(e_i)$ .
- ▶ Output for each  $y_1 = e_1 + \epsilon_1$ ,  $y_2 = e_2 + \epsilon_2$
- ▶ The noise terms are distributed:
  - ▶  $\epsilon_1 = v_s + v_1$
  - ▶  $\epsilon_2 = v_s + v_2$
  - ▶ where  $v_s \sim N(0, \sigma_s^2)$ ,  $v_1 \sim N(0, \sigma_1^2)$  and  $v_2 \sim N(0, \sigma_2^2)$ <sup>1</sup>
- ▶ Let's focus just on worker 1.
- ▶ The firm can offer linear wages:
  - ▶  $w(y_1, y_2) = \alpha + \beta(y_1 - \gamma y_2)$

1. Technical note: All are also jointly independent.

## Interpreting the Model

$$\epsilon_1 = v_s + v_1 \quad \epsilon_2 = v_s + v_2$$

How can we interpret  $v_s$ ,  $v_1$ ,  $v_2$  when workers 1 and 2 are at the same company?

## Interpreting the Model

$$\epsilon_1 = v_s + v_1 \quad \epsilon_2 = v_s + v_2$$

How can we interpret  $v_s$ ,  $v_1$ ,  $v_2$  when workers 1 and 2 are at different companies?

## Interpreting the Model

$$\epsilon_1 = v_s + v_1 \quad \epsilon_2 = v_s + v_2$$

How can we interpret the variances of  $v_s, v_1, v_2$ ?  
i.e. what does it mean if  $\sigma_s^2 > \sigma_1^2$ ?

## Some Observations

$$w(y_1, y_2) = \alpha + \beta(y_1 - \gamma y_2)$$

1. If  $\gamma = 0$  we have no relative performance evaluation (back to base model)
  - ▶ Since  $\gamma$  is a choice, access to relative performance evaluations must weakly improve profit!



## Some Observations

$$w(y_1, y_2) = \alpha + \beta(y_1 - \gamma y_2)$$

1. If  $\gamma = 0$  we have no relative performance evaluation (back to base model)
  - ▶ Since  $\gamma$  is a choice, access to relative performance evaluations must weakly improve profit!
2.  $\gamma$  does not influence effort.
  - ▶ Question: Why?

## Some Observations

$$w(y_1, y_2) = \alpha + \beta(y_1 - \gamma y_2)$$

1. If  $\gamma = 0$  we have no relative performance evaluation (back to base model)
  - ▶ Since  $\gamma$  is a choice, access to relative performance evaluations must weakly improve profit!
2.  $\gamma$  does not influence effort.
  - ▶ Question: Why?
3.  $Y_2$  contains information about  $Y_1$ 
  - ▶ Question: Why?

## Solving the Model

See the board!

# Solving the Model

## Theorem 1

*Under relative performance evaluation, worker 1's wage is*

*$w(y_1, y_2) = \alpha_{rel} + \beta_{rel}(y_1 - \gamma_{rel}y_2)$  where*

$$\gamma_{rel} = \frac{\sigma_s^2}{\sigma_s^2 + \sigma_2^2}$$

$$\beta_{rel} = \frac{1}{1 + r(\sigma_1^2 + (1 - \gamma_{rel})^2\sigma_s^2 + \gamma_{rel}^2\sigma_2^2)c''(e_1)}$$

$$\alpha_{rel} = \bar{u} - \beta_{rel}(e_1 - \gamma_{rel}e_2) + \frac{r\beta_{rel}^2[\sigma_1^2 + (1 - \gamma_{rel})^2\sigma_s^2 + \gamma_{rel}^2\sigma_2^2]}{2}$$

A nice comprehension check is to figure out how these would change for worker 2.

# Table of Contents

The Informativeness Principle

## Thinking More Generally

- ▶ We thought of  $Y_2$  as the output of a coworker or comparable worker.
- ▶ But we just showed that it does not matter for incentives.
- ▶ The firm only uses it to reduce the noise in performance evaluations.
- ▶ What if we think of  $Y_2$  as just some extra information?
  - ▶ Question: What are some examples?

Working It Out

See the board!

# The Informativeness Principle

## Theorem 2

*The firm should use additional information  $Y_2$  to set pay for worker 1 whenever the information is informative about worker 1's output:  $\sigma_\xi^2 > 0$ .*

- ▶ The firm uses  $Y_2$  to purge  $Y_1$  of noise/luck/etc.
- ▶ This reduces the effective variance the worker faces for each level of bonus  $\beta$ .
- ▶ This relieves the risk-incentive trade-off.
- ▶ Therefore it improves profit and total surplus!