

The Morale Effects of Pay Inequality

Based on Breza, Kaur and Shamdasani (2018)

Mingzhao Dai

Feb 4, 2025

Introduction: an example

- Imagine you are working in a coffee shop
- You accidentally know that your colleague gets better paid than you. Will you be affected in your work?
- You again know that both Anna and Bob has higher salary than you. Anna and you work on **Mondays**, while Bob works on **Tuesdays**. You observe only Anna's work and she's really professional in making latte art.
- Will you have different feeling comparing your wage with them and how does it affect your working behavior?

Research questions

- 1. Does pay inequality affect working behaviors (morale)? e.g. output level of workers
- 2. How does this effect change when workers are aware / unaware of their colleague's productivity?
i.e. the effect of observability of other's productivity

Theoretical framework

- A typical worker's payoff:

$$V(\underbrace{w_i}_{\text{own wage}}, \underbrace{w_R}_{\text{reference wage}}, \underbrace{e_i}_{\text{effort}}; \underbrace{\theta_i}_{\text{productivity rank}}) = \underbrace{w_i}_{\text{own wage}} - \underbrace{c(e_i; \theta_i)}_{\text{effort cost}} + \underbrace{M(w_i, w_R)}_{\text{morale effect}} e_i$$

* \mathbf{V} (own wage, reference wage, effort; productivity rank)

- Morale effect:

$$M(w_i, w_R) = \alpha f(w_i - w_R \mid w_i < w_R) + \beta f(w_i - w_R \mid w_i > w_R) + g(w_i)$$

looks like *Fehr & Schmidt (1999)*

- Formation of reference wage:

$$w_R = r(\mathbf{w}_{-i}, \theta_i, \theta_{-i})$$

Theoretical framework: reference wage

- $w_R = r(\mathbf{w}_{-i}, \theta_i, \theta_{-i})$
- Core: how does the worker form the reference wage?
- Only care about the wage difference, even productivity differs:
 $w_R = r(\mathbf{w}_{-i})$
- Take other's productivity into consideration, when thinking about wage difference:
 $w_R = r(\mathbf{w}_{-i}, \theta_i, \theta_{-i})$
- Do not observe productivity, use beliefs:
 $w_R = r(\mathbf{w}_{-i}, \hat{\theta}_i, \hat{\theta}_{-i})$
- Then compare their own wage w_i with reference wage w_R
 \implies source of morale effect of pay inequality

Experimental design: background

- **Location:** India, why? high morale effects from surveys
- **Subjects:** rural Indian workers who are seeking **seasonal manufactural jobs**, i.e., short term jobs. All male.
- **Job description:** **low-skill non-cooperative** manufacturing, e.g., producing candle wicks (easier to quantify the productivity)
- **Duration:** 1 month, during non-agricultural seasons
- **Sample:** 14 rounds, each round 30 workers (different across rounds)
- **Salary:** flat daily wage according to the productivity, higher than local prevailing wage \bar{w}

Experimental design: sample construction

- All recruited workers are labeled with a productivity rank:
(low productivity, medium productivity, high productivity)
- **Reference group design:**
Workers are randomly divided into different units, and different units have different production tasks and wage schemes.
Each unit has 3 workers. \implies Every worker actually has 2 real colleagues as reference.

Experimental design: sample construction

- **Perceived justifications:**

1. How do workers evaluate the productivity difference?

Productivity rank is discrete but productivity is continuous.

Example:

	low productivity	high productivity	morale effect
scenario 1	8	10	high
scenario 2	2	10	low

2. How does the observability of productivity matter? (Research Q2)

Units are randomly assigned with different production tasks. Different task has different observability of productivity.

Example:

You work in the coffee shop, less observable and quantifiable;

You work in the candle factory, more observable (the daily quantity produced)

Experimental design: sample construction

- Wage treatments:**
 Again, different units are randomly assigned different wage schemes (out of 4):

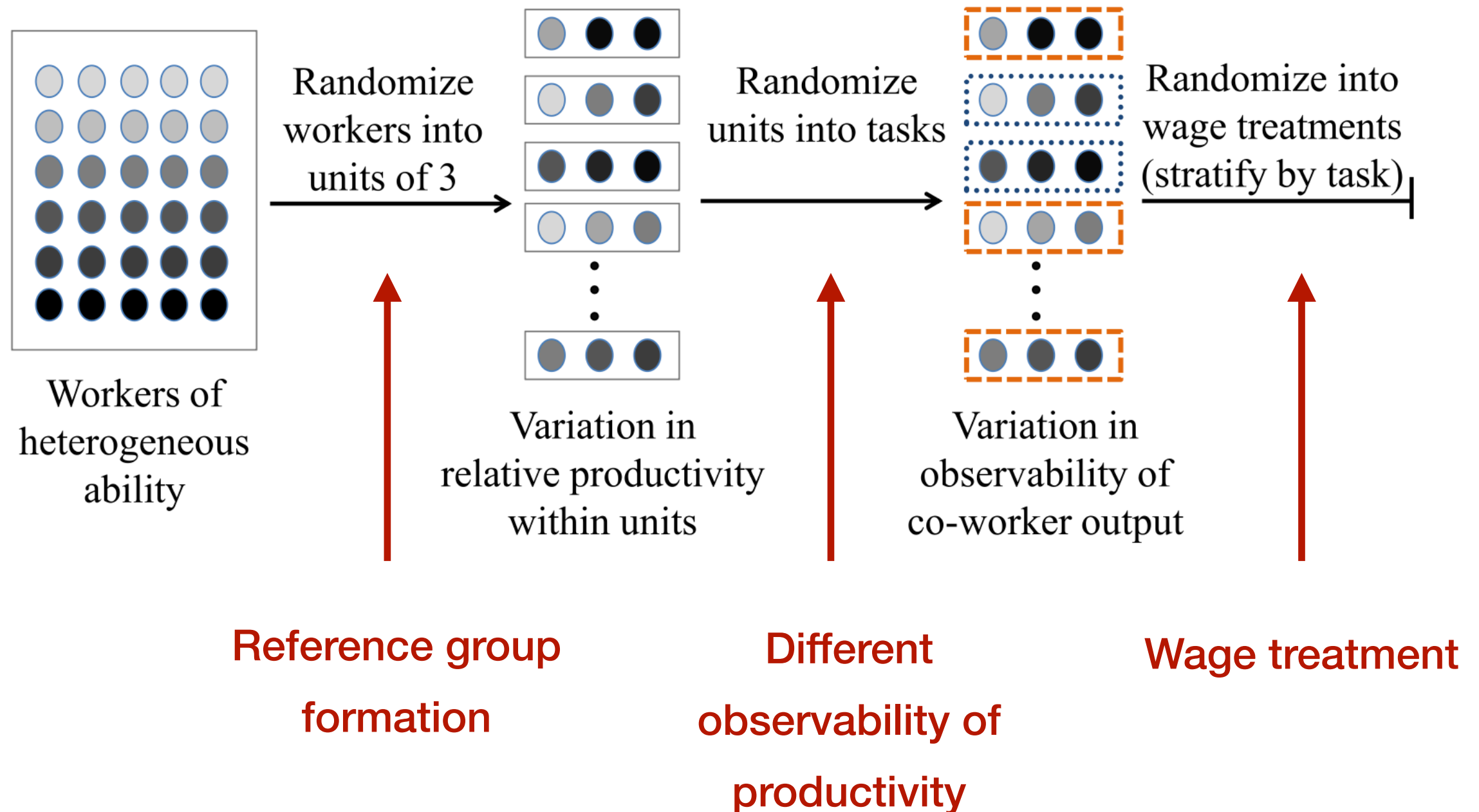
	Treatment	Controlled		
Worker rank	<i>Pay disparity</i>	<i>Compressed Low</i>	<i>Compressed Medium</i>	<i>Compressed High</i>
Low productivity	<div>W_{Low}</div>	<div>W_{Low}</div>	W _{Medium}	W _{High}
Medium productivity	<div>W_{Medium}</div>	W _{Low}	<div>W_{Medium}</div>	W _{High}
High productivity	<div>W_{High}</div>	W _{Low}	W _{Medium}	<div>W_{High}</div>

Relevant groups

- Wages are discrete (w_{Low} , w_{Medium} , w_{High}), and are paid according to the scheme of each unit. $w_{Low} > \bar{w}$.
- By comparing the treatment group and controlled group for each productivity rank, we get the **morale effect of pay inequality**.

Experimental design: sample construction

- Summary of 3 sample randomizations:



Experimental design: sample construction

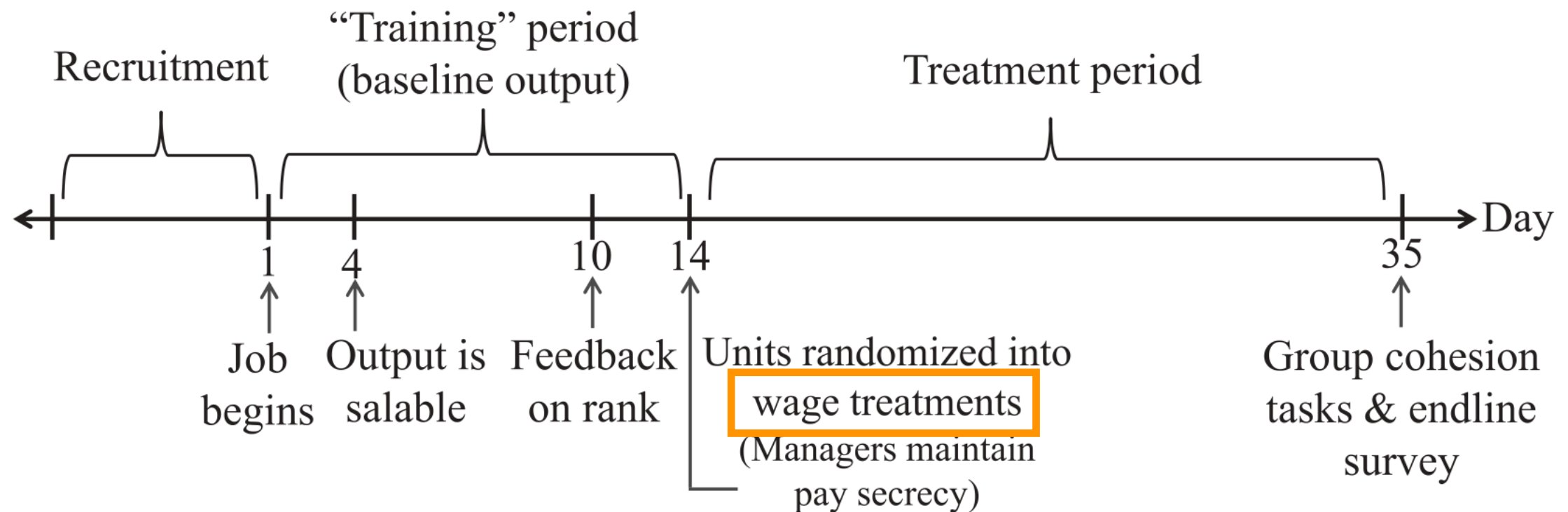
- How do experiment designer know the observability of production of different tasks?

Pilot experiments. Prior to the main experiment, some other workers are asked to rank their own productivity compared to their colleagues' productivity.

- Accuracy of their responses = *proxy* observability of production
i.e., higher accuracy = better knowledge of colleague's productivity

Experimental design: timeline

- (Pilot ->) Recruitment -> Training period -> Treatment period



- In training period, workers are trained and **classified into different productivity ranks** according to their training output.
- During training period, the wages are **the same (\bar{w})** for everyone. After training period (Day 14), workers are paid according to the **wage scheme** of the unit.

Experimental design: information set

- What is know and unknown for a worker i ?

θ_i : privately known

θ_{-i} : depends on the observability of productivity of the task

w_i : privately known since Day 14

w_{-i} : by colleague's self-disclosure and rumor

$PayDisp_i$: unknown to workers

Experimental design: underlying mechanism

- There are two channels of the morale effect of pay inequality:
 - Individual preference over relative pay:
being treated differently \Rightarrow don't want to put much effort anymore
 - Social cohesion/conflict:
jealous of colleague \Rightarrow don't want to work together / stay in the same unit with that colleague \Rightarrow output is affected

Regression model: DID

$$\begin{aligned} y_{it} = & \alpha_1 [Post_t \times PayDisp_i \times Low_i] \\ & + \alpha_2 [Post_t \times PayDisp_i \times Med_i] \\ & + \alpha_3 [Post_t \times PayDisp_i \times High_i] \\ & + \alpha_4 [Post_t \times Low_i] + \alpha_5 [Post_t \times Med_i] + \alpha_6 [Post_t \times High_i] \\ & + Irrel'_{it}\theta + Neigh'_{it}\gamma + \lambda_i + \tau_t + \eta_1 x_{kt} + \eta_2 x_{kt}^2 + \varepsilon_{it}. \end{aligned}$$

- We care about $\alpha_1, \alpha_2, \alpha_3$.
- E.g., $\alpha_1 = \mathbf{E} [y(PayDisp = 1) - y(PayDisp = 0) | Post = 1, Low = 1]$,
estimating the **ATE** of the pay inequality on outputs for *Low* rank

Regression model: extension

- The authors also examined the following two effects:
- Pooled effect of pay disparity:

$$y_{it} = \alpha [Post_t \times PayDisp_i] + Irrel'_{it}\theta + Neigh'_{it}\gamma \\ + \lambda_i + \tau_t + \eta_1 x_{kt} + \eta_2 x_{kt}^2 + \varepsilon_{it}.$$

estimating the treatment effect of an unit across all ranks.

- Effects of perceived justification:

by interacting $[Post_t \times PayDisp_i \times Rank_i]$ with $Observ_k$ or $ProdDiff_i$

Results

- 1. Do workers **really know their colleague's wage?**

- Yes, mostly.

In control group, 95.8% knows at least one colleague's wage, 90.9% knows both two colleagues' wages;

In treatment group, they are 87.1% and 74.2%.

- Interesting: **randomly divided** workers do not know which group they are in, but the percentages differ naturally in different groups.

Results

- 2. Does pay inequality have **negative effect** on the morale behavior (output/attendance)?

- Yes,

by checking α_1 , α_2 , α_3 .

The effects of pay inequality on morale behavior are as follows:

	low productivity	medium productivity	high productivity
output	— *	—	—
attendance	— *	— *	— *

* *significant*

Results

- 3. How does **perceived justification** affect the morale effect?
- Same with our guess: negative

	morale effect
productivity difference	—
observability of productivity	—

Especially, when ProdDiff is very big, the morale effect almost disappears.

Results

- 4. How is the **pooled unit effect** (regardless of productivity rank)?
- Negative: Treatment groups ($PayDisp=1$) have lower output and attendance.

	pay disparity groups	compressed wage groups	the existence of pay inequality
output	lower	higher	—
attendance	lower	higher	—*

Results

- 5. How is the **absolute wage effect** ($g(w_i)$)?
- No significant effects.
- Perfect for this study. Workers focus more on relative wage instead of absolute wage (high social preference).

Results

- 6. How is the effect from the channel of **social cohesion**?
- This channel is active. Pay inequality harms unit cohesion.
- How to estimate? By ex post teamwork games and endline survey.

Strength

- **Rigorous, complete, multi-dimensional experimental design:**
well-designed randomizations, timeline and ex post games and surveys show the power of experimental economics.
- **Introduce perceived justification, especially observability of productivity, and try to quantify it:**
pilot experiment provides a smart way to identify this abstract variable.
- **Policy implications for developing countries.**

Weakness

- Pilot experiment results as proxy of observability, reliable?:

The results are not robust, since different people have different understanding of productivity signals. The accuracy data will change when we change the pilot experiment subjects.

- Even the low wage w_{Low} is larger than outside option \bar{w} , weakening the incentive to work passively.

Probably workers care less about pay inequality when they are paid extra wage that cannot be found elsewhere. (Especially for these seasonal contract workers)

- All workers are male.

Links to the course

- Of course, similar framework with Fehr & Schmidt (1999):
however, $\beta > 0$ in this paper.
- Provide another example of Bénabou & Tirole (2006):
offering high wages (rewards in B&T) as a motivator of working hard
(prosocial behavior in B&T) may reversely reduce the total contribution,
due to the pay inequality.
- Provide an example of heterogeneous fairness norms:
strict egalitarianism (control group) v.s. libertarianism (treatment group)
Heterogeneity of fairness norms really exists and is the basis of the
perceived justification.