

# Social Preferences and Incentives in Organizations

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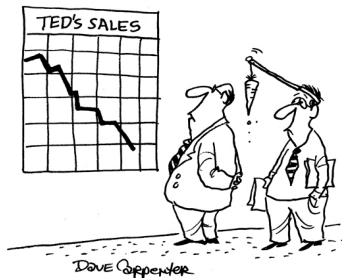
Cargèse, Corsica

Individual employment relationships are typically embedded in the larger framework of organizations such as firms, thus in a social context where mutual comparisons may play a role. Empirical evidence suggests that workers not only care about their absolute but also their relative economic position compared to co-workers or peers. In the last decades, a large body of literature has evolved that is concerned with social (or other-regarding) preferences in general and in regard to their effects on economic performance, wellbeing, and the motivation of workers.

In this workshop, we will discuss selected theoretical approaches to model incentive provision for other-regarding actors in the context of organizations. We will consider different incentive schemes such as individual, joint, and relative performance pay both in one-shot and repeated settings. This allows to reconsider optimal incentive schemes in organizations and sheds light on observed features of real-life incentive schemes.

# Incentive Theory

“Traditional” models have studied (not only) ...



“Ted, I think we need to re-evaluate  
your carrot.”

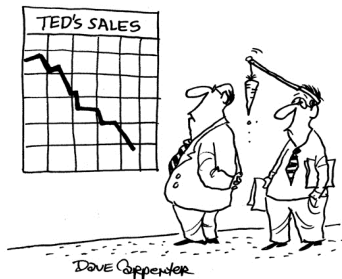
... the optimal design of incentives within firms (and between).

“Traditional” models have studied a plethora of different topics ...

- ex-ante vs. ex-post asymmetric information
- performance pay (individual, joint, relative)
- explicit vs. implicit incentives
- one-shot vs. repeated contracts
- one-task vs. multitasking settings, job design
- risk aversion, limited liability, wealth constraints
- bilateral vs. multilateral relationships
- hierarchies and organizational structure
- ...

# Incentive Theory

“Traditional” models have focused on ...



“Ted, I think we need to re-evaluate  
your carrot.”

... actors with purely self-regarding preferences.

# Relative Pay Concerns

However ...



*"O.K., if you can't see your way to giving me a pay raise, how about giving Parkerson a pay cut?"*

# Relative Pay Concerns

Relative pay matters ...



*"O.K., if you can't see your way to giving me a pay raise, how about giving Parkerson a pay cut?"*

... in particular in the workplace.

# Relative Pay Concerns



**„Mr. Burns, if you don't want to raise my wage, what about cutting Lenny's and Carl's?“**

Thanks to Johannes Martin for the cartoon.

## Neoclassical Economics

- *presumption*: by and large, **people act rationally** (i.e., deviations from perfect rationality are so small or so unsystematic as to be negligible)
- ⇒ actors can be approximated by a **homo economicus**, who is a rational, purely self-interested utility or profit maximizer

## Behavioral Economics

- attempt to **increase the explanatory and predictive power** of economic theory by providing it with more psychologically plausible foundations
- ⇒ *presumption*: deviations from rationality and pure self-interest are large or systematic enough to warrant the development of new (descriptive) theories of decision

# Social Preferences: Evidence

- **empirical evidence** suggests that relative pay comparisons strongly affect individual satisfaction
- **horizontal income comparisons** occur among peers, e.g., co-workers
  - Card, Mas, Moretti, and Saez (2010): U of California
  - Clark and Oswald (1996): British workers
  - Mayraz, Schupp, and Wagner (2009): German households
- **vertical income comparisons** occur across different hierarchical levels, e.g., between workers and firm owners
  - Agell and Lundborg (1995): Swedish manufacturing companies
  - Bewley (1999): large-scale interviews (business executives, labor leaders, professional recruiters, ...)
  - Blinder and Choi (1990): HR managers in New Jersey and Pennsylvania

- **experimental evidence** from the laboratory is inconsistent with purely selfish behavior
  - systematic results
  - dictator game: proposers offer 10-30% (rather than zero)
  - ultimatum game: proposers offer 30-50% on average, responders reject low offers (below 20% half of the time)
- **volunteers** voluntarily accept huge opportunity cost in terms of forgone salaries
- **non-profit organizations**, social businesses, charitable foundations state goals different from profit maximization
- **examples** of social preferences (as to income comparison): envy, compassion, altruism, spitefulness, status-seeking

# Social Preferences: Models

- **models of social preferences** presume that others' income, behavior, or intentions may affect individual utility
- such preferences are also called **other-regarding**
- here are some well-known theory contributions:
  - Rabin (1993): fairness
  - Dufwenberg and Kirchsteiger (2004): reciprocity
  - Bolton and Ockenfels (2000): equity, reciprocity, and competition
  - Falk and Fischbacher (2006): reciprocity
  - **Fehr and Schmidt (1999): inequity aversion (envy, compassion)**
- experimental evidence often in line with envy or inequity aversion
- neural evidence for inequality aversion (Tricomi et al. 2010)
- most of the (behavioral) agency literature (and this workshop) focuses on inequity aversion and envy

# Inequity Aversion

- $x_i$  denotes the monetary payoff of player  $i \in \{1, \dots, n\}$
- $x = x_1, \dots, x_n$  is the vector of monetary payoffs
- utility function of player  $i$ :

$$U_i(x) = x_i - \alpha_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_j - x_i, 0\} - \beta_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_i - x_j, 0\}$$

- where  $0 \leq \beta_i < 1$  and  $\alpha_i \geq \beta_i$
- ⇒ self-centered inequity aversion
- $x_i > x_j$ : advantageous inequality
  - $x_i < x_j$ : disadvantageous inequality
- inequitable payoffs lead to utility losses ⇒ player  $i$  is willing to give up money to achieve a more equitable payoff distribution

- utility function of player  $i$ :

$$U_i(x) = x_i - \alpha_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_j - x_i, 0\} - \beta_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_i - x_j, 0\}$$

- $\alpha_i \geq 0$  measures player  $i$ 's propensity for *envy*
- $\beta_i \geq 0$  measures player  $i$ 's *compassion*
- ( $\beta_i < 0$  represents joy of outperforming)
- $\beta_i < 1$ : players don't burn money
- $\alpha_i \geq \beta_i$ : envy is the stronger social emotion
- for  $n = 2$ , we obtain:

$$U_i(x_i, x_j) = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\}, \quad i \neq j$$

# Inequity Aversion and Incentive Pay

- **individual employment relationships** are typically embedded in the framework of the firm
  - firm is a **social context** where pay comparison may play a role
  - **incentive pay** is an important source of wage inequality
  - extent of pay inequality depends on the incentive scheme
- important **types of incentive pay**:
- *individual*: depends on individual performance only
  - *joint*: positively depends on peer's performance
  - *relative*: negatively depends on peer's performance
- ⇒ if the presence of other-regarding preferences affects the effectiveness of incentive pay, firms should be aware of it
- implications for optimal incentive schemes
  - implications for organizational architecture of the firm

- in the last two decades, multiple theoretical (and empirical) studies have been presented in the field of behavioral economics
- we will focus on (just a few in) simple principal-agent settings
- simple examples of individual, joint, and relative incentive pay
- introduce the models but focus on economic intuition (no proofs)
- we first review some basic results in one-shot games
- then we study more recent work
- the following slides are mostly based on:
  - Bental and Kragl (mimeo)
  - Demougin and Fluet (2003)
  - Gogova and Kragl (2013)
  - Grund and Sliwka (2005, JEMS)
  - Kragl (2015, JEMS), Kragl (2016, JITE)
  - Kragl and Schmid (2009, JEBO)
- all references at the end

- Envy in the Workplace: One-Shot Games
  - Individual Bonus Contracts
  - Group Bonus Contracts
  - Envy and Compassion in Tournaments
- Envy in the Workplace: Repeated Games
  - Relational Contracts
  - Impact of Envy on the Credibility Constraint
  - Comparison of Different Incentive Schemes
- Inequity Aversion in Vertical Bargaining
- Other-Regarding Preferences in the Society
- Conclusion and Discussion

## The Model

- one-shot game between one principal and two agents  $i = 1, 2$
- agents are homogeneous and risk neutral
- agents exert effort  $e_i$  to produce verifiable output  $Y_i \in \{0, 1\}$
- agents incur strictly convex effort costs  $c(e_i)$  with  $c(0) = c'(0) = 0$
- probability of realizing a 'favorable' output:

$$\Pr[Y_i = 1|e_i] =: p(e_i)$$

- where  $p(e_i) \in [0, 1)$  is strictly concave and  $p(0) = 0$
- agent  $i$  obtains payoff  $\pi_i$  with fixed payment  $w$  and **individual bonus**  $b$ :

$$\pi_i = \begin{cases} w & \text{if } Y_i = 0 \\ w + b & \text{if } Y_i = 1 \end{cases}$$

## Preferences

- principal's profit per agent is  $Y_i - \pi_i$
- agents observe mutual outputs and payoffs, but not efforts
- agents compare their payoff to that of their co-worker and have a distaste for earning less (are envious)
- agent  $i$ 's utility:

$$U_i(\pi_i, \pi_j, e_i) = \pi_i - c(e_i) - \alpha \max\{\pi_j - \pi_i, 0\}, \quad i \neq j$$

- where  $\alpha \geq 0$  denotes the propensity for envy
- as in Fehr and Schmidt (1999), *inequity* is specified as *payoff inequality*, which is suitable when participants are situated in a symmetric decision environment

## Timing: one-shot game

- 1 the principal offers each agent the wage contract  $(w, b)$
- 2 each agent decides whether to accept or reject in favor of an alternative employment that provides utility  $U_0$
- 3 if the agents accept the contract, they simultaneously choose their respective effort levels
- 4 outputs  $Y_i$  and  $Y_j$  are realized and payments are made

## The Agent's Problem

Payoff Matrix

Agent 1, 2	$Y_2 = 0$	$Y_2 = 1$
$Y_1 = 0$	$w, w$	$w, w + b$
$Y_1 = 1$	$w + b, w$	$w + b, w + b$

- agent  $i$ 's expected utility:

$$E[U_i | e_i, e_j] = w + p(e_i) b - c(e_i) - \alpha(1 - p(e_i)) p(e_j) b, \quad i \neq j$$

- the f.o.c. is given by  $(1 + \alpha p(e_j)) p'(e_i) b - c'(e_i) = 0$

- by the implicit-function theorem, we find  $\frac{de_i}{d\alpha} > 0$

⇒ **incentive effect of envy:** *for any given bonus, the agent works harder as he becomes more envious*

- in the Nash-equilibrium, we have  $e_i = e_j =: e$

## The Principal's Problem

- the principal's per-agent problem:

$$\max_{b,w,e} V_I(e, w, b; \alpha) = (1 - b) p(e) - w$$

$$\text{s.t. } w + p(e) b - c(e) - \alpha(1 - p(e)) p(e) b \geq U_0 \quad (PC)$$

$$b(e; \alpha) = \frac{c'(e)}{(1 + \alpha p(e)) p'(e)} \quad (IC)$$

- note that, by the incentive constraint (IC), we have  $\frac{db}{d\alpha} < 0$
- the participation constraint (PC) is binding in equilibrium:

$$C^P(e; \alpha) = w + p(e) b = c(e) + \underbrace{\alpha p(e) (1 - p(e)) b}_{\text{inequity premium}} + U_0$$

⇒ **inequity premium:** for any given effort, the principal's expected wage cost are larger with envious than with self-regarding agents

## The Principal's Problem

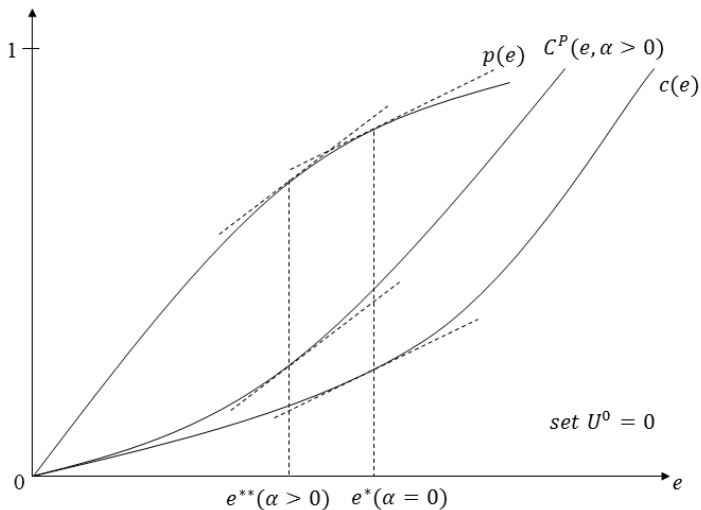
- the principal's problem simplifies:

$$\max_e p(e) - c(e) - \underbrace{\alpha p(e)(1-p(e)) \frac{c'(e)}{(1+\alpha p(e))p'(e)}}_{\text{inequity premium}} - U_0$$

## Results:

- $\Rightarrow$  for  $\alpha = 0$ , the first-best solution is implemented
- $\Rightarrow$  for  $\alpha > 0$ , the first-best solution is never achieved
- $\Rightarrow$  agency costs increase as agents become more envious
- $\Rightarrow$  optimal contract is less powerful than first-best (no "selling the job to the agent")

## The Principal's Problem



## Main Results

- ① *incentive effect of envy strengthens incentives*
- ② *agency costs of envy lead to lower firm profits and a welfare loss*

### *Intuition:*

- envious agents want to avoid the disutility due to envy
- hence, they work harder than self-regarding agents to decrease the probability of not getting the bonus
- nevertheless, agents incur a utility loss due to the prospect of pay inequality
- the principal needs to compensate them by an inequity premium in order to ensure participation
- this raises wage cost and lowers profit under the optimal contract
- results extend to the case of inequity aversion

## Implications

### Quote

*"The main function of internal pay structure is to ensure internal pay equity, which is critical for good morale."*      *Bewley (1999, p. 82)*

Concerns for fairness or equity can serve as an explanation for:

- less powerful incentives than predicted by traditional models
- wage secrecy norms
- wage compression in firms
- fairness norms
- group incentives (even if individual output measures are available; see the following model)

## The Model

- all assumptions as in the foregoing model except for wage contract
- agent  $i$  obtains payoff  $\pi_i$  with fixed payment  $w_G$  and (per-agent) **group bonus**  $B_{Y_i Y_j}$  paid contingent on both agents' output
- whenever paid out, the group bonus is paid to both agents
- w.l.o.g., I focus on the symmetric Nash equilibrium w.r.t. the agents' efforts  $\rightarrow B_{10} = B_{01} =: B$
- moreover, let  $B_{11} = B + \Delta$

Bonus Matrix

Agent 1, 2	$Y_2 = 0$	$Y_2 = 1$
$Y_1 = 0$	0, 0	$B, B$
$Y_1 = 1$	$B, B$	$B + \Delta, B + \Delta$

## The Agent's Problem

- agent  $i$ 's expected utility:

$$E[U_i | e_i, e_j] = w_G + p(e_i) B + (1 - p(e_i)) p(e_j) B + p(e_i) p(e_j) \Delta - c(e_i), \quad i \neq j$$

⇒ *payoff inequity is avoided altogether*

⇒ *externality of one agent's effort on the other agent's payoff*  
→ *free-rider problem*

- as before, in the Nash-equilibrium, we have  $e_i = e_j =: e$
- the f.o.c. yields the incentive constraint:

$$p'(e) B + p'(e) p(e) (\Delta - B) = c'(e) \quad (IC)$$

⇒ *envy has no effect on the agents' equilibrium effort*

⇒ *the principal can implement an arbitrary effort level using any bonus scheme  $(B, \Delta)$  that satisfies the constraint (IC)*

## The Principal's Problem

- the participation constraint is binding in equilibrium
- expected per-agent wage cost involve *no inequity premium*:

$$C^P(e) = w_G + 2p(e)B + p(e)^2(\Delta - B) = c(e) + U_0 \quad (PC)$$

- the principal's per-agent problem:

$$\max_{e, B, \Delta} V_G(e) = p(e) - c(e) - U_0 \quad \text{s.t.} \quad (IC)$$

- ⇒ *the first-best solution is implemented for any  $\alpha \geq 0$*
- ⇒ *no agency costs (no inequity premium)*
- ⇒ *altogether, when workers are envious, the principal favors the group over the individual bonus scheme in the one-shot game*

## Tournaments

- rank-order tournaments
  - promotion tournaments
  - rely on relative performance (common shocks filtered out)
  - are contractible even if output is not verifiable:  
firm commits to a fixed ordinal prize structure ex ante and cannot get out of paying the prize(s)
  - inequity aversion is highly relevant in tournaments
  - participants are typically identical ex ante and exert the same effort
  - however, by construction, there will be a winner and a loser
- ⇒ payoff inequality cannot be avoided ex post
- ⇒ inequity averse players will experience disutility under any outcome

## The Model

- basic model based on Lazear and Rosen (1981)
- two identical risk neutral agents  $i = 1, 2$
- strictly convex effort costs  $c(e_i)$
- agents produce output  $q_i = e_i + \varepsilon_i$
- $\varepsilon_i$  denotes the random term (iid across agents)
- $G(\cdot)$  denotes the (symmetric) distribution function of composed random variable  $\varepsilon_j - \varepsilon_i$  and  $g(\cdot)$  its density
- agents have reservation utility  $U_0$
- the agent with the higher output obtains the **winner prize**  $w$
- loser gets **loser prize**  $l < w$ , denote **prize spread** by  $\Delta = w - l$

$$\pi_i = \begin{cases} l & \text{if } q_i < q_j \\ w = l + \Delta & \text{if } q_i > q_j \end{cases}, \quad i \neq j$$

## The Agent's Problem

- agents are inequity averse with  $\alpha > \beta \geq 0$ :

$$U_i = \pi_i - c(e_i) - \alpha \max\{\pi_j - \pi_i, 0\} - \beta \max\{\pi_i - \pi_j, 0\}, \quad i \neq j$$

- in case of winning, agent  $i$  obtains:

$$U_i = w - \beta\Delta - c(e_i)$$

- in case of losing, agent  $i$  obtains:

$$U_i = l - \alpha\Delta - c(e_i)$$

- agent  $i$ 's probability of winning is:

$$\begin{aligned} \Pr(q_j < q_i) &= \Pr(e_j + \varepsilon_j < e_i + \varepsilon_i) = \Pr(\varepsilon_j - \varepsilon_i < e_i - e_j) \\ &= G(e_i - e_j) \end{aligned}$$

- accordingly, agent  $i$ 's probability of losing is:

$$\Pr(q_j > q_i) = 1 - G(e_i - e_j)$$

## The Agent's Problem

- agent  $i$ 's expected utility becomes:

$$E[U_i | e_i, e_j] = G(e_i - e_j) (w - \beta\Delta - c(e_i)) \\ + (1 - G(e_i - e_j)) (l - \alpha\Delta - c(e_i))$$

- in the Nash-equilibrium, we have  $e_i = e_j =: e$
- the f.o.c. is given by:

$$(1 + \alpha - \beta) g(0) \Delta = c'(e)$$

- $\Rightarrow$  equilibrium effort is increasing in  $\alpha$  but decreasing in  $\beta$
- $\Rightarrow$  (dis)incentive effect of envy (compassion)
- $\Rightarrow$  altogether, by  $\alpha > \beta$ , there is an **incentive effect of inequity aversion**: for given  $\Delta$ , a tournament among inequity averse agents leads to higher efforts than one among self-regarding agents

## The Principal's Problem

- in equilibrium, agents win (and lose) with probability 0.5
- they suffer a utility loss in either case
- the principal's expected wage cost per agent are:

$$C^P(e; \alpha, \beta) = c(e) + \underbrace{(\alpha + \beta) \frac{c'(e)}{2(1 + \alpha - \beta)g(0)}}_{\text{inequity premium}} + U_0$$

- ⇒ **inequity premium:** *for any given effort, the principal's expected wage cost are larger than with self-regarding agents*
- ⇒ *for  $\alpha > 0$  and  $\beta \geq 0$ , the first-best solution is never achieved*
- ⇒ *agency costs of inequity aversion lead to suboptimal efforts and profits*

## Extension: Limited Liability

- suppose that agents are wealth-constrained so that their wage must be non-negative in any state
- additional non-negativity constraint ( $l \geq 0$ )
- the expected wage costs per agent are then given by:

$$\max \left\{ \underbrace{c(e) + (\alpha + \beta) \frac{c'(e)}{2(1 + \alpha - \beta)g(0)}}_{(1)} + U_0, \underbrace{\frac{c'(e)}{2(1 + \alpha - \beta)g(0)}}_{(2)} \right\}$$

- two cases:
  - (i)  $(1) > (2)$ : the participation constraint is binding (results as before)
  - (ii)  $(2) > (1)$ : the non-negativity constraint is binding  $\Rightarrow$  agents earn an *informational rent*

## Extension: Limited Liability

- in case (ii), the expected wage costs per agent are given by  $\frac{1}{2}\Delta$ :

$$C^P(e; \alpha, \beta) = \frac{c'(e)}{2(1 + \alpha - \beta)g(0)}$$

⇒ *expected wage cost are lower with inequity averse than with self-regarding agents ( $\alpha > \beta$ )*

- intuitively, a lower prize spread is needed to induce effort, thereby reducing rent payments
- rents are paid if  $c(e) + U_0 < (1 - \alpha - \beta) \frac{c'(e)}{2(1 + \alpha - \beta)g(0)}$ 
  - if  $\alpha$  and  $\beta$  are small (utility loss due to inequity aversion is small)
  - if  $g(0)$  is small (impact of luck on the outcome of the tournament is large) → large prize spread is needed

## Extension: Joy of Outperforming

- suppose that  $\beta < 0 \rightarrow$  agent derives pleasure from being better off than his co-worker
- together with  $\alpha > 0$ , such preferences are known as competitiveness, pride, status concerns, or spitefulness
- recall the incentive constraint:

$$(1 + \alpha - \beta) g(0) \Delta = c'(e)$$

$\Rightarrow$  *agents work even harder than inequity averse agents*

- intuitively, the additional utility gain from winning provides extra work incentives

## Extension: Joy of Outperforming

- recall the expected wage costs of the principal:

$$C^P(e; \alpha, \beta) = c(e) + (\alpha + \beta) \frac{c'(e)}{2(1 + \alpha - \beta)g(0)} + U_0,$$

⇒ with  $\beta < 0$ , wage costs are smaller compared to inequity aversion

- intuitively, the expected joy of outperforming counteracts the expected loss due to envy
  - if  $\alpha > |\beta| \rightarrow C^P(e; \alpha, \beta) > c(e) + U_0 \rightarrow e^{**} < e^*$
  - if  $\alpha = |\beta| \rightarrow C^P(e; \alpha, \beta) = c(e) + U_0 \rightarrow e^{**} = e^*$
  - if  $\alpha < |\beta| \rightarrow C^P(e; \alpha, \beta) < c(e) + U_0 \rightarrow e^{**} > e^*$
- intuitively, in case (iii), the expected joy of outperforming exceeds the expected loss due to envy so that the inequity premium gets negative

## Results

- tournaments provide strong work incentives
- at the same time, they lead to large pay inequality
- for inequity averse workers, incentives are strengthened compared to self-regarding workers
- this may be beneficial for the firm when agents receive rents
- in general, however, the firm's total wage costs are increased by the presence of inequity aversion
- impact on the firm's optimal *promotion policies*
  - in vertical promotions, inequity aversion raises wage costs
  - lateral promotions may reduce the relevance of inequity aversion

## Summary

- in one-shot games, explicit incentive contracts rely on verifiable output (performance) measures
- envy and inequity aversion affect the firms' choice of optimal incentive schemes
- + *incentive effect of envy* under pay inequality
- *inequity premium* raises wage costs
- ⇒ *agency costs of inequity aversion* lead to lower profits
- group incentives rule out pay inequality
  - preferable in one-shot games with inequity averse workers
- tournaments imply the strongest degree of pay inequality
  - least desirable
- but: tournaments are contractible even if **output is non-verifiable**

# Envy in the Workplace: Relational Contracts

- assume that **output is not verifiable** (performance cannot be assessed by third parties such as a court)
- ⇒ explicit incentive contracts cannot be implemented
- however, **relational incentive contracts** (also implicit contracts) can be implemented in repeated games
- realistic for employment relationships → long-term interaction of firm and workers
- relational contracts are sustained as reputational equilibria if they are **self-enforcing**
- ⇒ **credibility constraint** requires the firm to be credible not to deviate from the agreement:
- the firm's gains from renegeing on the contract must fall short of the discounted gains from continuing the relational contract

## Overview: Credibility Problem and Payoff Inequity

	Payoff Inequity	Credibility Problem
Individual Bonus	yes (sometimes)	yes
Group Bonus	no	yes
Tournament	yes (for sure)	no

- **Question:** Which incentive scheme is optimal when output is not verifiable and workers are envious?
- firm's interest rate affects the severity of the credibility problem and hence the results

## Credibility Constraint

- we embed the initial model into an **infinitely repeated game** between a long-lived principal and an infinite sequence of two identical short-lived agents  $i = 1, 2$
  - output  $Y_i \in \{0, 1\}$  is **non-verifiable** but observed by both parties (but no outsiders)
  - the principal **promises to pay a bonus** upon good performance but the contract cannot be enforced in court
  - agents play a Grim trigger strategy (see, e.g., Baker et al. 1994)
- renegeing on the promised bonus once, destroys the principal's reputation in the labor market
- no agent will believe her to fulfill the contract in the future

## Credibility Constraint in the Individual Bonus Contract

- per-agent profits in the relational **individual** bonus contract:

$$V_I^*(r, \alpha) := \max_e V_I(e; \alpha) \quad \text{s.t. (CC)}$$

- fallback profit is zero: agents exert zero effort if trust is broken
- continuation profit: present value of per-period profits
- $r$  denotes the principal's interest rate

⇒ *credibility constraint:*

$$b(e; \alpha) \leq \frac{V_I(e; \alpha)}{r} \quad \text{(CC)}$$

→ for given effort, a small interest rate, a small bonus, and a high per-period and worker profit soften the constraint

⇒ *impact of envy on credibility is ambiguous:*

- + incentive effect of envy facilitates credibility
- inequity premium effect impedes credibility

## Credibility Constraint in the Individual Bonus Contract

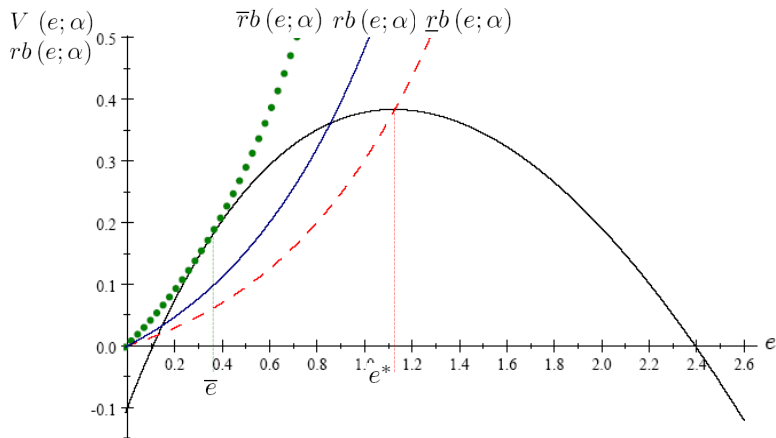
⇒ interpretation of the principal's interest rate  $r$ :

- opportunity cost (discount rate)
- measure of patience, dependency, or trust (Hart 2001)
- interpretation in terms of the likelihood that the firm disappears from the market (economic stability, market prospects)

$$rb(e; \alpha) \leq V_I(e; \alpha) \quad (\text{CC})$$

- $r \leq \underline{r}$  : (CC) is not binding → principal implements the same contract as under verifiability
- $\underline{r} < r \leq \bar{r}$  : (CC) is binding → principal implements lower effort to reestablish credibility and profits decrease
- $r > \bar{r}$  : (CC) cannot be satisfied any longer → relational contracts are infeasible and profits drop to zero

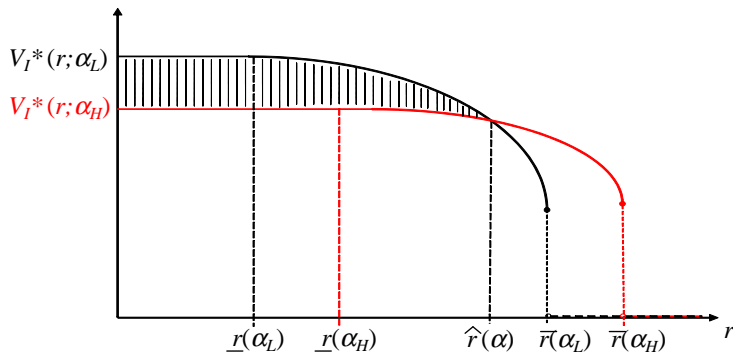
## Credibility Constraint in the Individual Bonus Contract



## Results: Envy in the Individual Bonus Contract

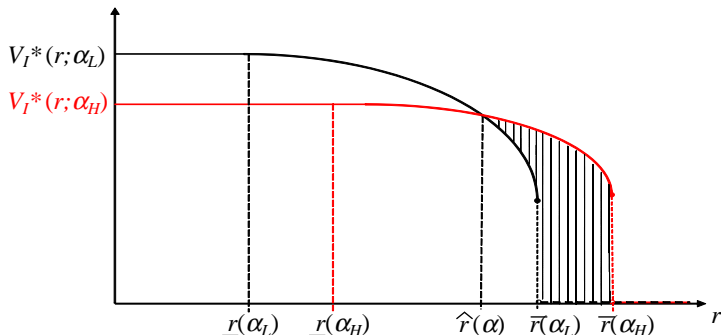
- in the foregoing figure, both curves shift downwards as  $\alpha$  increases
  - it can be shown that, under some condition, it holds  $d\bar{r}/d\alpha > 0$
- ⇒ the interest rate for which relational contracts become infeasible is increasing in envy
- ⇒ *envy has a credibility-enhancing effect if*
- incentive effect outweighs inequity premium effect
  - $V_I(e; \alpha)$  reacts less strongly to an increase in envy than  $b(e; \alpha)$
  - precision of the output signal is large
  - elasticity of effort costs is small
- 
- in the following figures, it holds that  $d\bar{r}/d\alpha > 0$
  - let  $\alpha_H > \alpha_L$

## Profits in the Relational Individual Bonus Contract



⇒ For a range of sufficiently small interest rates, the situation resembles that under verifiability; the principal is better off with less envious (or self-regarding) agents.

## Profits in the Relational Individual Bonus Contract



⇒ For any interest rate  $r > \hat{r}(\alpha)$ , the principal is (weakly) better off with more envious agents.

## Credibility Constraint in the Group Bonus Contract

- per-agent profits in the relational **group** bonus contract:

$$V_G^*(r) := \max_e V_G(e) \quad \text{s.t. } (CC_G)$$

- in the **group scheme**, the firm is credible if and only if:

$$\max\{B, B + \Delta\} \leq \frac{V_G(e)}{r} \quad (CC_G)$$

→ *optimal credibility-constrained group scheme:*

- scheme with lowest maximum bonus among all possible  $(B, \Delta)$
- depending on  $p(e)$ , the principal sets:
  - either  $(0, \Delta)$ : pays a bonus only if both agents are successful or
  - $(B, 0)$ : pays a bonus if at least one agent is successful

## Credibility Constraint: Individual vs. Group Bonus Contract

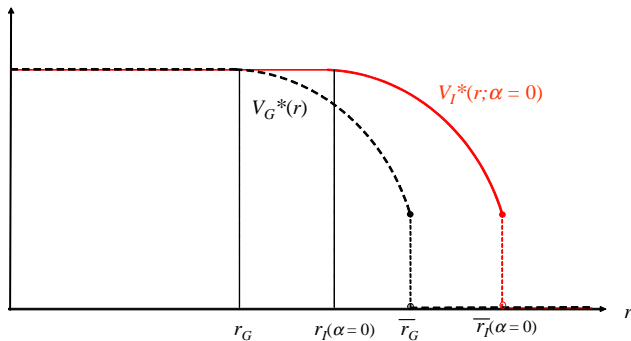
*lhs (bonus):*

- for any  $e, \alpha \geq 0$ , the size of the incentive-compatible group bonus exceeds the size of the individual bonus
- the difference is increasing in  $\alpha$
- *intuition:*
  - (i) free-rider effect:  $B, \Delta > b$  even if  $\alpha = 0$
  - (ii) incentive effect of envy:  $b$  is decreasing in  $\alpha$

*rhs (continuation profits):*

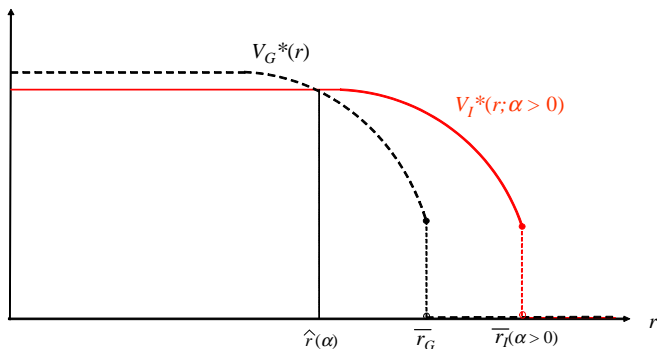
- for  $\alpha = 0$ , profits coincide (first-best)
- for  $\alpha > 0$ , profits in the individual bonus contract fall below those in the group bonus contract
- *intuition:* inequity premium effect of envy

## Individual vs. Group Bonus Contract: Self-Regarding Agents



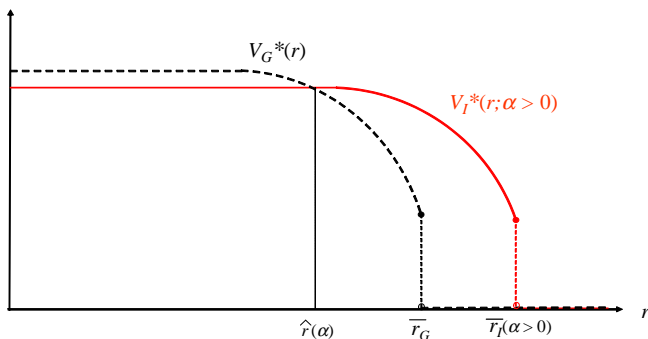
⇒ For  $\alpha = 0$ , the principal (weakly) prefers the individual bonus contract to the group bonus contract for any  $r$ .

## Individual vs. Group Bonus Contract: Envious Agents



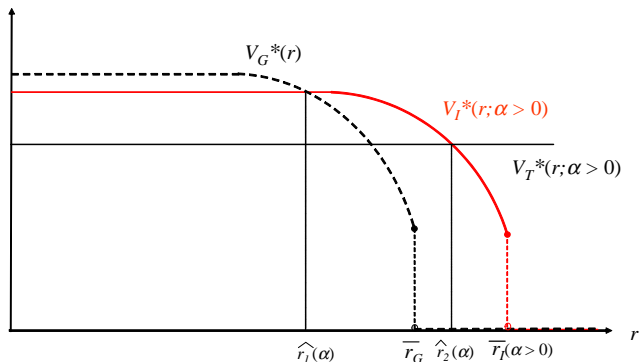
⇒ For  $\alpha > 0$ , the principal is better off using a group bonus for a range of sufficiently small interest rates.

## Individual vs. Group Bonus Contract: Envious Agents



⇒ For  $\alpha$  small, the principal is (weakly) better off with an individual bonus scheme for any  $r > \hat{r}(\alpha)$ . The result extends to large  $\alpha$  if  $d\bar{r}/d\alpha > 0$ .

## Individual vs. Group Bonus vs. Tournament: Envious Agents



⇒ For  $\alpha > 0$  and sufficiently high interest rates, the principal realizes positive profits only with the tournament contract.

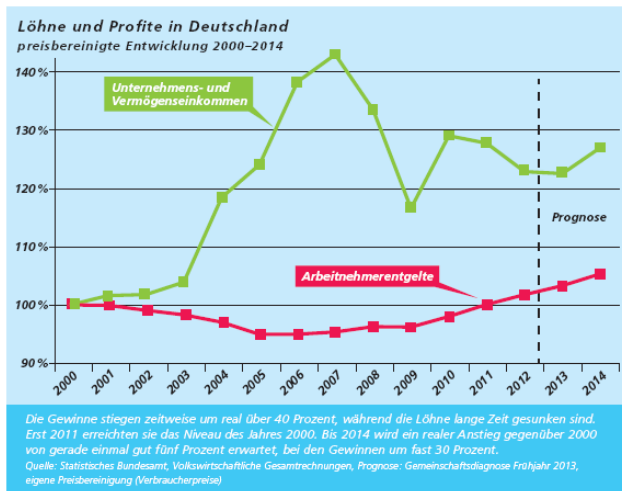
# Envy in the Workplace: Further Results

- in a **more general model** with unconstrained  $b_{Y_i Y_j}$ , pay inequality is measured by  $(b_{10} - b_{01})$ 
  - captures the foregoing models as special cases
  - yields richer but qualitatively the same results
- results extend to **inequity aversion** (recall that  $\alpha \geq \beta$ )
  - incentive effects is weakened (by compassion)
  - inequity premium is raised (additional disutility of compassion)
  - pay inequality is less likely to facilitate relational contracts
- results are strengthened by **joy of outperforming** ( $\beta < 0$ )
  - incentive effect is increased
  - inequity premium is reduced (utility of outperforming counteracts disutility of envy)
  - pay inequality is more likely to facilitate relational contracts
  - if  $\alpha < |\beta|$ , pay inequality unambiguously facilitates relational contracts

- results extend to **limited liability** of workers (wealth constraints)
  - if workers earn rents, size of the rent determines wage costs and continuation profits
  - envy yields smaller incentive pay, smaller rents, and higher profit
- pay inequality unambiguously facilitates relational contracts

# Inequity Aversion in Vertical Bargaining

## Wages vs. Profits in Germany



# Inequity Aversion in Vertical Bargaining

**Supersize our wages! Hundreds of fast-food industry workers across the U.S. join strike demanding \$15 an hour pay.**



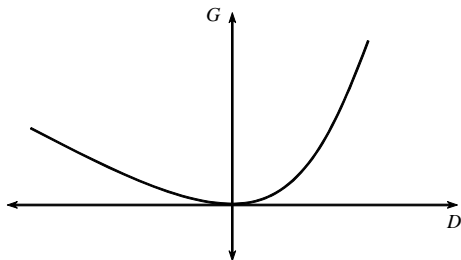
"The workers want to form unions [...] and bargain for more money. [...] a community organizer in St. Louis, said local employees of McDonald's and Wendy's can't make it on the salaries. 'Unless we can figure out how to make highly profitable companies pay a fair wage to their workers, we're just going to watch them pull all the blood, sweat, tears and money out of our communities.' [...] the so-called 'McJobs' [...] are known for their low pay and limited prospects. In contrast, McDonald's profits totaled \$5.47 billion in 2012." [Reference: Daily Mail (online), 29 August 2013]

# Inequity Aversion in Vertical Bargaining

## The Model

- one-shot game between firm and worker
- worker dislikes net income differences  $D$  for any output level  $Q$ :

$$U(Q, W, e) = W - c(e) - \gamma G(D)$$



- $D = [Q - W] - [W - c(e)]$
- $G(D)$ : disutility due to inequity aversion (asymmetric)
- $\gamma$ : worker's individual propensity for inequity aversion

## Main Results

1. the **welfare-maximizing contract** stipulates an equal sharing rule for any output produced (note the difference to the first-best contract with self-regarding workers)
2. the **profit-maximizing contract** (take-it-or-leave-it offer) solves a trade-off regarding expected wage costs:
  - higher pay directly raises wages costs but indirectly lowers them by reducing the inequity premium
  - optimal contract leads to agency costs of inequity aversion
3. the **optimal contract with Nash-Bargaining**:
  - leads to a **more egalitarian distribution of surplus** than bargaining with self-regarding workers
  - leads to higher total welfare than the profit-maximizing contract
  - approaches the welfare-optimal contract as the parties' bargaining power converges

## Idea

- until now:
  - interpersonal comparisons
  - impact of inequity aversion on contracts, effort, and welfare at the micro level
- motivated by the growing interest in inequality triggered particularly by Piketty (2014), we consider a new dimension
- potential **societal impact of attitudes towards inequality**
  - we look at **relative societal rankings**
  - initial **wealth** matters for the (dis)utility effects of inequality
- ⇒ people care about their **income and wealth** relative to the economy's **average**

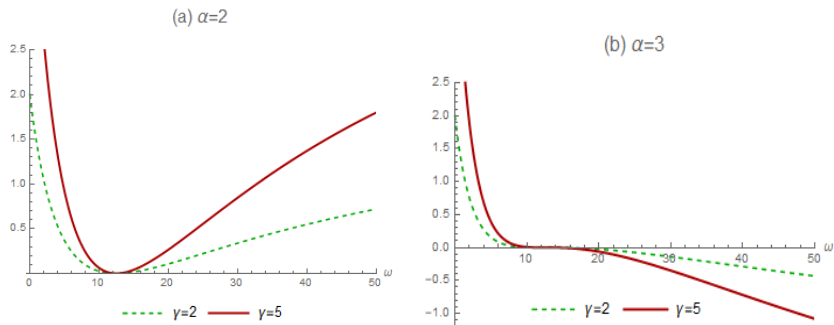
## Inequality Preferences

- we specify a person's **disutility of inequality** as:

$$f(\omega, \Omega) = \gamma \left( \frac{1 - \left(\frac{\omega}{\Omega}\right)}{1 + \left(\frac{\omega}{\Omega}\right)} \right)^\alpha, \quad \alpha \in \mathbb{N}$$

- $\omega$  is the person's total ex-post wealth (including income)
- $\Omega$  is the societal average ex-post wealth
- $\gamma \geq 0$  reflects the sensitivity towards inequality
- $\alpha$  captures the type of preference:
  - (a) an even  $\alpha$  reflects **inequality aversion**
  - (b) an odd  $\alpha$  represents **competitiveness**

## Inequality Preferences



⇒ attitude towards inequality is *endogenously asymmetric*:  
a given income difference affects persons with income below average  
more than those with income above average

## Questions

- How do such attitudes affect economic performance (e.g. GDP)?
- Do societies characterized by inequality aversion generate dynamic forces that help reduce inequality?

## The Model

- simple static general-equilibrium model
  - economy is populated by firms and workers
  - moral-hazard environment with individual incentive contracts
  - workers have the same preferences but differ in their initial wealth (poor, rich)
- ⇒ (dis)utility effects of inequality are more pronounced for the poor
- important: inequality preferences are valid when employed or *unemployed* ⇒ outside option becomes endogenous

## Results (work in progress)

- ⇒ inequality aversion tends to generate **even more inequality** but leads to higher output and firm profits (also true for competitive preferences)
- the poor work always harder than the rich but earn always lower wages
- compared to self-regarding workers, the **envious poor** work harder and **turn out to be cheaper to employ**
- the rich work harder if competitive but less if inequality averse
- the rich become cheaper to employ if competitive but more expensive if inequality averse (but less so than the envious poor)
- under utilitarian social preferences, “perfect” redistribution is welfare-enhancing for both types of preferences
- however, **the rich oppose redistribution** in either case; even when inequality averse they prefer to keep their wealth rather than give it to the poor

- **efficient design of labor contracts** is affected by different dimensions of the employment relationship
  - social preferences
  - available performance measures and incentive contracts
  - opportunity costs of the firm and employment duration
- **joint performance pay** is more effective:
  - in the presence of fairness concerns
  - when explicit contracts are possible
  - in relational contracts in stable industries or long-term employment
- **individual or relative performance pay** are more effective:
  - if relative pay comparison is not relevant
  - if relational contracts are important due to non-verifiability problems
  - when firms are subject to credibility problems
- incentive pay does not only raise work motivation but also **redistributes productive surplus** to workers, thereby meeting fairness concerns

- definition of other-regarding preference across people and relationships
    - type, strength, heterogeneity
  - relevance of context
    - social, cultural, institutional context
    - reference group
    - social distance (friends, relatives, co-workers, bosses, strangers)
- are the deviations from rationality and pure self-interest large and systematic enough to generally apply new decision theories?
- how can these models be applied systematically?
- implications for wage policies and transparency
  - implications for organizational architecture
  - implications for welfare and regulation

# Thank you for your attention!

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