

## 출장복명서

기업생태계연구본부 기업제도연구실  
신위뢰

1. 출장자: 신위뢰 부연구위원
2. 출장지: 미국 Boston(MA), State College(PA)
3. 과제명: 모바일 플랫폼 도입으로 인한 시장 구조의 변화분석  
- 양면시장을 중심으로
4. 출장목적: 국제산업조직학회 컨퍼런스(IIOC) 발표 및 참관, 경쟁정책  
전문가 면담
5. 출장일: 2017년 4월 3일-2017년 4월 11일

일정	장소	목적
4월 3일 -4월 3일	인천/뉴욕	세종-인천공항-뉴욕 도착 (JFK)
4월 4일 -4월 6일	State College, PA	State College, PA 로 이동 전문가(Ed Green, Robert Marshall, Vijay Krishna, John Riew) 면담 (4/5-4/6은 듀크대학의 Leslie Marx 교수 외 2명 면담이었으나, Marx 교수의 사정(미국 경쟁당국 재판 스케줄 변경)으로 인하여 인터뷰가 불가능하여, 공저자인 Robert Marshall 교수를 소개받고, 스테이트 컬리지 일정을 연장함.)
4월 7일 -4월 9일	Washington DC/인천	스테이트컬리지-보스턴 이동 전문가 면담(Mark Roberts, Heiko Karle), IIOC 발표 및 토론, 참관
4월 9일 -4월 11일	보스턴/인천	보스턴(4/9 오후)-인천공항(4/11 아침)-세종

## 6. 주요내용

### □ 경쟁정책 일반

- 경쟁정책과 관련된 연구 및 실무를 하는 미국 전문가들은 한국의 관련 이슈 및 구체적인 사례에 대해 follow-up하고 있었음. 이러한 타국의 사례들이 미국의 해외기업 규제에 쓰일 수 있다고 함.

- 국내기업들의 상품가격(예: 라면) 담합
- 대기업들의 합병과 관련한 정부의 판단

- Multi product-firm 과 관련한 경쟁정책 연구가 주목받게 될 것.

- 기존의 연구들은 single product-firm 에 집중되어 있음. 그러나 현재 antitrust 상황은 많은 경우 multi-product firm 과 관련되어 있음. multi-product firm들은 single product-firm과 달리 국내/국외 적으로 매우 새로운 경쟁정책 이슈들을 불러일으킴:

예) 다양한 경우의 수의 Leverage, merger에 대한 기준

- <multi-product firm>의 정의부터 시작하여, 이와 관련한 새로운 경제적 분석들이 필요함.

- 기업합병 연구와 관련하여 새로운 패러다임이 필요함.

- ex-ante 에 관한 정책이 충분히 credible하지 않음. 그 주된 이유는 기업의 commitment/liability issue가 있기 때문.

- 경제력 집중을 얘기할 때 각 시장/산업에서의 기업의 집중도뿐만 아니라, 기타 여러 가지 거시 경제 지표들을 활용할 수 있음.

- employment by firm size
- payroll by firm size
- Gini coefficients for each time period

#### □ 플랫폼 경쟁

○ 플랫폼에서 판매자들의 경쟁도는 플랫폼 자체의 시장구조를 결정하는 주요한 변수가 될 수 있음.

- 판매자들의 경쟁이 심하지 않은 경우, 하나의 플랫폼으로 모이는 tipping 현상의 균형이 발생함. 따라서 이러한 경우 플랫폼의 독점화가 가속될 수 있음.
- 판매자들의 경쟁이 심한 경우, 판매자들은 여러개의 플랫폼으로 나누어져서 활동하게 되고, 각각의 플랫폼에서 판매자들이 독점적인 지위를 가지게 되는 균형이 존재함. (판매자들의 경쟁이 moderate 한 경우에는 mixed strategy eqm이 존재함.

#### □ IIOC 발표 및 토론

\* 다음 페이지에 슬라이드 첨부

## Examples of Discrimination

### Discrimination in Organizations: Optimal Contracts and Regulation

Wiroy Shin

KIET

April 2017

- ▶ Eliminating employment discrimination has been a high-priority policy goal in the U.S. for 50 years.
  - Civil Rights Act of 1964

#### Discrimination Lawsuits in the U.S.

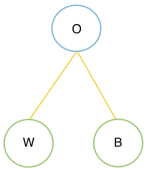
- ▶ Coca-Cola (2000) No.58 in Fortune 500
  - Racial discrimination - \$192 million (settlement cost)
- ▶ Bank of America (2013) No.21 in Fortune 500
  - Gender discrimination - \$39 million

This paper diagnoses the phenomenon and proposes contractual and regulatory solutions to ameliorate the situation.

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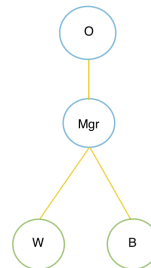
## Discrimination in Organizations



- ▶ Existing economic models of discrimination
  - Becker (1957), Coate and Loury (1993), Peski and Szentes (2013)
  - Models for a sole proprietorship with production workers (two level hierarchy)
  - Baseline models for small organizations

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## Discrimination in Organizations



- ▶ The owner delegates to the manager
- ▶ Information gap between the owner and the manager: productivity of workers, the manager's type (fair or discriminatory?)
- ▶ Discrimination arises from an Agency problem — This can't be analyzed by the two-level hierarchy model.

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## Contribution of this paper

1. The first paper studying discrimination in hierarchical organizations – what can be done inside and outside of the organizations to ameliorate the situation?
  - a. How can the manager be controlled by contractual arrangements? – Gap Projection Mechanism
  - b. Does the optimal contract achieve the first-best (complete fairness and efficiency)? – No
  - c. If not, can regulations help? - Yes, but badly designed regulation could be counter-productive .

#### Related Literature

- ▶ Taste-based discrimination: Becker (1957), Stiglitz (1973)
- ▶ Statistical discrimination: Phelps (1972), Coate and Loury (1993)
- ▶ Winter (2004), Peski and Szentes (2013)

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## Contribution of this paper

2. Distinct features of the screening problem and the solution
  - ▶ Multidimensional decisions and private information
  - ▶ Sequential and partial information revelation to principal
  - ▶ No information-aggregation
  - ▶ Existence of tractable solutions

#### Related Literature

- ▶ Rochet and Stole (2003)
- ▶ Courty and Li (2000), Krämer and Strausz (2015), Hart et al. (2015)
- ▶ Armstrong (1996), Biais et al. (2000)

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**How to solve?**

- ▶ Direct mechanism (Myerson, 1981) - The manager reports his private information to the owner, and the owner decides rules: whom to promote  $Q(\cdot)$  and a payment level of the manager  $P(\cdot)$ .

**Applications**

- ▶ favoritism in public procurement, resource allocations to subordinate institutions, corporate governance

- ▶ Part 1  
Optimal mechanisms in laissez-faire environment  
Analysis on regulation
- ▶ Part 2  
Legal status of the optimal mechanism and its implementation

Model

Timeline

1. The owner specifies a contract:  $\langle Q, P \rangle$ .
2. The manager (but not the owner) knows his own discriminatory preference type  $\theta$ , and observes each worker  $i$ 's productivity:  $x_B, x_W$ .
3. The manager reports this productivity information  $z_B, z_W$  to the owner including information regarding his personal discriminatory preference on the workers  $t$ .
4. The owner promotes one worker  $Q(t, z_B, z_W)$  and observes the output (perfectly correlated with the productivity) of the promoted worker  $x_{Q(t,z)}$ . However, she remains ignorant about the worker who was not promoted and the type of the manager.
5. The owner compensates the manager according to the contract:  $P(t, z_B, z_W; x_{Q(t,z)}) \in [0, x_{Q(t,z)}]$

Assumptions

**Productivity**

- ▶  $x_i$ , is i.i.d drawn from  $X_i = [0, \bar{\zeta}] \sim f_i$  (pdf)
- ▶  $x = (x_B, x_W) \sim f$  (pdf),  $\mu$  (measure)

**Discrimination coefficient**

If the manager is discriminatory, and the promoted worker's identity is  $B$ , the manager earns disutility equivalent to  $d$ .

- ▶  $\theta \in \{0, d\} \sim \nu$  (pmf)

**No outside options**

The owner cannot fire the manager nor can the manager refuse to provide the reports about  $\theta$  and  $x$ .

Utility

**Owner's profit**

$$\pi(t, z; x) = x_{Q(t,z)} - P(\xi_Q(t, z; x)) : \text{outcome} - \text{payment}$$

**Manager's utility**

$$u(t, z; \theta, x) = P(\xi_Q(t, z; x)) - d \cdot \mathbb{1}_{Q(t,z)=B} \cdot \mathbb{1}_{\theta=d} : \text{payment} - \text{discrimination coefficient}$$

**Incentive Compatibility condition**

The manager cannot achieve higher utility by lying about the workers' productivity levels and his discrimination type.

$$\forall \theta, t \in \Theta \text{ and } \forall x, z \in X,$$

$$P(\xi_Q(\theta, x; x)) - d \cdot \mathbb{1}_{Q(\theta,x)=B} \cdot \mathbb{1}_{\theta=d} \geq P(\xi_Q(t, z; x)) - d \cdot \mathbb{1}_{Q(t,z)=B} \cdot \mathbb{1}_{\theta=d}$$

## The owner's optimization problem

The owner's optimization problem is choosing the optimal  $Q$  and  $P$  to **maximize the expected profit**, subject to the **incentive compatibility constraint**. That is,

$$\max_{Q,P} \sum_{\theta \in \Theta} \int_{x \in X} \nu(\theta) \cdot f(x) \cdot \pi(\theta, x; x) dx$$

s.t.  $u(\theta, x; \theta, x) \geq u(t, z; \theta, x) \quad \forall \theta, t \in \Theta \text{ and } \forall x, z \in X.$

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Profit-max mechanism  
when the manager's discriminatory preference is  
private information  
 $\nu(d) \in (0, 1)$

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## Unconditional mechanism when $W$ is always promoted ( $\lambda = 0$ )

A mechanism  $\langle Q^\lambda, P^\lambda \rangle$  is an **unconditional mechanism**, if it promotes  $B$  with probability  $\lambda \in [0, 1]$  and pays zero to the manager regardless of the manager's reports and the owner's information state.

	$i = B$	$i = W$
$t = 0$	$(\emptyset, 0)$	$([0, 1] \times [0, 1], 0)$
$t = d$	$(\emptyset, 0)$	$([0, 1] \times [0, 1], 0)$

Table: Allocation rule and Payment

Unconditional mechanism is incentive compatible.

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## Delegation Mechanism

The manager always promotes  $W$  if he is discriminatory. If he is not discriminatory, the manager follows the first-best allocation rule.

	$i = B$	$i = W$
$t = 0$	$(z_B > z_W, 0)$	$(z_B < z_W, 0)$
$t = d$	$(\emptyset, 0)$	$([0, 1] \times [0, 1], 0)$

Table: Allocation rule and Payment

Delegation mechanism is incentive compatible.

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## Projection Mechanism: B-bar projection mechanism

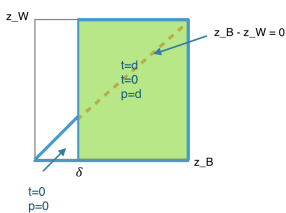


Figure: Productivity Region for  $B$ 's promotion

- If the manager reports that he is **discriminatory**, the owner selects  $B$  when  $B$ 's productivity is higher than threshold  $\delta$  and pays  $d$  to the manager.
- If the manager reports that he is **fair**, the owner first selects  $B$  based on the **rule above**, and pays  $d$  to the manager. If  $B$ 's productivity is less than  $\delta$ , then two worker's productivities are compared to each other.

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## Projection Mechanism: W-bar projection mechanism

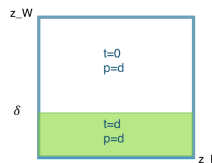


Figure: Productivity Region for  $B$ 's promotion

- If the manager reports that he is **discriminatory**, the owner selects  $B$  when  $W$ 's productivity is less than threshold  $\delta$  and pays  $d$  to the manager.
- If the manager reports that he is **fair**, the owner always selects  $B$ , and pays  $d$  to the manager.

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## Projection Mechanism: Gap projection mechanism

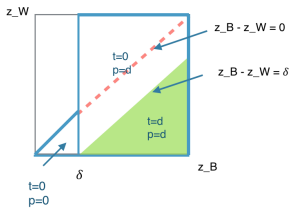


Figure: Productivity Region for  $B$ 's promotion

- ▶ If the manager reports that he is **discriminatory**, the owner selects  $B$  when the two workers' productivity **gap** is higher than threshold  $\delta$  and pays  $d$  to the manager.
- ▶ If the manager reports that he is **fair**, the owner first selects  $B$  when  $B$ 's productivity is higher than threshold  $\delta$ , and pays  $d$  to the manager. When  $B$ 's productivity is less than threshold  $\delta$ , then two workers' productivities are compared.

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## Profit-max Mechanism

### Theorem 2

Depending on parameters (e.g., distributions on the worker's productivity, the manager's preference type), the profit-max mechanism is either Projection mechanism or Delegation mechanism.

## Proof

1. The three mechanisms (Unconditional, Delegation, Projection) are incentive compatible.
2. No other mechanisms are incentive compatible
3. Unconditional mechanism is dominated by other two mechanisms in terms of expected profit.
4. The optimal mechanism is either Projection mechanism or Delegation mechanism.

## Example: $x_i \sim \text{Uniform}[0, 1]$ and $d = 0.2$

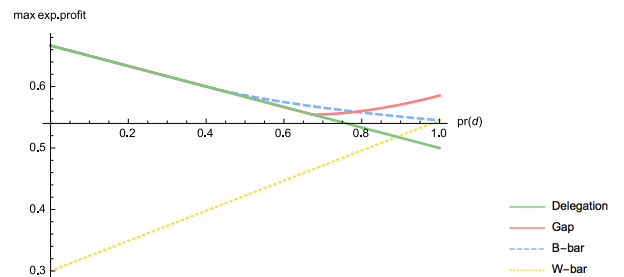


Figure: Maximum expected profits of the four mechanisms: Delegation, Gap, B-bar, and W-bar

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## Example: $x_i \sim \text{Uniform}[0, 1]$ and $d = 0.2$

$\nu(d) = 0.9$	Delegation	Gap	B-bar	W-bar
Maximum profit	0.516	0.570	0.551	0.520
Optimal threshold		0.270	0.726	0.300
$\nu(d) = 0.5$				
Maximized profit	0.583	0.583	0.585	0.422
Optimal threshold		1.000	0.904	0.300
$\nu(d) = 0.1$				
Maximized profit	0.650	0.650	0.650	0.3245
Optimal threshold		1.000	1.000	0.300

Table: Maximum expected profit and optimal threshold

## Legal issues in treatment of the manager

Communication between the owner and the manager:

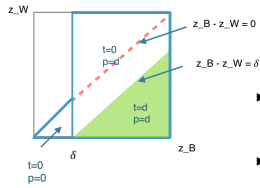
- ▶ Is it legal to ask about the manager's personal characteristic regarding bias?
  - ▶ No actual harassment is involved.
  - ▶ The manager is not punished from revealing his true type. He rather receives a bonus
- ▶ Legal view and economic view might not match: in that case, another communication method (e.g. indirect questions obtaining the same information) should be designed.

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## Gap Projection Mechanism: Legal issues



- ▶ Imperfectly protected  $B$ : it does not 100% avoid direct discrimination.
  - Paper trails for the promotion rule  $\Rightarrow$  EEO violation; possible civil litigation
- ▶ Reverse Discrimination: - Banding and Additional point category
- ▶ Communication issues between the owner and the manager

Is there an equivalent way to implement the allocation and payment minimizing possible litigation cost?  
 Otherwise, should the owner choose non-optimal mechanism (e.g. randomization)?

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## Alternative to Gap Projection Mechanism

- The owner asks the manager only about the two workers' productivity levels.
- A worker with higher reported productivity is promoted (if  $z_i > z_j$ ). The manager receives  $d$  only if the owner observes the promoted  $B$ 's productivity ( $x_B$ ) is higher than  $\delta$ .

The truthful reporting equilibrium outcome of the Gap Projection Mechanism can be obtained with an untruthful reporting equilibrium of the alternative mechanism.

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## Alternative Mechanism

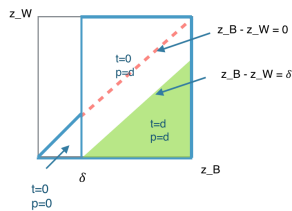


Figure: Productivity Region for  $B$ 's promotion in Gap Projection Mechanism

- ▶ If he is **discriminatory**, he reports productivity values with  $[z_B > z_W \text{ s.t. } z_B = x_B]$  when the true productivity gap exceeds  $\delta$  ( $x_B - x_W > \delta$ ), and reports  $[z_W > z_B \text{ s.t. } z_W = x_W]$  if  $x_B < \delta$ .
- ▶ If the manager is **fair**, he reports productivity information truthfully only if  $x_B < \delta$ . If  $x_B > \delta$ , he always reports  $[z_B > z_W \text{ s.t. } z_B = x_B]$  to earn the bonus  $d$  regardless of the true productivity difference  $x_B - x_W$ .

Regulation

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## Policy Implementation

- Suppose that the firm owns a nonatomic continuum of identical branches, where each branch has its own manager with the single promotion decision problem.
- A regulator can observe the aggregate promotion result of the firm, the ratio of  $B$  workers in the promotion.
- By Law of Large Numbers, from the allocation rule  $Q$ , the owner can perfectly forecast the ratio of  $B$  workers in the promotion.
- The regulator wants such ratio to be  $r$ . If the firm fails to achieve the threshold, there is a levy  $\tau$ .

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## Owner's problem under regulation

The promotion ratio of  $B$  with a mechanism  $\langle Q, P \rangle$  is

$$\rho(Q) = \nu(d) \cdot \mu(\chi_B^d(Q)) + (1 - \nu(d)) \cdot \mu(\chi_B^0(Q)).$$

Given  $(r, \tau)$ , the owner's optimization problem changes as follows combining the laissez-faire profit  $\pi(\theta, x; x)$  and the regulatory penalty  $\tau$ .

$$\max_{Q, P} \sum_{\theta \in \Theta} \int_{x \in X} \nu(\theta) \cdot f(x) \cdot \pi(\theta, x; x) dx - \tau \cdot 1_{(\rho(Q) \neq r)}$$

$$\text{s.t. } u(\theta, x; \theta, x) \geq u(t, z; \theta, x) \quad \forall \theta, t \in \Theta \text{ and } \forall x, z \in X.$$

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## Unfairness

Given an arbitrary allocation rule  $Q$ , **unfairness of the allocation rule  $Q$**  is defined as follows:

$$\phi(Q) = \sum_{t \in \{0,d\}} \nu(t) \cdot [\mu(x_W > x_B | x \in \chi_B^t(Q)) \cdot \mu(\chi_B^t(Q)) + \mu(x_B > x_W | x \in \chi_W^t(Q)) \cdot \mu(\chi_W^t(Q))].$$

The measure evaluates frequency of discriminatory incidents: given an allocation rule  $Q$ , worker  $j$  is promoted even though worker  $i$ 's productivity is higher than worker  $j$ 's productivity.

### Lemma 17

Given an arbitrary  $r \in (0, 1)$ , Unconditional mechanism is more unfair than other incentive compatible mechanisms (Projection, Delegation).

$$\max\{\phi(Q^c), \phi(Q^0)\} < \phi(Q^{\lambda=r}).$$

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## Results

- ▶ Regulators (e.g. EEOC) can enforce an organization to promote worker  $B$  as much as they want. – Theorem 3, Corollary 4 e.g., Gap Projection Mechanism
- ▶ However, such policy decisions need caution. – Theorem 4 and Example 5
- ▶ A regulation can induce undesirable negative side effects: high frequency of unfair events by choosing a less expensive method. (by randomization) – Lemma 15 and 17

## Conclusion

- a. What the owner can do best to reduce the discriminatory decisions without compromising the firms profit - **Importance of providing incentives reducing the bias**
  - b. Do profit maximizing decisions by the owner mitigate the manager's discretion completely, **partially**, or not at all?
2. A regulation can improve on the best laissez-faire allocation in terms of the promotion ratio in minority workers. However, it can lead to more unfair situations when it's too aggressive.

Thank you!

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## Legal Issues on Implementation

### The core statutes

The Civil Rights Act of 1964 is the main law prohibiting discrimination in employment opportunities (Title VII; e.g. hiring, job assignments, promotions, pay and benefits, and discharge) and educational opportunities (Title IV; e.g. college admission).

*“Title VII of the Civil Rights Act of 1964 (Title VII) makes it unlawful to discriminate against someone on the basis of race, color, national origin, sex or religion. The Act also makes it unlawful to retaliate against a person because the person complained about discrimination, filed a charge of discrimination, or participated in an employment discrimination investigation or lawsuit.”*

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## Affirmative action

Affirmative action measures can be adopted in three circumstances

1. Voluntary affirmative action
2. Court-ordered affirmative action
3. Affirmative action for under-represented minorities and women in workplaces of contractors of the federal government

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## Weber test

1. There must be a manifest imbalance in the relevant workforce.
2. The plan cannot unnecessarily trammel the rights of non-beneficiaries.
3. The plan must be temporary, seeking to eradicate traditional patterns of segregation.

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## Legal cases in the U.S. and their implications

- ▶ Layoff or replacement trammel the rights of non-beneficiaries.
- ▶ Quotas are generally not allowed, but exception exists in court-ordered affirmative action.
- ▶ Preferential treatment can be used: different cutoff levels are not allowed, but demographic identity can be used as an additional point category. Banding (e.g. test scores are categorized by ranges and compared by the category) might be allowed, but point boosting is not allowed.
- ▶ Improving diversity can be part of goals of educational institution. However, in workplaces, a justification of an operational need for diversity is limited without evidence of past discrimination.

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## Gap Projection Mechanism

The Gap Projection Mechanism has affirmative action components and ameliorates the discriminatory outcome of the status quo.

- ▶ it provides a bonus to the manager for promoting  $B$  when conditions are met.
- ▶ compared to the status quo, it increases a promotion ratio of  $B$ .

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## One-type case on the manager's personal type

Profit-max Mechanism  
when the manager's discriminatory  
characteristic is known by the owner  
 $\nu(d) = 1$

▶ Incomplete info

The study on the one-type case helps to understand the two-types case in two ways:

1. It provides necessary conditions for the optimal mechanism of the two-types case
2. The optimal mechanism of the one-type case can be a simple alternative improving the status quo of the two-types case.

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## Full information(first-best) allocation

Suppose that no information gap exists between the manager and the owner. The manager must report  $z = x$ . Then, The owner doesn't need to pay any information rent to the manager and she can promote whoever has higher productivity.

$$\begin{aligned} Q^F(z) &= B, & \text{if } x_B > x_W \\ Q^F(z) &= W, & \text{if } x_B < x_W \\ P^F(\xi_Q(z, x)) &= 0. \end{aligned}$$

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## Full information allocation

### Expected profit

$$E[\pi(\cdot; Q^F, P^F)] = E(\max\{x_B, x_W\})$$

### Probability of B's promotion

$$\text{pr}(x_B > x_W) = \frac{1}{2}$$

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## Unconditional mechanism

$$\begin{aligned} \forall z \text{ and } \forall \xi_Q(z, x), \quad Q^\lambda(z) &= B \quad \text{with probability } \lambda \\ Q^\lambda(z) &= W \quad \text{with probability } 1 - \lambda, \text{ and} \\ P^\lambda(\xi_Q(z, x)) &= 0. \end{aligned}$$

- ▶  $E[\pi(\cdot; Q^\lambda, P^\lambda)] = \lambda \cdot E(x_B) + (1 - \lambda) \cdot E(x_W) = E(x_i)$
- ▶ Any unconditional mechanism is incentive compatible.
- ▶  $\langle Q^\lambda, P^\lambda \rangle$  with  $\lambda = 0$  represents the status quo, where the owner does not provide any incentive, and the manager always promotes  $W$ .

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## Profit-max mechanism

### Detectable Lie

An owner's informational state  $\xi_Q(z, x) = (z_B, z_W, x_{Q(z)})$  is a **detectable lie** if  $x_{Q(z)} \neq z_{Q(z)}$ .

Suppose that the manager reports ( $z_B = 0.5, z_W = 0.7$ ) when ( $x_B = 0.9, x_W = 0.4$ ), and the owner promotes  $W$ . After promotion, the owner realizes an output  $x_{Q(z)} = 0.4 \neq z_W$ . In this case, the lie is detected.

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## Profit-max mechanism

### Lemma 2

WLOG, the optimal mechanism punishes the detectable lie by giving the minimum level of compensation to the manager.

### Lemma 3

If two reports (one true and one false) produce the same outcome, then a payment scheme should treat them equally in a set of incentive compatible mechanisms.

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## Profit-max mechanism

### Lemma 4

If some available deviation leads to  $W$  to be promoted, in order to select  $B$ , the owner must at least compensate the manager as much as the discrimination coefficient  $d$ .

### Lemma 5

Except the detectable lies, the optimal payment rule depends only on the identity of the promoted worker, not on the performance of the worker.

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## Profit-max mechanism

### Theorem 1 - the owner's profit max mechanism

**Profit maximization** subject to the owner's limited information, and to the manager's incentive compatibility constraints, is achieved by the following arrangement.

1. If the manager reports a productivity gap ( $z_B - z_w$ ) exceeds  $d$ , then the owner promotes  $B$ .
2. If the owner observes productivity different to what the manager promised, then she pays the manager 0 (detectable lie).
3. Otherwise,  
If the owner promotes  $B$ , she pays  $d$  to the manager.  
if the owner promotes  $W$ , she pays 0 to the manager.

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## Profit-max Mechanism

### Expected profit

$$\begin{aligned} E[\pi(\cdot; Q^*, P^*)] &= E(\max\{x_W, x_B - d\}) \\ &> E(x_W) = E[\pi(\cdot; Q^{\lambda=0}, P^{\lambda=0})] \end{aligned}$$

### Probability of $B$ 's promotion

$$0 < \text{pr}(x_B - x_W > d) < \frac{1}{2}$$

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## Linear outcome-based contracts - are not maximizing profit

### Outcome-based contract?

- ▶ Middle manager receives  $\alpha x_i$ ,  $\alpha < 1$ .
- ▶ The manager only chooses  $B$  if  $\alpha \cdot (x_B - x_W) > d$ .
- ▶  $x_B - x_W > d/\alpha > d$
- ▶ Comparing to the profit-max mechanism, the expected outcome is lower (more frequently, the qualified  $B$  is not promoted), and payment to the manager is higher (in any case,  $\alpha x_i$  is given, instead of the fixed  $d$  for  $B$ 's promotion).

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## Contribution

### Comments on *Sticks or carrots or both?*

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### Optimal contract under costly punishment and limited liability

- ▶ Realistic setting for corporate environments
- ▶ Reward/Punishment~Outside option

### Implications on bonus mechanism

- ▶ high  $\theta$  ~ repeated work
- ▶ low  $\theta$  ~ non-repeated work
- ▶ beyond job allocation policies; how to provide incentives

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## Suggestion

### Punishment cost

- ▶ decaying cost with repeated punishment occurrences  
- less cultural resistance

### Outcome standard

- ▶ good or bad ~ past performance of the agent

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