



## Pay and productivity, efficiency wages, ownership and pay

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### Study Materials and Reading List

- Slides of the lectures
- All materials provided on: <http://home.cerge-ei.cz/pytlikova/LaborSpring19/>

#### Compulsory Readings:

- Borjas: Labour Economics; chapter 11: Incentive Pay
- Lazear E. (2000), "Performance Pay and Productivity", *American Economic Review*, Vol. 90.

#### Other Relevant Literature:

- Card, D., Mas, A, Moretti, E. and E. Saez (2012): "Inequality at Work: The Effect of Peer Salaries on Job Satisfaction" *American Economic Review*, 102(6), pp. 2981-3003.
- Brown, J. (2011): "Quitters Never Win: The (Adverse) Incentive Effects of Competing with Superstars.", *Journal of Political Economy* 119(5),
- Eriksson, T. and M. Pytlikova (2011): "[Foreign Ownership Premia in Emerging Economies: Evidence from Czech Republic](#)", *Economics of Transition*, Vol 19(2), pp.371-395.
- Lazear, E and K. Shaw (2007),: "Personnel Economics: The Economist's View of Human Resources", *Journal of Economic Perspectives* 5, pp.45-66.
- Bloom, N., Van Reenen, J., 2011. "Human resource management and productivity". In: Ashenfelter, O., Card, D. (Eds.), *Handbook of Labor Economics*, vol. 4b., pp. 1697–1767
- Oyer, P. and S. Schaefer (2011): "Personnel Economics: Hiring and Incentives". In: Ashenfelter, O., Card, D. (Eds.) *Handbook of Labor Economics*, vol. 4b. Elsevier, 1769-1823

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### Other Relevant Literature:

- Breza, Emily, Supreet Kaur and Yogita Shamdasani. "The Morale Effects of Pay Inequality" *Quarterly Journal of Economics*, Volume 133, Issue 2, 1 May 2018, Pages 611–663
- Anat Bracha, Uri Gneezy, and George Loewenstein. Relative Pay and Labor Supply. *Journal of Labor Economics*, April 2015, Vol. 33, No. 2: 297-315.
- Hamilton, B., J. Nickerson, and H. Owan, "Team Incentives and Worker Heterogeneity: An Empirical Analysis of the Impact of Teams on Productivity and Participation". *Journal of Political Economy* 111(3), June 2003: 465-497.
- Babcock, Philip, Kelly Bedard, Gary Charness, John Hartman, and Heather Royer. "Letting Down the Team? Evidence of Social Effects of Teams" *Journal of the European Economic Association*, 2015: 841-870.
- Ariely, Dan; Kamenica, Emir; Prelec, Drazen. "Man's Search for Meaning: The Case of Legos" *Journal of Economic Behavior and Organization*, vol. 67, no. 3-4, September 2008, pp. 671-77
- Kremer, Michael, Supreet Kaur, and Sendhil Mullainathan. 2015. "[Self Control at Work.](#)" *Journal of Political Economy* 123 (6): 1227 – 1277
- Kuhn, Peter and Marie Claire Villeval. "Are Women More Attracted to Team Incentives than Men?", *Economic Journal*, February 2015
- Griffith, Rachel; Neely, Andrew. "Performance Pay and Managerial Experience in Multitask Teams: Evidence from within a Firm" *Journal of Labor Economics*, vol. 27, no. 1, January 2009, pp. 49-82

## OUTLINE

- **Personnel Economics:**
  - **Motivating workers –Paying for Performance**
  - **Ownership and pay**
  - **Effects of HRM on productivity and other outcomes**
  
- **Efficiency Wages (the next week 14.3.2019 with Daniel)**

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## Wage Determination within the Firm

- How employers design a compensation policy
- How do employers relate compensation to productivity
- Firms must choose compensation policies to obtain the right (profit-maximizing) kind of employees (*sorting and investing in employees*)
- Firms have to motivate employees to take actions that advance the firm's strategy and increase its profits
- Firms must weight the costs of various policies against benefits
- Important to understand the effect of various compensation policies on workers' productivity

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## Wage Determination within the Firm

*Firms don't take wages as given*

*Make managerial decision that take into account the following realities:*

- Workers differ in productivity, but difference hard to observe
- One worker's productivity can vary over time or between different environments
- A worker's productivity is a function of his ability, his effort and the environment
- High productivity is often related to being able to take initiatives to advance the employer's objectives

## Motivating Workers - Overview

- The Principal-Agent Problem
- Baseline to study incentives/motivation issues
- Employment relationship –a *contract* between the employer (principal) and the employee (agent)

## Problem 1 - Objectives

- Difficulties in principal/agent relationships arise because the two parties' interests differ - agency problems
  - Principal cares about value he receives as a result of the agent' actions minus any payment he makes to the agent
  - Agent is concerned by what he receives from participating in the relationship minus any costs incurred by doing so
- In the absence of some mechanism to align interests, the agent will not care about the value generated for the principal

## Problem 2 - Contracts

- Could solve agency problems if employment contracts were complete
  - Would specify each party's responsibility and rights for all possible situations
  - Specify a wage payment made to the agent that depends on both the information received by the principal and the action taken by the agent
  - Principal would reward preferred actions
- But very often complete contracts not feasible
- Contracts are *incomplete and implicit*

## Incomplete and Implicit Contracts

- *Incomplete* because it is impossible to stipulate each party's responsibilities and rights for each and every eventuality that could arise
- *Implicit* because agreements often too vague to be legally enforceable
- Finally, contract can often be terminated without legal penalty (especially from employee side)

### Problem 3: Information Asymmetries

- Information asymmetries (IA) = one party knows more than the other about its own intentions or performance under the contract
- With IA, it is easier to cheat/ break the promises in the contract, e.g.:
  - Employees: work less than expected, sloppy at work
  - Employers: don't give the promised wage raise or promotion
- Breaking the contract – risk of being legally sued, but may be difficult to prove cheating
- Contracts are informal and the threat of formal punishment is absent - what to do?

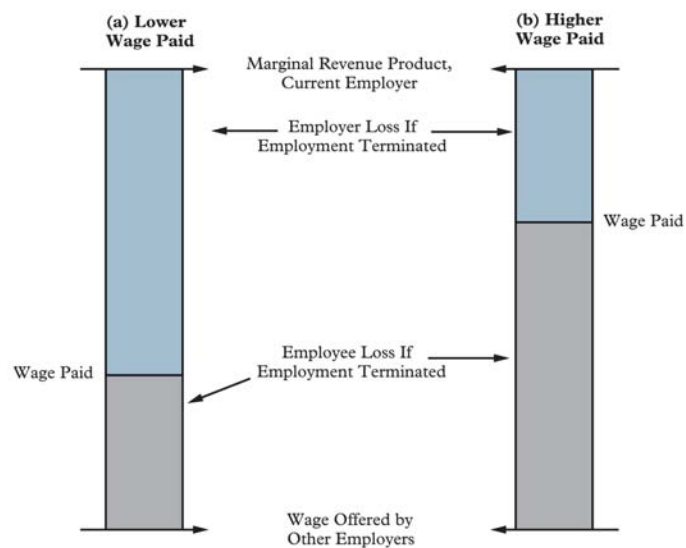
### Discourage Cheating by Signaling

- Signaling: make somebody to reveal his intentions or some private information he has about himself
- Signaling prevents cheating because it gives some information to the other party
- E.g.: a firm offers a low wage at the beginning of the career and a high wage after 5 years. If a worker would accept such an offer, it would mean that he may be interested in a long term career inside that firm (if not, would take a higher wage now elsewhere)
- Signal by educational attainment or training investment, preferred type of wage scheme, ...see Riley (2001): "Twenty-Five Years of Screening and Signaling". *Journal of Economic Literature* 39, pp.432-478.

## Discourage Cheating by Self Enforcement

- Parties have different interests -even the “right” type of employees might have incentives to underperform on their promises, i.e. *Opportunistic behavior*: will try to advance their own interest first/unjust their behavior to unfolding opportunities.
- Challenge is to adopt compensation policies which self-enforce both parties to stick to their promise
- *Self enforced contract*: both employer and worker derive more gains from honest continuation of the existing relationship than from severing it
- Idea of creating a surplus shared between the worker and the firm w.r.t. alternative situations
- firms can create a surplus by investing in their *reputations*

FIGURE 1 Two Alternative Divisions of the Surplus



## Motivating Workers

- Create rewards that give employees incentives to work hard toward goals of their employers
- *Pay schemes:*
- Pay for performance
  - Output based pay e.g. piece rate
  - Problematic if weak link between effort and output
    - ⊕ Risk aversion: if output influenced by external forces, worker may be subject to risk of earnings variation – most workers do not like risking
    - ⊕ If the performance measure fails to capture all aspects of desired performance – quality vs. quantity -you may not get what you pay for

## Motivating Workers

- Time based pay
  - paid for the time spent at the workplace
  - No risks for the worker
  - Creates “moral hazard” problem: why work hard if not compensated?  
E.g.: surfing on the internet for personal reasons,...
  - Monitoring and worker *supervision* may help - > may be costly and difficult to implement/ detailed supervision may destroy the advantages of specialization



## Motivating Workers

### *Empirical examples:*

Foster&Rosenzweig, 1994, A test for moral hazard in the labor market: contractual arrangements, effort and health" RESTAT 76. In Bukidnon in the Philippines is common for workers to hold several different farming jobs in a year. In some – paid by hour, in some for their output.

*Q how hard the same individual works under the two different pay systems?*

Measure effort by weight change and calorie consumption on farm, the study found that workers consumed 23% fewer calories and gained more weight per calorie consumed when they were paid by the hour. => less physical effort by worker when paid by the hour than when they were paid for their output

Then see e.g. Dohmen&Falk, AER2011, Performance pay and multidimensional sorting: productivity, preferences and gender – using lab experiment, they study incentives on work performance & selection – an evidence that workers paid for their performance work harder and experience greater levels of stress and exhaustion

## Motivating Workers in Groups

- If difficult to identify the productivity of each worker, firms may rely on *team incentives to motivate workers*
- May lead to problems and opportunities for employers
- **Fairness**
  - People's concern about their treatment relative to others in the reference group
    - E.g. lower pay increase than colleagues
    - Cut in salary vs. bonus
  - May lead to de-motivation, quits, sabotage
  - Fairness different concept for different workers

## Motivating Workers in Groups

- Empirical example; Card, Mas, Moretti and Saez, AER2012 – “Inequality at work: the effect of peer salaries on job satisfaction”:
  - They study the effect of disclosing information on peers' salaries on workers' job satisfaction and job search intentions. A randomly chosen subset of employees of the University of California was informed about a new website (Sacramento Bee newspaper established state worker salary database “www.sacbee.com/statepay”) listing the pay of University employees.
  - They find an asymmetric response to the information about peer salaries: workers with salaries below the median for their pay unit and occupation report lower pay and job satisfaction, while those earning above the median report no higher satisfaction. Likewise, below-median earners report a significant increase in the likelihood of looking for a new job, while above-median earners are unaffected.
  - The results thus suggest that workers are typically concerned about their pay relative to that of their peers but that this concern is primarily about whether they are paid less than average.

## Motivating Workers in Groups

- **Free riding** problems /**group loyalty**
  - Enjoy benefit from other peoples work
  - Solution may be pressure of your colleagues, i.e. peer pressure (see e.g. Fehr and Gächter's lab experiment, Nature 2002)
- Group loyalty
  - Concerned about well being of the group (altruism towards other team members)
  - Willing to make some sacrifice to advance the interests of the group
- Because of group considerations, motivation techniques must take account of the perceptions of fairness and issues of group loyalty. See e.g. Babcock, Philip, Kelly Bedard, Gary Charness, John Hartman, and Heather Royer. “Letting Down the Team? Evidence of Social Effects of Teams” *Journal of the European Economic Association*, 2015: 841-870

## BASIS - Major Characteristics of Compensation Plans

- The basis on which the pay is calculated
  - Piece-rate pay
  - Commission
  - Gain-sharing – group incentives plans
  - Profit sharing/bonus plans, executive performance pay
  - Pay for time with merit increases

The level of pay in relation to pay for comparable workers elsewhere

- Is the level of pay important?

Dynamics of pay over a worker's career

- How does your pay evolve over time

## BASIS - Piece-rate Pay

- The pay of the worker is a function of the output he produces
- Can vary from 0.5% to nearly 100%
- Not that common in real world or small %

### Advantages

- Pay directly linked to output
- Pay increases if effort increases
- No need for monitoring
- Most productive workers sort into jobs with this type of pay

### Disadvantages

- Output might not be measurable
- Output might not be the only important goal for the firm
- Workers might not have single control over output
- Variability of pay (output depends on external factors)
- Employees are risk averse,
  - firms may need to pay compensating wage differential
- Lack of maintenance of machines and tools

## Empirical evidence on individual performance pay

- The pioneering study by Lazear (AER 2000) - evaluation of the introduction of the incentive pay plan for windshield installers at Safelite Glass Company

### Lazear (2000) Safelite example



Safelite Glass Corporation is the largest installer of automobile glass in the United States. Over a 19-month period beginning in January 1994, CEO Garen Staglin and President John Barlow implemented a new compensation system for auto glass installers. Dubbed the Performance Pay Plan (PPP), the new system shifted all installers from hourly pay to piece rates. Piece-rate compensation systems offer employees a fixed payment for each unit of output they produce. Safelite's piece rates varied somewhat in different locations, but on average the PPP system offered employees \$20 for every windshield they installed. Like many workers under piece-rate systems, Safelite's installers were given a guaranteed minimum compensation amount; if a worker's weekly compensation from piece rates ended up below this minimum, the worker was paid the guaranteed amount.<sup>11</sup>

Safelite implemented PPP in an attempt to boost worker productivity. According to a study by Edward Lazear, it seems that this objective has been achieved. Analyzing detailed information on individual-level production within the firm, Lazear finds that Safelite's workers installed, on average, 2.70 windshields per eight-hour day prior to the implementation of PPP. After the switch to piece rates, this figure jumped 20 percent, to 3.24 windshields per day.

## Safelite

- Performance-based increased worker productivity at Safelite
- Looking 19 months before and after the introduction of the incentive pay plan, Lazear found that productivity increased by around 44% after the policy change, with about half of this due to selection effects and half from the same individuals changing their behavior.
- Performance-based pay thus also affected the [selection](#) (sorting) of employees who are attracted to the firm
- If workers are low- and high- performers, a given incentives plan like the one proposed by Safelite can attract mostly high performers (*Safelite attracted and retained fastest workers, the less productive workers left the company*)

## Empirical evidence on individual performance pay

Bandiera et al. study “soft fruit” pickers on a British farm:



## UK fruit farm

- Bandiera, Barankay and Rasul (QJE2007) engineered a change in the incentive pay system for managers in a UK fruit farm. All the workers (fruit pickers) were on piece rate pay, but prior to the policy change the managers were paid a flat rate, whereas afterwards there was a strong element of pay tied to the performance of the workers they managed. The average picker's productivity rose by 21% after the introduction of performance related pay and at least half of this was due to improved selection. The remainder of the effect is due to managers focusing their efforts more on the workers where it had the greatest marginal effect.
- Examining the mechanism through which this happened, Bandiera et al (Econometrica 2009) gathered information on social connections from their survey. They found that prior to the introduction of incentive pay managers favored workers to whom they were socially connected irrespective of the workers' ability. After the introduction of performance bonuses they targeted their efforts towards high ability workers regardless of whether they were socially connected or not. This had the effect of increasing the dispersion of productivity (as well as the level).

*But piece-rate compensation system not always optimal (e.g. quantity/quality concerns, if output depends on others, discourages piece-workers from adopting better/more efficient technologies, ...)*

## Experimental evidence

A criticism of these studies is that the workers who are treated are not random. The firm who introduced the policy presumably believed there would be some benefits from doing so, thus it is hard to rule out the idea that there may have been some other contemporaneous change that affects worker

Productivity (see the methodological problems discussion on identification later).

Shearer (2004) addresses this problem in his study of tree planters in British Columbia. He worked with the company employing the planters and designed an experiment where all workers were randomly assigned to the incentive pay group for some days and flat hourly time rates for others (so the same worker is observed under both systems). He cannot look at selection effects, but found that the pure incentive effect was to increase productivity by around 22%, very similar to Lazear (2000).

Another example of cleaner identification is Lavy (2009) who exploits a quasi-experiment in Israeli schools where teachers were offered individual bonuses based on their relative performance as indicated by pupil scores in math and English exams. School assignment was based on a rule determined by past matriculation results and this gives several identification methods including a regression discontinuity design around the threshold. He finds significant improvements in teacher performance and no evidence of distortions. Interestingly, the improvement in performance appeared to be due to changes in teaching methods and management. Not all evaluations of performance pay for teachers are so positive, although Lavy's (2007) survey does suggest that the weight of evidence is in favor and more so for individual incentive pay than for group incentives (discussed on the next slides).

*In summary, these studies do suggest that individual incentive pay increases productivity.*

## **BASIS – Gain-sharing / Group incentives plans**

- Advantages
  - Often output produced in teams
  - Output and pay should then be evaluated within these teams (complementarities,...)
  - Peer pressure might eliminate shirking
  - Empirical studies find positive correlation btw team work and organizational output
- Disadvantages
  - Free rider problem
  - Wrong sorting of workers – shirkers stay, productive go
  - Variability of pay (if output depends on external factors)

## **BASIS – Gain-sharing / Group incentives plans - empirical evidence**

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## BASIS - Executive Performance Pay

- Bonuses, profit/stock sharing
- Type of group incentive plan, where only the group leaders (CEO, top managers) paid according to output
- Advantages
  - Basing pay on overall firm goal: profit or stock value
  - The executive has a lot of power to influence the profit and stock value
  - Force the executive to focus on profits
- Disadvantages
  - Stock value associated with variation due to pure luck
  - Variation in pay (risks) may force firms to pay compensating wage differentials
    - High CEO pays..
  - Lead executives to pursue short run strategies and less risky projects

### Business history is littered with firms that got what they paid for ...

- At the H.J. Heinz Company, for example, division managers received bonuses only if earnings increased from the prior year. The managers delivered consistent earnings growth by manipulating the timing of shipments to customers and by prepaying for services not yet received.
- At Heinz, for example, prepaying for future services greatly reduced the firm's future flexibility, but the compensation system failed to address this issue.



### BASIS - Pay for Time with Merit Increases, Tournament-type contracts

- Merit pay – award larger pay increases to workers whose supervisors rate them as better performers
- Advantages
  - Stable pay
  - Easy to measure (only need to rank workers and reward them)
  - Focus on more soft values as service and quality
- Disadvantages
  - Incentive for shirking
  - A danger of politicking (workers spend time "marketing themselves")/or subjective aspects (friendliness, ..)
  - Monitoring necessary
- Merit increases (better pay to workers rated as good performers), Tournaments
  - A measure to base the monitoring on
  - Relative ranking – sabotage
  - Workers spend time "marketing" themselves
  - Decrease cooperation

### LEVEL - Motivating Workers: Higher Level of Pay and Productivity

- Why higher pay may increase productivity:
- Attract better workers
  - Enlarge the firm's applicant pool: can be more selective
- Build employee commitment
  - Employees less likely to quit
  - Firms offer therefore more training
- The cost of losing the job is higher -> less shirking
- "Fair play" - Perceptions of equity
  - Workers will pay back with higher effort, where as the opposite might results in shirking or sabotage

### Level – efficiency wages:

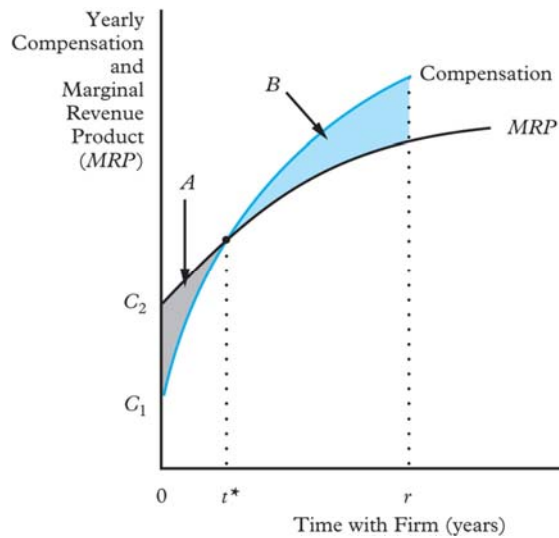
- Another way firms can link employee's reward to performance is through the threat of firing
- Firing is a punishment if wages are higher than what is available in the market (or if it is costly to find a new job, i.e. takes time and effort)
- If a worker shirks, he can be detected and fired
- Can motivate hard work (not shirk) by making the job inside the firm more valuable - increase inside wage
  - Applied by firms who want long-term relationship with their employees
  - If an existence of some unemployment, structured labour markets – i.e. unemployment as motivator
  - If difficult to motivate workers with output based pay
  - If difficult to monitor workers
- Example of Ford –doubling of wage in 1914- quit rate fell by 87%, absentee rate fell by 75%, morale and productivity increased -> increase in profitability (Raff and Summers, JoLE1987)
- *MORE ON LECTURE BY DANIEL THE NEXT THURSDAY*

### LEVEL - Motivating Workers: the sequence of pay and productivity

- Internal labour markets -> career options within the organisation
- Under-payment followed by overpayment
  - Sorting: attracts more stable workers
  - Incentives: workers provide high effort in order to refrain from being fired before the reward is paid -> less monitoring needed.
  - more likely in jobs in which close supervision not feasible.

**Fig: A Compensation-Sequencing Scheme to Increase Worker Motivation**

Implication:  $PV(A) = PV(B)$



## Sequence of pay

- Risks:
- Employees: might be fired or firm goes bankrupt before  $r$ , hence before full reward is paid
- Employers: older "overpaid" workers might stay too long after  $r$ . Firing them will signal that the firm's wage policy cannot be trusted.

## DYNAMICS- Promotions

- Promote workers who performed really well in lower-level jobs (incentives) or who possess skills valuable in higher-level jobs (selection)
- Most common promotion system is when promotions take the form of a **tournaments** - a set of workers compete for a promotion and only the “winner” is promoted
- **Standard** promotion – if a worker reaches a given threshold of performance, he receives a promotion (no winner aspect)

## DYNAMICS- Promotions

- Promotion is often associated with a wage and/or status increase
- Therefore, employees have strong incentives to increase their likelihood to be promoted
- Working hard today increases your probability to be promoted tomorrow
  - E.g. in sports (risk of injury), in corporate world (parents sacrifice time with their children),...

## DYNAMICS- Tournaments Promotions

- When performance is hard to evaluate, even by supervisor but when it is feasible to rank individuals
- Mostly used for internal promotions, like CEOs
- Promote the agent who is perceived as having performed best is a strong ex ante incentive provision tool
- Then the contest looks like a tournament: employees compete and the best one gets the prize (= promotion)
- Relative performance evaluation – your rank depends on what the others have done
- Therefore it insures workers against common risks

## DYNAMICS- Tournaments Promotions

- Advantages:
- Contestants put more effort the higher the expected benefits
- Expected benefits increase with the value of the prize and the probability to be promoted
- More competitive workers will be attracted by this type of promotion (sorting aspect)
- Disadvantages
  - You need to promote somebody (even if they are all bad) – bad for selection
  - Sabotage issue to lower the performance of others
  - After the winner is announced, no incentives left if no further promotions -> effort might decrease.
  - Women less likely to enter tournaments (Niederle&Vesterlund, QJE2007)

## DYNAMICS- Standard Promotions

- When performance is easy to evaluate by supervisors
- Promote the worker if his performance reaches a given level
- You need flexibility in the hierarchy of your firm (*imagine all employees of level 2 reach this year the threshold, what happens?*)
- The probability of being promoted depends only on your performance, no effect of what the others have done
- Workers face risk
- No sabotage
- Can be better for selection because you can choose not to promote workers this year

## DYNAMICS- Career Concerns

- In certain jobs, an important source of incentives is employees' career concerns
- Employees undertake current actions that enhance their future value in the labor market
- Employees want to keep their future prospects bright
  
- Investment bankers , money managers, and professional athletes are some examples
- Job is to choose and manage funds for investors
- Imagine the following situation: a manager had a bad year because his portfolio performed poorly

## DYNAMICS- Career Concerns

- If he is experienced, and has a long track record of good performance, the fund company will think it is bad luck
- If he is new, the firm may attribute this to poor choices from the manager and fire him
- Young mutual fund managers have strong incentives to avoid poor relative performance
- Managers with long track record can survive a bad year

## Where Does it Come From?

- Why would it be bad for a young manager to perform badly? Why would the firm punish him and not the older one?
- Idea is that over the career of a worker, firms learn the “ability” (quality) of the worker
- When a worker is new, the firm does not know if he is good or bad: a bad info will tend to make the firm think the worker is bad
- When he is older, there has been already a lot of info for the worker, a bad one is weighted with all the previous good ones

## Where Does it Come From?

- Like an average, the more values you have, the less weight you give to small values (i.e. bad years)
- The value of new info decreases with time (over the career)
- Incentives are very strong at the beginning of the career, not so much at the end
- Sometimes, career concerns may provide better incentives than pay for performance rewards (Professional athletes)
- Sometimes may also provide incentives where output based pay would be difficult to adopt (Academia)

## Application 1 – Why do Large Firms Pay Higher Wages

- US: workers in 500+ firms earn 21% more than workers in 20- firms
- Wage rise also faster with experience in the largest firms
- Why?
- Most explanations rely on the idea that larger firms need better workers and/or have better opportunities to make their workers more productive



## Why do Large Firms Pay Higher Wages

- Economies of scale in job training
- Interdependent work processes => disciplined workers
- Job vacancies are more expensive for large firms => have to pay higher wages
- Better at allocating workers efficiently
- Long term attachment more attractive in larger firms, hence more possibility to motivate through different pay schemes

## Application 2 – Why do Mutual Funds Managers Herd?

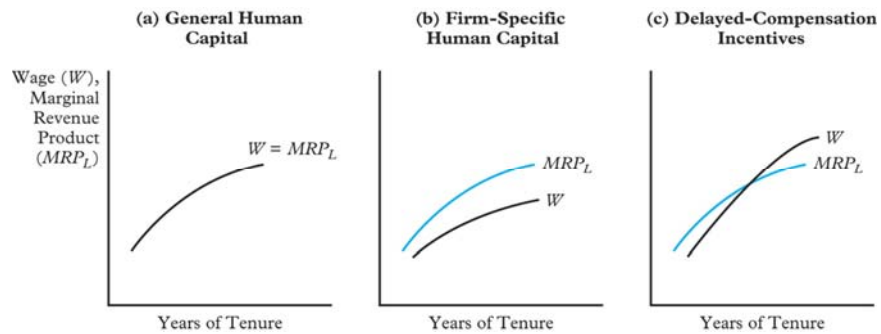
- Job is to choose and manage funds for investors
- Imagine the following situation: a manager had a bad year because his portfolio performed poorly
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- If he is new, the firm may attribute this to poor choices from the manager and fire him
- Young mutual fund managers have strong incentives to avoid poor relative performance

Study by Chevalier and Ellison (1999)

- Managers with long track record can survive a bad year
- Solution for young managers – reduce the likelihood of performing badly by choosing to hold similar portfolios to those of other funds
- evidence indicates that young managers are more likely to “follow the herd”
- Suggest potential negative effects of career concerns for firms

### Application 3 – Why wage increases with tenure?

- Three explanations:
  - General human capital combined with good matches
  - Firm-specific human capital
  - Delayed-compensation incentives



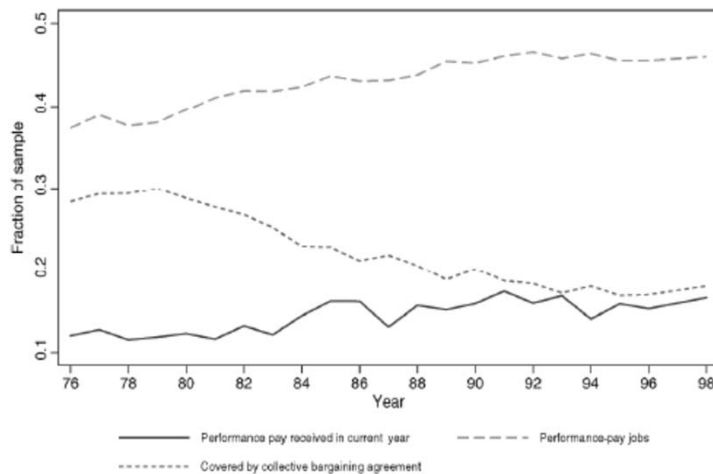
### HRM and productivity

- Measurement, some descriptive evidence
- Empirical strategies, identification problems and solutions

## HRM and productivity –some descriptive evidence

- Incentive pay - data available from a variety of sources:
  - for US: Using the Panel Study of Income Dynamic (PSID) Lemieux, McCleod and Parent (2009) estimate that about 14% of US prime age men in 1998 received performance pay. They define a worker as receiving performance pay if any part of compensation includes bonus, commission or piece rate. They find a much higher incidence of performance pay jobs (37% on average between 1976-1998) defined as a job where a worker ever received some kind of performance pay.
  - *Trends* - the incidence of performance pay rises from 38% in the 1970s to 45% in the 1990s. Interestingly, this rise in performance pay was mostly driven by increases in performance pay for salaried workers, for whom this rose from 45% in the 1970s to 60% in the 1990s. In contrast, hourly paid workers have both lower levels and growth rates in performance pay.

**Figure 2.1 Incidence of Performance Pay, US men in PSID, 1976-1998**



**Source:** Lemieux, McCleod and Parent (2009)

**Notes:** Male heads of household earning between \$1 and \$100 per hour. Self employed and public sector excluded. 30,424 observations on 3,181 workers. Performance pay in current year=1 if any part of compensation includes bonus, commission or piece rate. Stock options and shares are not included. A performance pay job is one where the worker ever receives some performance pay over the life of the job-match.

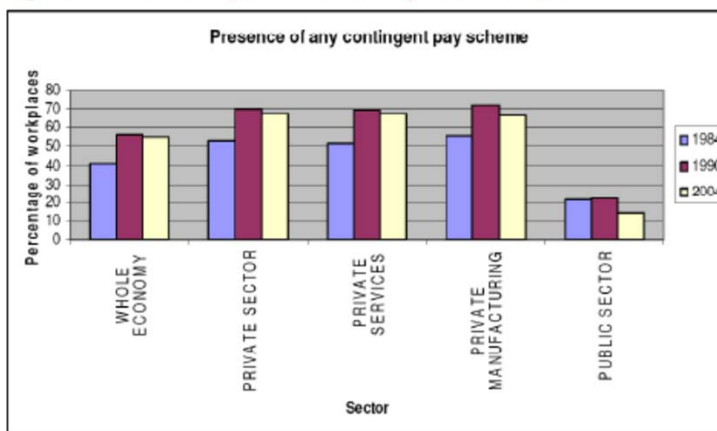
## HRM and productivity — some descriptive evidence

- Incentive pay - data available from a variety of sources:
  - for US: Using the Panel Study of Income Dynamic (PSID) Lemieux, McCleod and Parent (2009) estimate that about 14% of US prime age men in 1998 received performance pay. They define a worker as receiving performance pay if any part of compensation includes bonus, commission or piece rate. They find a much higher incidence of performance pay jobs (37% on average between 1976-1998) defined as a job where a worker ever received some kind of performance pay.
  - *Trends* - the incidence of performance pay rises from 38% in the 1970s to 45% in the 1990s. Interestingly, this rise in performance pay was mostly driven by increases in performance pay for salaried workers, for whom this rose from 45% in the 1970s to 60% in the 1990s. In contrast, hourly paid workers have both lower levels and growth rates in performance pay.
  - Other papers deliver similar estimates of around 40% to 50% of US employees being covered by some form of performance pay. For example, using the US General Social Survey Kruse, Blasi and Park (2009) estimate that 47% of American workers were covered by some group incentive scheme in 2006. Of this 38% of employees were covered by profit sharing, 27% by gain-sharing, 18% by stock ownership (9% by stock options) and 4.6% by all three types.

## HRM and productivity —some descriptive evidence

- Incentive pay - data available from a variety of sources:
  - for UK: the British Workplace Employment Relations Surveys (WERS) contains a cross section of all establishments with 25 or more employees in the UK (over 2,000 in each year). There are consistent questions in 1984, 1990 and 2004 on whether the firm used any form of performance/ contingent pay for workers both individually and collectively (e.g. team bonuses, Profit-related pay or Employee Share Ownership Schemes). Bloom and Van Reenen (2011) show that 41% of UK establishments had incentive pay in 1984, and this rose to 55% twenty years later – this is driven mostly via private sector as the incidence of incentive pay was very low in the public sector 10% or less, and it actually fell over time

**Figure 2.2 Trends in performance Pay 1984-2004, UK**



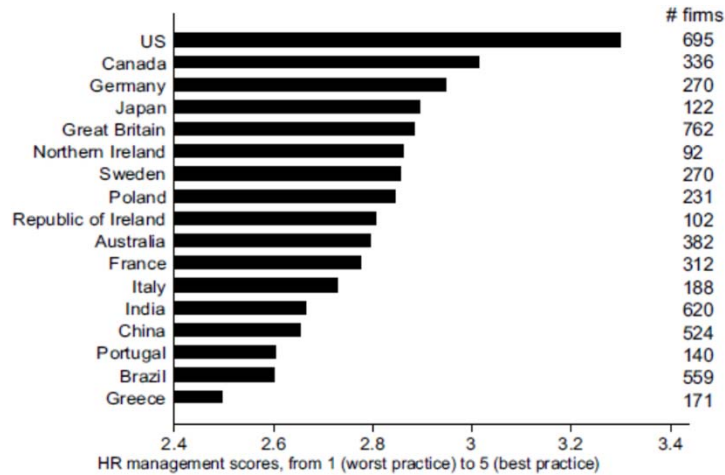
Source: Pendleton, Whitfield and Bryson (2009).

Notes: This data is derived from the UK Workplace Employment Relations Surveys (WERS) in 1984, 1990 and 2004. This is a representative sample of all UK establishments with over 25 employees. Although there were other WERS in 1980 and 1998 the questions are not consistent. The consistent question relates to the incidence of any form of contingent pay for workers (Individual, Collective – such as team bonuses, Profit-related pay or Employee Share Ownership Schemes). The incidence of contingent pay grew from 41% to 56% by 1990, but fell to 55% in 2004. The data relates to whether there was any incidence of this type of pay – we do not know how many workers were covered or what proportion of their remuneration was contingent.

## HRM and productivity —some descriptive evidence

- In addition to pay, there are other forms of HRM such as self-managed teams, performance feedback, job rotation, regular meetings, and training, etc.
- Data from surveys, such as:
  - for the US is Black and Lynch (2001, 2004), Cappelli and Neumark, (2001) - a survey backed by the US Department of Labor. In 1996, for example, about 17% of US establishments had self-managed teams, 49% in formal meetings and 25% in job rotation. Lawler et al. (2003)'s data of larger firms unsurprisingly shows a greater incidence of "innovative" HRM practices. E.g. for 1996, 78% of firms had self-managed teams and this covered at least 20% of the workforce for just under a third of all corporations.
  - UK WERS data (Bryson and Wood, 2009). About half of all UK firms had "team-working" in 1998. More interestingly, the WERS data allows an analysis of changes over time. The incidence of teamwork (as indicated by "team briefings" has grown from 31% in 1984 to 70% in 2004 and "suggestion schemes" has grown from 22% in 1984 to 36% 20 years later.
  - Bloom-Van Reenen (2007) surveys on general management practices medium-sized firms (100-10,000 workers) in 17 countries. They find that HRM practices were strongly correlated with firm's performance data from their company accounts (total factor productivity, profitability, growth rates, survival rates). HERE no causal results – but still they suggest that HR practices that reward performance are associated with better firm performance.
  - Other research shows that these practices are also associated with better patient outcomes in hospitals (Bloom, Propper, Seiler and Van Reenen, 2009) and improved work-life balance indicators (Bloom, Kretschmer and Van Reenen, 2009).

## HR management practices across countries



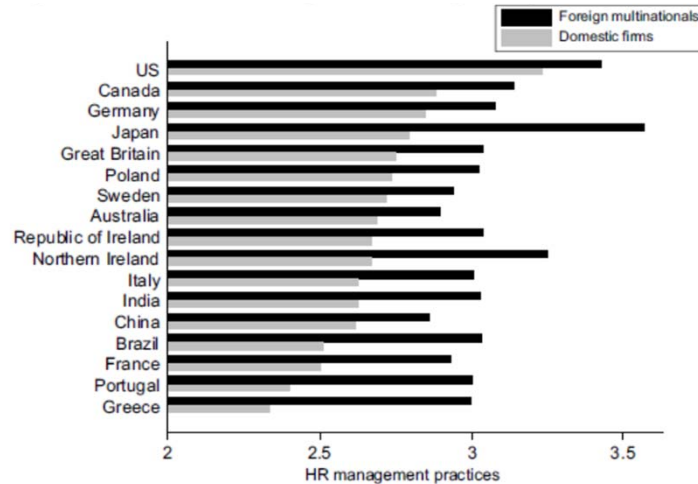
Notes: Averages taken across a random sample of the population of medium sized (100 to 5000 employee) manufacturing firms within each country. 5,850 observations in total. Firms per country in the right column. Scores firms on seven practices around pay, promotions, retention and hiring, where high scores. Source: Bloom, Genakos, Sadun and Van Reenen (2009)

## Ownership and HR management



Note: Averages taken across a random sample of medium (100 to 5000 employee) manufacturing firms within each country. 5,850 observations in total. Source: Bloom, Genakos, Sadun and Van Reenen (2009)

## Multinationals take good HR management practices abroad



Note: Averages taken across a random sample of medium (100 to 5000 employee) manufacturing firms within each country. 5,850 observations in total. Source: Bloom, Genakos, Sadun and Van Reenen (2009)

## HRM and productivity –Empirics

- The crucial Q: **do variations in variations in HRM practices play a role in driving differences in and productivity?**
  - Further other outcomes that the literature looked at such as: worker turnover, absenteeism, worker perceptions, job satisfaction/worker wellbeing, income inequality etc. E.g. for income inequality some evidence that the dramatic increase in wage inequality in the US, UK and other country since the late 1970s is due to HRM practices (Lazear and Shaw, 2008; Lemieux et al, 2009; Guadalupe and Cunat, 2009)
  - For TFP – *and important issue to correctly estimate production function – lively debate on that (Akerberg et al, 2007 surveyed the methods in the Handbook chapter)*
- Q: **why to expect any positive effects ?** - previously an assumption that all firms are optimizing their HRM practices/similar effects to introduction of new technology:
  - With a new technology we generally expect to see slow and staggered diffusion across firms. Some of this is due to firms optimizing given heterogeneous costs and benefits in a full information world. But slow diffusion may also be due to the differential arrival rate of information about the new technology. More subtly, the optimal HRM type may have changed over time. For example, performance pay may now be optimal in many sectors where previously it was unprofitable due to rapid falls in the cost of Electronic Resource Planning systems (such as SAP) that measure worker output (but not effort) more accurately and rapidly. If the “management as technology” perspective is correct, we would expect to see positive productivity effects from the adoption of these new HRM.

## HRM and productivity –identification problem

- As we showed in the examples covered in the previous slides, the typical study in the HRM and productivity literature in Personnel Economics examines the change in HR policy (typically an performance pay reform) in a single firm and a key concern is the effect on worker productivity – similar to literature on policy evaluation (Shaw, 2009), but in standard policy evaluation the scope is usually larger than a single firm - a country, state or country; and the policy maker the government rather than the CEO.
- Let  $d_{it}$  represent the treatment status of individual  $i$  at time  $t$ . Potential outcomes (productivity) are  $y_{it}^1$  and  $y_{it}^0$  under the treated and non-treated scenarios. These are specified as  $y_{it}^1 = c + \alpha_i + u_{it}$  for the treated and  $y_{it}^0 = c + u_{it}$  for the non-treated where  $\alpha_i$  is the effect of the policy on individual  $i$ ,  $c$  the common intercept and  $u_{it}$  the unobservable error. We assume that the policy effects are heterogeneous over individuals. This allows us to write the potential outcome equation as:

$$y_{it} = c + \alpha_i d_{it} + u_{it}$$

## HRM and productivity –identification problem

Consider the model where each individual  $i$  is observed before and after the policy change at times  $t_0 < k$  and  $t_1 > k$  respectively. The popular Difference in Differences (DD) estimator makes the assumption that the error term,  $u_{it}$ , takes a variance components form:  $u_{it} = \eta_i + \tau_t + \varepsilon_{it}$ , where  $\eta_i$  is correlated with  $d_{it}$ ,  $\tau_t$  is a common time effect, but  $\varepsilon_{it}$  is orthogonal to the other right hand side variables.

$$y_{it} = c + \alpha_i d_{it} + \eta_i + \tau_t + \varepsilon_{it} \quad (1)$$

Sequential differencing eliminates the fixed effect and the time effect so that

$$\alpha_i^{DD} \equiv (\bar{y}_{it_1}^1 - \bar{y}_{it_0}^1) - (\bar{y}_{it_1}^0 - \bar{y}_{it_0}^0) = E(\alpha_i | d_{it_1} = 1) = AIT$$

Where  $\bar{y}_{it}^d$  is the average outcome in group  $d$  at time  $t$ . Under the difference in difference assumptions we recover the average effect of treatment on the treated. This is equivalent to adding in time dummies and individual fixed effects in estimating equation (1).



## HRM and productivity –identification problem

Most of the HR studies have longitudinal data so they are able to do the first difference  $(\bar{y}_i^1 - \bar{y}_i^0)$ .

However, many studies do not have a control group in the firm who are not treated, thus there is no second difference. This is a drawback because the second difference controls for unobservable time shocks that are common to the two groups but unobserved to the econometrician. In other words, a major concern is that the supposed effect of the HRM policy is actually just some other event simultaneously dated with the introduction of the program.

Some studies try to exploit more variance than just before and after for a single organization:

- 1) the object of study may be a few firms in a narrowly defined industry (which is the usual strategy in IO).
- 2) there may be variation in the introduction of the policy across different sub-units within the firm (e.g. different plants, different geographical regions, different production lines, different teams, etc.). Exploiting this form of variation, however, highlights the classical *assignment problem* - even if the macro time shock is common between the two groups, the decision to adopt the policy for plant *A* and not to adopt it for plant *B* is unlikely to be exogenous. I.E., plants that introduce the HRM policy may also be those that the CEO thinks are most likely to benefit from it. If this could all be captured by observables then we would be able to control for this bias. But we are unlikely in most datasets to have such a rich set of controls.

## HRM and productivity –identification problem

- in Safelite study, Lazear, (2000) argues that the rollout of the policy across regions within Safelite Glass was essentially unrelated to differential potential benefits being determined by geography.

- in the fruit farm study, Bandiera et al (2007) examine whether similar productivity increases occurred at the same time in the season in a previous year when the policy experiment was not in place (a placebo test).

Having information on productivity prior to the policy is clearly helpful in considering selection. Lazear (2000) and Bandiera et al (2007) can show that workers who *ex ante* had lower productivity were less likely to be selected into employment *ex post*. Since the selection mechanism in both papers means the more able workers are more likely to be employed the ATT effect will be an upper bound of the effect on the compliers (those who stay employed).

Single firm studies are now the dominant form of methodology in Personnel economics, but given the problem of the absence of an obvious control group, one might wonder whether this is such a good idea. Usually it is thought that *focusing on a single firm enables researchers to control for many aspects that would be impossible to deal with in a larger cross-firm study. BUT What does this exactly mean?*

### HRM and productivity –advantages of single firm studies

Consider the possibility that we have multiple firms  $j = 1, \dots, J$  as well as multiple workers,  $i = 1, \dots, I$ , and the difference in difference assumptions hold. Further, let us assume that there is some exogenous within firm variation that enable us to identify the ATT from a single firm estimation strategy.

$$y_{jt} = c + \alpha_y d_{jt} + \eta_{jt} + \tau_{jt} + \varepsilon_{jt} \quad (3)$$

If each firm  $j$  is “different” in the sense it has different time shocks ( $\tau_{jt}$ ), then estimating equation (3) by including a common time shock  $\tau_t$ , as is typically done in the cross firm literature (e.g. Black and Lynch, 2004) will generally produce inconsistent estimate of the ATT effect. However, one could include firm\*time dummies in equation (3) and recover the ATT in each firm  $j$  if the treatment randomly varied by worker within each firm. This would clearly be more informative than just recovering the ATT for one firm alone.

### HRM and productivity –advantages of single firm studies

As second possible advantage of single firm strategies is that we may simply not have comparable policies across firms, in the sense that the policy changes  $dijt$  are not measured in the same units.

A third possible advantage of single firm studies is complete institutional detail. Knowing a single firm well may make it possible to collect more detailed information and rule out many of the alternative explanations that might explain the results.

### HRM and productivity – future directions

For the future it would be interesting – to consider larger numbers of firms who are subject to HRM policy interventions, where we have better ways of measuring the relevant management policy in a comparable way.

One way to do so are EXPERIMENTS, e.g.:

- Karlan and Valdiva (2009) randomize the provision of training for the owners of micro-enterprises in Peru, including some HRM training, and find some significant positive impact of sales and growth.
- Bruhn, Karlan and Schoar (2010) provide management training for small firms in Mexico, and again find some evidence for significant improvements on a range of performance metrics.
- Bloom, Eifert, Mahajan, McKenzie and Roberts (2010) run experiments on large Indian firms to introduce a modern management practices, including modern HR practices around piece-rate pay for workers and pay for performance for managers, and find large effects on productivity and profitability.
- Literature here still in an early stage – but the broad results are that introducing modern HRM practice into firms in developing countries leads to significant improvements in firm performance.

### HRM and productivity –Empirics, a summary of results from econometric studies

1. First, high quality studies generally show that there is a positive effect on productivity of incentive pay, both individual bonuses and (more surprisingly) group bonuses. This seems true across many sectors, including the public sector (see, for example, the Prentice et al, 2007 survey).
2. Second, in addition to a pure incentives effect, there is usually also an important selection effect generating higher productivity – productivity increases because high ability workers are attracted to organizations offering higher powered incentives.
3. Third, the introduction of new forms of incentive pay is generally more effective when combined with other “complementary” factors. There are complements within the bundles of HRM practices (e.g. team work and group bonuses), and between some HRM practices and other firm characteristics (e.g. decentralization and information technology).
4. Fourth, there are many examples of perverse incentives, for example, when rewards are tied to specific periods of time so that workers manipulate commissions to hit quarterly targets.
5. Fifth, incentive pay schemes tend to be associated with greater dispersion of productivity as the effects are stronger on the more able workers, and this is stronger than the selection effect (which pushes towards reduced dispersion)

For details see e.g. Bloom and Van Reenen (2011) chapter in the Handbook.

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### **Foreign Ownership Wage Premia in Emerging Economies: Evidence from Czech Republic**

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**Tor ERIKSSON & Mariola PYTLIKOVA**

Eriksson, T. and M. Pytlikova (2011): "Foreign Ownership Wage Premia in Emerging Economies: Evidence from Czech Republic", *Economics of Transition*, Vol. 19 (2), pp. 371-395.