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Merit pay and wage compression with productivity differences and uncertainty[☆]

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ABSTRACT

This paper experimentally investigates wage setting and effort choices in a multi-worker setting when there is heterogeneity in worker productivity and managers' perception of this productivity is imperfect. Worker ability is assigned via an aptitude test and, in an innovative design, manager uncertainty concerning this ability is related to the manager's own test performance. We propose a merit-pay hypothesis, that higher-ability workers will reduce their effort if they are not paid more than coworkers with lower ability, but not vice versa. Based on a simple model, we also predict that the higher the uncertainty about employee ability levels, the more managers compress wages between perceived high- and low-ability workers. We find strong experimental support for both hypotheses.

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1. Introduction

Wage inequality within countries and within firms is increasing and is at historically high levels. For example, the average ratio between the highest and lowest salary in firms is much higher today than fifty years ago. Structural changes such as skill-biased technological change, see for instance [Bekman et al. \(1998\)](#), or capital-skill complementarity as proposed by [Krusell et al. \(2000\)](#), could lead to higher wage inequality through performance pay ([Lemieux et al., 2009](#)). We are interested in the question of how wage inequality within a firm affects employees' motivation and their work effort and how this can in turn affect wage inequality.

When firms attempt to optimally set wages, they must take into account the incentive effects of these wages on employee work effort. ([Campbell and Kamlani, 1997, p. 780](#)) survey firms and find that: "Overall, firms appear to believe that wages

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have a strong effect on effort by affecting workers' attitudes toward their employer." There are reasons to believe that not only absolute wages matter, but also that the relative remuneration in comparison to one's coworkers matters, as argued by [Akerlof and Yellen \(1990\)](#). We wish to assess whether the relative wage of a worker matters for choosing effort when productivities are different.

Our paper makes three main contributions. To the best of our knowledge, we are the first to investigate the effect of relative pay on worker performance when productivity is assigned on the basis of test performance and the firm only receives a signal concerning the productivity of each worker.¹ Previous work has found little or no effect of relative pay on worker performance, but we find that this changes in our richer environment. Second, we develop a novel mechanism for generating uncertainty about a worker's productivity, with more-able managers receiving a more precise signal in this regard. The mechanism reflects the fact that managers differ in their ability to assess worker skill and performance. Third, we use this mechanism to investigate the effect of uncertainty about productivity on whether managers choose to compress wages. While previous work has found evidence of wage compression when differences in worker productivity are clear, we feel that there is considerable uncertainty about such differences in the field environment, and so our setting may have more external validity.

We hypothesize that many people believe that merit should be rewarded and therefore more-able workers should receive higher remuneration and we therefore postulate our merit-pay hypothesis: *Ceteris paribus*, more productive workers who believe in merit pay will reduce their effort when not receiving a higher wage than their less productive coworkers, while less productive workers will not react much to relative wages.² At the end of the experiment, we asked participants to fill out a questionnaire, which included the question: "Do you think the higher-ability worker deserves to be paid more than the lower-ability worker?" Fifty-two out of 66 assigned workers (79%) answered this question positively. For this subsample, our hypothesis thus predicts that more capable workers would expect higher compensation or else reduce effort.

To investigate this hypothesis, we needed to address three important issues, which are reflected in the contributions listed above. First, an arbitrary assignment of productivity may not give high-productivity workers a sense of entitlement, so we instead assign ability in the experiment according to the results of an aptitude test at the beginning of the experiment.³ Second, the manager is very unlikely to intentionally pay a higher wage to the lower-ability worker, and so we would not observe very many violations of merit pay. We therefore create a mechanism that induces an endogenous degree of uncertainty into the managers' perception of worker ability, resulting in higher-ability workers receiving a lower wage in 26% of the cases.⁴ Third, wage assignments should still be attributable to the competence of the managers, as otherwise workers are not likely to punish the manager for a wage they perceive as unfair ([Ku and Salmon, 2012](#)). In our mechanism, the precision with which the manager can distinguish between higher and lower ability workers depends on her performance in the aptitude test. This reflects the fact that there is heterogeneity in the field regarding managerial competence with respect to differentiating the productivity of different workers – whether at hiring, when deciding on bonuses and wage increases, or for promotion.⁵

If workers care about equality, then higher wage dispersion could result in lower worker effort ([Milgrom and Roberts, 1992](#)). However, if workers differ in their productivity, a higher wage dispersion is cost-effective for inducing more effort from higher-productivity workers ([Adams, 1966](#); [Lazear and Rosen, 1981](#)). [Bewley \(1999\)](#) shows the importance of fairness in determining effort in response to wages. But what constitutes a fair wage? Are fair wages the same across coworkers, or do they depend on each worker's effort, or on each worker's output? [Cappelen et al. \(2007\)](#) find that a person's effort and productivity strongly influence perceptions of a fair wage, whereas impersonal market features such as prices do not.⁶

A related issue is that of wage compression. [Frank \(1984\)](#) reports that firms compress wages relative to productivity. [Charness and Kuhn \(2005\)](#) find that, even with no uncertainty about imposed productivity, managers did compress wages significantly more when wages are public than when they are not. When there is uncertainty, firms have an incentive to compress wages so as to guard themselves against the possibility of being wrong in their assessment of worker ability.⁷

¹ In fact, there are very few studies that do not simply assign productivity to workers randomly. [Rivas \(2009\)](#) and [Bolton and Werner \(2012\)](#) do assign productivity to workers according to a test, but the productivity levels are common information.

² This is in line with what [Cappelen et al. \(2010\)](#) call meritocracy. Our hypothesis also holds when we define merit pay as receiving at least as much as less-productive coworkers (instead of strictly more).

³ For instance, [Charness and Kuhn \(2007\)](#) find no statistically or economically significant effect of coworker wages on effort, even when controlling for ability (which was randomly assigned). However, if workers "earn" their productivity by their own doing, then they are more likely to expect merit pay. Similarly, random wage assignments in [Bartling and von Siemens \(2011\)](#) do not seem to affect effort in a team production environment.

⁴ [Bolton and Werner \(2012\)](#) report this in 4.9% of the cases and [Charness and Kuhn \(2007\)](#) observe shares of 6.5% and 8.1% in two treatments; neither have manager uncertainty of worker ability.

⁵ Every organization has its share of incompetent managers, and one of the greatest sources of employee frustration are "idiot" bosses, reports USA Today ([Kay, 2013](#)). The Financial Post ([Deveau, 2013](#)) reports that 69% of employers complain that bad hires lowered company productivity and affected morale. [Wourio \(2011\)](#) at Microsoft Business argues that "many businesses approach the concept of job promotions with something less than a studied eye" and that "the consequences of an ill-advised promotion can be nothing short of cataclysmic."

⁶ In a similar vein, [Gantner et al. \(2001\)](#) provide some evidence that a person's input contributions, including productivity, are correlated with one's demands in a bargaining game.

⁷ Specifically, they worry that high-ability workers will not provide effort when they receive a low wage – even when workers do not respond to relative wages. We show this in a simple theoretical model. The idea is related to the dynamic learning model in [Harris and Holmstrom \(1982\)](#) on the true level of productivity of a worker.

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