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Abstract

We consider a simple employment contract model to analyze the difference between two remedies for illegal dismissals: damages vs. reinstatement. In the reinstatement case, shirking behavior is more attractive for the worker, giving him stronger bargaining power and a higher utility than in the damages case. Hence, in the reinstatement case, the firm has to offer a higher wage than in the damages case to maintain the worker's incentive. After wage is determined through a contract, the firm is more likely to fire the worker in the reinstatement case than in the damages case because of the high wage payment. Since the reinstatement case entails a transaction cost of declined workers' productivity caused by the dismissal announcement, damages are better than reinstatement from the viewpoint of social welfare.

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1. Introduction

In the continental European countries and Japan, there are strict regulations on employment protection, making it difficult for firms to fire their employees indiscriminately. Firms are required to give severance pay and sufficient advance notice to fired employees under their governments' regulations and follow procedures specified by employment protection regulations. Even so, conflicts between firms and workers over dismissals, and battles in court still occur, with firms insisting that their dismissal policies are legal and reasonable, but the fired workers believing otherwise. If firms and employees fail to settle, the Court decides on the legality of a firm's dismissal policy. There are two types of remedy for illegal dismissal when fired workers win in court: damages and reinstatement. In this paper, we will consider the effects of these options on social welfare.

Although Japan and European countries have strong employment protection regulations, few regulations of this type exist in the U.S. and U.K., and employment at-will is the dominant doctrine. Thus, as Ljungqvist (2002) points out, effects of employment regulation on total employment level and social welfare have been controversial and divided since the late 1980s, from both theoretical and empirical viewpoints.[1] However, there are few analyses studying the difference between remedies for illegal dismissal, although there are studies on reinstatement from the viewpoint of grievance and arbitration procedure (Bamberger and Donahue (1999)) and the viewpoint of permanent replacement during strike activities (Budd (2000)).

According to OECD (1999), in Australia, Germany, Japan, and Norway, reinstatement is often the remedy chosen for illegal dismissal. Although there are few dismissal regulations in the U.S., reinstatement also can be the remedy for unjust dismissal. In 1991, the National Conference of Commissioners on Uniform State Law proposed the Model Employment Termination Act which requires "just cause" for dismissal and adopted reinstatement as the remedy for illegal dismissal.[2] In contrast, in

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[1] For example, Bentolila and Bertola (1990), Bertola (1990), Lazear (1990), Hopenhayn and Rogerson (1993), Saint-Paul (1995), Bertola and Rogerson (1997), Nickell (1997), and Ljungqvist and Sargent (1998).

[2] In the U.S., the common law doctrine of employment at-will is dominant in many states. However, as Krueger (1991) and Grenig (1991) indicate, there have been recent modifications to the doctrine of employment at-will in the U.S. In most states, exceptions to employment at-will have been allowed in court. There are three exceptions: public policy exception, implied contract exception, and good faith exception. State legislation which specifies "just cause" as a requirement for dismissal has been proposed in ten states since the 1980's. Although only Montana passed a broad law to protect at-will employees from unjust dismissal, Krueger (1991) suggests the trend of employment protection is strengthened. Worker Adjustment and Retraining Notification Act

Belgium, France, and Switzerland, damages are paid when workers are dismissed illegally; the court system rarely orders reinstatement in these countries. Also, there are countries where either damages or reinstatement are used as remedies for illegal dismissal, such as the Netherlands, Portugal, Spain, and Sweden. In the real world, there are two main remedies for illegal dismissals, damages or reinstatement.

Our analysis considers the case involving contractual incompleteness. If labor contracts could specify completely all contingencies, settlements and trials would not be needed because firms and workers could only fulfill promises determined by the contracts. Under complete contracts, legal processes do not appear at all. However, in the real world, legal remedies are sought, and one reason for this is that everything cannot be specified by contracts and *ex ante* agreements. Hence, it is reasonable to consider contractual incompleteness when we examine the difference between court-ordered remedies for illegal dismissal.

We consider a simple employment contract between a firm and a worker which specifies basic wage. If the firm's state is severe, the firm fires the worker. There is an opportunity for settlement before trial between the firm and the worker, which we analyze through Nash bargaining. The result of settlement depends on the firm's state. Under a more severe state, the worker is fired and receives severance pay, whereas, re-employment is realized as the result of a settlement under a moderately severe state. Their threat point of settlement is influenced by the difference between the two remedies, damages or reinstatement. Trial disappears on the equilibrium path, though it still affects settlement.

In this paper, we will consider two cases, reinstatement and damages, and show that reinstatement increases bargaining power of the worker in severe states, but decreases it in moderately severe states. Re-employment is inefficient in more severe states. In the reinstatement case the Court requires the firm to re-employ the fired worker if they go to trial and the worker wins. The firm and the worker take trial into account in the settlement stage, and thus the firm is willing to offer comparatively high severance pay to avoid re-employment in the reinstatement case. On the other hand, in moderately severe states, re-employment is efficient. If the firm and the worker go to trial, the worker always quits the firm in the damages case whether the worker wins the trial or not. Since re-employment is efficient, to keep the worker from quitting the firm,

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(WARN) which was passed as a federal law in 1988 obliges firms employing over 100 full-time workers to give notice to employees at least sixty days before a plant closing and mass layoffs. In 1991, the National Conference of Commissioners on Uniform State Law proposed the Model Employment Termination Act which requires ”just cause” for dismissals.

the firm is willing to offer a higher new wage in the damages case than in the reinstatement case. In the reinstatement case, even if a settlement is not found and trial occurs, the worker can be re-employed when the worker wins the trial. In the severe state, the possibility for reinstatement gives workers a stronger position in the settlement stage than does the case of receiving damages, and *vice versa* in the moderately severe states.

We consider the firm's dismissal policy dependent on the firm's state, though, we also can regard the firm's state as the worker's ability in our model. Not everyone knows the worker's ability when making employment contracts, but his ability is revealed after making the contract, and the firm is willing to fire the worker with low ability. Severe states can be equated to low abilities. In the damages case, workers' income increases with respect to their abilities as it does with respect to the firm's state. However, in the reinstatement case, workers with lower abilities can receive more income than those with middle abilities because lower ability workers have a strong position in the settlement stage.

In the reinstatement case, shirking behavior is more attractive for the worker, because shirking behavior increases the likelihood of a more severe state. Even if the state is severe, the shirking worker has comparatively strong bargaining power, and thus, gets a higher utility in the reinstatement case than in the damages case. The firm cannot punish shirking workers punitively because workers' behavior is not verifiable. Hence, in order to maintain the worker’s incentive in the reinstatement case, the firm must offer a higher wage than in the damages case. However, after making the employment contract and after the training process, the firm is more likely to fire the worker because of the high wage payment in the reinstatement case than in the damages case.

Therefore, social welfare is better served in the damages case than in the reinstatement case, and reinstatement leads to a decline of the firm's profit. Dismissal is more frequently observed because of high wage payment when reinstatement rather than damages is the remedy. Furthermore, when there is a transaction cost involved with dismissal, that is, a decline in workers’ productivity caused by the dismissal announcement, then reinstatement can be more socially wasteful than damages. In the real world, workers who are fired cannot return to their original workplaces and continue working as they did previously. Dismissal announcements are likely to lead to a decline of workers' motivation and to the disruption of the relationship between workers and managers. Thus, even if workers agree to settle and return to the workplace, their productivity is reduced. Therefore, we conclude that damages as a remedy are better than reinstatement.

Reinstatement as a remedy for illegal dismissal is a type of specific performance indicated as recompense for a breach of contract in law and economics. Typical textbooks on law and economics, such as Cooter and Ulen (1997) and Miceli (1997), focus on various remedies for a breach of contract. Most of them consider the effect that a remedy has on a relationship-specific investment. This is an important topic, and there are many studies on relationship-specific investment from the viewpoint of the hold-up problem, but that is not our focus here.[3] We do not consider the relationship-specific investment between firms and workers, but instead examine the effects that reinstating workers or paying damages has on the likelihood of dismissal, gaps in wages, and social welfare.

This paper is organized as follows. In section 2, we explain the basic model on damages and reinstatement. Section 3 analyzes the differences between them and shows that damages have a more desirable effect on social welfare than does reinstatement. Finally, in section 4, there is a discussion where conclusions are drawn.

2. The Model

We consider a simple labor contract model and focus on two remedies for illegal dismissal: damages and reinstatement. A firm offers a wage level to make a contract with a worker. After making a contract, the state of the firm is revealed and the firm chooses to fire the worker or not. If the worker is dismissed, he can sue the firm for judgment and remedy for ”illegal” dismissal. If the worker wins in court, he can receive the remedy.

The worker is required to learn the firm-specific skill. Without learning the skill, he cannot produce any output in the firm since the skill is essential to the firm's activities. If he shirks learning the firm-specific skill, as we mention later, he will be necessarily dismissed because of zero productivity. However, a shirking worker can still win in court because a worker’s training is not verifiable.

Since it cannot be verified that the worker learns the firm-specific skill, the

[3] Edlin and Reichelstein (1996) consider the hold-up problem wherein both a seller and a buyer make relationship-specific investments under contractual incompleteness, and insist that specific performance leads to efficient investment levels but damages cannot. This study is relevant to a design for solving the hold-up problem like Aghion, Dewatripont, and Rey (1994) and Noldeke and Schmidt (1995). However, Edlin and Reichelstein's result greatly depends on the assumption specifying utility and cost functions and asymmetric treatment on bargaining power between specific performance and damages. Without these settings, specific performance is not always better than damages.

firm cannot offer any wage scheme contingent on the training program, that is, the firm cannot offer a basic wage and a compensation for training cost separately, and the firm is unwilling to pay compensation for training after the training process. The worker foresees the firm's opportunistic behavior on training compensation, and thus, compensation for training is not functional. If the firm can offer the basic wage and training compensation separately, the firm offers a basic wage equivalent to the reservation wage in the labor market. Hence, after the training program, the worker receives the same wage level as he would receive in the outside market. In this situation, there is no conflict on dismissals between the firm and the worker because the fired worker can receive the same wage at an outside firm. Dismissal conflicts occur when a wage gap exists between the incumbent firm and the other outside firms.

When the worker finishes the training program, the state of the firm is revealed: $\theta \in \Theta \equiv [0, \overline{\theta}]$. Although the firm and the worker can observe the state, the firm cannot make a contract contingent on the state since the firm and the worker cannot verify the firm's state in court. The firm can only offer a basic wage. If contracts contingent on the states could be made, then trials would not occur. As we point out later, we can also regard the state θ as the worker's ability.

Throughout the paper, timing of the firm's and worker's actions is as follows:

① A firm offers a wage level *w* to a worker. If the worker rejects the offer, the game is over for him.
② If the worker accepts the wage offer, he is required to learn the firm-specific skill. The worker's learning cost is a constant *T*. This skill is essential to the firm's activities.
③ The state of the firm $\theta \in \Theta \equiv [0, \overline{\theta}]$, which follows the distribution function $F(\theta)$, is revealed.
④ The firm determines whether to dismiss the worker or not. If the worker is not dismissed, he receives the wage level specified by the contract.
⑤ After firing the worker, there is a settlement stage before trial. The firm can offer a new wage $\tilde{w}$ and re-employment, or provide severance pay *D* before the worker goes to trial. If the worker agrees to the offer in the settlement, he can get the new wage $\tilde{w}$ and be re-employed or he receives severance pay and quits the firm. However, the re-employed worker's productivity is slightly reduced by the dismissal announcement.
⑥ If the fired worker does not agree to the offer in the settlement stage, the worker and firm go to trial. For simplicity, litigation costs of the firm and the worker are assumed to

be zero.[4] The worker can win and receive the remedy with probability *P,* which is exogenously given. If he loses, he gets nothing from the firm and only the reservation wage $\overline{w} \geq 0$.

A decline in productivity, which is denoted as ε, is caused by separation from the workplace and a degradation of the industrial relationship. It is assumed that the decline of productivity ε is sufficiently small. When the firm and the fired worker settle, the worker can be re-employed. Also, if the firm loses in court in the reinstatement case, the firm is ordered to re-employ the worker in the previous workplace and to pay the original wage. However, it is often reported that workers who have been fired or whose dismissal has been announced cannot work as effectively in their original workplace as they could previously, in part, because separation from the workplaces leads to a decline of fired workers' productivity. Dismissal of workers creates ill will and a breakdown in what may have been a previously good industrial relationship between firm managers and fired workers, which decreases the workers' motivation. Animosity and resentment does not allow for effective communication between firm managers and fired workers, and a deterioration of the industrial relationship yields loss of productivity. Moreover, return of the fired workers can lead to conflict between the retained employees and the fired workers, which can further affect productivity.

We assume that the firm's expected profit is non-negative: $\int_0^{\overline{\theta}} \theta f(\theta) d\theta - w \geq 0$, where $f(\theta)$ is the density function on the state θ. It is assumed that, in recessions, the firm can finance wage.

1. Damages

First, we consider the case of damages. How are damages of an illegal dismissal determined? Let us denote the wage specified in the contract in the damages case as w_d. Does a fired worker get the specified wage level w_d from the firm when he wins in court? No, when the firm loses in court, the firm is required to pay compensation which yields the same level of utility for the worker that the worker

[4] This assumption is not essential to our results. If positive litigation costs are assumed for the firm and worker, trial is unlikely and settlement is likely to be realized. With positive litigation costs, parties are likely to avoid trial, though, the settlement with litigation costs does not influence our results significantly.

would have received staying in the firm: $(w_d - \overline{w})$. Since the dismissed worker receives the reservation wage $\overline{w}$, it is sufficient to pay the amount of compensation $(w_d - \overline{w})$. This implies that the amount in damages a worker receives depends on the principle of expectation damages.[5]

From the viewpoint of backward induction consideration, we begin by considering the case at the trial stage. When a worker is dismissed and rejects settlement, the worker will go to trial. Since w_d is given at that time, the expected utility of the fired worker who goes to trial $\overline{u}_d$ is given by:

$$\overline{u}_d(w_d) = P(w_d - \overline{w}) + \overline{w} . \qquad ...(1)$$

P is the probability that the worker wins in court. The probability with which the worker wins in court is exogenous. Training and the firm's state are not verifiable, and thereby the worker can lose the trial even if he diligently trained to accumulate skills. On the other hand, when the worker shirks training, he can win the trial for the same reason—his ability is not verifiable. Thus, the probability is independent of the worker's training behavior.

Under employment protection regulations, "just cause" is often required on dismissals, and the Court determines whether a firm's dismissal policy is just and legal. Although firms may follow appropriate procedures for dismissing workers, the workers may not agree, in which case the workers are likely to insist that there are problems with the firms' treatment of dismissals. When disagreements arise between the workers and firms on the dismissal policy, and the two parties cannot work out an agreement , then the court system must decide. In this paper, the possibility with which workers' opinions are accepted is *P*.

In European countries and Japan, there are strong dismissal regulations. Firms must provide sufficient advance notice and/or severance pay and follow appropriate procedures such as negotiating with unions or labor representative institutions. Moreover, firms are often required to show just cause on dismissal. So, even if firms follow appropriate procedures and provide sufficient advance notice and severance pay, they might not be allowed to fire workers without showing just cause for the dismissal. When opinions differ--the firms insisting they have just cause for dismissal but the

[5] The expectation damage measure is defined as the amount of money that the victim of a contract breach, the worker, must receive in order to be compensated as well as if the contract were performed. This is a typical remedy for a breach of contract. See textbook on law and economics, for instance, Cooter and Ulen (1997) or Miceli (1997).

workers disagreeing--then the courts are left to decide. We consider these types of situations in this model.

Our model also encompasses the situation in the U.S. where there is the doctrine of employment at-will. Under this doctrine, firms can dismiss workers unilaterally. However, a firm's dismissal policy may be regarded as discriminatory by a court or jury, and even if a firm does not discriminate against its workers in its dismissal policy, a court or jury may still side with the fired worker in the real world. This risk upon dismissing an employee is denoted as the possibility that firms may lose in trial. Our model involves this situation.

Next, we consider the settlement stage before trial. At the settlement stage, the fired worker's expected utility obtained by trial is his threat point. The threat point of the firm is given by $\bar{\pi}_d(w_d, \theta) = -P(w_d - \bar{w})$. The firm and the worker take their expected utility in the trial into account and perform Nash bargaining in the settlement stage. In the settlement stage, re-employment can be realized, depending on the firm's state. If the firm and the worker agree on re-employment, the new wage $\tilde{w}_d$ is determined by Nash bargaining:

$$\tilde{w}_d = \arg\max \left\{ \tilde{w}_d - P(w_d - \bar{w}) - \bar{w} \right\} \left\{ \delta\theta - \tilde{w}_d + P(w_d - \bar{w}) \right\},$$

where $\delta \equiv 1 - \varepsilon$. Note that productivity of the re-employed worker is reduced by ε. Hence, it holds that

$$\tilde{w}_d(w_d, \theta) = P(w_d - \bar{w}) + \frac{\delta\theta + \bar{w}}{2}. \qquad ...(2)$$

This is the worker's utility when re-employment is realized in the settlement: $u_d(w_d, \theta) = \tilde{w}_d(w_d, \theta)$. The new wage level $\tilde{w}_d$ in the settlement stage depends on the original wage w_d and the firm's state θ. $\tilde{w}_d$ increases with respect to θ, and the firm's profit is $\pi_d(w_d, \theta) = \delta\theta - \tilde{w}_d(w_d, \theta)$. In this case, total payoff is given by $\delta\theta$ because wage is a just transfer from the firm to the worker.

On the other hand, when re-employment is not realized, the worker gets severance pay D_d and quits the firm in the settlement stage. In this situation, severance pay D_d is given by

$$D_d = \arg\max \left\{ D_d + \bar{w} - P(w_d - \bar{w}) - \bar{w} \right\} \left\{ -D_d + P(w_d - \bar{w}) \right\}.$$

Hence, it is obtained that

$$D_d(w_d) = P(w_d - \overline{w}). \qquad ...(3)$$

In this situation, the worker's utility and the firm's profit are $u_d(w_d, \theta) = D_d(w_d) + \overline{w} = \overline{u}_d(w_d)$ and $\pi_d(w_d, \theta) = -D_d(w_d) = \overline{\pi}_d(w_d)$, respectively. Total payoff is $\overline{w}$.

In the settlement stage, the determinant on re-employment is *ex post* efficient. The critical point of re-employment is denoted as $\hat{\theta} \equiv \frac{\overline{w}}{\delta}$. Hence, under $\theta \in [0, \hat{\theta})$, re-employment is not realized in the settlement stage. It is efficient for the worker to quit the firm under $\theta < \hat{\theta}$. Actually, it holds that $\widetilde{w}_d(w_d, \theta) < \overline{u}_d(w_d)$ and $\delta\theta - \widetilde{w}_d(w_d, \theta) < -D_d(w_d)$ under $\theta \in [0, \hat{\theta})$. These inequalities hold oppositely under $\theta \geq \hat{\theta}$.

As we show later, there is a critical point of dismissal θ_d^*. The worker's expected utility in the damages case U_d is given by

$$\begin{aligned} U_d(w_d) &\equiv \int_0^{\overline{\theta}} u_d(w_d, \theta) f(\theta) d\theta \\ &= (1 - F(\theta_d^*)) w_d + \int_{\hat{\theta}}^{\theta_d^*} \widetilde{w}_d(w_d, \theta) f(\theta) d\theta + F(\hat{\theta}) \overline{u}_d(w_d) - T \end{aligned} \qquad ...(4)$$

where subscript *d* refers to the damages case. Clearly, since the worker quitting the firm and the dismissed worker are one and the same, a constraint condition exists:

$$\theta_d^* \geq \hat{\theta}. \qquad ...(5)$$

As we show later, θ_d^* is endogenously determined and the constraint (5) is not binding since ε is sufficiently small. The worker is dismissed and agrees to be re-employed under the state $\theta \in [\hat{\theta}, \theta_d^*)$, and the fired worker quits the firm under the state $\theta \in [0, \hat{\theta})$.

The firm's expected profit is given by

$$\begin{aligned}\Pi_d(w_d) &\equiv \int_0^{\bar{\theta}} \pi_d(\theta, w_d) f(\theta) d\theta \\ &= \int_{\theta_d^*}^{\bar{\theta}} \theta f(\theta) d\theta - (1 - F(\theta_d^*)) w_d + \int_{\hat{\theta}}^{\theta_d^*} (\delta\theta - \tilde{w}_d(w_d, \theta)) f(\theta) d\theta \\ &\quad - F(\hat{\theta}) P(w_d - \overline{w})\end{aligned}$$

where $\pi_d(w_d, \theta)$ is the firm's profit under the state θ and wage w_d.

The firm is willing to optimize θ_d^* to maximize its profit subject to the constraint (5). We can show that the constraint (5) is not binding on the equilibrium. Using the first order condition and (2), when the constraint (5) is not binding, the critical point of dismissal θ_d^* is determined as follows:

$$\theta_d^*(w_d) = \frac{2(1-P)w_d + (2P-1)\overline{w}}{2-\delta}. \qquad ...(6)$$

Using (6), it holds that $\theta_d^*(w_d) - \hat{\theta} \to 2(1-P)(w_d - \overline{w}) > 0$ as $\varepsilon \to 0$. Since the decline in productivity due to the dismissal announcement is sufficiently low, the constraint (5) is not binding, and thus we can ignore the constraint (5).

We consider the relationship between the wage in the settlement $\tilde{w}_d$ and the critical point of dismissal θ_d^* (see figure 1). When the firm and the fired worker agree to settle, the firm can decrease the wage level and get outputs. Hence, even if δ is almost 1, the firm has no incentive to offer a wage that is higher than the original wage w_d: $\tilde{w}_d \le w_d$. $\tilde{w}_d$ increases with respect to θ, and thus, there is the critical point of the state when the worker is fired. Actually, as $\delta \to 1$, it holds that $\tilde{w}_d(w_d, \theta_d^*) \to w_d$.

Hence, under $\theta \in [\hat{\theta}, \theta_d^*)$, the firm is willing to fire and settle with the worker.

We summarize these results as a proposition.

Proposition 1

In the damages case, the following results are obtained.

[1] Under $\theta \in [0, \hat{\theta})$, the worker is fired and receives severance pay

$D_d(w_d) = P(w_d - \overline{w})$. The worker's utility and the firm's profit are given by $u_d(w_d, \theta) = \overline{u}_d(w_d) = P(w_d - \overline{w}) + \overline{w}$ and $\pi_d(w_d, \theta) = \overline{\pi}_d(w_d) = -P(w_d - \overline{w})$, respectively.

[2] Under $\theta \in [\hat{\theta}, \theta_d^*)$, the worker is fired and then settles with the firm. The worker is re-employed at the new wage $\widetilde{w}_d(w_d, \theta)$ specified by (2). The payoff for the worker is given by $u_d(w_d, \theta) = \widetilde{w}_d(w_d, \theta)$. The firm's profit is $\pi_d(w_d, \theta) = \delta\theta - \widetilde{w}_d(w_d, \theta)$.
[3] Under $\theta \in [\theta_d^*, \overline{\theta}]$, the firm continues employing the worker at the original wage w_d, and its profit is $\theta - w_d$.

The worker receives constant severance pay $D_d(w_d)$ under $\theta \in [0, \hat{\theta})$, the new wage $\widetilde{w}_d(w_d, \theta)$ in the settlement under $\theta \in [\hat{\theta}, \theta_d^*)$, and the original wage w_d under $\theta \in [\theta_d^*, \overline{\theta}]$. The worker's income depends on the firm's state (figure 1).

The firm must offer a wage level satisfying the worker's incentive compatibility for making the labor contract. The expected utility of the worker who learns the skill is given by (4). On the other hand, the expected utility of the shirking worker is as follows:

$$U_d^S(w_d) = \overline{u}_d(w_d) \equiv (w_d - \overline{w})P + \overline{w}.$$

When the worker shirks, his productivity is always zero, regardless of the firm's state since the firm-specific skill is essential. Since it is not verifiable whether the worker shirks or not, the firm cannot punish the shirking workers punitively. The firm's only option is to fire him. Hence, the firm is always willing to fire the shirking worker, but the shirking worker can still go to trial. On the equilibrium path, the firm agrees to settle with the shirking worker and to pay severance pay $D_d(w_d)$. After all, the firm treats the shirking worker the same as the diligent worker under the most severe state: $\theta = 0$. The expected utility of the shirking worker is given by the above equation. Thus, incentive compatibility is represented by $U_d \geq U_d^S$:

$$U_d = (1 - F(\theta_d^*))w_d + \int_{\hat{\theta}}^{\theta_d^*} \widetilde{w}_d(w_d, \theta) f(\theta) d\theta + F(\hat{\theta})\overline{u}_d(w_d) - T \geq U_d^S = \overline{u}_d(w_d).$$

Incentive compatibility is rewritten as

$$V_d(w_d) \equiv (1-F(\theta_d^*))w_d + \int_{\hat{\theta}}^{\theta_d^*} \tilde{w}_d(w_d, \theta) f(\theta) d\theta - (1-F(\hat{\theta}))\bar{u}_d(w_d) \geq T. \quad ...(7)$$

As long as the incentive compatibility holds, the firm is willing to decrease wage as much as possible, and thus incentive compatibility (7) is binding on the equilibrium.

2. Reinstatement

Next, we consider the reinstatement case. Timing of the players' actions and model setting are similar to the damages case. In the reinstatement case, if a worker is fired, goes to court and then wins, he can return to the previous workplace with the same wage level specified by the contract. Subscript *r* refers to the reinstatement case.

From the viewpoint of backward induction consideration, we begin by considering the case at the point of going to trial, after the worker is dismissed and rejects settlement. Since w_r is given at that time, the expected utility of the fired worker who goes to trial $\bar{u}_r$ is given by:

$$\bar{u}_r(w_r) = P(w_r - \overline{w}) + \overline{w}. \quad ...(8)$$

This is similar to the damages case. On the other hand, the expected profit of the firm in trial is given by $\bar{\pi}_r(w_r, \theta) = P(\delta\theta - w_r)$.

Next, we move backward and consider the settlement stage before trial. At the settlement stage, the fired worker's expected utility obtained by going to trial is his threat point. The firm and the worker take their expected utility in the trial into account and perform Nash bargaining in the settlement stage. Similar to the damages case, in the settlement stage re-employment depends on the firm's state. If the firm and the worker agree on re-employment, new wage $\tilde{w}_r$ is determined by Nash bargaining: $\tilde{w}_r = \arg\max \left| \tilde{w}_r - \bar{u}_r(w_r) \right| \left| \delta\theta - \tilde{w}_r - \bar{\pi}_r(w_r, \theta) \right|$. Hence, it holds that

$$\tilde{w}_r(w_r, \theta) = Pw_r + \frac{(1-P)(\delta\theta + \overline{w})}{2}. \quad ...(9)$$

This is the worker's wage when re-employment is realized in the settlement. $\tilde{w}_r$ increases with respect to θ, and the firm's profit is $\pi_r(w_r, \theta) = \delta\theta - \tilde{w}_r(w_r, \theta)$. In this case, total payoff is given by $\delta\theta$ because wage is a just transfer from the firm to the

worker.

On the other hand, when re-employment cannot be realized, the worker receives severance pay D_r and quits the firm in the settlement stage. In this situation, severance pay D_r is given by $D_r = \arg\max\{D_r + \overline{w} - \overline{u}_r(w_r)\}\{-D_r - \overline{\pi}_r(w_r, \theta)\}$. Hence, it is obtained that

$$D_r(w_r, \theta) = Pw_r - \frac{P(\delta\theta + \overline{w})}{2}. \quad ...(10)$$

In this situation, the worker's utility and the firm's profit are $u_r(w_r, \theta) = D_r(w_r, \theta) + \overline{w}$ and $\pi_r(w_r, \theta) = -D_r(w_r, \theta)$, respectively, and the total payoff is $\overline{w}$.

Similar to the damages case, determinant on re-employment is efficient in the settlement stage. Hence, under $\theta \in [0, \hat{\theta})$, re-employment is not realized in the settlement stage and the worker gets the severance pay $D_r(w_r, \theta)$ to quit the firm. Under $\theta \geq \hat{\theta}$, the worker is re-employed and gets the new wage $\tilde{w}_r(w_r, \theta)$.

As (10) shows, severance pay $D_r(w_r, \theta)$ decreases with respect to θ. This implies that severance pay increases as the firm's state becomes more severe. Although re-employment is inefficient under $\theta \in [0, \hat{\theta})$, the firm has to re-employ the fired worker when the firm loses the trial in the reinstatement case. Re-employment decreases the firm's profit as the state is more severe. Hence, in the settlement stage, the firm is willing to offer a higher severance pay to avoid trial under the more severe state.

The worker's expected utility in the reinstatement case U_r is given by

$$U_r = (1 - F(\theta_r^*))w_r + \int_{\hat{\theta}}^{\theta_r^*} \tilde{w}_r(w_r, \theta) f(\theta) d\theta + \int_0^{\hat{\theta}} (D_r(w_r, \theta) + \overline{w}) f(\theta) - T, \quad ...(11)$$

where θ_r^* is the critical point of dismissal in the reinstatement case. Clearly, because the worker going to trial is also the dismissed worker, a constraint condition exists:

$$\theta_r^* \geq \hat{\theta}. \quad ...(12)$$

The firm's expected profit is given by

$$\begin{aligned}\Pi_r(w_r) &\equiv \int_0^{\bar{\theta}} \pi_r(w_r, \theta) f(\theta) d\theta \\ &= \int_{\theta_r^*}^{\bar{\theta}} \theta f(\theta) d\theta - (1 - F(\theta_r^*)) w_r \\ &\quad + \int_{\hat{\theta}}^{\theta_r^*} (\delta\theta - \tilde{w}_r(w_r, \theta)) f(\theta) d\theta - \int_0^{\hat{\theta}} D_r(w_r, \theta) f(\theta) d\theta\end{aligned}$$

The firm is willing to optimize θ_r^* to maximize its profit subject to the constraint (12). We can show, like in the damages case, that the constraint (12) is not binding on the equilibrium in the reinstatement case since the decline of productivity caused by the dismissal announcement is sufficiently small. Using (9), (10), and the first order condition, when the constraint (12) is not binding, the critical point of dismissal θ_r^* is determined as follows:

$$\theta_r^*(w_r) = \frac{(1-P)(2w_r - \bar{w})}{2 - (1+P)\delta}. \qquad \text{...(13)}$$

It is clear that $\theta_r^*(w_r) - \hat{\theta} \to 2(w_r - \bar{w}) > 0$ as $\varepsilon \to 0$. Hence, the constraint (12) is not binding, and thus we can ignore the constraint.

We consider the relationship between the wage in the settlement $\tilde{w}_r$ and the critical point of dismissal announcement θ_r^* (figure 2). When re-employment is realized, the firm gets outputs $\delta\theta$ and pays wage $\tilde{w}_r$. If $\tilde{w}_r \geq w_r$, the firm has no incentive for settlement. There is the upper limit of the state when re-employment is realized since $\tilde{w}_r$ increases with respect to θ. Actually, $\tilde{w}_r(w_r, \theta_r^*) \to w_r$ holds as $\delta \to 1$. We summarize these results as a proposition.

Proposition 2

In the reinstatement case, the following results are obtained.

[1] Under $\theta \in [0, \hat{\theta})$, the worker is fired and receives severance pay $D_r(w_r, \theta)$ specified by (10). The worker's utility and the firm's profit are given by $u_r(w_r, \theta) = D_r(w_r, \theta) + \bar{w}$ and $\pi_r(w_r, \theta) = -D_r(w_r, \theta)$, respectively.

[2] Under $\theta \in [\hat{\theta}, \theta_r^*)$, the worker is fired, and then settles with the firm. The worker is

re-employed and receives the new wage $\tilde{w}_r(w_r, \theta)$ specified by (9). The expected payoff for the worker is given by $u_r(w_r, \theta) = \tilde{w}_r(w_r, \theta)$. The firm's profit is $\pi_r(w_r, \theta) = \delta\theta - \tilde{w}_r(w_r, \theta)$.

[3] Under $\theta \in [\theta_r^*, \bar{\theta}]$, the firm continues employing the worker with the original wage w_r, and its profit is $\pi_r(w_r, \theta) = \theta - w_r$.

The worker's income is decreasing with respect to θ under $\theta \in [0, \hat{\theta})$ since severance pay decreases with respect to θ. In the reinstatement case, failure of settlement leads to re-employment of the fired worker when the worker wins the trial. This situation occurs with probability P. As the state becomes more severe, re-employment decreases the firm's profit. Hence, the firm is likely to agree to settle by offering a higher severance pay as the state becomes more severe.

Under $\theta \in [\hat{\theta}, \theta_r^*)$, the worker is re-employed and gets the new wage $\tilde{w}_r(w_r, \theta)$, and the worker's utility increases with respect to θ. In this case, as the state becomes better, re-employment increases the firm's profit, and thus the firm is willing to settle with the worker by offering a higher new wage. Under $\theta \in [\theta_r^*, \bar{\theta}]$, the firm maintains the employment relationship with the original wage w_r.

The firm must offer a wage level that satisfies the worker's incentive compatibility on making the labor contract. The expected utility of the worker who learns the necessary employment skill is given by (11). On the other hand, using (10), the shirking worker gets severance pay $D_r(w_r, 0) = P\left(w_r - \frac{\overline{w}}{2}\right)$ in the settlement. Note that the shirking worker's productivity is zero, and his expected utility is as follows:

$$U_r^S(w_r) \equiv D_r(w_r, 0) + \overline{w}. \qquad \text{...(14)}$$

As we also saw in the damages case that the firm must offer a wage level that satisfies the worker's incentive compatibility. If the worker shirks, his productivity is always zero, and thus the firm is willing to fire the worker. The expected utility of the shirking worker in the case of reinstatement is given by (14). Incentive compatibility $U_r \geq U_r^S$ is replaced by

$$V_r(w_r) \equiv (1-F(\theta_r^*))w_r + \int_{\hat{\theta}}^{\theta_r^*} \tilde{w}_r(w_r, \theta) f(\theta) d\theta + \int_0^{\hat{\theta}} (D_r(w_r, \theta) + \overline{w}) f(\theta) d\theta - D_r(w_r, 0) - \overline{w} \geq T \quad \text{...(15)}$$

The firm is willing to decrease wage as much as possible while incentive compatibility holds. Hence, incentive compatibility is binding on the equilibrium: $V_r(w_r) = T$.

3. Analysis

We consider the difference between damages and reinstatement. First, we consider two benchmarks for intuitive understanding.

Proposition 3

[1] Under $P = 0$, reinstatement is completely equivalent to damages. The critical point of dismissal is given by $\theta_d^* = \theta_r^* = \frac{2w^* - \overline{w}}{2 - \delta}$, where w^* is the wage in both cases. Under $\theta \in [0, \hat{\theta})$, the worker is fired and gets no severance pay: $D_d(w) = D_r(w, \theta) = 0$. Under $\theta \in [\hat{\theta}, \theta_i^*)$ $(i = d, r)$, the worker is re-employed and gets the new wage: $\tilde{w}_i(w, \theta) = \frac{\delta\theta + \overline{w}}{2}$ $(i = d, r)$. Under $\theta \in [\theta_i^*, \overline{\theta}]$, the worker remains employed with the original wage w^*.

[2] Under $P = 1$, incentive compatibility (7) and (15) never hold, and thus the employment contract is not enforceable.

Proof is easy. In the case of $P = 0$, the worker always loses the trial. Hence, the difference between remedies for illegal dismissal is irrelevant because every dismissal is legal. On the other hand, when $P = 1$, the firm cannot fire the worker. If the firm employs a worker, the firm must always compensate with the wage level stated in the original employment contract. Since the Court cannot distinguish diligent workers from shirking ones, the shirking worker can always get the wage stipulated in the employment contract. Hence, the firm cannot encourage the workers to learn the essential skill.

We focus on the case of $0 < P < 1$ and assume that employment contracts are enforceable in both remedies.

Proposition 4

Under $0 < P < 1$, it holds that

[1] $w_d^* < w_r^*$

[2] $\theta_d^*(w_d^*) < \theta_r^*(w_r^*)$

Proof is found in the Appendix. Suppose that $w_d = w_r = w$. In this case, it holds that $V_d(w) > V_r(w)$ for any wage $w\ (> \overline{w})$ (see figure 3). The firm is willing to decrease wage while incentive compatibility (7) and (15) are satisfied. Hence, these incentive compatibilities are always binding on the equilibrium: $V_d(w_d^*) = V_r(w_r^*) = T$. As figure 3 suggests, wage in the reinstatement case is greater than that in the damages case on the equilibrium: $w_d^* < w_r^*$. Even if $w_d^* = w_r^*$ holds, so does $\theta_d(w_d^*) < \theta_r(w_r^*)$ from (6) and (13). Hence, it is clear that $\theta_d(w_d^*) < \theta_r(w_r^*)$ under $w_d^* < w_r^*$.

Under $\theta \in [0, \hat{\theta})$, the worker quits the firm and gets severance pay in both cases, which is efficient. However, in the severe state, the firm's bargaining power is weaker in the reinstatement than in the damages case. As figures 1 and 2 suggest, in the severe state $\theta \in [0, \hat{\theta})$, the worker's utility in the reinstatement case is greater than that in the damages case. This implies that shirking behavior is more attractive for the worker when reinstatement rather than damages is the outcome. From the viewpoint of the worker's incentive, the firm has to offer a higher wage in the reinstatement case.

Moreover, in the moderately severe state $\theta \in [\hat{\theta}, \theta_i^*)$ $(i = d, r)$, the firm can decrease wage by a dismissal announcement. In these states, re-employment is efficient. In the damages case, the worker quits after going to trial whether the worker wins or not. In the reinstatement case, the worker returns to the firm with probability *P* at trial. Hence, in the settlement stage, the firm is more willing to avoid trial in the damages case than with reinstatement, and thus, the new wage in the former case is higher than in the latter when the same wage is offered in the original contract: $\tilde{w}_d(w, \theta) > \tilde{w}_r(w, \theta)$. Since the worker takes into account the new wage during the settlement stage, the firm must offer a higher original wage in the reinstatement case than in the damages case to maintain the worker's incentive. Therefore, as proposition 4 [1] indicates, the firm has to

offer a higher wage in the reinstatement case to encourage the worker to learn the firm-specific skill.

However, after making the employment contract and after training, the firm is likely to fire the worker because of the high wage payment. Thus, dismissal is more likely to occur in the case of reinstatement.

Next, we consider social welfare in both cases. The worker is not fired under $\theta \in [\theta_i^*, \overline{\theta}]$ $(i = d, r)$ and settles on returning to the original workplace under $\theta \in [\hat{\theta}, \theta_i^*)$ $(i = d, r)$. Therefore, the worker is employed and produces outputs under $\theta \in [\hat{\theta}, \overline{\theta}]$, and the worker quits the firm under $\theta \in [0, \hat{\theta})$ in both cases. Since wage and severance pay are both just transfers from the firm to the worker, they are ignored from the viewpoint of social welfare. Hence, social welfare is given by

$$W_i \equiv \int_{\theta_i^*}^{\overline{\theta}} \theta f(\theta) d\theta + \int_{\hat{\theta}}^{\theta_i^*} \delta\theta f(\theta) d\theta + F(\hat{\theta})\overline{w} - T \qquad (i = d, r).$$

The critical point of quittance is equivalent in both cases, and thus the following proposition is obtained.

Proposition 5

Social welfare in the damages case is greater than in the reinstatement case: $W_d > W_r$.

Proof is easy. From proposition 4 [2], it holds that $W_d - W_r = \int_{\theta_d^*}^{\theta_r^*} (1-\delta)\theta f(\theta) d\theta > 0$.

In both cases, settlement is agreed on the equilibrium path, and thus trial disappears. Settlement is *ex post* efficient in both cases, and hence, the different remedies for illegal dismissal, damages or reinstatement, depends on frequency of the dismissal announcement. Dismissal is more likely to be announced in the reinstatement case than in the damages one as proposition 4 [2] indicates. Decline of productivity caused by the dismissal announcement is socially wasteful, and therefore, reinstatement has a more detrimental effect on social welfare than does instituting damages as a remedy. Moreover, we can show that reinstatement increases the worker's utility more than when damages are allowed.

Proposition 6

Under $0 < P < 1$, reinstatement distributes income better from firm to workers compared to damages: $\Pi_d > \Pi_r$ and $U_d < U_r$.

Proof is found in the Appendix. This result is obvious. Incentive compatibility (7) and (15) are binding on the equilibrium, and thus the worker's utility is equivalent to that of the shirking worker case. As figures 1 and 2 imply, the shirking worker receives a higher severance pay in the reinstatement case than in the damages case, and since $W_d > W_r$ holds, $\Pi_d > \Pi_r$ is clear. Hence, proposition 6 is obtained.

We have considered that employment contracts are enforceable in both cases under $0 < P < 1$, though as figure 3 implies, employment contracts are more likely to be enforceable in the damages case than with reinstatement. There is the level of training cost T satisfying $V_r(w) < T$ for any w. Clearly, unless employment contracts are enforceable, any added value disappears. Hence, when looking at the likelihood of enforceability of employment contracts, damages are better than reinstatement.

4. Conclusion and Discussion

We consider a simple employment contract model to analyze the difference between remedies for illegal dismissal. We have focused on two remedy options: damages or reinstatement. As figures 1 and 2 show, the wage the worker actually receives in the reinstatement case is greater under severe states and lower under moderately severe states than in the damages case when the same wage is offered in the original contract. Hence, shirking behavior is more attractive with reinstatement than with damages. After making the contract, a dismissal announcement is more likely to occur in the reinstatement case than in the damages case, and productivity is reduced by a dismissal announcement. Damages are better than reinstatement since reinstatement would likely lead to dismissal.

We can regard the firm's state as the worker's ability. Following our results, as figure 1 suggests, the wage the worker actually gets increases with his ability in the damages case. However, figure 2 implies that, in the reinstatement case, the worker with less ability gets a higher wage. The firm is willing to fire the worker with less ability, although he may return to the firm as the result of trial. If the worker wins the trial, the firm must re-employ him and pay the original wage over the reservation wage. Hence, the firm has an incentive for paying a higher severance pay in the settlement stage. The

worker with less ability has a stronger bargaining power in the reinstatement case. Imagine this situation in your own workplace, and you will probably feel some anger. Workers with high ability dislike the situation where workers with less ability receive a greater reward, and feelings of resentment can decrease their motivation. This effect is not observed in the damages case. From this point of view, damages are more desirable than reinstatement as a remedy for illegal dismissal.

We have considered when a dismissal announcement reduces the fired worker's productivity. In many cases, firms and fired workers settle to avoid trial, but they sometimes fail to settle and end up going to trial. Naturally, there may be emotional conflict between the firm's managers and the workers, ranging from unpleasantness to downright animosity. In this situation, reinstatement is not an efficient remedy for illegal dismissal. Yamaguchi (2001) reports that only about 30% of fired workers who win in trial return to their previous workplaces in Japan where reinstatement is frequently ordered by the Court. Reinstatement is not always a happy result for winners in court.

In European countries and Japan, there are various regulations on dismissal. Workers are protected by these regulations, and firms must follow specific procedures such as providing sufficient advance notice, negotiating with labor representative institutions and/or providing sufficient severance pay. Moreover, firms may be required to show just cause for the dismissal: explaining the need for firing the employee, or disclosing if there is any option other than dismissal. If firms do not make sufficient efforts to avoid dismissal or cannot effectively explain the reason for dismissal, the Court may decide that the firms do not have a just cause for dismissal, even if the firms followed the appropriate procedures, including providing advance notice and severance pay. We considered such situations in this paper.

Actually, in Japan, the Court rarely accepts a firm's dismissal policy even if the firm follows the labor law procedures and adheres to any agreements with unions or labor representative institutions. The Court is likely to consider that any dismissal is too severe for workers. Abraham and Houseman (1993) indicate that work councils play a significant role on dismissal outcomes in Germany. Firms are required to negotiate with work councils and, although the councils may not be able to completely prevent firms from firing employees, the fired workers are likely to receive remedies in court, such as compensation or reinstatement, when work councils are opposed to the dismissal. This is similar to Japan in that firms' dismissal policies may not accepted even if the firms follow appropriate dismissal procedures.

Dismissal with discrimination, such as discrimination against race, sex, age, or

union membership is illegal, obviously so, and is often punished punitively. There are two types of remedies for these illegal dismissals: damages and reinstatement, and these types of dismissals are considered as part of this model. Even in the U.S., where employment at-will is the dominant doctrine, and firms can dismiss employees freely, firms still face risks on dismissal with discrimination. A firm risks losing in trial, and the judge or jury may side with a fired worker even if the firm did not really discriminate against the worker when dismissing him. This is an important consideration for firms. Oyer and Schaefer (2000) examined how the Civil Rights Act of 1991, which punishes employment discrimination more severely than previous statutes, has affected the dismissal of minorities. They compared non-Hispanic white men and black men between the ages of 21 and 39 holding full time jobs and found that firms were likely to avoid individual firings of black men after passage of the Act in 1991. However, this did not hold true when workers were massively dismissed. Massive layoffs are less likely to be regarded as discriminatory dismissals than individual firings since many workers with various backgrounds and characteristics are fired at the same time. Hence, with massive layoffs, firms run little risk of being found discriminatory in dismissals even if some workers sue the firms. According to their study, this risk of judgment for discriminatory dismissals is important for firms in the U.S. Bemmels (1988) also investigated the gender effect of grievance and arbitration procedures and shows that female workers are 32% more likely to receive full reinstatement than male workers.

Our model considers these situations under the doctrine of employment at-will as in the U.S. According to our results, reinstatement leads to a high likelihood of dismissal and decreases social welfare. Also, as occurs in Japan and European countries some antipathy exists between firms and workers if workers return to their original workplaces.

Although our model encompasses many situations involving reinstatement or the payment of damages after dismissal, it is not relevant to the problem of reinstating workers who perform strike activities. Under the Mackay Rule in the U.S., in which workers cannot reinstate or receive damages after strike activities, firms can fire workers and replace them with new ones permanently when the workers perform strike activities. This is an important topic, but it is not considered in this paper because this is a problem of strengthening bargaining powers of workers, not a comparison of remedies. These are two different problems. The problem to consider with the Mackay rule is whether workers have any right to receive any recompense at all for being permanently replaced, whereas our focus is on which is the better of two remedies, damages or reinstatement. Although in the U.S., permanent replacement is allowed under the

Mackay rule, which is relevant to the doctrine of employment at-will that allows firms to fire employees without any constraint, in European countries and Japan, there are workers reinstatement rights after strike activities. This would be expected in these countries since they have such strict employment protection regulations.

In the Introduction, we indicated that employment protection regulations produced different effects on the economy. Similarly, the effect that permanent replacement of workers during strike activities has on employment level is ambiguous. In Canada, permanent replacement is accepted in some states, but not in others. Budd (2000) finds that the effect of strike replacement legislation on employment is ambiguous in Canada. It is not always inefficient that workers are protected by employment protection regulations and organizing unions. Actually, Booth and Chatterji (1998) and Eguchi (2002) show that unions with bargaining power improve social welfare. However, if workers are allowed to receive remedies when a firm permanently replaces them during strike activities, there is still the question of which is the better remedy, reinstatement or damages? This problem is left for future work.

Appendix

Proof of proposition 4

Suppose that $w_d = w_r = w$. From (2) and (9), it holds that

$$\tilde{w}_d(w, \theta) - \tilde{w}_r(w, \theta) = \frac{P(\delta\theta - \overline{w})}{2}.$$

From propositions 1 and 2, a new wage is offered in the settlement stage: $\theta \geq \hat{\theta} \equiv \frac{\overline{w}}{\delta}$.

Hence, it clearly holds that

$$\tilde{w}_d(w, \theta) \geq \tilde{w}_r(w, \theta) \quad \text{under} \quad \theta \geq \hat{\theta}. \qquad \text{...(A1)}$$

This inequality strictly holds under $\theta > \hat{\theta}$. Moreover, using (6) and (13), since δ is sufficiently near 1, it is obtained that

$$\theta_d^*(w) < \theta_r^*(w)\,. \qquad \text{...(A2)}$$

Actually, if $\delta \to 1$, it holds that $\theta_d^*(w) - \theta_r^*(w) \to -2P(w-\overline{w}) < 0$. From (1) and (10), it is obvious under $w_d = w_r = w$ that

$$D_r(w,\theta) + \overline{w} - \overline{u}_d(w) = \frac{P(\overline{w} - \delta\theta)}{2} > 0 \quad \text{under} \quad \theta \in [0, \hat{\theta})\,. \qquad \text{…(A3)}$$

The following equation is obtained from (A2) and a simple calculation:

$$\begin{aligned} V_d(w) - V_r(w) = & \int_{\theta_d^*}^{\theta_r^*} (w - \tilde{w}_r(w,\theta)) f(\theta) d\theta \\ & + \int_{\hat{\theta}}^{\theta_d^*} (\tilde{w}_d(w,\theta) - \tilde{w}_r(w,\theta)) f(\theta) d\theta \\ & + \int_0^{\hat{\theta}} \left| \overline{u}_d(w) - D_r(w,\theta) - \overline{w} \right| f(\theta) d\theta \\ & + D_r(w,0) + \overline{w} - \overline{u}_d(w) \end{aligned} \qquad \text{...(A4)}$$

Addition of the third and fourth terms in the above equation (A4) is positive from (A3):

$$\begin{aligned} & \int_0^{\hat{\theta}} \left| \overline{u}_d(w) - D_r(w,\theta) - \overline{w} \right| f(\theta) d\theta + D_r(w,0) + \overline{w} - \overline{u}_d(w) \\ & \quad = \frac{P}{2} \int_0^{\hat{\theta}} \delta\theta f(\theta) d\theta + \frac{(1 - F(\overline{w}))P\overline{w}}{2} > 0 \end{aligned} \qquad \text{...(A5)}$$

As figure 2 implies, $w > \tilde{w}_r(w,\theta)$ holds under $\theta < \theta_r^*$, and thus the first term in (A4) is positive. Using (A1), (A2), and (A5), it holds that $V_d(w) > V_r(w)$ for any w $(> \overline{w})$. Incentive compatibility is binding on the equilibrium in both cases since the firm is willing to decrease wage: $V_d(w_d^*) = V_r(w_r^*) = T$. As figure 3 suggests, it holds that $w_d^* < w_r^*$.

From (6), $\theta_d^*(w_d)$ increases with respect to w_d. $\theta_d^*(w) < \theta_r^*(w)$ holds even under $w_d = w_r = w$ from (A2), and thus $\theta_d^*(w_d^*) < \theta_r^*(w_r^*)$ is clear under $w_d^* < w_r^*$. ■

Proof of proposition 6

Incentive compatibility is binding on the equilibrium in both cases. Hence, the worker's expected utility is as follows:

$$U_d(w_d^*) = U_d^S(w_d^*) = \overline{u}_d(w_d^*) \equiv (w_d^* - \overline{w})P + \overline{w}$$

and

$$U_r(w_r^*) = U_r^S(w_r^*) = D_r(w_r^*, 0) + \overline{w} .$$

Using (10), it holds that

$$\begin{aligned} U_r(w_r^*) - U_d(w_d^*) &= D_r(w_r^*, 0) + \overline{w} - \overline{u}_d(w_d^*) \\ &= P(w_r^* - w_d^*) + \frac{P\overline{w}}{2} > 0 \end{aligned} \qquad \text{...(A6)}$$

From proposition 5 and (A6), it is obvious that $\Pi_r < \Pi_d$ because the following inequality holds: $\Pi_d = W_d - U_d(w_d^*) > W_d - U_r(w_r^*) > W_r - U_r(w_r^*) = \Pi_r$.■

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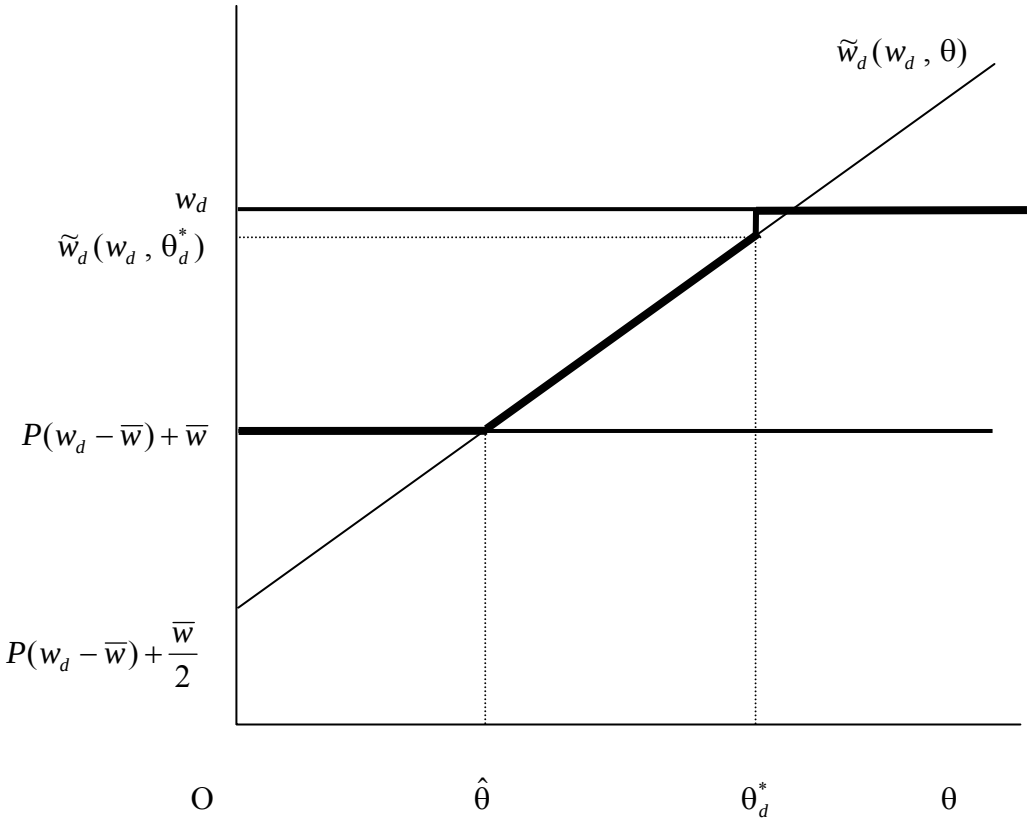
$\widetilde{w}_d(w_d, \theta)$
w_d
$\widetilde{w}_d(w_d, \theta_d^*)$
$P(w_d - \overline{w}) + \overline{w}$
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Figure 1

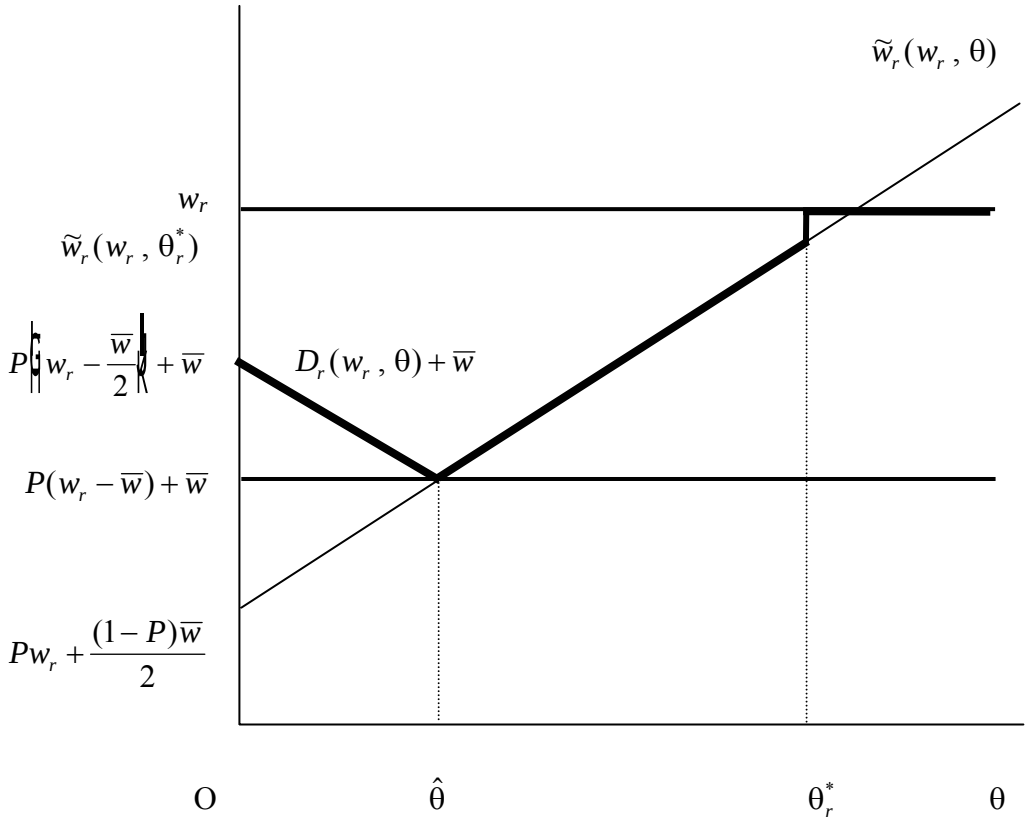
$\widetilde{w}_r(w_r, \theta)$
w_r
$\widetilde{w}_r(w_r, \theta_r^*)$
$P\left(w_r - \frac{\overline{w}}{2}\right) + \overline{w}$
$D_r(w_r, \theta) + \overline{w}$
$P(w_r - \overline{w}) + \overline{w}$
$Pw_r + \frac{(1-P)\overline{w}}{2}$
O
$\hat{\theta}$
θ_r^*
θ

Figure 2

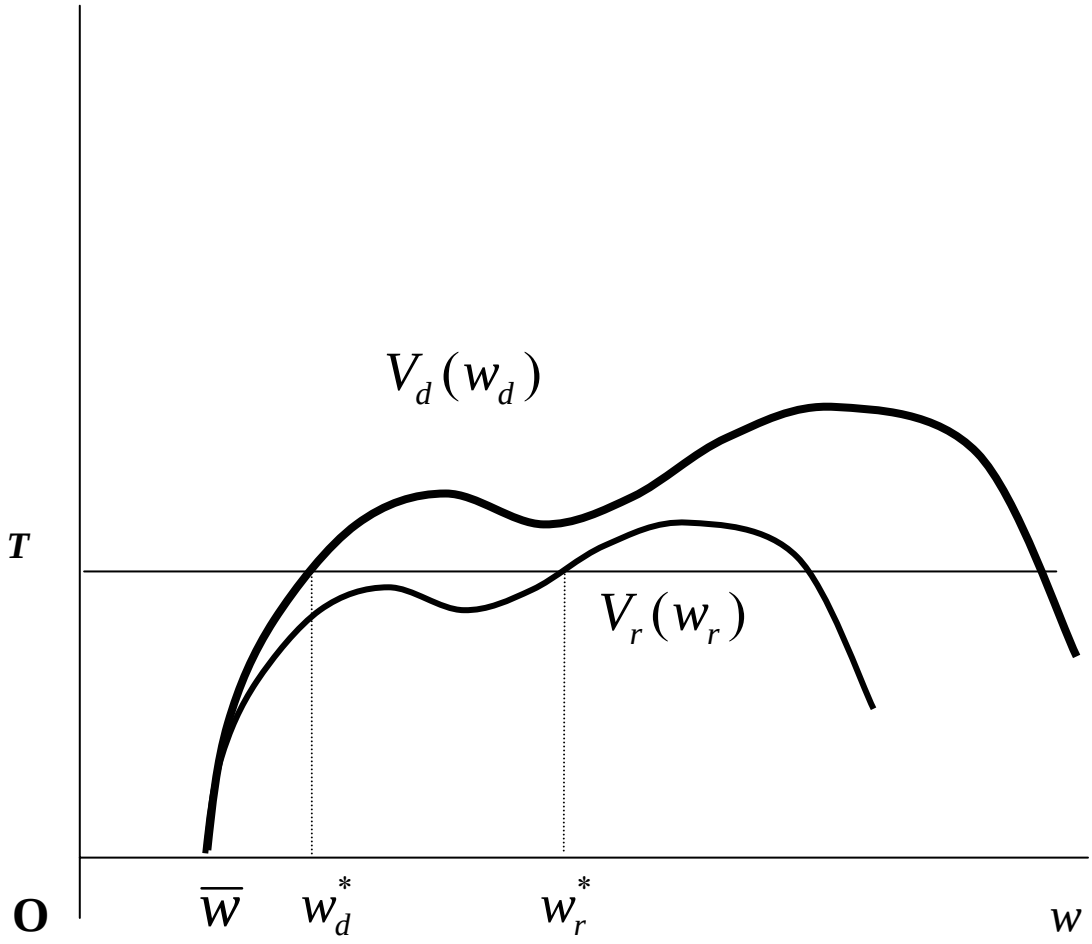

Figure 3