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# INSIDER BARGAINING POWER, STARTING WAGES, AND INVOLUNTARY UNEMPLOYMENT\*

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## Abstract

Recent studies of wage bargaining and unemployment have emphasized the distinction between insiders and outsiders, and that unions act in the interest of insiders. Yet one typically assumes that insiders and recently hired outsiders are paid the same wage. We consider a model where the starting wage may differ from the insider wage, but incentive constraints associated with turnover affect the form of the contract. We examine under what conditions the starting wage is *linked* to the insider wage so that increased bargaining power of insiders raises the starting wage and reduces the hiring of outsiders.

Keywords: Starting wage, Bargain, Seniority, Hiring, Unemployment.

JEL Codes: J23, J31, J33.

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## I. Introduction

Much recent research on wage formation and unemployment has focused on the distinction between insiders and outsiders in the labor market. A common theme is that employed workers (insiders) have bargaining power that allows them to demand high wages although there are unemployed outsiders queuing for jobs. The more bargaining power insiders have, the higher are wages and the lower is employment. But the link between insider bargaining power and employment is due to an *ad hoc constraint* that is typically imposed on the wage contract: all workers are paid the same wage.<sup>1</sup> Thus, the wage that insiders get is also the wage at which firms hire outsiders. But if unemployed outsiders are queuing for jobs, then the surplus to be shared between the firm and the insiders could be increased by setting a low starting wage. If this were done there would be no necessary connection between insider bargaining power and employment (see Frank (1985), Frank and Malcomson (1994)).<sup>2</sup> It should not be in the insiders' interest to create an inefficiency by pricing outsiders out of the market, but to hire outsiders as long as their marginal product exceeded their alternative income.<sup>3</sup>

In practice, recently hired workers are sometimes paid less than senior workers, but in many sectors the difference is small and unemployed workers often appear to be ready to take jobs at lower starting wages than those currently prevailing. In fact, a recent questionnaire study shows that, in Sweden, attempts to underbid are not unusual but such offers are usually turned down by firms (Agell and Lundborg (1995)). Furthermore, the seniority wage schedule appears relatively rigid: a percentage wage increase negotiated in a collective agreement typically applies not only to those workers employed at the time of the bargain, but also to those to be hired during the contract period. So the question arises why insiders should use their bargaining power not only to raise their own wages, but also to raise

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<sup>1</sup> Insider-outsider models where all workers are paid the same wage have been used to explain the persistence of unemployment (Blanchard and Summers 1986, Gottfries and Horn 1987, Lindbeck and Snower 1987, Burda 1990, Drazen and Gottfries 1994, Gottfries and Westermarck 1998), the fact that labor contracts typically specify wages, but not employment (Oswald 1993), and nominal wage contracts (Gottfries 1992).

<sup>2</sup> See also Gollier (1989,1991) and Fehr's (1990) comment on Lindbeck and Snower (1988). The latter assume that when new workers are hired they are paid their reservation wage, and the firm decides unilaterally about hiring and firing. Insiders may harass outsiders so as to raise outsiders' reservation wages to avoid being replaced and improve their own bargaining position. Again there appear to be *ad hoc* constraints on the contract. In their setup one would expect the contract to specify the starting wage and also to give insiders priority in employment - as is typically the case in real union contracts.

<sup>3</sup> Of course, this is true also in the case when the union cares about all workers. Kuhn and Robert (1989) consider a monopoly union with a senior and a junior worker and argue that for a given seniority ranking there should be little distributional conflict between the workers. Both workers should agree to set the junior wage as high as possible without the junior worker losing his job. Hence there is no involuntary unemployment in their

starting wages. *Why are starting wages "linked" to the wages paid to insiders/senior workers?*

A plausible argument against low starting wages - or payments for jobs, or bonds posted by workers - is that firms would have an incentive to cheat, to replace expensive insiders by cheap new workers. There are typically ways in which the firm can make such replacements without this being observed by other workers or by the union.<sup>4</sup> In order *not* to give the firm an incentive to replace insiders, the difference between the insider wage and the starting wage must not be too large. However, there may be more efficient ways to protect insiders from being replaced. A natural way would be to stipulate in the contract that the firm should make a severance payment to all insiders that are fired. However, such payments may also be associated with incentive problems. Whether a worker leaves the firm or not often depends on the actions of both the firm and the worker, making the distinction between fires and quits unclear. Payments may then be made also to workers who effectively quit, increasing the turnover of workers.

In this paper we consider the design of labor contracts taking account of the incentive effects discussed above. We allow the starting wage to be lower than the insider wage and payments to be made to workers who leave the firm. But, following Carmichael (1983), MacLeod and Malcolmson (1989) and others, we assume that other workers (or a third party) cannot observe the *reason* for a separation, so payments cannot depend on who initiated the separation. Employed workers (insiders) get outside offers randomly drawn from an exogenous distribution. A "double" incentive problem arises because workers have private information about their outside offers and the firm can make workers quit in a way that is not observed by other workers or a third party.<sup>5</sup>

Under these conditions, payments to (all) workers who leave the firm have two different effects. On the one hand, they protect insiders from being replaced and thus make it possible to reduce starting wages, which raises the surplus to be split between the firm and the

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model.

<sup>4</sup> Arguments of this type are common in the "efficiency wage" literature. Other explanations why workers do not pay for jobs are that they may be credit constrained and that firms may cheat by selling a job and then immediately claim that the worker shirked and dismiss the worker, so unemployed workers would be unwilling to make such payments. The first is contradicted by the observation that workers typically appear to be happy that they get a job which would not be the case if payments for jobs cleared the market (see Carmichael (1985)). The second is subject to the objection that it should be relatively easy to detect if a firm systematically dismisses recently hired workers. Another argument is that when bargaining takes place on the *industry level*, the union has incentive to raise the starting wage so as to limit supply and raise the product price in the industry. This argument seems relevant in many situations, but the starting wage appears to be linked to the insider wage also when bargaining takes place on the firm level or in an industry subject to intense international competition.

<sup>5</sup> For example, the firm may change the working conditions in such a way that some insiders quit.

insiders. On the other hand, they stimulate quits which are costly to the firm. We show that, depending on the parameter values, two different types of contracts may arise. The effect of insider bargaining power on employment is different in the two cases.

In *Case 1* turnover is important, and the bargaining power of insiders not too strong. Payments to workers who leave the firm are optimally set to zero in order to reduce turnover costs. (In fact, it would be efficient to charge a fee from quitting workers, but we assume this is not feasible.) In this case there is a close link between the insider wage and the starting wage, and an increase in bargaining power for the insiders raises the starting wage. Thus we can rationalize the type of contract that is postulated in most models of union wage bargaining.

How does an increase in insider bargaining power influence employment levels in this case? As it turns out, this depends on contract length. With long-term contracts an increase in the starting wage reduces employment, so that an increase in insider bargaining power has a negative effect on employment. However, when contracts are frequently renegotiated, the firm suffers from a commitment problem: the firm cannot credibly promise to pay high wages in the future, so turnover is high. In this case, a permanent increase in insider bargaining power is beneficial to the firm since it functions as a commitment to pay permanently high wages, which reduces turnover. With a lower turnover, the firm is willing to hire more workers, so employment increases! Thus, if contracts are renegotiated very frequently, then this commitment problem is severe, and an increase in insider bargaining power can increase profits and employment, as well as wages.

In *Case 2* insiders have a lot of bargaining power. The wage is high relative to alternative offers, and workers are unlikely to quit even if they are paid for quitting. Then, turnover is not much of a problem and the best way to protect insiders is to stipulate in the contract that payments should be made to workers who leave the firm - a form of "golden parachutes" for employees. In this case, the starting wage may be substantially lower than the insider wage and an increase in insider bargaining power does not affect employment.

In practice, payments to workers who leave appear to be small in most countries, at least for regular employees, suggesting that *Case 1* is the common one and that increased bargaining power of insiders will indeed raise starting wages. With (implicit or explicit) long term contracts, this reduces employment.

The arguments made here are closely related to arguments made in the literature on "efficiency wages", particularly by MacLeod and Malcomson (1989,1992). They analyze bonding in a shirking model with a "double incentive problem": workers can shirk and firms

can falsely claim that the worker has shirked and replace the worker. They find that bonds (or payments for jobs) are not helpful at all as a way to redistribute surplus between the parties., However, they did not analyze the consequences of insider bargaining power and another difference is that we focus on incentive problems associated with turnover rather than shirking.<sup>6</sup>

In Section II we describe the model, and analyze hiring and quits. The optimal contract is characterized in Section III. Discussion follows in Section IV.

## II. The Model

We consider optimal contracts between a firm and its insiders, with unemployed outsiders ready to take any job they can get. All workers who were employed in the previous period are insiders.<sup>7</sup> The contract specifies an insider wage,  $w$ , a starting wage,  $\omega$ , and a payment to be made to workers who leave the firm,  $z$ . Because of imperfect information, a number of incentive constraints affect the form of the contract:

i) insiders (or the union) cannot monitor the total *number* of workers quitting, being hired, promoted etc. Thus the contract cannot stipulate the number of workers to be hired, nor can payments to individual workers dependent on what happens to *other* workers.<sup>8</sup>

ii) insiders get outside offers, which cannot be observed by the firm or by other insiders. Thus payments to workers cannot depend on outside offers - only on whether the worker continues to work for the firm or not.<sup>9</sup>

iii) the firm controls the work environment and it can take some unobservable action so as to induce (some) insiders to quit. Similarly, a worker may make himself useless, thus forcing the firm to fire him. Thus payments cannot depend on who initiates the separation. Payments made to workers who leave the firm will be called *separation payments*.<sup>10</sup>

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<sup>6</sup> We focus on turnover rather than shirking because the standard shirking model appears less relevant for unionized labor markets with a high degree of job security. In many European countries, the firm can openly dismiss a worker only if he has misbehaved very seriously, but the firm may be able to replace insiders in more indirect ways, e.g. by inducing insiders to quit. Recent survey studies such as Agell and Lundborg (1995, 1999), Campbell and Kamlani (1997), and Bewley (1998) find little support for the shirking model but do support the turnover model.

<sup>7</sup> We assume that insiders have bargaining power as a group because of their capacity to take collective action against the firm. Since insiders have firm-specific knowledge it is prohibitively costly for the firm to replace *all* insiders.

<sup>8</sup> This assumption excludes contracts where the firm has to pay a "fine" to the remaining insiders if an insider is replaced, promotion ladders and hiring limits. These alternatives are discussed in the final section.

<sup>9</sup> We do not allow lotteries. Moore (1985) considers a contract where the probability that a worker is retained depends on what he says about his outside offer.

<sup>10</sup> We use the term "separation payment" rather than severance or redundancy payment to mark the fact that these payments do not depend on who initiates the separation of the worker. In practice there are of course cases where it is clear who initiated the separation. What is important for our argument is that there are a substantial number

iv) because of enforcement problems, workers who leave cannot be charged a fee. Thus the separation payment has to be nonnegative.

The standard turnover model (Salop (1979)) does not suffer from the double incentive problem discussed in the introduction. If the starting wage differs from the insider wage by an amount equal to the training cost, the firm does not have any incentive to fire a trained worker and the outcome is Pareto efficient (see Salop (1979), Akerlof and Yellen (1986)). In effect, workers pay for their training and turnover is not costly to the firm. In contrast to the standard model, we assume that *separations induced by workers are more costly to the firm than those induced by the firm*. There are several reasons why this is plausible. Voluntary quits imply unpredictable loss of expertise and disruptions in production. The most productive workers are more likely to get good outside offers while the firm will tend to replace insiders with low productivity if it gets the opportunity.<sup>11</sup> We do not introduce heterogeneity explicitly, however, but simply assume that voluntary quits are costly for the firm.

Given these constraints, there are two ways to make sure that the firm does not replace insiders. One is to set a high starting wage; the other is to set a high separation payment. Both methods have disadvantages: high starting wages "waste" money on outsiders while payments to workers who leave the firm stimulate voluntary quits, which are costly to the firm. As we will see, the choice of method will depend on the bargaining power of the insiders and the importance of turnover costs.

### *Sequence of events*

The firm and the workers are risk neutral and infinitely lived and discount the future with discount factor  $\beta$ . The number of workers employed in period  $t$  is denoted  $n_t$ . All employees who have worked for at least one period in the firm are insiders. Thus, the firm enters period  $t$  with  $n_{t-1}$  insiders. Contracts have a stochastic length: an existing contract is prolonged to the next period with exogenous probability  $\rho$  and ceases to hold with probability  $1-\rho$ . We think of contracts as being long-term implicit contracts - promises - which extend beyond the length of formal contracts, so  $\rho$  is close to unity.<sup>12</sup> In each *period*, events occur in *three stages* as

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of cases where one cannot readily make the distinction. When some firings masquerade as voluntary quits, and conversely, incentive problems of the type discussed here will arise.

<sup>11</sup> If the productivity of individual workers is not observed by other workers, a union contract cannot differentiate wages according to productivity.

<sup>12</sup> This specification is chosen because it allows us to model the longevity of contracts in a simple way. Implicitly, the probability of breakup may reflect the probability that new circumstances make the old contract irrelevant.

follows.

In *Stage 1* nature decides whether the contract survives from the previous period or not. A contract survives with probability  $\rho$ . If the contract survives, wages and separation payments remain unchanged. If the old contract “dies”, the firm and the insiders agree on a contract that specifies the insider wage,  $w$ , starting wage,  $\omega$ , and separation payment,  $z$ . Since our interest is in the *form* of the contract rather than what determines bargaining power and the *level* of the wage, we use a rather simplistic model of bargaining. We simply assume that a contract must give each insider an expected present value of income which is at least equal to some exogenous number  $\bar{U}$ . Thus the value of  $\bar{U}$  implicitly reflects the “bargaining power” of the insiders.<sup>13</sup>

In *Stage 2* all insiders independently draw outside offers, and a fraction  $q_t$  of the insiders quit. Each worker who quits costs the firm  $\theta$ .

In *Stage 3* the firm unilaterally decides which fraction of insiders to replace,  $r_t$ , and how many new workers to hire. Since some workers quit in each period, the normal situation is that the firm hires some new workers in every period and we therefore focus on such a situation.<sup>14</sup> The hiring (training) of each new worker costs  $c$ . Then production occurs and wages are paid. Output is a concave function of employment,  $F(n_t)$ , and the product price is normalized to unity. For a given contract  $(w, \omega, z)$ , profits in period  $t$  are

$$F(n_t) - w(1 - q_t - r_t)n_{t-1} - (\omega_t + c)(n_t - (1 - q_t - r_t)n_{t-1}) - (z + \theta)q_t n_{t-1} - z r_t n_{t-1}. \quad (1)$$

The only uncertainties in the model concern the values of outside offers received by individual workers and the survival of the contract. To analyze the model we start with the last stage.

### *Stage 3: The Incentive Constraint and Employment*

Let us first consider whether, for a given contract, the firm has incentive to *replace* an insider by a new employee (outsider). If the firm keeps the insider it must pay his wage,  $w$ . If the firm replaces the insider it must pay the new worker the starting wage  $\omega$ , a training cost  $c$ , and the insider who is forced to leave is paid a separation payment  $z$ . Since new workers become insiders after one period, replacement of insiders does not affect future profits. From (1) we

<sup>13</sup> For a discussion of the relevant threats in bargaining, see Gottfries and Westermarck (1998).

<sup>14</sup> Also, the purpose of the paper is to explain the starting wage, which cannot be observed if the firm does not hire.



see immediately that if  $w > \omega + c + z$ , then the firm will replace as many insiders as possible. We assume that the (expected) loss of utility for an insider who is forced to leave the firm at Stage 3 is sufficiently high that the contract will be designed in such a way that the firm does not replace insiders.<sup>15</sup> Thus, the following *No Cheating Constraint* must be satisfied:

$$\omega \geq w - z - c. \quad (2)$$

There is excess supply of outsiders and the contracting parties do not take account of the interests of the outsiders. Since the firm and the insiders raise their joint surplus by reducing the starting wage, they will always reduce  $\omega$  to the point where the No Cheating Constraint holds with equality:<sup>16</sup>

$$\omega + c = w - z. \quad (3)$$

In the following we assume that (3) holds, so the contract is fully characterized by the vector  $(w, z)$ . Now consider the firm's choice of *employment*. When the firm decides about employment, the contract  $(w, z)$  is given and a fraction  $q_t$  of the insiders have left at Stage 2. The firm maximizes the present value of profits. We use  $V(n_t, w, z)$  to denote the present value of profits from period  $t+1$  onwards if the contract  $(w, z)$  survives to that period, and  $\Phi(n_t)$  to denote the present value of profits if it does not survive. Using the fact that  $\omega + c = w - z$ , and thus  $r_t = 0$ , we can write the firm's objective at Stage 3 of period  $t$  as

$$F(n_t) - w n_t + z (n_t - n_{t-1}) - \theta q_t n_{t-1} + \beta \rho V(n_t, w, z) + \beta(1-\rho)\Phi(n_t). \quad (4)$$

Using subscripts on functions to denote derivatives, the first order condition with respect to  $n_t$  is:

$$F_n(n_t) + \beta \rho V_n(n_t, w, z) + \beta(1-\rho) \Phi_n(n_t) = w - z. \quad (5)$$

The left hand side of (5) is the benefit of hiring one more employee, which consists of today's addition to output, and the discounted value of having one more insider in the future. The

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<sup>15</sup> Recall that the insiders remaining at this stage are those who did not get any acceptable offers in Stage 2.

<sup>16</sup> A formal proof is straightforward.

right-hand-side is the marginal hiring cost  $\omega+c$ , which equals  $w-z$  due to the No Cheating Constraint.

### *Stage 2: Quits*

Each period every insider gets an outside offer. The present value of the outside offer is a stochastic variable  $x$  drawn from a distribution with distribution function  $G(x)$ . We use  $U(w,z)$  to denote the present value of income for an insider with contract  $(w,z)$  at the beginning of a period - before he has observed his individual outside offer for that period. An insider who accepts an outside offer worth  $x$  gets  $x+z$ . An insider who stays gets  $w$  this period and from next periods onwards he gets  $U(w,z)$  if the contract is prolonged, and  $\bar{U}$  if a new contract is negotiated. Thus, the insider will *reject* an outside offer worth  $x$  if and only if:

$$x + z \leq w + \beta p U(w,z) + \beta(1-p)\bar{U}. \quad (6)$$

The probability that a worker stays with the firm is therefore  $G(w - z + \beta p U(w,z) + \beta(1-p)\bar{U})$  and the fraction of insiders quitting is

$$Q(w,z) = 1 - G(w - z + \beta p U(w,z) + \beta(1-p)\bar{U}). \quad (7)$$

Typically we would expect that only a minority of the workers would get acceptable outside offers so that, with a unimodal distribution  $G''(w - z + \beta p U(w,z) + \beta(1-p)\bar{U}) < 0$  in the relevant region, and this is assumed in the following.  $U(w,z)$  is implicitly defined by

$$U(w,z) = \int \max(w + \beta p U(w,z) + \beta(1-p)\bar{U}, x+z) dG(x). \quad (8)$$

Differentiating, we find the derivatives of  $U(w,z)$ :

$$U_w(w,z) = \frac{G}{1 - \beta p G} \geq 0, \quad U_z(w,z) = \frac{1 - G}{1 - \beta p G} \geq 0, \quad (9)$$

and the derivatives of  $Q(w,z)$  are thus:

$$Q_w(w, z) = \frac{-G'}{1 - \beta\rho G} \leq 0, \quad Q_z(w, z) = \frac{1 - \beta\rho}{1 - \beta\rho G} G' \geq 0. \quad (10)$$

Not surprisingly, quits decrease with the wage and increase with the separation payment. In these expressions  $G$  and  $G'$  are evaluated at the value of  $x$  which makes the worker indifferent between accepting and rejecting the outside offer, i.e.,  $x = w + \beta\rho U(w, z) + \beta(1-\rho)\bar{U} - z$ .

### III. The Optimal Contract

In order to specify the contracting problem in *Stage 1*, we first define the firm's value function for a given contract  $(w, z)$ :  $V(n_{t-1}, w, z)$ . This function fulfills the Bellman equation:

$$V(n_{t-1}, w, z) = \max_{n_t} [F(n_t) - wn_t + z(n_t - n_{t-1}) - \theta Q(w, z)n_{t-1} + \beta\rho V(n_t, w, z) + \beta(1-\rho)\Phi(n_t)]. \quad (11)$$

Using the envelope theorem we find the derivatives of the value function with respect to  $w$  and  $z$ :

$$V_w(n_{t-1}, w, z) = -n_t - \theta Q_w(w, z)n_{t-1} + \beta\rho V_w(n_t, w, z), \quad (12)$$

$$V_z(n_{t-1}, w, z) = n_t - n_{t-1} - \theta Q_z(w, z)n_{t-1} + \beta\rho V_z(n_t, w, z). \quad (13)$$

With these prerequisites we are ready to address the main issue: the characterization of the optimal contract between the firm and its insiders. Thus we consider a situation where the old contract has ceased to hold and the firm and the insiders negotiate a new contract in *Stage 1* of period  $t$ . We assume that the contract is Pareto efficient from the point of view of the firm and the insiders, taking account of the relevant incentive constraints. Thus the contract should solve the following maximization problem:

$$\max_{w, z} V(n_{t-1}, w, z) \quad (14)$$

$$\text{s. t. } n_{t-1} U(w, z) \geq n_{t-1} \bar{U}, \quad (15)$$

$$\text{and } n_{t-1} z \geq 0. \quad (16)$$

The maximized value of (14) is  $\Phi(n_{t-1})$ . The first order conditions are:

$$V_w(n_{t-1}, w, z) + \lambda n_{t-1} U_w(w, z) = 0, \quad (17)$$

$$V_z(n_{t-1}, w, z) + \lambda n_{t-1} U_z(w, z) + \mu = 0, \quad (18)$$

where  $\mu$  and  $\lambda$  are nonnegative shadow prices associated with the constraints.

Our main question is how increased insider bargaining power, reflected in  $\bar{U}$ , affects the starting wage and employment. Since we want to analyze *permanent* changes in bargaining power, we consider a *long run equilibrium* where all variables are constant. Dropping time subscripts, we may use (9), (10), (12) and (13) to rewrite (17) and (18) as:

$$-\frac{1}{1-\beta\rho} \left[ 1 - \theta \frac{G'}{1-\beta\rho G} \right] + \lambda \frac{G}{1-\beta\rho G} = 0, \quad (19)$$

$$-\theta \frac{G'}{1-\beta\rho G} + \lambda \frac{1-G}{1-\beta\rho G} + \mu = 0. \quad (20)$$

In order to determine equilibrium *employment*, we first use the envelope theorem to find the derivative of  $V$  with respect to lagged employment (i.e., the number of insiders):

$$V_n(n_{t-1}, w, z) = -z - \theta Q(w, z), \quad (21)$$

and, by another application of the envelope theorem:

$$\Phi_n(n_{t-1}) = V_n(n_{t-1}, w^e, z^e) = -z^e - \theta Q(w^e, z^e), \quad (22)$$

where  $w^e$  and  $z^e$  denote the expected wage in the new contract. Substituting into (5), using the definition of  $Q(w, z)$  and considering a stationary equilibrium we get an equation for long run labor demand:

$$F_n(n) = w - z + \beta z + \beta \theta [1 - G(w - z + \beta \bar{U})]. \quad (23)$$

The forward looking terms in the labor demand function have to do with the fact that a marginal insider in the next period is more costly to the firm than a newly hired worker in that period. When  $z$  is positive, the insider is paid a higher wage, the difference being  $z$ , and the insider may quit causing turnover costs in the coming period.

The solution to the model is characterized by the two first order conditions (19) and (20), the two constraints (15) and (16) and the labor demand relation (23). In order to analyze the solution we multiply (19) by  $(1-\rho\beta)$  and add the result to (20) to get:

$$\mu = 1 - \lambda. \quad (24)$$

Since  $\mu$  must be nonnegative there are two possibilities.

*Case 1:*  $0 \leq \lambda < 1, \mu > 0$  and  $z = 0$ .

*Case 2:*  $\lambda = 1, \mu = 0$  and  $z > 0$ .

Which case is relevant depends on the bargaining power of the insiders and the magnitude of the costs associated with turnover. We now analyze the relation between  $\bar{U}$ ,  $w$ ,  $z$ ,  $\omega$  and  $n$  in each case.

*Case 1:  $z=0$ .*

This case occurs if insiders have relatively low bargaining power and/or turnover costs are unimportant. To understand it, consider first the situation when insiders have so little bargaining power (low  $\bar{U}$ ) that  $\lambda=0$ . This is a pure efficiency wage model and the constraint on  $z$  binds. The firm would like to charge a fee from quitting workers, but by assumption this is not feasible. The wage is set in such a way that the reduction in turnover cost associated with a marginally higher wage equals the direct cost of a wage increase:

$$-\theta Q_w(w,0) = \theta \frac{G'}{1-\beta\rho G} = 1, \quad (25)$$

where  $G$  and  $G'$  are evaluated at the value of  $x$  which makes the worker indifferent between accepting and rejecting the outside offer, i.e.,  $x = w + \beta \rho U(w, 0) + \beta(1-\rho)\bar{U}$ . Equation (25) therefore implicitly determines the efficiency wage.

Consider now the case when insiders have *a little* bargaining power (higher  $\bar{U}$ ) so that  $0 < \lambda < 1$ . In this case  $z$  is still optimally set to zero. The firm and the insiders share the surplus and since turnover costs reduce the surplus it is in their joint interest not to stimulate quits. Another way to explain this result is to note that the wage set in the efficiency wage case ( $\lambda=0$ ) maximizes profit so, starting from that wage, a marginal wage increase does not affect the level of profit. An increase in the separation payment, on the other hand, stimulates quits which generate turnover costs for the firm.<sup>17</sup> Thus, if insiders have a little bargaining power, it is cheaper for the firm to raise  $w$  than to raise  $z$  above zero.

Thus, we have shown that when insiders have some, but not too much bargaining power,  $z$  is still equal to zero. A marginal increase in  $\bar{U}$  raises  $w$  and, since (3) implies that  $\omega = w - c$ ,

$$d\omega/dw = 1. \quad (26)$$

The starting wage increases *one-for-one* with the insider wage. Thus, for modest degrees of insider bargaining power the starting wage is *linked* to the insider wage.

In order to evaluate the effect of insider bargaining power on *employment*, we differentiate (23) and use the fact that (15) holds with equality. We find that employment decreases when  $\bar{U}$  increases provided that

$$\theta \frac{G'}{1 - \beta G} \leq 1 / \beta. \quad (27)$$

Comparing with (25) we see that if contracts are long term ( $\rho$  close to one) this condition is fulfilled for wages equal to or higher than the “efficiency wage“. Thus we have rationalized the standard view in the wage bargaining literature: stronger insider bargaining power implies higher starting wages and lower employment.

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<sup>17</sup> Since the starting wage is reduced by the same amount, the separation payment has no direct pecuniary cost to the firm.

However, for low values of  $\rho$  (27) may not hold, and employment may *increase* when the wage increases. To understand this surprising result, consider the case with one-period contracts ( $\rho=0$ ) and no union. Since wage expectations affect turnover, the firm has incentive to promise high wages in the future in order to reduce turnover but with only short-term contracts available we rule out such commitments. Insiders rationally believe that future contracts are independent of today's contract. If the firm sets a high wage today, the insiders believe that this will last only as long as the current contract lasts, and that the wage will be reduced as soon as the current contract is terminated. Therefore a wage-increase will only have a minor effect on turnover and it does not pay for the firm to raise the wage to a high level today. The same is true in future periods. There is simply no way for the firm to convince the insiders that future wages will be high since insiders know that the firm has no incentive to honor its promise in the future. This leads to a bad equilibrium with a low wage, high turnover and low profits and employment.

Now reintroduce the union. If the insider bargaining power is *permanently* increased, workers expect higher wages in the future, and this has a beneficial effect on turnover. Thus, with only short-term contracts available, a strong union (i.e., permanently high  $\bar{U}$ ) may effectively help the firm to commit to a higher wage, which reduces turnover and raises profits and employment.<sup>18</sup>

In contrast, if  $\rho$  is relatively high then the firm is able to make long-term commitments on its own and increased insider bargaining power reduces profits and employment.

#### Case 2: $z > 0$

As the wage is raised relative to the distribution of alternative offers, turnover becomes less of a problem. When the wage is sufficiently high, marginal payments to quitters will only have a small effect on quits and eventually it becomes efficient to raise  $z$  above zero. Now,  $z$  is set according to

$$\theta G'(w - z + \beta \bar{U}) = 1 - G(w - z + \beta \bar{U}). \quad (28)$$

This condition says that  $z$  should be set so that the firm's cost of higher turnover associated

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<sup>18</sup> Alternatively, in line with the Folk Theorem, long-term promises can be supported by trigger strategies if the firm is sufficiently patient. If the insiders' bargaining power  $\bar{U}$  is *temporarily* increased for this period only, this is unambiguously bad for the firm, since it makes constraint (15) tighter.

with an increase in  $z$  is equal to the benefit to insiders from an increase in  $z$ .<sup>19</sup>

Differentiating, we find that  $z$  increases *more* than  $w$  as  $\bar{U}$  increases:

$$\frac{dz}{dw} = \frac{1}{1 - \rho\beta} > 1. \quad (29)$$

To explain this, note that  $z$  is a one-off payment while a permanent increase in bargaining power raises the wage both today and in the future. Hence  $z$  can increase by the *present value* of the wage increase without increasing turnover! A somewhat surprising consequence is that the starting wage *falls* as the insider wage increases:

$$\frac{d\omega}{dw} = \frac{-\rho\beta}{1 - \rho\beta}. \quad (30)$$

What is the effect of  $\bar{U}$  on employment in this case? A falling starting wage makes it cheaper to hire outsiders today, but since hiring today implies less hiring tomorrow, it is only the interest rate on  $z$  that matters. Substituting into (23) we find that the net effect on employment is zero in this case.<sup>20</sup>

To sum up, our main result is that for modest degrees of insider bargaining power the starting wage is *linked* to the insider wage. The link arises because of the “double” incentive problem discussed in the introduction. Neither party should have a too strong incentive to terminate their relationship since this would be costly for the other side. A too low starting wage would induce the firm to replace insiders and a high separation payment would induce excessive quits. Because the starting wage is linked to the insider wage through a rigid seniority wage schedule, an increase in insider bargaining power raises all wages and (with long-term implicit or explicit contracts) reduces employment.

When insiders have a lot of bargaining power, so the wage is high relative to alternative offers and there is little turnover, the firm is not so worried about workers quitting, and workers can be protected from misbehavior by the firm by separation payments. In this case, an increase in insider bargaining power has no effect on employment.

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<sup>19</sup> Note that insiders get  $z$  with probability  $1 - G$ . Since  $\omega$  is set to fulfill the non-cheating constraint, the pecuniary cost of an increase in  $z$  is recovered by the firm through a corresponding decrease in  $\omega$ , so the only cost to the firm of a higher  $z$  is that associated with higher turnover.



The relation between  $w$  and  $\omega$  is thus nonlinear: as insiders' bargaining power increases,  $\omega$  first increases one-for-one with  $w$  (Case 1) and then falls rapidly (Case 2) to the reservation wage. With long-term contracts, employment first falls (Case 1) and then stays constant (Case 2).

#### IV. Discussion

The efficiency wage theory is often regarded as the main alternative to bargaining theories of unemployment. In this paper we have argued that the information and incentive problems which are emphasized in the literature on "efficiency wages" may explain features of labor contracts which are typically *imposed* in the wage bargaining literature.

We investigated the effect of insider bargaining power on employment, allowing starting wages to be lower than wages paid to insiders and payments to be made to workers leaving the firm. A steep seniority wage schedule may not be incentive compatible because the firm would have an incentive to replace expensive senior workers with cheap new hires. One way to protect employed workers is to stipulate that "separation payments" should be made to workers who leave the firm, but such payments will stimulate quits. When turnover considerations are important, payments to workers who leave the firm are set to zero and the starting wage is tied to the insider wage to prevent replacement of insiders.

It should be emphasized that what we explain in this model is a *link* between the insider wage and the starting wage - not that the two must be equal. The model predicts that new workers pay their training costs in the form of low starting wages. Similarly, if there is an observable productivity differential between previously employed workers and new hires, the starting wage may be lower without creating an incentive for the firm to replace insiders. However, a modification of the model may change this result. Suppose that there is heterogeneity among workers and *some* insiders are less productive than the average new worker, but this is observed only by the firm and all insiders are paid the same wage. Then, in order to protect less productive insiders, the starting wage must be higher than the insider wage minus the hiring cost. In that case, new workers do not pay the full cost of their training.

The model predicts a *rigid seniority wage schedule*: business cycle shocks or other factors that change insider wages will not affect the slope of the seniority wage schedule (as long as the contract is of the Case 1-type). The slope of the seniority wage schedule should

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<sup>20</sup> Eventually, the starting wage will fall to the reservation wage for outsiders.

primarily reflect hiring costs and productivity differentials between senior and junior workers. A systematic empirical investigation of these predictions is beyond the scope of this paper, but many union contracts appear to have these characteristics. The 1979 contract between GM and the United Auto Workers, for example, stipulated the following:

*“New employees shall be hired at a rate sixty (60) cents below the maximum base rate of the job classification and shall receive an automatic increase of twenty-five (25) cents at the expiration of thirty (30) days. Every employee who is retained by the Corporation in the job classification shall receive an increase to the maximum base rate for the job classification at the expiration of ninety (90) days or as soon as he or she can meet the standard requirements for an average employee on the job, whichever occurs first, provided however, that deviation from the above ninety (90) day rule may be made pursuant to negotiation between the Local Shop Committees and Local Managements, for jobs requiring more than ninety (90) days to attain average proficiency.”*

The starting wage is 5-10 percent lower than the regular wage. Very similar wordings and percentage wage differentials can be found in contracts for other years between the same parties.

We will now briefly discuss three important assumptions which drive our results and how modifications of these assumptions would affect the results. One key assumption is that *payments to workers who leave the firm cannot depend on who initiates a separation*. One may argue that in practice it is often clear who initiated the separation and that payments are sometimes made to workers that are fired, but seldom to workers who quit. However, even if redundancy and severance payments do occur, they are typically not very large; the amount is seldom more than one or two months' pay (see Oswald 1986, Hartog and Theeuwes 1993).<sup>21</sup> But *if* the contract would stipulate very substantial payments to be made to workers when they are fired, but not when they quit, the firm would have a strong incentive to make workers quit when in fact it would like to fire them. Likewise, workers who would like to leave the firm for some reason, would have strong incentives to make themselves less useful so as to force the firm to fire them. Thus, substantial differences in the payments depending on the cause of separation would be associated with serious incentive problems and this is probably one reason why actual payments are not very large. Therefore we think that the assumption that payments cannot depend on the reason for the separation is a useful abstraction.

Another important assumption is that the *union cannot prevent that the firm replaces some insiders* if the wage differential is too large. Clearly, an important activity of unions is to

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<sup>21</sup> There is some evidence that formal seniority wage scales are more common in high wage industries (Frank 1994) and extra-statutory redundancy payments are more common in firms with strong union presence and high wages (Booth 1987, 1995). Also, severance payments usually depend on years of service (Oswald 1986, Hartoog and Theeuwes 1993). These observations are consistent with the view that such payments serve to protect senior

monitor job security of insiders and if the union could do this perfectly, greater wage differentials could be allowed. What happens as the union becomes more able to monitor cheating by the firm? As an intermediate case, we could assume that cheating by the firm may be detected and penalized with some probability, so cheating is associated with an expected cost for the firm. Such a cost would affect the "no cheating constraint" (2) so that the wedge between the insider wage and the starting wage could be increased. The higher this cost, i. e. the better cheating by the firm can be monitored, the steeper will the seniority wage schedule be.

This observation may help to explain differences in wage structures between countries and industries. For example, the steep seniority wage schedules and "lifetime" employment contracts observed in large Japanese firms are usually explained either as incentive schemes or as a reflection of high rates of human capital formation (see e. g. Mincer and Higuchi (1988) and Aoki (1990)). Our analysis suggests that high wages of senior Japanese workers may instead have to do with the presence of strong enterprise unions, which cooperate closely with management in a "corporatist" fashion. Well-informed and strong unions with a strong presence on the shop floor, transparent systems of performance evaluation (job rotation etc.) and a lack of good outside opportunities for employees should make it difficult for the firm to replace expensive insiders without reason. These conditions may make it possible to enforce a combination of high wages for insiders relative to outside opportunities, steep seniority wage schedules and job security of insiders, which is unfeasible in other systems. Furthermore, because unions are enterprise unions, they do not try to limit industry supply, but find it in their interest that the firm hires young and secondary workers at low wages.

A third important assumption is that *the number of workers being hired and fired cannot be specified in the contract*. Our motivation is that contracts that specify numbers of workers require more organization and monitoring than contracts which only specify conditions for individual workers. This assumption excludes contracts where the firm has to pay a "fine" to the remaining insiders if an insider is replaced. It also excludes "promotion ladders" of the type discussed by Carmichael (1983). Translating Carmichael's idea to our model, one may argue that insiders could negotiate a fixed number of high-wage positions to be distributed among the insiders while the remaining insiders are paid as new workers (correcting for hiring costs and productivity differentials). This would raise the average

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workers.

income for insiders and the firm would have no incentive to cheat since if it fires a “promoted” insider it will just have to promote another insider. Aside from the fact that this contract requires the union to monitor the number of promotion positions, it also involves unequal treatment of insiders, something that may be difficult when insiders are equivalent in all respects and have equal influence in the union.

If numbers of workers could be specified in the contract, another possibility would be to limit hiring. Since this would prevent replacement of insiders, starting wages could be reduced to the benefit of the firm and the insiders. Such a contract would resemble an apprenticeship system, where apprentice wages are low but the number of apprentices is regulated. In fact, 19th century craft unions usually did not allow apprentices to become members and they tried to reduce the number of apprentices in various ways.<sup>22</sup> However, it seems that such a contract requires a well-defined and relatively stable trade. With substantial variations in product demand and quits, a hiring limit will be impractical.

Considering the difficulties unions may have monitoring turnover and its causes, the best way for insiders to protect their positions and future rents may be to require the firm to give away some of the rent if it hires an outsider.

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<sup>22</sup> Limits on the number of apprentices is a standard feature of traditional apprenticeship systems; an example is the Statute of Artificers of 1563 (Davies (1956)). Such limits typically allowed a rather large number of apprentices, however, and it is not clear whether the constraints were binding. When craft unions were formed in the 19th century, they sometimes tried to reduce the number of apprentices and Sanger(1895) found that a substantial number of union contracts in the UK regulated the number of apprentices. By 1960, Liepmann reported that limitation of the number of apprentices had with certain exceptions, ceased to be a prominent issue, but still, unions tried to use age limits and other regulations in the apprenticeship system to limit entry.

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