INSIDER POWER, WAGE DISCRIMINATION AND FAIRNESS

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Forschungsbericht/
Research Memorandum No. 298
May 1992

This paper is part of a research project (No. 8327) on equilibrium unemployment financed by the Austrian Science Fund.

Zusammenfassung

"Insider power" wird oft als Hauptgrund für unfreiwillige Arbeitslosigkeit betrachtet. Wir zeigen, daß unter Standardannahmen - die "Insider" sind egoistisch und müssen nicht um ihren Arbeitsplatz bangen - Macht der "Insider" nicht zu unfreiwilliger Arbeitslosigkeit führen würde, sondern ein arbeitsmarkträumendes "Two-tier system" nach sich ziehen würde.
Während Macht der "Insider" ein häufig beobachtetes Phänomen ist, gibt es kaum "Two-tier systems" in der Realität. Wir zeigen, daß "insider power" zu einem Effizienzlohneffekt führt, der die Einführung eines "Two-tier system" verhindern kann, wenn die "Outsiders" Fairnesspräferenzen haben. Es ist daher die Kombination von "Insider power" und Fairnesspräferenzen, die Arbeitslosigkeit verursacht.

Abstract

The exercise of insider power is frequently considered as a major cause of involuntary unemployment. We show that under standard assumptions - insiders are selfish and they need not fear the loss of their job - insider power does not guarantee unemployment but the introduction of a market clearing two-tier system.
Yet, while insider power is a common phenomen two-tier systems are rarely observed. We show that if outsiders exhibit a preference for fairness the presence of insider power gives rise to an efficiency wage effect which may prevent the introduction of market clearing two-tier systems. It is, thus, the combination of insider power and workers' prefernces for fairness which causes unemployment.

"...The purely economic correspondence between the wage paid to a particular worker and his value to the employer is not a sufficient condition of efficiency; it is also necessary that there should not be strong feelings of injustice about the relative treatment of different employees (since these would diminish the efficiency of the team)."

J. R. Hicks (1968, p. 317)

Before going further it is as well to make clear an important assumption ... that all workers are paid the same wage rate. ... Nevertheless it must be admitted that this is not wholly satisfactory, because one might reasonably want to know why two tier systems are so rare. One likely reason is that workers have strong feelings about what constitutes a fair and just remuneration."

A.A. Carruth and A.J.Oswald (1987, p.432)

I. Introduction

In many OECD-economies employees have the power to bargain collectively with the management over their wages. It is obvious that if wages are not determined by competitive market forces but by collective bargaining at firm level it is only by chance that they will coincide with the market clearing wage rate. Therefore, it seems rather likely that the exercise of insider power will in general lead to wages which generate unemployment. However, almost the whole literature which deals with insider power as a source of unemployment <u>assumes</u> the absence ot two-tier wage systems. In a two-tier system incumbents get paid high wages while outsiders[2] receives lower, possibly market clearing, wages.

This paper shows that under "standard" assumptions, that is,

[2]Throughout the paper the term outsider means workers who are newly employed in addition to or in place of incumbents.

powerful and selfish insiders bargain collectively about wages, both the firm and its incumbents are strictly better off when they implement a market clearing two-tier system. From this follows that a theory of unemployment which is based on the notion of insider power should not merely assume but explain the absence of a market clearing discriminatory wage system.

We know only of one model in which unemployment is caused by insider power although it does not rule out a two-tier system by assumption. In Lindbeck and Snower (1988) incumbents have an interest to restrict the employment of additional workers because their wages depend positively on the marginal product of labour which in turn decreases with employment. By harassing outsiders insiders are capable to raise the reservation wages and, hence, to reduce the employment of outsiders.[3]

The present model is not based on insiders' capabilities to harass outsiders. It relies instead on the notion of fairness or equity which has been proved to be relevant in numerous experiments conducted by social psychologists. These experiments show that in situations in which experimental subjects feel themselves to be underpaid they respond with a reduction of effort. We argue that whenever employees have some discretion over their effort a two-tier system is likely to weaken the firm's incentive system and will, thereby, cause a reduction of the effort of outsiders because they feel themselves underpaid. This in turn provides the firm with an efficiency wage motive for setting outsider wages. We show that this may lead to the complete absence of wage discrimination or at least to a two-tier system which does <u>not</u> clear the labour market.

[3]In Fehr (1990) it is argued, that if harassment is costly to the harasser, it is no longer a credible threat in the Lindbeck/Snower model. Moreover, Fehr proposes two discriminatory wage systems both of which remove the dependance of insider wages on the marginal product of labour and, thus, eliminate the incentive to restrict employment. In their reply Lindbeck and Snower (1990) question the feasibility of these contracts.

II. Insider power and wage discrimination

Consider a labour market with L identical workers and k identical firms. The reservation wage of workers is denoted by r. Without loss of generality we set k = 1. In each firm there are m insiders which bargain collectively with the management over their wage v. Insiders are only interested in their own well-being. The profits of the firm from employing m incumbents at a wage of v and (n-m) outsiders at a wage of w are given by

$$\Pi\ (m,n,v,w) = q(n) - vm - w(n-m). \qquad (2.1)$$

q(n) is an increasing, strictly concave and twice differentiable revenue function with q(0) = 0. $\bar{v}$ denotes the insider wage at which $q'(m) = \bar{v}$ holds. For convenience we assume that insiders can at most enforce $\bar{v}$. This means that except for the case of their replacement by cheap outside workers insiders face no employment risk.

Insiders derive their power to bargain over the wage v from their ability to credibly threaten to strike and from the existence of replacement costs. Their strategy involves the protection of each insider from being replaced by a cheap outsider, i.e. they implement their strike threat if at least one of their members is replaced. Thus the firm faces the option of either employing all m insiders or replacing them all. The costs of this replacement are given by c.

We assume that at the reservation wage r aggregate labour demand $n = n(r) \equiv q'^{-1}(r)$ falls short of L. The competitive profit is, therefore, given by

$$\Pi^c = q(n(r)) - rn(r) \qquad (2.2)$$

If a firm replaces all insiders by new and powerless outside workers its profit is $\Pi^r \equiv \Pi^c - c$. If, instead, it bargains with its insiders and pays all employed workers the agreed upon wage $v \le \bar{v}$ its profits are $\Pi(v) = q(n(v)) - vn(v)$. We assume that the firm prefers to keep its insiders, i.e.

$$\Pi(v) \geq \Pi^r \tag{2.3}$$

holds. Notice that since insiders face no risk of unemployment they let the firm unilaterally decide on n. To derive the bargaining outcome we apply the asymmetric Nash bargaining solution[4]. For simplicity we assume that during a strike $\Pi = 0$ whereas workers' strike payments and the (monetary equivalent of the) leisure they enjoy during a strike add up to r. The Nash product is thus given by

$$N = \Pi(v)^{(1-\alpha)} \ (v-r)^{\alpha} \tag{2.4}$$

Setting the derivative of N w.r.t. v equal to zero and rearranging terms yields

$$v = r + \alpha\Pi[n(v),r]/n(v) \tag{2.5}$$

with $\Pi[n(v),r] \equiv q(n(v)) - rn(v)$. Equation (2.5) indicates that $v<q'(m)$ can always be ensured by a sufficiently low α. Inserting (2.5) into the definition of $\Pi(v)$ gives

$$\Pi(v) = (1-\alpha) \ \Pi[n(v),r] \tag{2.6}$$

(2.5) and (2.6) give us the payoffs of the employees and the firm, respectively, if no wage discrimination takes place. This situation is depicted in figure 1.

As we can see there are $[L - n(v)]$ involuntarily unemployed workers. $\Pi[n(v),r]$ is given by the shaded area below the labour demand curve and above r whereas $\Pi(v)$ is given by the shaded area below labour demand and above v. On the basis of the assumptions

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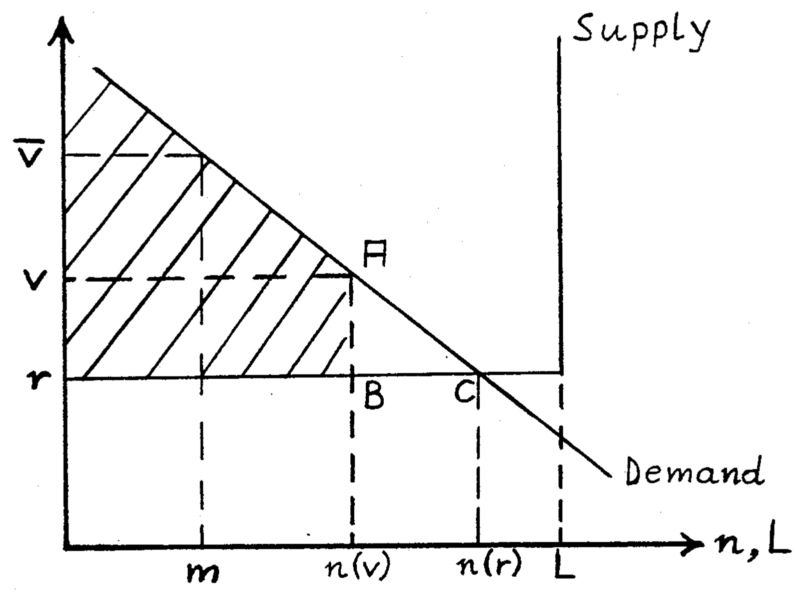
[4]We want to stress, however, that our results do not depend on this particular choice. The advantage of the Nash bargaining solution is that it can be viewed as the limiting outcome of an appropriately specified bargaining game (see Binmore, Rubinstein and Wolinski 1986, Hoel 1986). In the appendix we derive our bargaining equations from a non-cooperative game. The exponents in the asymmetric Nash-product reflect relative time preferences or relative delay capacities of the bargaining parties.

made in this section the combination [v, n(v)] does, however, not represent a proper equilibrium because it is possible that <u>both insiders and the firm</u> can gain by the introduction of a two-tier wage system. The firm could, for example, propose to employ m insiders at a wage of $v^d \geq v$ while [n(r) - m] outsiders get paid the reservation wage r. Such a contract would increase profits and leave insiders at least as well off as before.



<u>figure 1</u>

In fact it can be shown that insiders will always be strictly better off in the presence of such a two-tier system. To derive this result we define

$$\Pi^d = \Pi^d(m,n(w),v^d,w) = q(n(w)) - v^d m - w(n(w)-m) \qquad (2.7)$$

as the profit which results from wage discrimination. While the insider wage is v^d newly employed workers receive w. The Nash-product is now given by

$$N^d = [\Pi^d(v^d,n(w),w)]^{(1-\alpha)} (v^d-r)^{\alpha} \qquad (2.4')$$

Since insiders care only about their own welfare we have $\partial N^d/\partial w = -[(1-\alpha)/\Pi^d][n(w)-m] < 0$, that is, the bargaining parties agree upon reducing w to the lowest possible level r. Substituting w=r and n(w) = n(r) into $\partial N^d/\partial v^d = 0$ and rearranging terms results in

$$v^d = r + (\alpha\Pi^c/m) \qquad (2.5')$$

Inserting v^d as given in (2.5') and $w = r$ into (2.7) yields

$$\Pi^d = (1-\alpha)\Pi^c \qquad (2.6')$$

Since competitive profits are strictly larger than $\Pi[n(v),r]$ a comparison between (2.5) and (2.5') and between (2.6) and (2.6') reveals that both the firm and its insiders are strictly better off under a two tier system. The reason for this is that without wage discrimination there are unexploited gains from trade because the reservation wage is below the marginal product. In figure 1 these unexploited gains are given by the triangle ABC which represents exactly the difference $\Pi^c - \Pi[n(v),r]$. A two tier system allows the bargaining parties to reap these gains. The firm receives a share of $(1-\alpha)$ of $[\Pi^c - \Pi(n(v),r)]$ while insiders get a share of α.

Notice that since the non-replacement constraint (2.3) holds and $\Pi^d > \Pi(v)$, we have $\Pi^d > \Pi^r$. In addition it is worthwhile to mention that v^d may even exceed $q'(m)=\bar{v}$. As long as insiders protect each other with a strike threat from individual replacement and as long as collective replacement is unprofitable ($\Pi^d > \Pi^r$) insiders may even get paid "above the labour demand curve", i.e. above $q'(m)$. This means that our result does not depend on the simplifying assumption of $v^d < \bar{v}$. For all levels of m strictly below $n(r)$ and for a sufficiently large value of c which ensures $\Pi^d \geq \Pi^r$ the collective replacement of insiders is unprofitable and both the insiders and the firm are in favour of employing $(n(r)-m)$ outsiders at a wage of r.

So far our assumptions ensured that incumbents are not subject to the risk of dismissal and are therefore only interested in the maximization of their wage. Suppose for a moment that incumbents aim at maximizing their <u>expected</u> wage v^e and that firms have the right to choose n. Furthermore each incumbent faces the same risk of being dismissed if m exceeds n. Then $v^e = (n/m)v + [1-(n/m)]r$. It can be shown that under these conditions both the firm and its incumbents are again better off if they introduce a two-tier system. The reason is again that with wage discrimination all gains from trade can be reaped and that both parties receive a share of these gains. Incumbents, for example, will get a higher expected wage because those who remain employed will be paid a higher wage v^d (in comparison with the wage v in the absence of discrimination).[5]

The above analysis suggests that with powerful and purely egoistic incumbents we should observe multi-tier-systems. However, while the existence of insider power is a widespread phenomenon, wage discrimination between homogeneous workers is rarely observed. We know of only one well documented exception: the US-airline industry. After deregulation of this industry two-tier wage systems became an established industry practice by 1986 (Walsh 1988, p.50). It seems that some of the mechanisms of the above model have been effective in this case. In particular, both the firm and incumbents benefited from the new system: "Wage increases for incumbent workers were frequently negotiated simultaneously with two-tier wage structures". To some extent the gains have been reaped by incumbents in the form of voluntary separation/early retirement provisions which were "frequently negotiated in conjunction with two-tier wage structures. Adopted to help trim the ranks of the more expensive A-scale workers, these arrangements entailed substantial outlays by carriers". (Walsh 1988, p.57).

Although the example of the US-airline industry indicates that under certain circumstances the above model may be applicable the infrequent occurrence of overt wage discrimination suggests that our model is at least incomplete. On the other hand we want to emphasize at this point, however, that the basic ingredients of our model without discrimination are by now very common in the literature which deals with the effects of insider/union power on

[5]The detailed proof of this proposition is available on request. To save space we omitted the proof in this paper

employment[6]. These models and their (implied) explanations of unemployment are, therefore, also incomplete because, although there is a strong incentive, they do not explain the absence of wage discrimination.

III. Fairness and wage discrimination

III.1 How to explain the absence of wage discrimination?

What are the reasons for the fact that two-tier wage systems are rarely observed in economies with insider power? One possibility is that insiders do not only care about their own welfare but also about the welfare of co-workers. Although altruistic insider preferences could explain the rarity of wage discrimination economists usually dislike this sort of explanation[7]. Almost all models of insider power are based on the assumption of selfish insiders. If it were impossible to provide an explanation on the basis of the assumption of selfish insider preferences all those theories which explain unemployment by the exercise of the power of selfish insiders would be questionable. Because then one would have to take into account the altruism of insiders already at the point where one aims at the explanation of unemployment and not only at that stage of the analysis where one wants to rule out market clearing two-tier wage systems.

A more promising explanation relies on an intertemporal argument. The implementation of a two-tier system is likely to weaken the future bargaining position of highly paid incumbents. First of all it is quite probable that the workers paid a lower wage will not be very enthusiastically engaged in future collective actions. Since in a permanent two-tier system they receive only their reservation wage they have no active interest in participating in

[6]See e.g. Carruth and Oswald (1989, chapter 7) or Layard and Nickell and Jackman (1991, chapter 2).

[7]"Few economists would want to take an axiom of unselfishness as the foundation stone upon which to construct a theory of trade union actions" (Carruth and Oswald 1987, p.441)

collective actions and if the firm offers them small benefits they are prepared to act as strike breakers. This increases the disagreement payoff of the firm which results in lower insider wages (or lower wage increases).[8]

The employment of cheap workers is also likely to reduce the replacement costs c because after some time they become acquainted with the idiosyncratic features of their jobs. Therefore, the losses which occur in case of the replacement of all insiders are likely to become lower and after some time they may have fallen sufficiently to curb the wage demands of the insiders. To see this more explicitely we have to invoke the non-replacement constraint which in case of of a two-tier system is given by $\Pi^d = (1-\alpha)\ \Pi^c \geq \Pi^c - c$. Deleting Π^c on both sides of the inequality gives $\alpha\Pi^c \leq c$: The rent which is reaped by insiders collectively must not exceed c. Clearly, if c is reduced the appropriation of rents by incumbents is more severely constrained.

Thus, there are reasons for selfish insiders to prevent the implementation of a two-tier wage system. The relevance of such reasons seems also to be confirmed by the experience of the US-airline industry.[9] Despite this we think that this explanation is still not the whole story because it relies only on the long term interests of powerful incumbents while - in the light of the

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[8]In the last section we assumed that the disagreement payoff of the firm is zero, i.e. we assumed that outside workers cannot be used as strike breakers. But in case of a two-tier system workers with a lower wage are already employed when conflicts occur in the future. They are, therefore, easily available potential strike breakers. If they work during a strike of highly paid incumbents output and disagreement profits are positive.

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[9]"B-scales may also prove useful to carriers in restraining future wage increases for A-scale workers. ... In case of permanent two-tier plans, the pressures for elimination of the B-scale are apt to be especially severe, and unions are left with little choice but to make such changes a major focus of negotiations. ... A focus on B-scale workers might explain the outcome of the negotiations between American and its pilots at the end of 1985, when, under a wage re-opener provision following a highly profitable year, bottom-tier pilots averaged 25% increases while A-scale workers received average rises of only 4%" (Walsh 1988, p.60)

analysis of section II - firms still have a strong interest in the implementation of two-tier wage systems. If only incumbents were interested in "equal pay for equal work" we would expect strong conflicts of interest between the two parties.

Firms would consistently try to implement wage discrimination and, given the different degrees of insider power and the diversity of circumstances in reality, one would predict that sometimes firms will win the conflict and sometimes the union of incumbents sucessfully prevents discrimination. But in the reality of those economies in which insider power is prevalent there seem to be almost no overt conflicts about this issue and firms do not seem to be eager to introduce multi-tier systems. As a result multi-tier systems are almost non-existent. This points towards the need to explain why firms may not be interested in wage discrimination.

III.2 Fairness and equity effects

During the last decade an increasing number of (experimental) economists seemed to have recognized the potential impact of fairness considerations on economic transactions.[10] Kahneman, Knetsch and Thaler (KKT 1986a) derived norms of fairness from answers of interview partners to hypothetical questions. They come to the conclusion that each party of an economic transaction is entitled to the terms of a so-called reference transaction. A reference transaction may e.g. be determined by past exchanges of the trading partners or by the terms of trade one party concedes to a third party in a similar situation. In KKT (1986b) these authors provide also some experimental evidence that subjects are willing to forgo some money in order to enforce norms of fairness.

The concept of a reference transaction plays also a prominent role in Equity Theory. This theory has been developed by Adams (1963a,

[10]For example: Akerlof (1982); Akerlof and Yellen (1988, 1990); Carruth and Oswald (1989, chapter 5); Layard and Nickell and Jackman (1991, p.158 - 160)

1963b) and has triggered an impressive amount of experimental research by social psychologists (see Mowday 1991 for a recent survey). According to this theory inequity exists for an agent A if the relation between perceived inputs and perceived outputs, I_A/O_A, is different from I_R/O_R of the relevant agent R. In the context of work relations the input is for example the (perceived) effort of a worker while the output is his wage whereas the relevant reference agent may be a close friend or the employer or other (not necessarily equally skilled) workers in the same or similar firms. Akerlof and Yellen (1990) for example, assume that workers of a particular skill compare themselves with more highly paid and better skilled workers.

An agent who perceives himself to be unfairly treated tries to restore equity by adjusting either his inputs or his outputs.[11] Since at the work place the output (wage) cannot be unilaterally changed by employees they are likely to respond mainly by input (effort) variations. In case of an overpayment, i.e. when the effort/wage ratio, e/w, is lower than the ratio of the reference agent Equity Theory predicts that workers increase e whereas in the opposite case of an underpayment they reduce e in order to remove the psychic tensions caused by inequity.

The experimental data are in general relatively favourable for the underpayment prediction of the theory while in situations of overpayment the evidence is mixed and somewhat inconclusive.[12]

[11] Adams considers in fact a number of additional inequity resolving methods. But almost all experiments have dealt with the variation of work effort.

[12] In a recent survey the author concludes: Research support for the theory appears to be strongest for predictions about underpayment inequity. Although there are fewer studies of underpayment than of overpayment, results of research on underpayment are relatively consistent and subject to fewer alternative explanations. There are both theoretical and empirical grounds for being cautious in generalizing the results of research on overpayment inequity to employee behavior in work organizations ... Differences in productivity and satisfaction due to overpayment inequity are often in the predicted direction but fail to reach acceptable levels of statistical significance. (Mowday 1991, p.120)

According to the experimental data effort is an increasing function of the wage paid in an underpayment situation while for an overpayment situation wage increases do not affect effort or are at least negligible.

The importance of reciprocity or fairness effects has recently been confirmed by a series of 4 experiments (Fehr, Kirchsteiger, Riedl 1991). The authors set up a two stage experiment: At the first stage a one-sided oral auction with firms as wage makers took place. At this stage firms and workers were matched and the wage was determined. At the second stage workers had to choose their effort levels. Stage 1 and stage 2 together constituted 1 round and each experimental session lasted 12 rounds. In all 4 experimental sessions there was a statistically significant positive impact of wages on effort.

III.3 Fairness preferences

In our view the concept of a reference transaction is particularly compelling in the context of two-tier wage systems which discriminate between identically skilled workers. It is quite natural that workers with a lower wage feel themselves underpaid because they get less for the same work. Because of this unambiguous determination of the reference transaction equity theory seems to be particularly applicable to the problem of two-tier systems.

Before we do this we ask, however, the question, what sort of preferences and constraints may cause the relationship between effort and wages revealed in the experiments. A necessary condition is that employees have some discretion over their effort. This means that effort is not a perfectly observable and verifiable variable because if it were no effort-enforcement problem exists. In addition the positive effort wage relationship in underpayment situations must not be due to pecuniary reward/penalty effects of wage variations because otherwise the theory is not distinguishable from other efficiency wage theories. If, for example, higher wages are associated with a larger penalty for shirking because in case of a dismissal the employees' loss is larger, effort will in general be an increasing function of the wage, too. (Fehr 1984, 1986; Shapiro and Stiglitz 1984). But fairness and equity considerations provide only then a distinct explanation of the effort-wage relationship if wage variations are not associated with a change in constraints, i.e. with a change in the pecuniary incentive structure. Fairness and equity effects must, therefore, be due to changes in preferences which are associated with wage changes. Or put differently: Wage variations cause variations in the marginal rate of substitution between income and effort.

To be more specific let us assume that workers' utility functions are given by

$$u = y + z(f,e); \qquad (3.1)$$
$$z_f > 0, \quad z_{ff} < 0, \quad z_{ee} < 0, \quad z_{ef} > 0$$

where y represents the wage paid and f the perceived fairness of the wage whereas e denotes effort. An increase in perceived fairness is valued positively ($z_f > 0$) but at a decreasing rate ($z_{ff} < 0$). The marginal rate of subsitution between income y and effort is given by z_e and increases with perceived fairness f ($z_{ef} > 0$). In addition we assume that workers perceive the fairness of their wage y according to

$$f = \begin{cases} 1 \\ y/w^f \\ 0 \end{cases} \quad \text{for} \begin{cases} y \geq w^f \\ y^0 < y < w^f \\ y \leq y^0 \end{cases} \qquad (3.2)$$

where w^f denotes the wage of a reference agent and y^0 is a threshold below which fairness is at its minimum. Finally we assume that the marginal utility of effort is always negative if fairness is at its minimum level and positive over an initial range if f is positive:

$$z_e = \begin{cases} \leq 0 & \text{for all } e \geq 0 \text{ if } f = 0 \\ > 0 & \text{for some } e > 0 \text{ if } f > 0 \end{cases} \qquad (3.3)$$

Assumption (3.3) together with $z_{ef} > 0$ captures the idea that the less unfair workers perceive their wage the more they are willing to provide effort voluntarily.

As already mentioned fairness and equity considerations are a distinct source of effort variations if they are only due to preference effects of wage changes. Therefore, let us assume that individual effort is completely unobservable such that workers have to fear no penalty at all. Then they choose e to satisfy

$$u_e = z_e(f,e) = 0 \tag{3.4}$$

This condition gives us e as a function of f. According to our assumptions we have

$$\begin{array}{ll} e = e(f) & e(y \le y^0) = 0,\ e(y^0 < y < w^f) > 0 \\ & e(y \ge w^f) = e^f. \\ e' = 0 & \text{for } y \le y^0 \text{ and } y \ge w^f \\ e' > 0 & \text{for } y^0 < y < w^f \end{array} \tag{3.5}$$

This effort function is illustrated in the figure below. It represents the essence of the experimental data mentioned in the previous section. Maximum effort occurs at $y \ge w^f$ and is denoted by e^f.

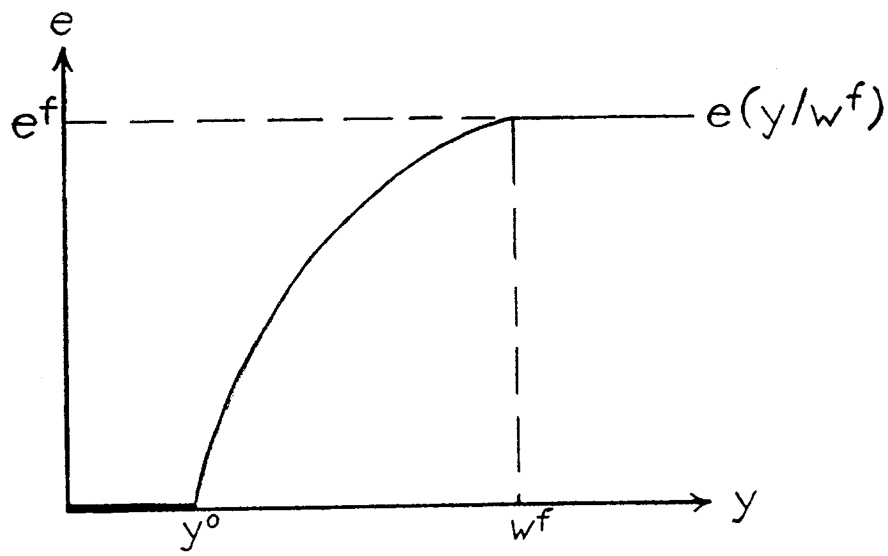

figure 2

IV Bargaining under fairness effects

In this section we apply the result of the previous subsection to our model of wage discrimination. To see the impact of fairness preferences as clear as possible we stick to the assumption that workers face no penalties when choosing e. Output q is now an increasing and strictly concave function of total effort. If e.g. all n employees work equally hard q is given by q(en).

As in section II we assume that there are m powerful and selfish insiders. They derive their power from the existence of sufficiently large replacement costs c which allow them to protect themselves from being replaced by cheap outsiders. We also maintain the assumption that the bargaining power of incumbents, as measured by the exponent in the Nash product or their relative time preferences, respectively, is sufficiently small to keep their wage below their marginal product at a total employment of m. To have a potential incentive for wage discrimination we assume that the marginal product of outsiders at m exceeds their reservation wage. Furthermore, as in section II, aggregate employment is assumed to be below L at the market clearing wage.

We assume that the wage which is regarded as fair is the insider wage v^d. This definition captures the idea that for new workers who possess approximately the same skills as incumbents the wage v^d represents in a natural way the relevant reference wage. It implies that new workers perceive the fairness of their wage according to $f^o=w/v^d$ whereas insiders are always treated fairly and will therefore always choose e^f.[13]

If the firm replaces all m insiders, all employees get paid the same wage and perceived unfairness vanishes, i.e. every one supplies e^f and the utility of the fairness-effort bundle is

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[13]Notice that in reality there may be other behaviorally relevant sources of perceived unfairness, i.e. wage differentials between skilled and unskilled workers may be regarded as unfairly high by the unskilled (Akerlof, Yellen 1990) or the market clearing wage may be viewed as unfairly low. We abstract from these effects to present our point as clear as possible.

given by $z(1,e^f)$. Let b represent the unemployment benefit, l the monetary value of leisure if unemployed (or if on strike) and assume for simplicity that $l=z(1,e^f)$. Then the reservation wage (in case of replacement) r^r is given by the solution of the equation $b+l=r^r+z(1,e^f)$, i.e. by b.
If the firm employs the insiders at a wage v^d and hires new workers at a wage of w, the utility of new workers is given by

$$u = w+z(f^o,e(f^o)) \tag{4.1}$$

with $e(f^o)=e^o$ being the effort chosen by the new workers according to (3.5).
To calculate the reservation wage of additionally employed workers one has to distingiush between two different cases. First, if $w=v^d$ (equal payment case) a newly employed worker does not perceive himself to be treated unfairly and his reservation wage r^n is just, as in the replacement case, given by b. When a two tier system exists ($v^d>w$), the utility of the fairness-effort bundle of workers paid a low wage, $z(f^o, e(f^o))$, is lower than $z(1,e^f)$. Therefore, the reservation wage of new workers r^n is larger than b under a two tier system.

IV.1. Employment and wages of employed outsiders

If the firm does not replace the insiders the sequence of actions is as follows. First, incumbents bargain with the firm about their wage v^d. Then, at the second stage, when v^d is already given, the firm determines total employment n and wages of the employed outsiders w in order to maximize its profits π^d subject to the constraint that insiders will choose e^f while new employees will choose their effort level e^o according to (3.5)[14]. Formally this means that the firm maximizes

$$\pi^d = q(e^f m+e^o(n-m))-v^d m-w(n-m) \tag{4.2}$$

[14]Implicitely it is assumed that the firm wants to employ outsiders and that it pays a wage above the reservation wage of the outsiders. See also below for the conditions under which $w>r^n$ applies.

subject to $e^o=e(f^o)$ with respect to w and n. The first order condition for n gives

$$q'(e^f m+e^o(n-m)).e(f^o) = w \qquad \textbf{(4.3)}$$

Since $e(f^o)$ is not differentiable with respect to w at $w=v^d$, we have to distinguish between an interior solution and a corner solution $w=v^d$. In the first case a two tier system will result, in the second case insiders and outsiders will be treated equally. At an interior solution the derivative of π^d w.r.t. w is zero which yields

$$q' . \frac{e'}{v^d} = 1 \qquad \textbf{(4.4)}$$

Notice that this condition cannot hold for $w>v^d$, because in this case e' would be zero. Therefore an interior solution implies $w<v^d$. Substituting (4.4) into (4.3) results in a condition which is analogous to the famous Solow-condition, namely

$$\sigma_{ef}(f^o) \equiv \frac{e'(f^o).f^o}{e(f^o)} = 1 \qquad \textbf{(4.5)}$$

The firm chooses the wage for new workers such that the elasticity of effort with respect to perceived fairness equals one. This is also the condition for the maximisation of e^o per unit of w which of course has to be met in a profit maximum. Notice that in the two tier case the outsiders' effort per wage unit is greater than the insiders' effort per wage unit, because otherwise it would be more profitable for the firm to pay an equal wage for both types of workers:

$$\frac{e^o}{w} > \frac{e^f}{v^d} \iff \frac{e^o}{e^f} > f^o \qquad \textbf{(4.6)}$$

If the effort function is convex in the intervall $[y^o, v^d=w^f]$ (see figure 2) the maximization of e/w cannot occur below v^d. In this case we have a corner solution because σ_{ef} exceeds 1 for $w<v^d$ while $\sigma_{ef}=0$ for $w>v^d$. Thus profits are maximized when

$$w = v^d, \quad f^o = 1, \quad e^o = e^f \tag{4.7}$$

holds. (4.5) - in the two tier case - or (4.7) determine the profit maximizing levels of e^o and f^o. The optimum values of these variables are not effected by v^d. The wages of outsider depend, however, directly on v^d: $w=f^o v^d$. Once e^o, f^o and w are determined the firm chooses n according to (4.3). We denote the inverse labour demand function in the following by

$$w_{II}(n) \equiv e^o.q'(e^f.m+e^o.(n-m)) \tag{4.8}$$

$w_{II}(n)$ is relevant for the two tier case as well as for the equal wage case. Concavity of q implies that $w_{II}(n)$ is decreasing in n.

IV.2. The determination of the insider wage

In this subsection we analyse wage bargaining between the firm and its insiders. For simplicity we use the Nash bargaining solution[15]. Bargaining takes place under the constraint that the firm will choose outsider wages w and total employment n according (4.5) or (4.7), respectively, and (4.3).

We assume that in case of disagreement the firm's profit is zero while incumbents get strike benefits s. Our assumptions ensure that insiders do not face the risk of being dismissed. Therefore, they aim at maximizing v^d which yields the Nash product

$$N = (v^d-s)^{\alpha}.(\pi^d)^{(1-\alpha)} \tag{4.9}$$

The Nash bargaining solution is given by the maximization of (4.9) with respect to v^d subject to (4.8) and $w=f^o v^d$. It is worthwhile to point out that the bargaining parties take e^o and f^o as given because they are not effected by the level of v^d

[15]The Nash solution can be justified as the outcome of a bargaining model of alternating offers (see Appendix).

(see (4.5) or (4.7)). The first order condition is given by

$$0 = \frac{\alpha}{v^d - s} + \frac{1-\alpha}{\pi^d}\frac{d\pi^d}{dv^d} \qquad \textbf{(4.10)}$$

Substituting $w=f^o v^d$ into (4.2) and using the fact that the partial derivative of π^d with respect to n is zero (from the solution of the second stage) yields

$$\frac{d\pi^d}{dv^d} = \frac{\partial\pi^d}{\partial v^d} = -m-f^o(n-m) \qquad \textbf{(4.11)}$$

Substitution of (4.11) into (4.10) and solving for v^d leads to

$$v^d(n) = (1-\alpha)s+\alpha\frac{q[e^f m+e^o(n-m)]}{m+(n-m)f^o} \qquad \textbf{(4.12)}$$

Recall that f^o and e^o are independent of v^d and n. Therefore, (4.12) gives us the wage insiders can enforce at any given level of n. Because of $w=f^o v^d$, (4.12) implies also a certain wage for the outsiders:

$$w_I(n) \equiv w = f^o[(1-\alpha)s+\alpha\frac{q}{m+(n-m)f^o}] \qquad \textbf{(4.13)}$$

Thus, for a given level of, say $\tilde{n}$, employees insiders enforce implicitely an outsider wage according to (4.13). If at the resulting outsider wage $w_I(\tilde{n})$ the profit maximizing employment choice is given by $\tilde{n}$, that is, if $w_I(\tilde{n})=w_{II}(\tilde{n})$, an equilibrium obtains. In the following two subsection we analyze the properties and determinants of these equilibria.

IV.3 Equilibrium without wage discrimination

In section IV.1 we have seen that whether the implementation of a two tier system is profitable or not depends only on the properties of the effort function $e(f^o)$. If this function is convex for $f^o<1$, e^o/w is maximized at $f^o=1$, that is, wage discrimination is not profitable and $e^o=e^f$ holds. The wage equation $w_I(n)$ is then given by

$$w_I(n) = (1-\alpha)s+\alpha\frac{q(e^f n)}{n} \tag{4.14}$$

Notice that since q is strictly concave the slope of $w_I(n)$,

$$\frac{dw_I(n)}{dn} = (\alpha/n)[q'e^f-(q/n)], \tag{4.15}$$

is negative because $q'e<(q/n)$ holds for $n>0$. Moreover, our assumption that incumbents' bargaining power α is sufficiently low to keep their wages below their marginal product (at m) means that

$$w_{II}(m) = q'(m.e^f)e^f > (1-\alpha)s+\alpha\frac{q(me^f)}{m} = v^d(m) = w_I(m) \tag{4.16}$$

holds. Because of $w_I=v^d$ this implies that firms want to hire $n>m$ employees (see figure 3).

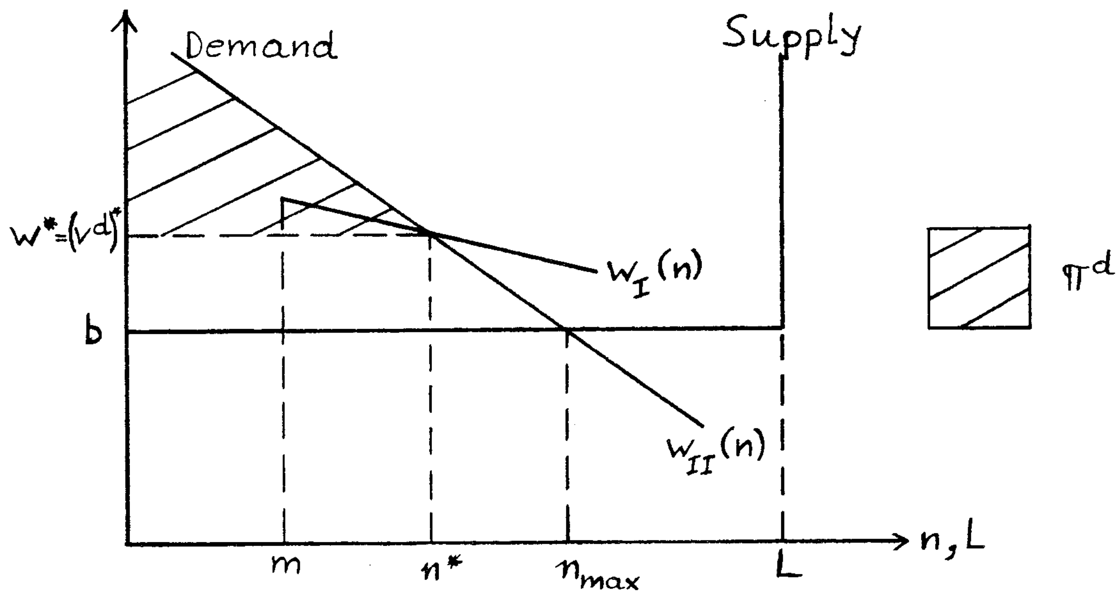

figure 3

The reservation wage of new employees in the absence of wage discrimination equals the reservation wage of insiders and is equal to b. Therefore, the firm can employ at most n_{max} workers where n_{max} is defined by

$$q'(e^f n_{max})e^f = b \tag{4.17}$$

In order to guarantee the existence of an equilibrium we assume that

$$w_I(n_{max}) > w_{II}(n_{max}) \tag{4.18}$$

holds. Without wage discrimination (4.18) becomes:

$$(1-\alpha)s+\alpha\frac{q(e^f n_{max})}{n_{max}} > q'(e^f n_{max})e^f \tag{4.19}$$

Because $(q/n)>q'e^f$ for all n, s greater or equal b suffices to guarantee (4.18). (4.18) simply says that the wage enforced by the insiders is above the reservation wage.
Because of the continuity of $w_I(n)$ and $w_{II}(n)$, (4.16) and (4.18) imply that there exists an equilibrium ($w^*=v^{d*}$, n^*) (see figure 3). The equilibrium wage w^* is above the market clearing wage b and equilibrium employment n^* is less than the market clearing employment. $w^*>b$ implies that the firm can hire as much outsiders as it wants at the wage enforced by the insiders. Furthermore, those $L-n^*$ outsiders who do not get a job are involuntarily unemployed. From (4.14) it is easy to see that the larger s and α the higher are wages and the more likely it is that the market does not clear and that involuntary unemployment occurs.
The whole analysis rests on the assumption that insiders have power. Without insider power, i.e. if replacement costs c are zero, our model predicts that total replacement would occur and all employees would get the reservation wage b. This can be seen from figure 3. The replacement profit π^r is given by the area between the marginal productivity curve ($w^{II}(n)$ curve) and the reservation wage line at b minus the replacement costs c, whereas the bargaining profit π^d is given by the area between w^{II} and the wage $v^{d*}=w^*$.

IV.4. Equilibrium with wage discrimination

As we have seen in section IV.1 wage discrimination may occur if the e(f)-function is not convex. In this case e^o/w is maximized at $f^o<1$ and wage discrimination is profitable. Because of (4.6) our assumption that incumbents' bargaining power α is sufficiently low to keep their wages v^d below their marginal product (at m) implies

$$w_{II}(m) = q(m.e^f)e^o > f^o[(1-\alpha)s+\alpha\frac{q(me^f)}{m}] = w_I(m) \qquad \mathbf{(4.20)}$$

Therefore, firms want to hire n > m employees. (see figure 4). Just as in the previous subsection we define n_{max} such that at this level of employment the marginal productivity of outsiders equals their reservation wage:

$$q^{\prime}(me^f+(n_{max}-m)e^o)e^o = r^n \qquad \mathbf{(4.21)}$$

In order to guarantee the existence of an equilibrium we assume that

$$w_I(n_{max}) > w_{II}(n_{max}) \iff$$

$$f^o[(1-\alpha)s+\alpha\frac{q(e^fm+(n_{max}-m)e^o)}{m+(n_{max}-m)f^o}] > q^{\prime}(e^fm+(n_{max}-m)e^o)e^o \qquad \mathbf{(4.22)}$$

holds. As already mentioned a certain insider wage enforced by the insiders determines also an outsider wage w_I via f^o. Assumption (4.22) says that the outsider wage enforced by the insiders is greater than the reservation wage of the outsiders. If s or α is sufficiently large (4.22) will be met. The continuity of $w_I(n)$ and $w_{II}(n)$ together with (4.20) and (4.22) ensures that there exists an equilibrium.

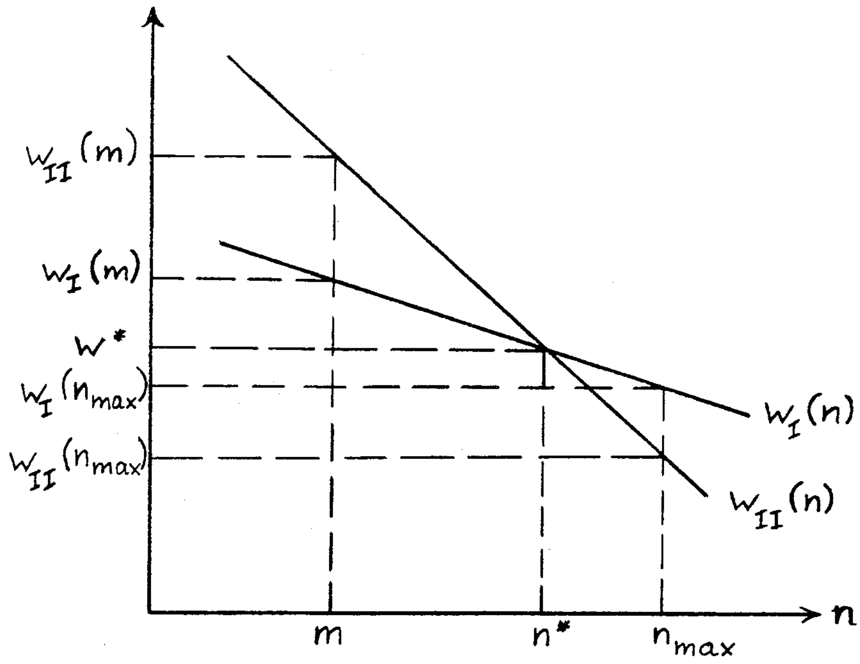

figure 4

The equilibrium wage w^* is above the market clearing wage r^n and equilibrium employment n^* is below the market clearing employment n_{max}. $w^*>r^n$ implies that the firm can hire as much outsiders as it wants at the outsider wage implicitely enforced by the insiders. Furthermore, those $L-n^*$ outsider who do not get a job are involuntarily unemployed. From (4.22) it is easy to see that the larger s and α the higher are wages and the more likely involuntary unemployment occurs.

We have again assumed that replacement costs are sufficiently high to make it profitable for the firm to avoid total replacement. This can be seen from figure 5.

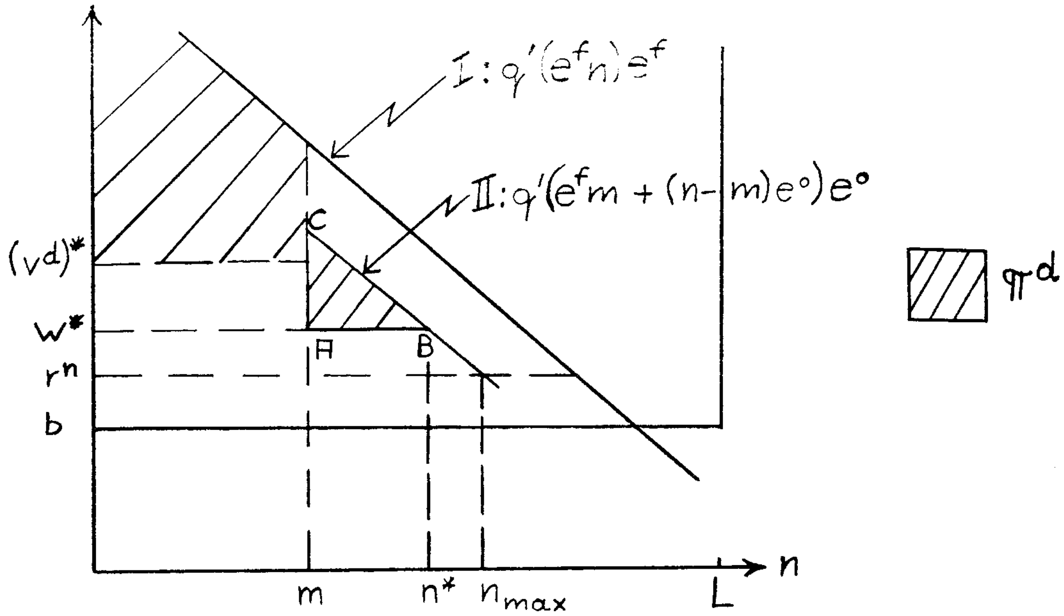

figure 5

The replacement profit π^r is given by the area between the marginal productivity curve of replaced workers $(q'(e^f n)e^f)$ - curve I - and the reservation wage of replaced workers b minus c. The bargaining profit is the sum of two areas. The profit arising from insiders' work is the difference between their marginal productivity curve - curve I - and their wage v^{d*}. The marginal productivity of newly employed outsiders is given by curve II $[q'(e^f m+(n-m)e^o)e^o]$. The profit arising from outsiders is the area between curve II and their wage w*. It is given by triangle A,B,C.

V. Concluding Remarks

In this paper we have shown that insider power alone is not sufficient for the explanation of unemployment. If there are powerful insiders both the firm and its incumbents gain by the introduction of a market clearing two-tier system. Yet, under the plausible assumption, that the insider wage constitutes a fair reference wage for employed outsiders an efficiency wage effect arises. The lower the outsider wage relative to the insider wage the lower will be the effort of outsiders. It is shown that in case of a convex effort-wage relationship a two-tier system will be unprofitable. If the relationship is concave (in the relevant range) wage discrimination may be profitable to a certain extent. The resulting wage differential will, however, be in general smaller than the wage differential which arises in the absence of fairness effects. Our analysis therefore provides a rationale for the absence or smallness of wage discrimination among identically skilled workers within the same firm and, hence, for involuntary unemployment.

The efficiency wage relation which arises in our model is due to the joint effect of insider power and fairness preferences. If either of the two is absent the labour market clears. The analysis has been carried out under the simplifying assumption that workers face no pecuniary penalties when choosing a low effort level. Yet, in general, firms are able to devise incentive systems which provide workers with pecuniary effort incentives. As long as there is, however, a positive probability that low effort levels will not be detected by firms the basic mechanism which may render market clearing two-tier systems unprofitable remains intact: Unfair wage differentials give rise to an increase in the marginal disutility of effort which induces those who receive lower wages to reduce their effort. Of course, as the literature on efficiency wages (e.g. Bowles 1985, Shapiro and Stiglitz 1984, Stoft 1982) has shown, unemployment may arise independently of insider power if workers are imperfectly monitored. But as our analysis indicates the existence of insider power is likely to cause additional efficiency wage effects.

Appendix:

In this section we will show that the insider wage v^d as determined in section IV.2 by the Nash bargaining solution can be derived as the unique subgame perfect equilibrium of an infinite horizon sequential bargaining game with alternating offers (for details of this kind of bargaining games see Osborne, Rubinstein 1990, chapter 3 and 4). To show this it is sufficient to derive the wage equation (4.13) as unique subgame perfect equilibrium (SPE) of such a game.

Recall that f^o is given by (4.5) or (4.7), respectively, and that outsider wages are given by $w=f^o v^d$. Now we define $N=m+(n-m)f^o$ which allows us to write the total wage costs as $v^d N$. We assume that in case of disagreement profits are zero while insiders receive strike payments s. Then, according to Rubinstein and Osborne (1990, p.89) players preferences over the bargaining outcomes achieved at bargaining period t can by represented by the utility functions

$$u_w = (\delta_w)^t \ (v^d - s) \qquad \textbf{(A.1)}$$
$$u_f = (\delta_f)^t \ \pi^d$$

where δ_w and δ_f are the discount factors of insiders and firms, respectively. Notice that in case of disagreement $u_f=u_w=0$. In addition if and only if the bargaining outcome is $v^d=s$ incumbents do not care about when (and whether) such an agreement is reached.

Since insiders will not accept any agreement which gives them less than s the bargaining cake is given by

$$q(me^f+(n-m)e^o)-sN \qquad \textbf{(A.2)}$$

The surplus "per worker" is then (q-sN)/N and if workers receive a share of x, the wage of insiders is determined by

$$v^d = s+x[(q-sN)/N] \qquad \textbf{(A.3)}$$

whereas profits are given by

$$\pi^d = q - v^d N = (1-x)(q-sN) \qquad \textbf{(A.4)}$$

(A.3) and (A.4) show that, for any given level level of N and q, bargaining over v^d is tantamount to bargaining over the share x. If e.g. x=0, v^d=s whereas if x=1, π^d=0.
It is well known that the unique SPE-outcome of an alternating offers game is given by the fundamental equations (see Rubinstein, Osborne 1990, p.45). Let x^f denote the proposal of the firm whereas x^w represents the insiders' proposal. Then the fundamental equations are given by the condition that insiders (the firm) are (is) indifferent between accepting x^f (x^w) "today" and enforcing x^w (x^f) "tomorrow":

$$\begin{aligned} x^f \frac{q-sN}{N} &= \delta_w[x^w \frac{q-sN}{N}] \\ (1-x^w)(q-sN) &= \delta_f(1-x^f)(q-sN) \end{aligned} \qquad \textbf{(A.5)}$$

Solving these equations leads to the equilibrium proposals

$$(x^w)^* = \frac{1-\delta_f}{1-\delta_f\delta_w}; \quad (x^f)^* = \delta_w(x^w)^* \qquad \textbf{(A.6)}$$

Without any loss in generality we assume that insiders start the bargaining process with an offer; then $(x^w)^*$ is the bargaining outcome. In addition let δ_i be determined by

$$\delta_i = e^{-\tau r_i} \qquad i = w,f \qquad \textbf{(A.7)}$$

τ denotes the delay between two bargaining periods and r_i is the subjective discount rate reflecting the impatience of insiders and the firm, respectively. Substituting δ_i in (A.6) and taking the limit yields

$$x^* \equiv \lim_{\tau\to 0} (x^w)^* = \lim_{\tau\to 0} \frac{1-e^{-\tau r_f}}{1-e^{-\tau(r_f+r_w)}} = \frac{r_f}{r_f+r_w} \qquad \textbf{(A.8)}$$

Substituting x^* into (A.3) leads to

$$v^{d} = (1-\frac{r_f}{r_f+r_w})s + \frac{r_f}{r_f+r_w}\frac{q}{n+(n-m)f^{o}} \qquad \textbf{(A.9)}$$

As it can be easely seen (A.9) is the same as (4.13) if α is defined by $\alpha=r_f/(r_f+r_w)$. The bargaining power of insiders as measured by α in the Nash solution concept just reflects the relation of the impatience of the firm and the workers, repectively. The less patient the firm and the more patient the insiders are, the greater is α - the greater is the bargaining power of insiders.

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