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Insiders and Outsiders in Labour Market Models

By

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The monopoly union model and the wage bargaining model are analysed in light of the distinction between insiders and outsiders. It is shown that a possible outcome of the wage bargaining is the wage level where all insiders keep their job, but no outsiders are taken on. In this situation, small variations in the bargaining situation of the union will not affect the wage and employment outcome. Furthermore, it may even be the case that the union does not wish a higher wage, because this would lead to lay-offs among the insiders. Thus, the monopoly union model and the bargaining model may yield the same wage and employment levels.

1. Introduction

The last few years have seen an increasing interest in the consequences of the distinction between insiders and outsiders in labour market models, see e. g. Lindbeck and Snower (1988), Solow (1985), and Carruth and Oswald (1987). The motivation for this distinction is that union behaviour is determined by the current membership, the insiders. The insiders will pursue their own interests, which in general will be different from the interests of those who are not members of the union, the outsiders. In spite of the large interest in insider-outsider problems many unresolved questions remain. In this paper I use an insider-outsider model to study

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some aspects of two very popular labour market models, the monopoly union model of Dunlop (1944) and the "right-to-manage"/bargaining model of Nickell (1982).

The main argument of the paper is the following. If there is no risk for any of the insiders being laid off, the union will be indifferent to the level of employment, and it will strive for a higher wage. However, if there is a risk that some of the insiders will be laid off, then the union will value carefully the gains from higher wages against the risk of layoffs among insiders. Thus, a possible outcome of the wage bargaining is the wage level where all insiders keep their job, but no outsiders are taken on. In this situation small changes in the bargaining positions of either the firm or the union (e. g. a rise in the cost to the firm of a strike) will not affect the outcome of the wage bargain, because the wage will remain at the level where all insiders are employed. A special case of this result is that in certain circumstances, the monopoly union model and the bargaining model may yield the same wage and employment outcome. This result will hold if (intuitively) union fear for job losses makes it wish a low wage, a wage which it also could have obtained through negotiations.

The paper is organised as follows. In Section 2 I set out the bargaining model and the monopoly union model, and I derive the conditions for these models to give the same outcome. In Section 3 I present results from numerical simulations of the models to give an idea about the realism of these conditions. Finally there are some concluding remarks in Section 4.

2. The Models

Before turning to the analysis, a few words on union preferences are in order. A crucial question is of course who are the insiders, whose interests the union is to pursue.[1] Defining insiders as identical to union membership does not provide an answer which is sufficient to build a satisfactory model of union preferences. However, empirical evidence from United Kingdom (Barker et al., 1984) indicates that relatively few unemployed are union members, and that unemployed members have restricted and no

[1] It is not obvious that the union behaves purely in the interests of the insiders, as the union leaders may have their own interests, cf. Pemberton (1988). Yet I shall follow the standard approach and neglect the distinction between membership and leadership.

voting rights. It seems reasonable, therefore, to define insiders as those currently employed in the firm.

For my purpose there is no need to have a complete dynamic model of how the number of insiders varies over time. I shall consider a one period model where the number of insiders is given by history, as those employed in the last period. Thus, unions are assumed to maximise a utility function

$$U(W, n; m), \tag{1}$$

where W is the real wage level, n is the employment level and m is the number of insiders. I assume that $U(\cdot)$ is twice differentiable and strictly quasiconcave in W and n for $n < m$, with strictly positive partial derivatives U_1 and U_2. For $n > m$, the union is indifferent to the employment level so $U_2 = 0$, whereas we still have $U_1 > 0$ (and $U_{11} \leq 0$). Thus U_2 is not defined at the wage level where $n = m$ (as pointed out by Carruth and Oswald, 1987) while U_1 is defined and continuous for all wage levels.

A specific union utility function which I shall use as an example in the following is the utilitarian, see Carruth and Oswald (1987).

$$\begin{aligned} U &= n\,u(W) + (m-n)\,u(b) \quad &&\text{for } n \leq m, \\ &= m\,u(W) &&\text{for } n > m, \end{aligned} \tag{2}$$

where $u(\cdot)$ is the concave individual workers utility function and $u(b)$ is the utility level of the workers who do not get a job in this firm.

The Bargaining Model

Here, I assume that the wage level is determined in a bargain between union and firm, while employment is set unilaterally by the firm after the bargaining. This latter assumption seems to be in better accordance with facts than the alternative assumption of employment being determined in a bargain between union and firm (efficient bargains), cf. Oswald (1984). I follow the common assumption that the wage is given by the asymmetric Nash bargaining solution

$$W = \arg\max_W\, [\pi(W, n) - \pi_0]^c\, [U(W, n; m) - U_0]^{1-c}, \tag{3}$$

subject to $n = n(W; p) = \arg\max_n \pi(W, n; p)$ (so n is the profit maximising labour demand), π is the profit function of the firm, p is the exogenous output price level, c is the bargaining power of the firm and π_0 and U_0 are the parties' respective disagreement points, assumed to be exogenous. The GDP deflator is set equal to one, so that W and p are measured in real terms. Moreover, c, π_0 and U_0 are assumed to be independent of p. I assume that the Nash product is single peaked, so that there is a unique solution to (3). Necessary and sufficient conditions for a maximum $W = W^*$, are

$$\begin{aligned} U_1 + U_2\, n_W &\geq -[c(U - U_0)\, \pi_W]/[(1-c)(\pi - \pi_0)] \text{ for } W < W^*, \\ U_1 + U_2\, n_W &\leq -[c(U - U_0)\, \pi_W]/[(1-c)(\pi - \pi_0)] \text{ for } W > W^*, \end{aligned} \tag{4}$$

(in the intervals where U_2 is defined), where π_W is the total derivative of the profit function with respect to the wage level (which is equal to the partial derivative π_1 due to the envelope theorem). If U_2 is defined (and continuous) at $W = W^*$, then instead of (4) we have the standard first order condition

$$U_1 + U_2\, n_W = -[c(U - U_0)\, \pi_W]/[(1-c)(\pi - \pi_0)]. \tag{5}$$

We now have the following

Proposition: If the Nash bargain yields the outcome W^I, defined by $m = n(W^I; p)$, then there will exist intervals for the parameters c, U_0 and π_0, such that if any of these parameters varies within its respective interval, then this will not affect the bargaining outcome. Furthermore, when the parameters are in the interior of their respective intervals, small variations in p will lead to variations in the bargaining outcome in the same direction, and no change in the employment level. (Proof, see Appendix).

Somewhat loosely the intuition behind this proposition is the following. For wage levels below W^I, the union's total marginal utility of wages ($U_1 + U_2\, n_W$) is high, thus the union may have ample bargaining power to obtain the wage level W^I (i. e. the first part of (4) holds with strict inequality). However, further wage increases will cause layoffs among the insiders, thus the union's total marginal utility of wages will be much smaller, and the union may lack the bargaining power necessary to achieve a higher wage.[2] Small changes in the bargaining power or in any of the disagreement points will not alter this situation (this is illustrated in Fig. 1 below).

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[2] The total marginal utility of wages may even be negative for wage levels above W^I, in which case the union will not want higher wages regardless of bargaining power, cf. the corollary below.

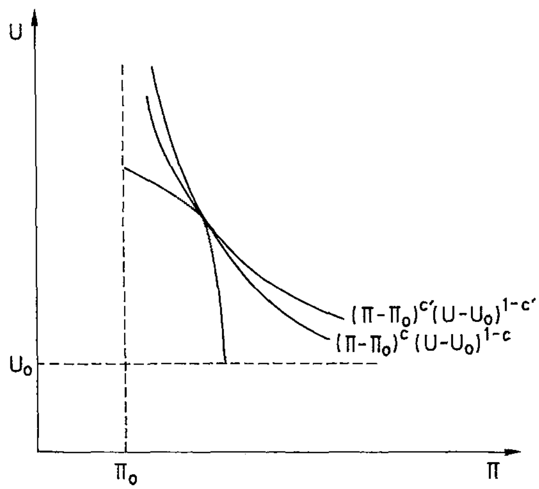

Fig. 1. The utility-possibility frontier is kinked for $W = W^I$. Variations in the bargaining position ($c > c'$) will move the curve indicating the Nash product, but for small variations the Nash product will still be maximised at $W = W^I$

The intuition behind the effect of p is that a rise in the output price will raise labour demand, so that a higher wage level will be consistent with all insiders retaining their job (W^I rises). As long as the parameters are within their intervals the new W^I will be the bargaining outcome, and the employment level will remain at m.

The Monopoly Union Model

In the monopoly union model the firm still has the right to set employment unilaterally (after the wage is set), whereas the union is assumed to be able to set the wage level unilaterally. Thus W is given by

$$W = \arg\max_{W} U(W, n; m) \tag{6}$$

subject to $n = n(W; p) = \arg\max_n \pi(W, n; p)$. As is well known (cf. e. g. Manning, 1987), the monopoly union model can be seen as a special case of the bargaining model, where the union has all the bargaining power, that is $c = 0$. Thus, necessary and sufficient conditions for a maximum $W = W^*$, are found by setting $c = 0$ in (4), which yields

$$\begin{aligned} U_1 + U_2\, n_W &\geq 0 \qquad \text{for } W < W^*, \\ U_1 + U_2\, n_W &\leq 0 \qquad \text{for } W > W^*, \end{aligned} \tag{7}$$

(in the intervals where U_2 is defined). This interpretation suggests a special case of the Proposition. The interval within which variations in the bargaining power have no effect on the bargaining outcome may include both zero (i. e. the monopoly union model) and the bargaining power of the firm in a bargaining model. Thus, we have the following

Corrollary: There may exist situations where the monopoly union model and the bargaining model give the same wage and employment outcome. In these situations employment will be equal to the number of insiders, and the wage level will be given by the labour demand function, i. e. $n = m$ and $W = W^I = n^{-1}(m)$.

Again the crucial feature is that the total marginal utility of wages $U_W = U_1 + U_2 n_W$ is discontinuous. In the monopoly union model we must have that $U_W \leq 0$ for $W > W^I$, otherwise the union would choose a higher wage. In the bargaining model we must have U_W strictly greater than zero for $W < W^I$, because (intuitively) in a negotiation a party can never obtain an agreement to which it is indifferent on the margin. These two requirements can only be fulfilled simultaneously when U_W is discontinuous.

3. Numerical Simulations

An interesting question is of course how likely it is that the monopoly union and the bargaining model yield the same result. It is however not possible to answer this in general, since it will clearly depend on the functional forms. Yet an illustration is worthwhile. I have chosen some fairly common functional forms, exactly the same as Carruth and Oswald (1987) in their simulation of efficient bargains. The union utility function is assumed to be utilitarian, given by (2), and the individual workers have the constant elasticity utility function

$$u(W) = W^{1-\gamma}/(1-\gamma) \tag{8}$$

and similarly for $u(b)$ and $u(z)$. The payoff of the firm is the profit

$$\pi = pn^{\alpha} - Wn \qquad 0 < \alpha < 1, \tag{9}$$

where I have assumed constant elasticity in the production function. I have chosen the same variations in the parameters γ and α as Carruth and Oswald (1987). The disagreement points are the parties' payoffs during a conflict (e. g. a strike), and are assumed to be $\pi_0 = 0$, $U_0 = n\,u(z) + (m-n)\,u(b)$ for $n \leq m$ and $U_0 = m\,u(z)$ for $n > m$, where $u(z)$ is the utility level of a worker on strike, and $u(b)$ is the utility of a worker who fails to obtain a job in the firm.[3] As a normalisation, I set $b=1$. I have experimented with different values of z. As Carruth and Oswald (1987), I have tried $z=b=1$, but I have also used $z=0.9$ and $z=0.8$. This allows for the possibility that the workers' utility in case of a conflict is lower than what they will get if they fail to get a job in the firm. I have followed Carruth and Oswald (1987) in using the symmetric Nash bargaining solution, i. e. (3) with $c=1/2$.

The general picture of the simulations is given in Fig. 2.

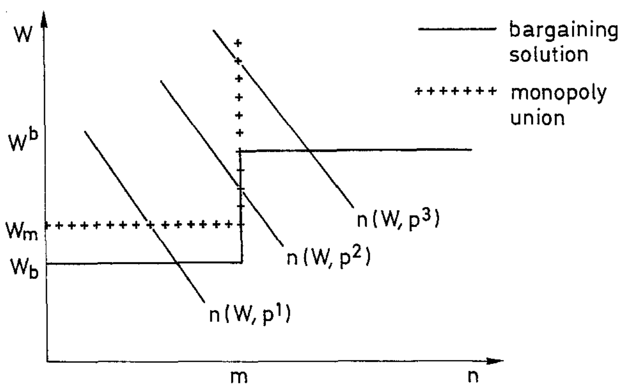

Fig. 2. The horizontal form of the solutions follows from the assumption of constant elasticities in the union utility function and the production function. In general the solution curves can be either increasing or decreasing in n

For "low" price level (like p^1) a monopoly union causes higher wages and lower employment than the bargaining solution. Small price increases will raise employment while wages are constant. This is the sticky wage result of McDonald and Solow's (1981) monopoly union model. For "medium" prices (p^2) the two models give the same outcome. As discussed by Blanchard and Summers (1986) and others, price increases will only result in higher wages in these situations. For "high" prices (p^3), a monopoly union will raise wages and prevent outsiders from getting a job. In a bargain-

[3] The specification of U_0 presupposes that if some of the workers are made redundant after the wage bargaining, then these workers will realise this immediately and leave before a possible conflict. This seems like a reasonable assumption in a model with perfect information.

ing model the price increase will not raise the wage level, thus outsiders will be employed.

Note that it is only when $W_m < W^b$ that there will exist price levels for which the bargaining solution and the monopoly union solution curve will coincide. If $W_m > W^b$, then a monopoly union will, for all price levels, set a higher wage than what a union can obtain through a wage bargain.

Table 1 below shows the wage levels indicated in Fig. 2, and their corresponding price levels, for different parameter values.

Table 1. *Numerical Illustration of the Wage Levels in Fig. 2 for Different Prices and Parameter Values*

Z	W_m	W_b	W^b	p_m	p_b	p^b	
1	1.46	1.31	1.84	29.2	26.2	36.8	a)
0.9	1.46	1.26	1.66	29.2	25.2	33.2	a)
0.8	1.46	1.21	1.47	29.2	24.2	29.4	a)
1	1.10	1.05	1.11	1.94	1.85	1.95	b)
0.9	1.10	—	—	1.94	—	—	b)
0.8	1.10	—	—	1.94	—	—	b)
1	1.78	1.44	4.0	35.6	28.8	80.0	c)
0.9	1.78	1.39	3.6	35.6	27.8	72.0	c)
0.8	1.78	1.34	3.2	35.6	26.8	64.0	c)

Union membership $m = 100$.
a) Risk aversion parameter $\gamma = 2.5$, technology parameter $\alpha = 0.5$.
b) Risk aversion parameter $\gamma = 2.5$, technology parameter $\alpha = 0.9$.
c) Risk aversion parameter $\gamma = 0.5$, technology parameter $\alpha = 0.5$.
— Simulation yields wage lower than unity, i. e. lower than the outside opportunity. The most realistic outcome in these cases would be that the wage is equal to the outside opportunity lest all workers should leave the firm, cf. Binmore et al. (1986).

In the monopoly union model prices lower than p_m yield $W = W_m$ and $n < m$ (corresponds to p^1 in Fig. 2), while prices higher than p_m yield $W > W_m$ and $n = m$ (corresponds to p^2 and p^3). In the bargaining model prices lower than p_b give $W = W_b$ and $n < m$ (corresponds to p^1), prices in the range $[p_b, p^b]$ give $W_b \leq W \leq W^b$ and $n = m$ (corresponds to p^2), and prices above p^b yield $W = W^b$ and $n > m$ (corresponds to p^3). Thus, it is only if $p_m < p^b$ or equivalently $W_m < W^b$, that there is a range of prices (between p_m and p^b) for which the monopoly union model and the bargaining model will yield the same wage and employment levels.

As we can see from the simulation results in Table 1, in almost all cases there will be a range of prices for which this holds true. *Thus the simulation results indicate that the monopoly union and the* *bargaining model giving identical solutions will not only be a rare coincidence, but rather something that may happen under a variety of circumstances.*

The results also illustrate the Proposition. Comparing outcomes for different values of z reveals that a lower union disagreement point shifts the bargaining solution curve indicated in Fig. 2 downwards (increased bargaining power of the firm will also give this result). For most price levels this will lead to lower wages and higher employment. If, however, the price level initially is in the range (p_b, p^b), so W is initially in the range (W_b, W^b) and $n = m$, then small reductions in the union disagreement point will not influence the wage and employment outcome, as long as the price level is still within the range (p_b, p^b) after this range has shifted. For example, a downwards shift in the bargaining solution curve in Fig. 2 will not affect wages or employment if the price level is p^2.

4. Concluding Remarks

The paper has analysed the bargaining and the monopoly union model when the union is only concerned about the insiders, i. e. those currently employed in the firm. It is argued that in some situations a monopoly union may want a moderate wage to prevent compulsory redundancies. This wage may be so low that it also could be obtained through wage negotiations. Thus, the monopoly union model can predict the same wage and employment outcome as the bargaining model. Furthermore, if the wage is set at the level where further wage increases lead to redundancies, small variations in the bargaining position of the union or the firm will not affect the outcome of the wage bargaining. This is a potentially important result, as it may indicate that there are inherent problems in detecting any effects of the union's bargaining position in empirical studies. As yet empirical studies that test the effect of the union's bargaining position are too scarce[4] to make it possible to say whether this will turn out to be a real problem.

Under what circumstances are these situations likely to occur? It seems plausible that in "normal" times and industries, the high quit rate will ensure that there is no risk for layoffs among insiders (Pemberton, 1988, reports annual turnover rates in Britain varying between 20 and 37%). Even though layoffs would result if the

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[4] Exceptions are Svejnar (1986), McConnell (1989) and Holden (1989).

wage became very high, this would be far above what the union could expect in wage negotiations. In recessions or declining industries, however, insider jobs can be at risk for much lower wages than in normal times and industries. In this case the union can be able to obtain the wage level for which only insiders are employed, because the bargaining position of the union need not be much worse in recessions (or declining industries) than normal (because a strike may be as costly to a firm in a bad economic situation as to a firm in a good economic position).

Appendix

Proof of Proposition 1

I will only prove this for the bargaining power c, the assertions concerning U_0 and π_0 are proved in the same way. Let U_0 and π_0 be given. Recall that $U_2 > 0$ for $W > W^I$, while we have $U_2 = 0$ for $W < W^I$. Thus if W^I is the bargaining outcome, (4) can be written as

$$U_1 \geq -[c(U - U_0)\,\pi_W]/[(1-c)(\pi - \pi_0)] \text{ for } W < W^I, \tag{A.1}$$

$$U_1 + U_2\, n_W \leq -[c(U - U_0)\,\pi_W]/[(1-c)(\pi - \pi_0)] \quad \text{for } W > W^I.$$

Define c_L by

$$c_L = \min\,\{c \mid U_1 + U_2\, n_W \leq -[c(U - U_0)\,\pi_W]/[(1-c)(\pi - \pi_0)];\ \text{all } W > W^I\}, \tag{A.2}$$

and c_U by

$$c_U = \max\,\{c \mid U_1 \geq -[c(U - U_0)\,\pi_W]/[(1-c)(\pi - \pi_0)];\ \text{all } W < W^I\}. \tag{A.3}$$

Observe that as the Nash product is assumed to be single-peaked, it is only necessary to check the conditions in an interval close to W^I. The RHS of (A.1) is continuous in W, thus the right-hand limit of the RHS at W^I is equal to the left-hand limit. Moreover, U_1 is also continuous, so the right-hand limit of U_1 at W^I is equal to the left-hand limit. Thus, $U_1 + U_2\, n_W$ (for $W > W^I$) $< U_1$ (for $W < W^I$), and (A.2) and (A.3) implies that $c_U > c_L$, so (A.1) will be fulfilled for all $c \in [c_L, c_U]$, which is the interval we seek.

We now turn to the effect of changes in p. Observe that W^I is defined as a continuous function of p by $m = n(W^I; p)$. Let W^{I0} and W^{I1} be the wage levels associated with p^0 and p^1, where

$\Delta p = p^1 - p^0$. As U_1 and RHS are continuous in W, it follows that if

$$U_1 > -[c(U - U_0)\,\pi_W]/[(1-c)(\pi - \pi_0)] \quad \text{for } W < W^{I0}, \tag{A.4}$$

and Δp is sufficiently small, then

$$U_1 \geq -[c(U - U_0)\,\pi_W]/[(1-c)(\pi - \pi_0)] \quad \text{for } W < W^{I1}. \tag{A.5}$$

Correspondingly, if

$$U_1 + U_2\,n_W < -[c(U - U_0)\,\pi_W]/[(1-c)(\pi - \pi_0)] \quad \text{for } W > W^{I0}, \tag{A.6}$$

and Δp is sufficiently small, then

$$U_1 + U_2\,n_W \leq -[c(U - U_0)\,\pi_W]/[(1-c)(\pi - \pi_0)] \quad \text{for } W > W^{I1}. \tag{A.7}$$

Thus, (A.5) and (A.7) ensure that the wage outcome associated with p^1 is W^{I1}, and that employment remains at m. QED

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