

Seminar Paper No. 308

THE ECONOMIC THEORY OF TRADE UNIONS:  
AN INTRODUCTORY SURVEY

by

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Abstract

The paper attempts to provide an introductory survey of work on the economic theory of trade union behaviour. It concentrates on recent contributions to the literature, sets out a number of central results and ideas, and speculates on future topics for research.

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## The Economic Theory of Trade Unions: An Introductory Survey\*\*

### 1. Introduction

Over the last decade there have been two published survey articles on the economics of trade unions. The first, by George Johnson, appeared in 1975 in the American Economic Review, and the second, by C. J. Parsley, in the 1980 Journal of Economic Literature. The purpose of this paper is to summarise some of the research which has been going on since then.<sup>1</sup> One motive for doing this is that there has been a remarkable growth of work in the area. For reasons not explored here it seems that, around the turn of this decade, a significant number of economists - from all over the world, but perhaps particularly from the U.S.A., Britain and Scandinavia - became interested in the consequences of the activities of labour unions. Some of the articles which were stimulated in this way are listed in the bibliography; they include a number of working papers which are unpublished. A second motive for a new survey paper on unions is that the character of published work has changed. We now appear to be a little closer to a situation in which it could be said that there is an orthodox, methodologically conventional and testable theory of the trade union. George Johnson obviously felt that this was not true in 1975: "it is worth noting that the problem of modelling trade union behaviour has proved to be virtually intractable. This is because (1) there is no consensus on the goals of union activity (see W. N. Atherton) such as exists with respect to the firm or consumer and (2) the received pure theory of bargaining is devoid of operational content. The absence of a solid theoretical foundation has handicapped the economic analysis of trade unions and has surely contributed to its decline in relative attention." Pencavel (1977) draws a similar conclusion.

Many reputable textbooks, notably Ehrenberg and Smith (1982), treat the micro-economic theory of the union in a rather simple way.<sup>2</sup> The existence of a trade union is thought of as shifting the competitive labour

supply curve to the left, which raises the equilibrium wage and reduces employment. This is obviously ad hoc. From standard producer theory, moreover, we know that a monopolist does not have a supply curve, which might make us concerned about the use of a union's 'supply curve' in labour economics. Much of the new work on the economic theory of trade unions attempts to provide a more rigorous analysis.

The paper is divided into a number of sections. The next three concentrate on the microeconomic theory of union behaviour (the results of econometric testing, although important, are not<sup>3</sup> covered) and summarize some orthodox ideas and predictions. It seems fair to conclude that this area is the best developed within the field, which is one reason to devote to it the largest part of a survey paper. Section 5 is less conventional: it questions the central idea in the microeconomics of unions, namely that there is a dichotomy between monopoly equilibria and efficient bargains, by constructing models in which efficient outcomes lie on the labour demand curve. One way in which this can be done is to assume that lay-offs are by seniority rather than by random draw. Section 6 covers general equilibrium models. There has been surprisingly little written on these issues, and the section necessarily reflects that. The concluding segment, section 7, contains some personal judgements about past research and one or two suggestions for future work.

## 2. The Micro-economics of the Trade Union: Union Preferences

To apply the usual methodology of economics to the study of unions requires that one specify both preferences and constraints. The concept of the preferences or utility function of a trade union is still an idea which stirs debate. But most recent writing has taken the following kind of approach.

Assume that the union cares mainly about its members' real wages and the level of employment in its industry. Assume for the moment that each worker is paid  $w$  and that the number of jobs in the industry is  $n$ .<sup>4</sup> Define an increasing, quasi-concave utility function for the union,  $U(w,n)$ . There are then two natural ways to proceed. First, one can imagine that the union attempts to maximise this function whilst taking as given the labour demand curve. Hence the union sets one variable (the wage, say), and the firm the other variable (employment). Second, it is possible to think of the union as trying to maximise its utility function subject to some minimum level of profit, or of the parties as bargaining about their respective positions on a contract curve. Geometrically, therefore, this suggests as a solution a point of tangency between a union indifference curve and an iso-profit contour (there is an infinite number of these efficient equilibria). In this case the firm and union jointly agree on pay and employment. The ideas behind these two alternative approaches are simple but enormously influential.<sup>5</sup> Section 3 compares the two models.

Why should a union have a quasi-concave utility function  $U(w,n)$ ? Some early writers, like Fellner (1951), Cartter (1959), Akerlof (1969) and Atherton (1973), argued for this general form on intuitive grounds; but most of the first writings in the field offered a more specific rationale.<sup>6</sup> The notion, for example, that the trade union is to be thought of as maximising the wage bill (possibly including government payments to unemployed members) has often been made: see, among others, Dunlop (1944), Hieser (1970) and Johnston (1972). A very closely related assumption is that the union's

preferences can be represented as  $U = n(w-w^C)$ , where  $w^C$  is the competitive wage rate. In this case the union aims to maximise its rent - the surplus income on top of the wage bill under perfect competition in the labour market. The assumption can be found in Rosen (1970), De Menil (1971) and Calvo (1979). More recently, however, writers have normally followed one of two assumptions, those of:

- (i) a general quasi-concave union utility function, usually of a specific structural form (Stone-Geary, for example)
- (ii) an expected-utility, or utilitarian, function.<sup>7</sup>

These are worth studying in detail, although it must be borne in mind that some writers reject this kind of neoclassical methodology (see Ross (1948), Burton (1981) and Martin (1980), for example).

The first approach can be found in the writings of Calmfors (1982), Carruth and Oswald (1981), Corden (1981), Hersoug (1978), (1983), Kotowitz and Mathewson (1982), Mulvey (1978), Oswald (1979), Rees (1977), Stewart (1982) and Warren-Boulton (1977). However, it has become particularly influential in the work of Dertouzos and Pencavel (1981), Pencavel (1984a), (1984b) and MacCurdy and Pencavel (1982). They adopt the Stone-Geary functional form

$$U = (w-\gamma)^\theta (n-\delta)^{1-\theta}, \quad (1)$$

where  $\gamma$  and  $\delta$  may be thought of as 'minimum' or 'reference' levels of wages and employment. The parameter  $\theta$  captures the relative importance of 'supernumerary' wages and employment to the trade union. This assumption has a number of advantages. First, it is simple and familiar (from consumer theory). Second, it nests as special cases some other assumptions about union preferences. The wage bill utility function occurs when  $\theta = \frac{1}{2}$  and  $\gamma = \delta = 0$ . The rent utility function is produced when  $\theta = \frac{1}{2}$ ,  $\delta = 0$  and  $\gamma = w^C$ . Dertouzos and Pencavel (1981) also argue that the assumption captures the notion of a comparison wage rate - that the union might care about

'relativities' - if  $\gamma$  is thought of as the standard of comparison. Third, the Stone-Geary function is reasonably easy to handle in econometric work.

Nevertheless, there is a difficulty with the Stone-Geary union utility function (one which applies to all similar functional specifications). It is not derived explicitly from our conventional axioms about workers' preferences. There is apparently no way to show why, for example, risk-averse employees would, as a group, behave as if maximising a Stone-Geary function.

The second approach to union utility functions, (ii), is a little different. In its simplest form this function can be written either as

$$U = \frac{n}{m} u(w) + \frac{(m-n)}{m} u(b) \quad \text{Expected Utility} \quad (2)$$

or

$$U = nu(w) + (m-n)u(b) \quad \text{Utilitarian} \quad (3)$$

where  $u(\cdot)$  is the concave utility function of an individual worker,  $m$  is the membership of the trade union<sup>8</sup> and  $b$  is the level of unemployment benefit (or an alternative wage). If  $m$  is fixed, these obviously have exactly the same properties; but if membership is variable, and influenced by the union, the two forms will not be equivalent. The rationale for the utilitarian form is straightforward: the union is assumed to treat people identically<sup>9</sup> and to care about the sum of their utilities. This is not a moral justification, it should be stressed, but merely an economic interpretation; this is not the place to summarize the arguments for and against utilitarianism.<sup>10</sup> In its expected utility form the union's preferences reflect the fact that there are two states of nature for each member of the union. If the individual is lucky, he is employed at wage  $w$ ; if he is unlucky, he takes home unemployment pay (or an alternative wage, earned in a competitive sector)  $b$ . Because  $n$  people are employed, membership is  $m$ , and everyone is treated equally, each worker is assumed here to face a random draw in which the probability of getting a job at utility  $u(w)$  is  $n/m$ , and the probability of having utility  $u(b)$  from



unemployment is  $(m-n)/m$ .<sup>11</sup> If workers care about leisure time then their utility from being unemployed can be written  $v(b)$ , say, without upsetting the form of these union utility functions.

The approach to union preferences captured in equations (2) and (3) was apparently developed independently by at least half a dozen authors. By chance, although characteristically in the history of economic thought, the idea was thought of in a number of countries at around the same time. It seems to have appeared first in a journal in Dreze and Modigliani (1981),<sup>12</sup> although in a slightly different form Farber's (1978) article actually pre-dated this, and was then followed by McDonald and Solow (1981), Calmfors (1982), Oswald (1982a) and Sampson (1983a). But it can also be found in unpublished work by De Bruyne and Van Rompuy (1981), Moore (1981) and Sampson and Shepherd (1978), and was probably previously known, judging from a footnote in Ashenfelter and Brown (1983), to some American labour economists.<sup>13</sup> The advantage of this approach is that the union's utility function has a clear micro-economic foundation: individuals' preferences, and the size of the membership, appear explicitly. Hence it is possible to see how the group's preferences change as, say, members become more risk-averse or the size of the union declines. Equations (2) and (3) are also simple enough (Ashenfelter and Brown (1983) and Carruth and Oswald (1982), for example) to generate convenient estimating equations.<sup>14</sup> Furthermore, the rent and wage bill forms of union preferences again emerge under special conditions. The form  $U = n(w-w^c)$  requires risk-neutrality of individuals; the form  $U = nw$  follows from risk-neutrality plus the assumption that membership equals employment.

There are generalisations of the expected utility or utilitarian analysis of union preferences. The approach sketched above makes the implicit assumption that union members are homogeneous. But there have been attempts in the literature to allow for individuals' heterogeneity. Farber's (1978) well-known paper assumes that the union aims to satisfy the desires of the median-aged member, because that minimises the risk that the union leaders will lose

their own jobs. In a framework similar to that in equation (2), Farber treats the union as maximising the median member's expected utility. Blair and Crawford (1984), however, show that in fact a voting equilibrium need not exist in his model. Atherton (1973) and Booth (1984b) also recognise the heterogeneity of the union's workers.<sup>15</sup> The important and related question of seniority is pursued by Grossman (1982), (1983). He assumes that workers are indexed by  $i \in [0, n_t]$ , where  $n_t$  is the size of the union at the start of period  $t$ . Grossman lets seniority decrease with the index  $i$  and assumes that all firing depends on the criterion of seniority within the union (Oswald (1984c) provides U.S. evidence in favour of this). Uncertainty enters the analysis, because the price of output is unknown ex ante, and is also discussed by Atherton (1973), Black and Bulkley (1984), Blair and Crawford (1984), Hall and Lilien (1979), Oswald (1982b) and in the large and influential literature on labour contract theory - where unions are treated as groups of atomistic workers - such as Azariadis (1975), Baily (1974), Hart (1983) and Moore (1984).

### 3. The Micro-economics of the Trade Union: Two Models

The literature now seems to be dominated by two models of the trade union - a dichotomy which many articles stress, including Ashenfelter and Brown (1983), MaCurdy and Pencavel (1982), McDonald and Solow (1981), Nickell (1982) and Oswald and Ulph (1982). They might be called the monopoly model and the efficient bargain model.

#### The Monopoly Model

Imagine a union which runs a closed shop and can control either entry into the profession or the wage rate. Say that the union faces many small firms and that it would be prohibitively costly to negotiate with all of them. To keep the model simple, let the trade union fix the wage, and assume that firms set employment unilaterally. Take the union utility function to be that in equation (3) and take membership,  $m$ , to be fixed. For simplicity write the firm's decision as

$$\text{Max}_n \quad pf(n) + (\sigma - w)n \quad (4)$$

where  $p$  is the exogenously given price of output,  $f(n)$  is a concave production function,  $n$  is employment (the only input),  $w$  is the wage and  $\sigma$  is an employment subsidy by the government. Let workers face a linear income tax schedule, such that their take home pay each is  $\omega = w(1-t) + s$ ; hence the marginal tax rate is  $t$ , and  $s$  is a flat income benefit. If we write the demand curve for labour as  $n(w,p,\sigma)$ , the union utility function after the labour demand and tax schedules have been substituted in becomes a function  $U = R(w,p,m,b,s,\sigma,t)$ . The union's desired wage rate, which can be represented as a tangency in Figure 1, is the solution to

$$\text{Max}_w \quad R = u(w(1-t)+s)n(w,p,\sigma) + [m - n(w,p,\sigma)]u(b).$$

At an interior maximum, then,

$$R_w = u'(\omega)(1-t)n(w,p,\sigma) + [u(\omega) - u(b)]n_w(w,p,\sigma) = 0. \quad (5)$$

This says simply that at the optimum the union's marginal benefit from raising the wage must equal its marginal cost from doing so. The marginal benefit is the increase in utility gained by each worker multiplied by the total number of employed members. The marginal cost is the number of members who lose their jobs multiplied by the utility a member loses when he or she is transferred into the pool of unemployed members.

The comparative static predictions each emerge from one further differentiation ( $dw/db$  takes the sign of  $R_{wb}$ , and so on). The key results - ignoring corners, such as  $m = n$  - are as follows.

1. An increase in unemployment benefit raises the union's desired wage rate.

$$\text{Proof } R_{wb} = -u'(b)n_w > 0. \quad (6)$$

2. A rise in the price of the product has no effect on the union's desired wage rate whenever the elasticity of labour demand is constant.

$$\text{Proof } \frac{u'(\omega)(1-t)w}{u(\omega)-u(b)} = \frac{-wn_w}{n} \equiv \epsilon, \text{ by the first-order condition. The}$$

left hand term, and hence  $w$ , is fixed if  $\epsilon$  is constant.

3. A change in membership does not affect the union's desired wage rate.

$$\text{Proof } R_{wm} = 0. \quad (7)$$

4. A rise in the worker's income subsidy lowers the union's desired wage rate.

$$\text{Proof } R_{ws} = u''(\omega)(1-t)n + u'(\omega)n_w > 0 \quad (8)$$

5. An increase in the employment subsidy to firms raises the union's desired wage rate.

$$\text{Proof } R_{w\sigma} = u'(\omega)(1-t)n_\sigma > 0 \quad (9)$$

6. A change in the marginal rate of income tax has an ambiguous effect on the union's desired wage rate

$$\text{Proof } R_{wt} = -u''(\omega)w(1-t)n - u'(\omega)n - u'(\omega)wn \begin{matrix} > \\ < \end{matrix} 0 \quad (10)$$

7. The wage is higher, and employment lower, than at a competitive equilibrium.

Proof Competition would imply  $pf'(n) + \sigma = w^c = b$ . By the first-order condition, and concavity of  $f(n)$ ,  $w > w^c$  and  $n < n^c$ .

Results 1, 4 and 5 capture effects which pivot the union's indifference curves toward either its wage goal or its employment goal. Result 6 is ambiguous because incentives at the margin can outweigh or be outweighed by income effects. Result 5, that membership does not matter, stems from the fact that neither the marginal benefit nor the marginal cost to the union depend here on the size of the membership pool. This is probably seen as the most unattractive of the seven predictions, because economists tend to think that membership is an important influence on union behaviour. One way around the result is to assume that equilibrium is at a corner where employment equals membership, another is somehow to let membership affect bargaining power, a third is to think of membership as a choice variable for the union. None has been much explored. Result 7 says that the union rations jobs and raises the value of marginal product and therefore the wage rate. Result 2 states the condition under which a demand shift will maintain exactly the same equilibrium wage rate (so that, geometrically, the 'expansion path' is horizontal). Any deeper intuitive foundation is unclear, so the result is probably best thought of as an arithmetical property of the analytical structure.

These are the main results on the microeconomics of the monopoly union. Changes in the prices of other inputs in the production function turn out to have ambiguous effects. The same can be true, surprisingly, for the effects of

a change in the consumer price index (or some other appropriate real wage deflator). However, if unemployment benefit and income taxes and subsidies are indexed, and the firm's price is perfectly correlated with the consumer price index, the union's desired nominal wage is homogeneous of degree one in that index. In other words, the unit of account is unimportant in this kind of neoclassical framework. Another extension of the model is to the case where other groups' wages enter the union's utility function (a "comparability" or "jealousy" effect), but the results are not clear-cut. Finally, it may be worth pointing out that the textbook concept of a wage preference path, the locus of tangency points produced by parallel shifts in labour demand, is potentially misleading. In a more general model there is no unique expansion path, because parallel shifts have no clear meaning here, unlike in consumer theory (the one possible exception is the shifts caused by direct purchasing of labour by government).

The monopoly model is closely related to another analytical approach in which equilibria are also points on the labour demand curve. If the firm sets employment unilaterally, but the union and firm together bargain over the wage rate, the framework corresponds to what Nickell (1982) and Nickell and Andrews (1983) call the "right to manage" model. One very attractive feature of this is that it fits the facts: we know that the wage is normally fixed by collective agreement and not simply imposed by the trade union. Nevertheless, the model's predictions are similar to those listed earlier, so that there is at least a case for wielding Occam's Razor. The matter is not yet settled.

#### Efficient Bargains

The equilibrium in the monopoly model is inefficient: the outcome does not lie on the bargaining contract curve. This idea, due originally to Leontief (1946), and studied recently by McDonald and Solow (1981), can be represented as in Figure 2. Efficient bargains - there are an infinite number - lie on the CC locus of tangency points between indifference curves and iso-profit contours. Hence, by moving from the monopoly equilibrium,  $w^u$ , both

parties can gain. The competitive equilibrium is given by the intersection of the labour demand curve and the horizontal labour supply curve (fixed by the height of the reservation wage).

Perhaps the simplest case is that where profit is  $pf(n) - wn$  and the union's utility is  $u(w)n + (m-n)u(b)$ . Efficiency requires that one be maximised subject to an arbitrary level of the other. The equation of the contract curve, therefore, is

$$\frac{u(w)-u(b)}{u'(w)} = w - pf'(n), \quad (11)$$

which is essentially equation (3) in McDonald and Solow (1981). The same equation appears repeatedly in work on labour contract theory.

Various results can be proved.

1. The contract curve slopes upwards in wage-employment space.

Proof 
$$\frac{dw}{dn} = \frac{pf''(n)u'(w)}{[w-pf'(n)]u''(w)} > 0 \quad (12)$$

2. A rise in unemployment benefit (or the reservation wage) shifts the contract curve up and to the left.

Proof 
$$\frac{\partial w}{\partial b} = \frac{-u'(b)}{[w-pf'(n)]u''(w)} > 0 \quad (13)$$

3. An increase in the price of output shifts the contract curve down and to the right.

Proof 
$$\frac{\partial w}{\partial p} = \frac{u'(w)f'(n)}{[w-pf'(n)]u''(w)} > 0 \quad (14)$$

4. Equilibrium employment is higher than in the equivalent competitive labour market.<sup>16</sup>

Proof<sup>17</sup> Add  $b$  to both sides of the first-order condition for efficiency, (11), and write as  $u(w) - u(b) + u'(w)(b-w) = u'(w)[b-pf'(n)]$ . The left hand side is positive by concavity of  $u(\cdot)$ . Hence  $b \geq pf'(n)$ , so the value of the marginal product of labour is lower than the competitive reservation

wage, b. This implies that employment has been pushed beyond the level which would be generated without a union in the labour market.

5. If the labour demand curve's elasticity is constant, and the bargaining outcome is fixed by the "fair shares" rule  $wn = kpf(n)$ , where  $k$  is the share parameter, the wage will be unaffected by changes in the price of output.

Proof<sup>18</sup> Differentiate the two equations, the contract curve and the sharing rule, to give

$$\begin{bmatrix} -u''(w) \left[ \frac{w-pf'(n)}{n} \right] - u'(w)pf''(n) \\ -kpf'(n) \end{bmatrix} \begin{bmatrix} dw \\ dn \end{bmatrix} = \begin{bmatrix} -u'(w)f'(n) \\ kf(n) \end{bmatrix} dp \quad (15)$$

It follows that when  $\epsilon = -\frac{dn}{dw} \cdot \frac{w}{n}$  is constant, namely when  $f'(n)/f''(n)n$  is a constant,  $\frac{dw}{dp} = 0$ .

Result 5 is an especially simple form of the 'wage stickiness' which McDonald and Solow (1981) wish to highlight. More generally, however, they assume that in a slump the efficiency locus, given by the contract curve, shifts up; but the equity locus, of which the 'fair' division rule is one, shifts down. When these two are off-setting, the wage is sticky. This explanation is different from both that for the related monopoly model's wage stickiness proposition and that for the rigid wage in simple implicit contract models.<sup>19</sup> The latter makes a particularly good standard for comparison, because it is probably now the best known theoretical rationale for wage rigidity. Contract theories like those developed by Baily (1974) and Azariadis (1975) rely on (i) the risk aversion of individuals and (ii) the absence of full insurance and capital markets. Workers want to equate marginal utilities of income across states of nature, and competitive firms therefore find it optimal to pay a fixed wage (thereby smoothing workers' incomes) over booms and slumps.



Those interested especially in macroeconomics often look to microeconomics to provide an explanation for wage inflexibility. Hence one might legitimately ask whether union theories offer a more satisfying explanation than the Baily-Azariadis contract framework. Unfortunately it is not clear that they do. Both the monopoly union and efficient bargain justifications rely on particular structural assumptions and parameter sizes. The wage is rigid in the monopoly framework when the elasticity of labour demand is a constant; it is rigid in the efficient contract framework when two loci move by exactly offsetting amounts. Neither explanation, then, has for the economic theorist the same appeal as that provided by implicit contract models, where rather weaker assumptions (that a worker's utility merely be strictly concave, and so on, for example) are required. But this is a theoretical point. In the end the issue is an empirical one and can only be settled by testing among the competing models.

The other phenomenon central to macroeconomic analysis is unemployment. Very strikingly, however, conclusion 4 implies that a trade union which negotiates a Pareto-optimal wage bargain will raise rather than reduce employment. Unions produce 'over-employment' according to this view.<sup>20</sup> This makes more intuitive sense than one might at first presume. When, as here, there are imperfect insurance markets, economic agents try to make their decisions in such a way as to offset the effects of that imperfection. In an ideal world each union member would like to purchase full insurance - that is, insurance which equates his or her marginal utility of income across all states of nature - against the risk of unemployment. That possibility is assumed away here: an unemployed person receives only government benefit, *b*. There is a way to achieve insurance indirectly, however, because the union can reduce the risk of any individual being laid off. Hence it sets employment above the level which it would desire if insurance markets were perfect (that is also the competitive level). Overemployment is rational; it is the optimal way to reduce risk at the

expense of technical efficiency.

Similar kinds of bargaining models have appeared in the literature. De Menil (1971), in an important early piece of work, assumes that workers as a group try to maximise their economic rent (which, as discussed, is equivalent to risk-neutrality). Nickell (1982), in attempting to generate a Phillips curve, shows that higher wages are produced by a rise in last period's real wage, the expected growth of real wages or the unemployment benefit replacement rate. Taxes turn out to have ambiguous effects. Aoki (1980), De Menil (1971), Kuhn (1984), Nickell (1982), Nickell and Andrews (1983) and Moene (1983) use a Nash co-operative solution, as does a later section of McDonald and Solow (1981), to model how the wage is determined. Nickell's work combines this with the "right to manage" model in which a monopoly union operates on the labour demand curve but where the wage is fixed by bargaining. Grout (1983a), (1984) focuses on a world in which workers are risk-neutral, there is a generalised Nash bargain, and labour contracts are not legally binding. Unionisation increases the implicit cost of capital - because workers cannot be bound to any agreement about the level of investment, and will renege on a contract if it is in their interest to do so - and may raise unemployment. Other papers which examine efficient bargain models include Ashenfelter and Brown (1983), Calvo (1978), Ellis and Fender (1982), Gravelle (1982), Grout (1983b), Hall and Lilien (1979), Kotowitz and Mathewson (1982), Leontief (1946), MaCurdy and Pencavel (1982), Malcolmson (1983), Oswald and Ulph (1982) and Svejnar (1982). It is a thriving area.

There is another significant issue to be tackled. Which of these two models, the efficient bargain framework or the monopoly union approach, is the better? One response is that such a question can only be answered empirically - a view all of us must share to some degree. In reality, unfortunately, there are difficulties to be faced along the way, because an econometric investigation may implicitly have to test joint hypotheses about production function (or demand) structure as well as the form of union behaviour.

A second response, and one which does not preclude the first, is that both models may be useful, and that which is chosen in a particular case must depend on the nature of the industry and country being studied. What is certain, however, is that the models have different strengths and weaknesses. The advantages of the monopoly union view are that it corresponds to the observation that firms usually set employment unilaterally (see, for example, the empirical findings documented in Oswald (1984c)) and that it is incentive-compatible. In the efficient bargain model the union must negotiate over employment levels; and the firm always has an incentive, once the wage is fixed, to renege by jumping to the labour demand curve.<sup>21</sup> The advantage of the efficient bargain analysis is that it generates outcomes which are Pareto-optimal for the two parties. This is an obvious characteristic to impose when one large union confronts one large employer. Another objection to the monopoly model is, of course, that unions do not usually set the wage without negotiation: the bargaining process so visible in the real world appears here to have been swept aside. Section 5 tackles some of these puzzles. It argues - at this point the paper is no longer an eclectic survey - that the distinction between the monopoly and efficient contract models may be a misleading one.

#### 4. The Micro-economics of the Trade Union: Extensions

This section is concerned with extensions of the basic models and with issues not captured in them. Five themes are briefly covered. First, the paper summarizes recent attempts to provide a theory of union size and to allow for variable membership. Second, uncertainty is considered. Third, there is a short discussion of the theory of public sector bargaining. Finally, the section touches upon the economics of labour-managed firms and of strikes.

One of the problems with most of the literature is that union membership is taken as exogenously determined. For some purposes this may not matter, but for a general theory we need to be able to explain union size. Grossman (1982), (1983) suggests a way to tackle this (Booth's (1984a) framework is similar, except that layoffs are random). The union has a seniority schedule and, by voting, maximises the expected utility of the median worker. This generates a voting schedule in wage-membership space, which is marked VV in Figure 3. It is downward sloping because if the union were to get slightly larger, so that the (new) median worker were less senior than before the change, the union would become more concerned about employment prospects, and would vote for a smaller wage rate. The second equilibrium curve, MM, is produced by the assumption of perfect mobility ex ante (before output prices are known). The curve depicts the requirement that the least senior worker be indifferent between the utility he achieves by joining the union and that which he can obtain by working in the non-union sector. It has a negative gradient, at least near VV, because a higher wage reduces the expected utility of the least senior man (he is now more likely to lose his job), which causes the union's membership to shrink.

Under appropriate assumptions the equilibrium is stable. Grossman then goes on to show, for example, that if the value of the marginal product of labour schedule has constant elasticity, and workers' relative risk aversion is greater than unity, the level of unemployment will increase

- (i) when job opportunities outside the union sector worsen,
- (ii) when unemployment benefit rises,
- (iii) when there is a mean-preserving reduction in the variability of the value of the marginal product schedule.

He also examines conditions under which the existence of the seniority schedule raises unemployment. Perhaps the chief practical difficulty with the model is that it assumes a kind of open union, with free entry, which may be less appropriate to Europe than the United States.<sup>22</sup> But there are also some intellectual puzzles left unexplained (as the author makes clear), especially the question of why it is rational for a union to operate a seniority system, and why the parties are willing to agree on Pareto inefficient equilibria.

New work by Ulph and Ulph (1982), (1983) also discusses how union size is determined. They propose a general equilibrium extension of the conventional monopoly union model, and aim in particular to explain how unions influence the allocation of different labour skills across jobs. In their models an equilibrium assignment of workers to jobs has the property that, given the wage rates and employment probabilities negotiated by different unions, no worker wishes to change jobs.<sup>23</sup> The analysis generates the interesting result that unions raise the wage rates earned by the least skilled, but may increase or reduce the wages of people with high skill. However, like Grossman (1982), (1983), the authors do not explain why free entry by workers is the right assumption in the study of trade union effects. Variable membership is also allowed in the partial equilibrium models of Grout (1983b) and Kidd and Oswald (1983). In Grout's analysis new workers may join the union, but they have no influence on the bargained wage in the period in which they join. The principal analytical result is that employment in the firm may be below the competitive level (the opposite of the normal conclusion under an efficient bargain). Kidd and Oswald's (1983) result is the reverse. If in each period a proportion of unemployed union members quit the union, as

they seem to in the U.K., the union must, in principle, solve a complicated intertemporal problem. In the steady state this type of dynamic (monopoly union) model can generate more employment than a competitive market: the utilitarian union has an extra reason to keep employment high, namely that that also holds membership and hence group utility high. Much depends here on whether the union has utility function (2) or (3), and analysis of this choice has hardly begun.<sup>24</sup>

The impact of uncertainty on union behaviour is not well understood. One approach - as in Bulkley (1982) and Oswald (1982b) - is to use conventional Rothschild-Stiglitz methods to discuss the consequences on the desired wage of increases in uncertainty. A simple finding is that, for a utilitarian monopoly union, an increase in the riskiness of unemployment benefit decreases the union's optimal wage rate. Many variables, however, have ambiguous effects. As in most other areas of the economics of uncertainty it is often necessary to make an assumption about how risk-aversion changes with income. The possible effect of asymmetric information is tackled in papers - closely related to the economics of efficient union bargains - by Calvo and Phelps (1977), Green and Kahn (1983), Grossman and Hart (1981), Hart (1983), Hall and Lilien (1979), Moore (1984) and others. The paper by Hart provides a useful survey of results. Although most papers in this area do not assume that workers are represented by a trade union, the assumption of unionization appears to be compatible with the models. Hence the distinction between union theory and contract theory is not an especially sensible one. The reasons why labour economists are often suspicious of the new theoretical work on asymmetric information is, one might suspect, because the theorists' predictions do not appear to fit the facts of the world. First, the new contract models usually suggest that (i) product prices cannot be observed by the union, (ii) there is a private unemployment insurance scheme (Oswald (1984b) queries the empirical validity of this for U.S. union contracts) and (iii), as a prediction, that the contract should specify the wage as a non-linear function

of employment. All three are disputed claims. Second, no-one has tested the asymmetric information approach, and it is not immediately obvious how it could be distinguished empirically from other theories of pay and employment determination. Nevertheless, it is probably fair to conclude that the links with the union literature are still unexplored and that asymmetric information models may turn out to be extremely important. Finally, in a different spirit, a recent paper by Malcolmson (1983) suggests that, under uncertainty, the existence of unions might raise economic efficiency by encouraging the use of state-contingent contracts.

Up to this point the paper has assumed implicitly that a union always bargains with a privately run firm. But in most developed countries there is a great deal of bargaining between unions and the government (or government agencies). In the U.K., for example, about one third of all employees are in the public sector, and it is wage negotiations of this kind which attract most publicity in the press.

Some theoretical work on public sector bargaining is now starting to emerge. Gravelle (1982) uses a Nash solution to depict the outcome of bargaining between a monopoly firm and a trade union, both with private and public ownership. Under public ownership the firm is assumed to maximise a concave function of the sum of profits and consumer surplus. Employment and output in the sector are higher than is efficient. The same kind of conclusion can be drawn from Grout, Oswald and Ulph (1984), where a utilitarian public sector union fixes an efficient bargain with a government which is trying to maximise a social welfare function. Public sector wages turn out to be sticky relative to those in the private sector. Some writers, however, have taken a different tack. Calmfors and Horn (1984) and Gylfason and Lindbeck (1982), (1984b) retain the notion of a monopoly union, and have it maximize its utility subject to an aggregate employment function which is affected - because of direct government purchasing of employees - by public sector labour demand. Perhaps the main problem with this is the familiar one:

the equilibrium is not Pareto optimal for the two parties. Nevertheless, this field is obviously important and yet surprisingly neglected.<sup>25</sup>

One remarkable feature of all the micro-economic models discussed so far is that none allows a role for strikes. There are two likely reasons. First, despite the publicity which they generate, strikes are relatively rare; most wage negotiations are settled without industrial action. Second, the analysis of strikes is one of the most unsatisfactory parts of modern economic theory. It is probably no exaggeration to say that only a little progress has been made since The Theory of Wages by John Hicks. The dominant model seems to be that of Ashenfelter and Johnson (1969), Pencavel (1970) and Farber (1978), where, as in Figure 4, the length of strike is seen as arising from a constrained maximisation problem. The union is assumed to behave according to reaction curve CC. The firm has iso-profit curves  $\pi_0$  and  $\pi_1$ , and maximizes against the union's concession curve. At the optimum there is a strike of  $s^*$  and a wage outcome  $\Delta w^*$ . The obvious difficulty is why the union should behave in such a mechanical and apparently irrational way. More fundamentally, strikes are a different kind of variable from almost any other in economic theory: they hurt both parties simultaneously. Presumably that is why they are hard to explain. One way out may be to build on assumptions about asymmetric information (see Hayes (1984), Fudenberg, Levine and Ruud (1983) and Tracy (1984)), but work of this kind is in its infancy.

Finally, it seems natural to think that there might be a parallel between trade unions (especially those which negotiate efficient bargains) and labour-managed firms. This has not yet been much exploited, although the formal structure in Browning (1982) and Brewer and Browning (1982) suggests that it may be possible to bridge the two. The formal similarity between the theory of the labour managed firm and the model to be proposed in a later part of the next section is an obvious one.



## 5. Criticisms of Orthodox Theory

The purpose of this section is to challenge the now conventional view that efficient bargains are fundamentally different from monopoly equilibria. Two cases will be given in which the wage rate equals (rather than exceeds) the value of marginal product. Efficient contracts, in such a world, lie on the labour demand curve. This meshes well with the observation that firms appear to have the right to set the employment level unilaterally.

The first model follows from the fact that equations (2) and (3), describing the union utility function, are in fact only correct when  $m \geq n$ , namely when employment does not exceed membership. Strictly speaking, the proper specifications are

$$U = u(m) + (u(b)-u(w)) \max \left[ 0, \frac{m-n}{m} \right] \quad (16)$$

and, in utilitarian form,

$$U = mu(w) + (u(b)-u(w)) \max \left[ 0, m-n \right] \quad (17)$$

Sketching these in Figure 5, we find that the indifference curves become horizontal at kink points where  $m = n$ . This merely formalizes the obvious distinction between "insiders", whose preferences count, and "outsiders", whose preferences do not. Geometrically it produces both kinks and flat segments in union indifference contours. The reason is that once all members of a group of size  $m$  get jobs (i.e. once  $m \leq n$ ), that group is indifferent to employment (assuming away altruism). Preferences of the form described in the diagram have many unusual implications, and there is space in this paper for a discussion of only one. A union which is growing will find that efficient equilibria occur along the normal labour demand curve - namely at the turning points of iso-profit contours. This is because the union is then expanding into the region in which outsiders, whose utilities do not enter the union's maximand until they have entered, are about to be let into the trade union. Ex ante, outsiders carry no weight; hence union indifference curves are

horizontal; hence efficient bargains must be points on the labour demand curve. Figure 5 illustrates this type of equilibrium.

In the new steady-state, however, once extra members have been taken on, the efficient equilibrium takes the even more unfamiliar form of Figure 6. This is because the kinks, which occur by definition at employment equal to current membership (future members have no say in today's policies), shift from the old membership point,  $m$ , to the new membership level,  $m'$ . The number of insiders is then greater than before. The dynamic behaviour of this kind of model is obviously complicated, because there is a real sense in which the union's preferences are endogenous. Very little on these issues has been written down in the literature (though see Lindbeck and Snower (1984), Shaked and Sutton (1984), and Robert Solow's contribution to this volume).

The final example is more widely applicable. Evidence documented in Medoff and Abraham (1981) and Oswald (1984c) suggests that lay-offs are not done randomly, as the formulation of equation (2) implies, but by seniority within the firm.<sup>26</sup> 'Last in, first out' firing practices change the usual models' structure rather dramatically: the more senior workers, who dominate the voting over marginal job gains or losses, become locally indifferent to the total level of employment. To see why, think of a case in which the union is considering whether to agree to their firm's offer, say, to raise the wage in exchange for a ten percent reduction in the work-force. Under majority voting, and 'last in, first out', a group of self-interested unionized employees have an obvious incentive to accept such an offer. The reason is that union indifference curves are horizontal here, because most workers in the firm, know themselves to be perfectly insulated from even moderate falls in employment. The result, once more, is that an efficient wage bargain (that is, one that is Pareto optimal from the two sides' points of view) occurs where the wage equals the value of the marginal employee's output.

Figures 7 and 8 depict two kinds of static equilibrium in the model with lay-offs by seniority. Employment level  $n^S$  is the median voter's seniority

position. For employment less than  $n^s$  this individual is laid off; for levels greater than  $n^s$  the worker always has a job. For  $n > n^s$ , therefore, the union (whose preferences are captured here by those of the median individual) is indifferent about the level of jobs and cares only about the size of the wage rate. A typical equilibrium, then, would look like Figure 7. In exceptional circumstances, however, even the median voter - half way down the seniority roster - would be threatened with redundancy, and in that case Figure 8 would describe the (corner) solution. The recent 'concession bargaining' in some industrial sectors of the U.S.A. might be interpreted in this way.

The ideas in this section are not fully developed. Nevertheless, they represent a way to question the conventional wisdom that equilibria on the labour demand curve are not Pareto-optimal. The version based on the assumption of lay-offs by seniority appears to be particularly attractive, because there is formal and informal evidence to suggest that in countries like Britain, Sweden and the U.S.A. 'last in, first out' is the rule rather than the exception.

## 6. General Equilibrium Models

The principal reason for studying the microeconomics of union actions is that it provides an avenue to larger issues: we wish to know what consequences the actions of trade unions have for the whole economy. A natural starting point is with simple general equilibrium models. Unfortunately, because there was, until recently, little agreement on how to construct a model of a single union, relatively little has been written on these questions. There are some competing analytical approaches, however, and they may be worth touching upon in turn.

One place to begin is the two sector general equilibrium model of price and trade theory.<sup>27</sup> Consider an economy divided into a unionized sector producing good X and a non-unionized sector producing a different good Y. Let  $n$  be the number of workers in the first sector, and  $l$  those in the second. Assume for simplicity that the working population is fixed at  $P$ , that capital is immobile, that the two goods are traded on world markets, and that the government pays unemployment benefit  $b$  to those without a job. Assume that the non-union sector has a competitive labour market and that the union in the other sector can influence wages by controlling entry. Figure 9 describes the model. The demand curve for union labour is  $n(w^u)$ , that for non-union labour (read right to left) is  $l(w^n)$ . Union indifference curves are drawn in as  $I_0$  and  $I_1$ . The union is assumed to have a quasi-concave utility function. It takes the firm's labour demand curve as outside its control and picks its target real wage. Then, if the union can enforce this, the equilibrium amount of employment in the union sector is  $\hat{n}$ .

In a world without unemployment benefits (so  $b = 0$ ), the wage in the non-union sector would have to fall to point J, to ensure that the number of jobs in the non-union sector became  $\hat{n}P$ . If the government pays unemployment benefit of  $b$ , the reservation wage is likely to be something above this - leisure may have value, despite the social stigma of unemployment - at, say, level  $\hat{w}^n$ . Then the equilibrium rate of unemployment, denoted  $U^*$ , is given by

the line HI. Two things here cause it to be positive. First, the union rations jobs in its sector, and hence there bids up the wage and the marginal product of labour. Second, the existence of state unemployment benefit prevents the non-union wage from falling to clear that labour market. The existence of the union has also, of course, lowered the wage in the non-union sector. This general kind of model - but with different details - can be found in Anand and Joshi (1979), Minford (1983), Oswald (1982c) and Sampson (1983a). The idea of the diagram comes from international trade theory: see Neary (1978), for example. Another model with sector-specific capital, but one with an efficient wage bargain rather than a monopoly union, is Calvo (1978).

Once capital is assumed to be mobile, however, it is not possible to produce such simple predictions. The early literature concentrated on the repercussions of a high wage in one sector. Johnson and Mieszkowski (1970), for example, use the two-sector general equilibrium model to explore the effects of a fixed wage differential,  $\alpha > 1$ , where  $w^u = \alpha w^n$ ,  $w^u$  is the union wage and  $w^n$  is the non-union wage. The techniques used there were developed for the analysis of tax-induced distortions in the capital market, and may well fail to capture some important aspects of the problem. But their conclusion is worth stating: "the implication of this analysis is that partial unionization of labour in fact does not benefit labour at the expense of capital". Most of the writers' analytical results are ambiguous, so the validity of this claim is open to question, even on the author's own terms. A famous paper by Jones (1971) gives further results and is more tentative in its claims.

One result which can be proved quickly, yet conveys the flavour of this literature, is that in a small open economy with mobile capital a rise in the union/non-union wage differential,  $\alpha$ , will lower both sectors' wage levels if the union sector is labour-intensive. The simplest proof uses minimum cost functions. Let unit minimum cost for the good produced by the union sector

be  $c(w^u, r) \equiv c(\alpha w^n, r)$ , where  $r$  is the rental rate. Let that for the non-union sector's output be  $\gamma(w^n, r)$ . By the zero profit conditions these equal prices, which are fixed by the small country assumption. Then, by differentiation of the two zero profit conditions, using numbers as partial derivative subscripts,

$$\alpha c_1 \cdot dw^n + c_2 \cdot dr + c_1 w^n \cdot d\alpha = 0 \quad (18)$$

$$\gamma_1 \cdot dw^n + \gamma_2 \cdot dr = 0. \quad (19)$$

Hence

$$\frac{dw^n}{d\alpha} = \frac{c_1 w^n \gamma_2}{c_2 \gamma_1 - c_1 \alpha \gamma_2} \quad (20)$$

which is certainly negative if  $\gamma_1/\gamma_2 < c_1/c_2$ , namely if the union sector is labour intensive (by duality theory the capital-labour ratio is the ratio of the cost function's derivatives). Similar calculations show that  $dw^u/d\alpha$  is then also negative.

Yet to focus as this does on the effects of the differential seems unnatural. What happens to the non-union wage, in a two sector economy with capital mobility, when those in the unionized sector get a pay rise (in absolute terms)? Let the unit minimum cost functions again be  $c(w^u, r)$  and  $\gamma(w^n, r)$ . In a small open economy a rise in the union wage rate will now increase pay in the non-union sector. It is straightforward to calculate that

$$\frac{dw^n}{dw^u} = \frac{\gamma_2 c_1}{\gamma_1 c_2} > 0. \quad (21)$$

A rise in the union wage depresses the rental rate in the union sector, because world prices are fixed and profits must be zero. As the rental is common to both sectors (by the assumption of perfect capital mobility), that tends to generate supernormal profits in the sector with the competitive, non-union labour market. These must be competed away for an equilibrium to

exist, however, so that  $w^n$ , the non-union wage, necessarily increases.

Unfortunately, in a closed economy, where output prices are determined endogenously, few unambiguous results emerge. The literature includes Carruth and Oswald (1981), Diewert (1974a), (1974b), Hu (1973), Johnson and Mieszkowski (1970) and Magee (1971), (1973). See also, for open economy results only, Chaudhuri (1982a), (1982b).

Only the simplest kinds of general equilibrium models (like those, with immobile capital, discussed earlier) generate uncomplicated predictions about the welfare consequences of unions' actions. In them the existence of trade unions reduces employment in the unionized sector, raises the natural (or equilibrium) rate of unemployment in the whole economy, creates efficiency losses in the allocation of resources, and worsens the distribution of income. Some British commentators (Minford (1983), for example) have argued recently that these are grounds for the government to emasculate the trade union movement.<sup>28</sup> However, as unambiguous empirical evidence is scant, and more complicated theoretical models - especially those where the Second Best Theorem applies - may suggest different prescriptions, some believe such conclusions to be unreasonable. It is a controversial field in which much more work needs to be done.

The question of whether unions cause inflation is a traditional one. One view is that they can not do so, and this is normally supported by three arguments. First, the activities of trade unions change the real characteristics of the economy. They alter, say, the natural rate of unemployment (or NAIRU).<sup>29</sup> This is implicit in most of the new micro-economic theory of unions, and is made explicit in, for example, Layard (1982), Minford (1983), Nickell and Andrews (1983), Oswald (1982c) and Sampson (1983a), (1983b).<sup>30</sup> Second, governments fix the supply of money. Third, the classical dichotomy holds. When taken together these points suggest that the government is the cause of inflation but that a high equilibrium unemployment rate might be caused by union actions. Not everyone agrees with this analysis. One earlier

strand in the literature thought of unions as directly creating inflation (see Hines (1964), Ashenfelter (1978), Ashenfelter, Johnson and Pencavel (1972), and Mitchell (1978)). Another line of thought is that, especially in economies in which unions bargain at the macroeconomic level, the unions, the firms and the government are jointly responsible for the inflation rate which emerges. On this view the government's monetary policy is endogenously influenced by the form and aggressiveness of union bargaining.

Another and rather different way to think of a unionized economy is as one with a large number of different sectors and different trade unions. If, as happens in most countries, individual unions bargain separately, it may be plausible to see the long run outcome as a kind of non-cooperative Nash equilibrium. The equilibrium wage vector is then sub-optimal, because each trade union ignores the external effects its own wage bargain has on the utility, wage claims, employment and purchasing prices of individuals and firms in other parts of the economy. Models of this general sort are discussed in Akerlof (1969), Flanagan (1976), Gylfason and Lindbeck (1984a), (1984b), Oswald (1979), Pissarides (1982b) and Rosen (1970). They may provide a rationale for government intervention in the labour market. Despite the apparent empirical desirability of models in which there are many sectors, few would claim that this analytical framework is much used. That may be a weakness of orthodox theory.



## 7. Conclusions

The economics of trade unions is a rapidly expanding field. In this survey, which has concentrated on theoretical work, a very large number of the entries in the bibliography have been written or published in the last two years. Most writing has focused upon the micro-economics of union behaviour, and it may seem to some that we have overcome one or two problems emphasized in George Johnson's (1975) survey article. It certainly appears that there is at last a measure of agreement about plausible ways to specify a union utility function.

Debate persists, of course. One influential approach in the literature ~~assumes that the union utility function can usefully be specified as a~~ Stone-Geary function defined on wages and employment. The other popular course - one which seems more firmly grounded in micro-economic axioms - is to use the expected utility or utilitarian form of trade union preferences. Yet it is not obvious that these two are compatible. The related question of how to design an economic model of wage determination is also approaching an interesting stage. The monopoly model of a union has quite different predictions from the efficient bargain model: in the first case unions raise unemployment, whilst in the second they do the opposite. Seminal econometric work testing between these two is already beginning to appear (although little so far for Europe). This seems an exciting avenue for research.

This paper has also suggested that the now wholly orthodox distinction between the monopoly union framework and the efficient bargain model may be misleading. It is at this point that the paper is least a summary. Section 4 focuses on two cases in which efficient bargains lie on (rather than above) the labour demand curve. The one which seems of most practical importance is based on the assumption that lay-offs are by seniority ("last in, first out"). In this case the majority of union members - hence also, under plausible assumptions, the trade union - are locally indifferent to the level of employment. Union indifference curves are therefore horizontal, so that Pareto-optimal

agreements require that the wage rate equal the value of the marginal product of labour. The importance of this idea is difficult to evaluate without econometric testing, but it seems to have two advantages. First, lay-offs by seniority are, in practice, apparently much more common than redundancies decided by random draw. Indeed examples of the latter are hard to find. Second, the model's structure and predictions are consistent with the observation that in reality the firm normally has the right<sup>31</sup> to set the level of employment unilaterally.

Where might the literature go next? First, and arguably important, it seems natural to try to close the gulf between economists who work on trade unions and industrial relations specialists who study what unions do in the world. Closer links and common projects are likely to help both groups. At this point it is surely certain that economists need to know more facts<sup>32</sup> - such as, for example, whether union workers ever truly face lay-offs by random draw. Second, the growth of empirical work testing union models appears both desirable and rather likely to occur. Third, there is an obvious need for good macroeconomic and general equilibrium analysis; partial equilibrium models have dominated for too long. This would allow us to say more about the effects of trade unions on the level of economic welfare. Fourth, the correct ways to incorporate strike threats and to specify union membership are not yet clear. What explains strikes?<sup>33</sup> Should unemployed men count in the construction of the trade union's preferences?<sup>34</sup> These issues remain obscure. Fifth, and perhaps most essential, the subject (like many a real economy) needs constructive research on the best form of economic policy for the labour market.

Footnotes

- \*\* Helpful suggestions were made by Lars Calmfors, David Card, Stanley Fischer, Thor Gylfason, Henrik Horn, George Johnson, Assar Lindbeck, Chris Pissarides, John Pencavel and Ingemar Stahl, but the normal disclaimer applies. I am also grateful to Mac Arvin for research assistance and to David Kidd for the opportunity to read his unpublished Oxford thesis. After the first draft of this paper was completed I was able to see Hank Farber's (1984) interesting forthcoming survey. It concentrates more on empirical work, so that the two cover somewhat different aspects of the field.
1. The very early literature will not be discussed: see Edgeworth (1881), Hicks (1964), Mill (1961) and Smith (1937). The introduction in Diewert (1974a) provides a helpful introduction. See also Friedman (1951), Shishter (1943) and Simons (1944). Relatively little was written between the nineteen fifties and the late nineteen seventies.
  2. I believe, however, that the next version of this popular text is to have a new and rather different section on trade unions.
  3. This is because the original request was for a survey of the theory. See John Pencavel's conference paper, however, for a discussion of empirical findings.
  4. There has been little written on unions and internal labour markets, although Aoki (1982) is an exception. Oswald (1983b) may also be relevant. An intriguing case for seniority wage ladders is contained in Doyle (1984).
  5. Freeman (1980), however, stresses a rather different approach to the analysis of unions. It is full of ideas.
  6. A rather unconventional alternative,  $U(\dot{w}, \dot{n})$ , where dots denote time derivatives, was suggested by Kotowitz and Portes (1974).
  7. Card (1984b) suggests a generalization which can be used to test econometrically for the expected utility function.
  8. The free rider problem will not be discussed. Booth (1984b) develops a 'social custom' model to explain why equilibria may exist where union membership is not compulsory.
  9. McDonald (1984) shows how the results change if the employed and the unemployed are assigned different weights.
  10. But it is well known that utilitarianism is less objectionable the more that agents are alike.
  11. Section 5 of the paper is critical of this, but the assumption has been widely used in the literature.
  12. Although it never appears to have been emphasized, the same function for a worker was used in early implicit contract theory (Baily (1974), say). John Pencavel has pointed out to me that the expected utility form also appears in Martin (1980).
  13. The assumption is also used in recent work by Ashenfelter and Brown (1983), Booth (1984), Calmfors (1984a,b), Chaudhuri (1982a) (1982b), Ellis and

Fender (1982), (1984), Gravelle (1982), Grout, Oswald and Ulph (1984), Hersoug (1984), McDonald and Solow (1984), Sampson (1983b) and Svejnar (1982), amongst others.

- 14.. Recent empirical work, which is not carefully surveyed here, includes Ashenfelter and Brown (1983), Brown and Medoff (1978), Card (1984a), Carruth and Oswald (1983), Dertouzos and Pencavel (1981), Farber (1982), Hersoug, Kjaer and Rodseth (1984), MaCurdy and Pencavel (1982), Malcolmson and Sartor (1984), Martinello (1984), Medoff (1979), Minford (1983), Nickell and Andrews (1983), Pencavel (1984a), (1984b) and Svejnar (1982). It is interesting to contrast the methodology with that in the seminal work of Lewis (1963). Much of the early work on unions was concerned to estimate the size of the union/non-union wage differential. Stewart (1983) gives some of the best recent estimates; his conclusion is that the average differential for the U.K. is 7% - 8%.
15. Booth (1984a) is an interesting attempt to blend political ideas and a choice-theoretic framework. One of her conclusions is that the more standard model in which individuals are homogeneous produces the same qualitative predictions. Quantitatively, however, the models are different.
16. Oswald and Ulph (1982) point out that this over-employment result disappears if the union runs an efficient unemployment insurance scheme. There is an equivalent argument in labour contract theory (Hart (1983)).
17. This follows the proof in Oswald and Ulph (1982). The result is clear from the diagrams of McDonald and Solow (1981) and their statement that  $b > pf'(n)$ .
18. This follows McDonald and Solow (1981).
19. A paper by Jackman (1983) has proposed another explanation for wage rigidity, using a model of staggered wage setting.
20. Lars Calmfors has suggested to me that this is worrying because under-employment rather than over-employment is the phenomenon which we seem to need to explain. The model in section 5 may suggest a way around this unfortunate feature of efficient bargain models.
21. Bean (1984) is also concerned with this difficulty, although his model largely follows the structure of implicit contract theory.
22. One might also question why junior union workers would insist on the competitive level of utility. With a lifetime of extra job security in front of them it seems plausible that new union applicants would be willing to accept a lower starting utility.
23. Lazear (1983) makes a similar assumption.
24. Sampson (1984) is another new approach to dynamics.
25. But see the recent paper by Horn (1984).
26. No attempt will be made here to study why this is widespread, but it is an interesting issue. Other theoretical models with seniority can be found in Grossman (1983), Blair and Crawford (1984) and Strand (1983).
27. Other forms of two sector model are developed in Johnson (1977), McDonald and Solow (1984) and Pemberton (1984a).

28. Other forms of intervention are possible in principle. Gorden (1981), Jackman and Layard (1980), Oswald (1983a) and Sampson (1982) suggest that employment subsidies in the union sector would raise output and welfare. Layard (1982) proposes a wage inflation tax to twist the labour demand curve and raise employment. Related issues are discussed in Pemberton (1983), Pissarides (1982a), (1982b) and Oswald (1984a). See also Shah (1982) and Sampson (1983b). Calmfors (1984) discusses the case for job sharing.  
16).
29. Snower (1983), however, argues that Keynesian features - a multiplier, for example - can be generated by a model which changes the Walrasian model to allow for wage setting unions. Hersoug (1978), too, discusses union responses to reflationary pressures. There is also a large macroeconomic literature (not surveyed here) which includes Fischer (1977), Gray (1976), Phelps and Taylor (1977), Taylor (1980), (1983), inter alia. See also Johnson (1983).
30. Ellis and Fender (1982) suggest a rather different approach by blending unions and a fixed price macroeconomic framework.
31. Survey evidence in Oswald (1984c) appears to confirm, for British and U.S. unions, what has been believed by economists for some time.
32. Card (1984b), for example, provides a very careful study of what wage indexation provisions are like in real labour contracts. See also Ehrenberg et al (1983) and Kaufman and Woglom (1984). This issue is particularly important for macroeconomics. Similar work on other topics seems highly desirable.
33. One attempt is discussed in the work on asymmetric information.
34. See McDonald (1984) and Pemberton (1984b) for recent attempts to discuss this problem.

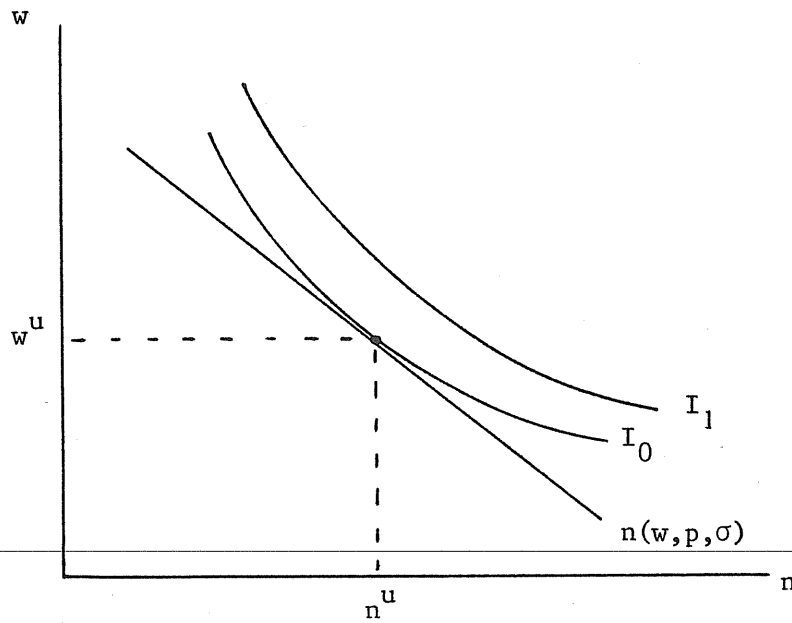


Figure 1: Monopoly Union Model

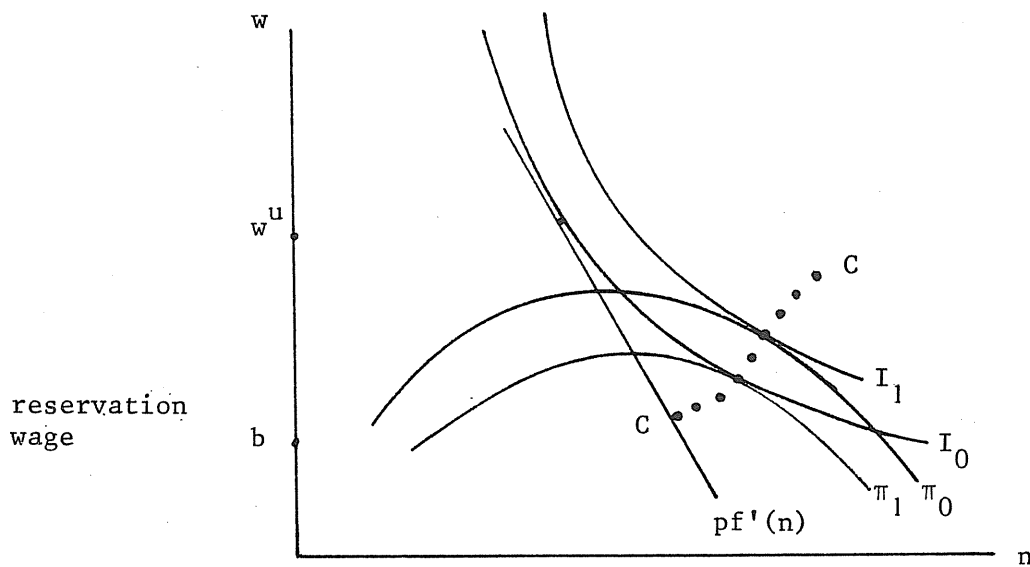


Figure 2: Efficient Bargain Model

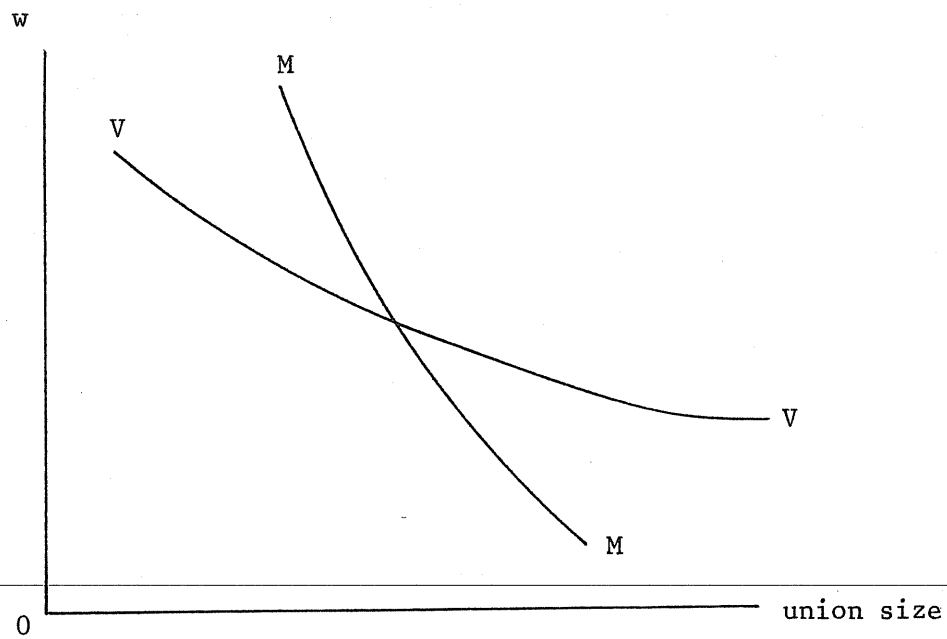


Figure 3: Grossman's Seniority Model

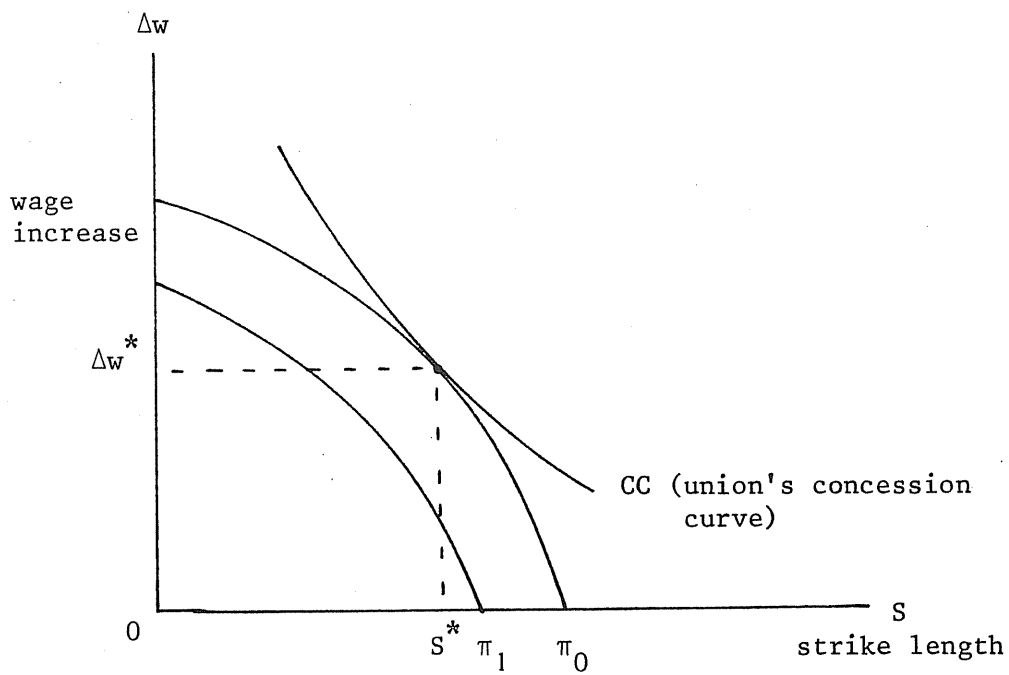


Figure 4: Ashenfelter-Johnson Strikes Model

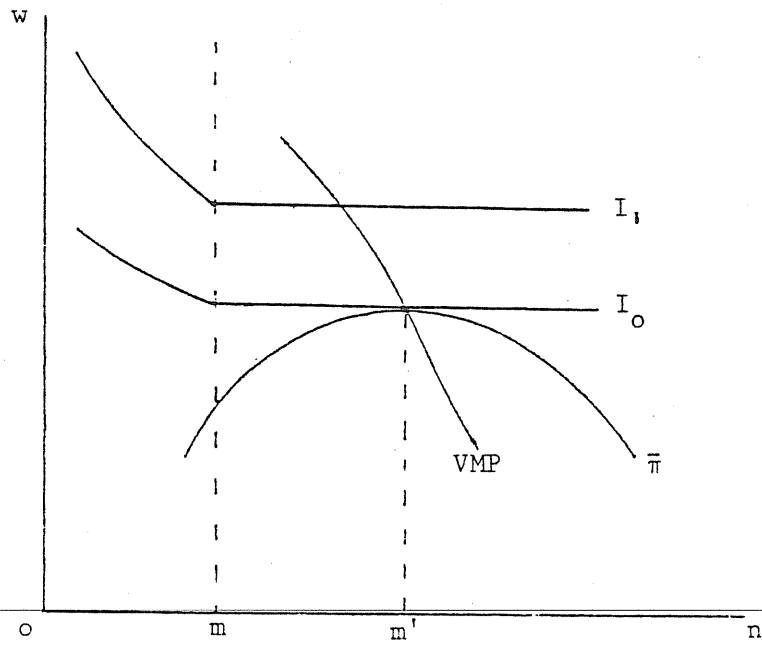


Figure 5: Kinked Indifference Curves and an Efficient Bargain

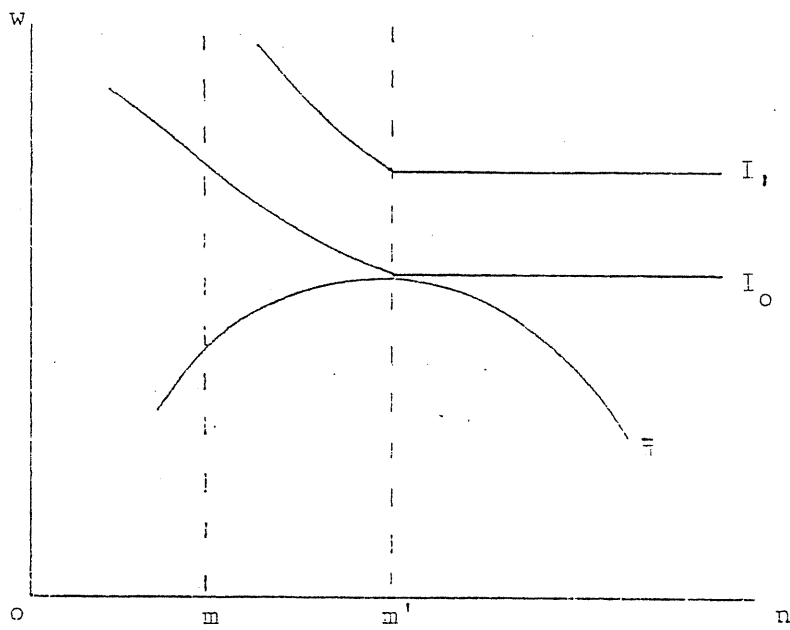


Figure 6: Long Run Equilibrium



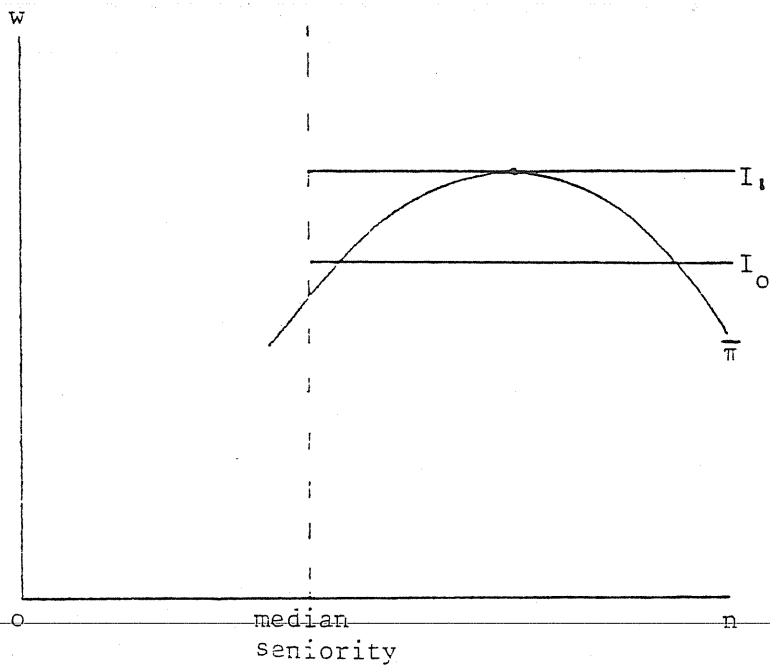


Figure 7: An (Interior) Efficient Bargain  
under Lay-offs by Seniority

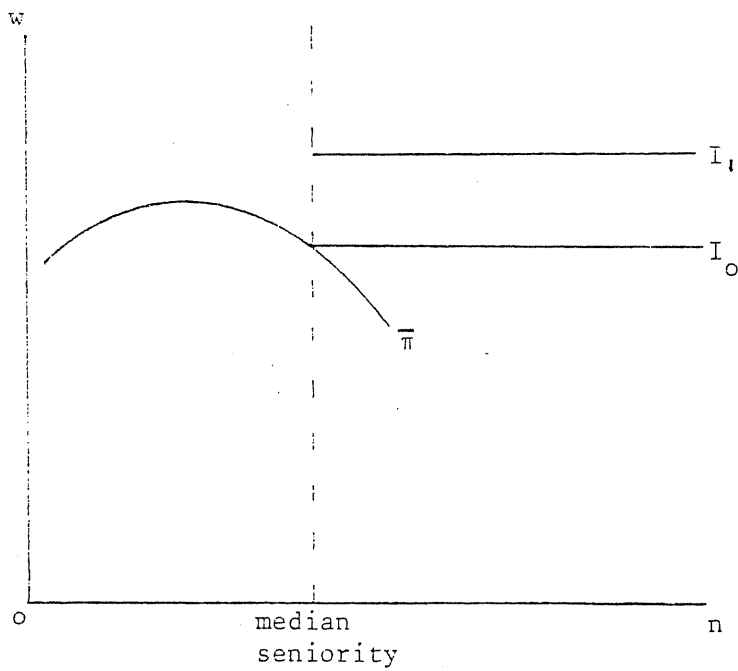


Figure 8: A Corner Solution

A Two Sector Model

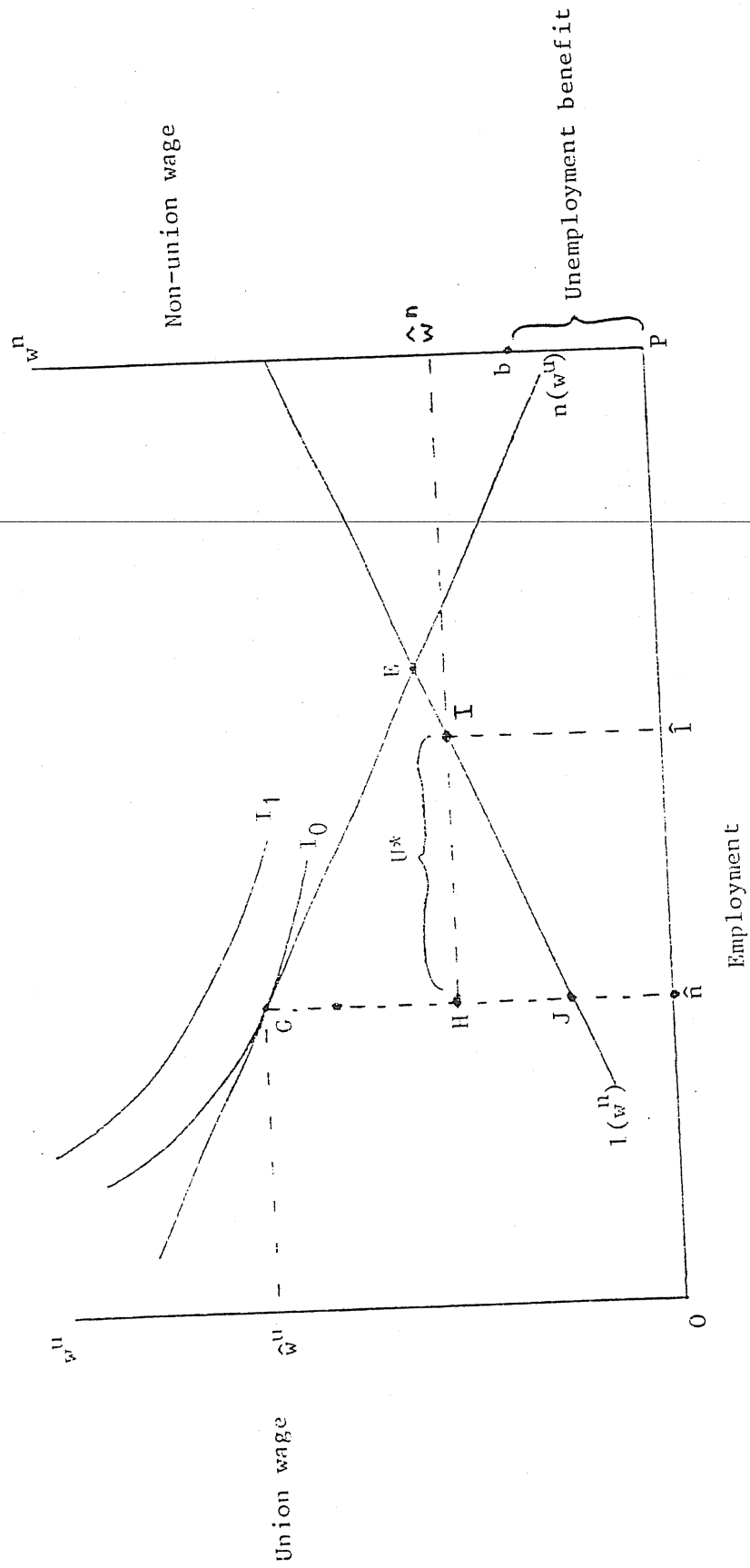


Figure 9

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