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Altruism, union utility and outsiders

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Introduction

Recently there have been attempts to elaborate the implications of the insider-outsider approach for the microeconomics of trade union behaviour. That is, the insider-outsider distinction (Gregory, 1986; Lindbeck and Snower, 1986; Nickel and Andrews, 1983; Solow, 1985) has been extended in formal models of the union. In particular, Carruth and Oswald (1987) maintained that the standard utilitarian function ignored the distinction between insiders and outsiders. Since insiders would be expected to have much more influence on union behaviour, this calls for a utility function which is valid for the whole range of employment levels. Subsequently Jones and McKenna (1989) attempted to extend the previous approach by considering the possibility that the union also cares about employed outsiders. Both approaches imply kinked union indifference curves since the utility function is a two-step function with a critical employment level equal to union membership.

This article aims to provide a general approach which incorporates the contributions of both Carruth and Oswald and Jones and McKenna. It shows the above to be merely special cases of a more general framework in which the weight of outsiders on union preferences can vary. It also supplies the theoretical basis of such a general approach by working out the comparative statics under a monopoly union framework and also under an efficient bargain framework. Furthermore, the paper attempts to incorporate the increasingly popular concept of altruism into a union context (Samuelson, 1993; Simon, 1993).

The union utility function

We follow the Carruth and Oswald paper by specifying two different utility functions, one dealing with a situation when employment is less or equal to union membership and another when employment is higher than membership.

$$U = \begin{cases} Nu(w) + (M-N)\ u(b), & N \le M \quad (1) \\ (Mu(w))^{\alpha}(Mu(w) + (N-M)u(w))^{1-\alpha} & N > M \quad (2) \end{cases}$$

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where w is the wage rate, b is unemployment benefits or an alternative wage, N is employment, M is union membership and $u(.)$ is the individual worker's utility function.

The first part of the function is a utilitarian union utility function and identical to the one used by Carruth and Oswald. However, the second part is of a Cobb-Douglas form in which the degree of influence of the outsiders is determined by α. One could think of α as the degree of altruism of the union. In consumer theory, a number of authors have analysed the importance of one's utility being influenced by the utility of another individual (see for instance Collard, 1978). By following the same logic, one might accept the existence of altruistic behaviour in the union context. Although this type of behaviour has not been analysed extensively in the union literature, there are examples where theorists have accepted its role (see for instance Sen, 1979; Solow, 1990). Our specification allows flexibility as far as "how altruistic" the union is. For instance, in the case when $\alpha = 1$ it reduces to the Carruth-Oswald model in which the union does not take into account outsiders when $N > M$. We can simplify the above by writing.

$$U = \begin{cases} Nu(w) + (M - N)\ u(b), & N \le M \quad (3) \\ (M^{\alpha} N^{1-\alpha} u(w), & N > M \quad (4) \end{cases}$$

The slopes of the indifference curves for (3) and (4) are:

$$\frac{dw}{dN} = \begin{cases} -\dfrac{u(w) - u(b)}{Nu'(w)} < 0, & N < M \\ -\dfrac{(1-\alpha)u(w)}{Nu'(w)} < 0, & N > M \end{cases} \qquad (5)$$

It is clear that the union indifference curve will be kinked and negatively sloped. However there will not be a kink if the following holds:

$$(1-\alpha)\ u(w) = u(w) - u(b) \qquad (6)$$

We can thus at $N = M$ evaluate the critical value of α, α_m, which results in a smooth indifference curve:

$$\alpha_m = \frac{u(b)}{u(w)} \qquad (7)$$

This ratio can be viewed as a type of shadow price of unemployment. If $\alpha < \alpha_m$ then the union puts more weight on employment after all members have been employed. This might be unrealistic and although we do not exclude this possibility, it is more likely that α will be : $\alpha \in [\alpha_m, 1]$. From convexity it follows that:

$$\frac{dw}{dN}\bigg|N < M > \frac{dw}{dN}\bigg|N > M$$

In the region close to M we have:

$$\frac{dw}{dN}\bigg|\lim N -> M - \geq \frac{dw}{dN}\bigg|\lim N -> M^{+}$$

Thus, the resulting indifference curve may have a kink at M[1]. As the following Figure 1 shows, in the one extreme when $\alpha = 1$ the slope will become horizontal (see I'). In the other extreme, when $\alpha = \alpha_m$, the above expression holds at equality and the indifference curve will be smooth. The curve labelled I'' implies that $\alpha < \alpha_m$.

Comparative statics

Monopoly union

Our initial step is to assume that we operate in the context of a Monopoly Union model (Mayhew and Turnbull, 1989; McDonald and Solow, 1981; Ulph and Ulph, 1990). According to this model the firm sets N in the sense that it chooses that N which maximizes a profit function usually given as:

$$\pi = pf(N) - wN \tag{8}$$

where p is price. Thus we derive the firm's labour demand:

$$N = g(w/p)$$

with $g'(w/p) < 0$ and $g''(w/p) = 0$ for linear labour demand or $g''(w/p) > 0$ for convex labour demand.

The effect on employment by an increase in product price is given by:

$$\frac{dN}{dp} = \frac{g'(w/p)}{p}\ [\partial w/\partial p - w/p] \tag{9}$$

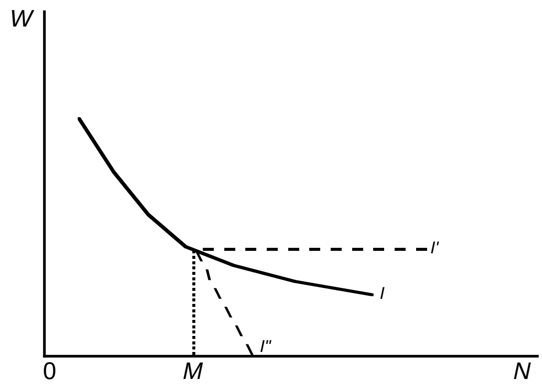

Figure 1.
Indifference curve

This effect is unambiguously positive if $\partial w/\partial p$ is negative. It will also be positive as long as the expression in the bracket is negative.

Let us now start by focusing on the first part of the union utility function, where $N < M$. The union sets the wage rate (w) given labour demand. Thus:

$$\underset{w}{Max}\, U = g(w/p)\; u(w) + (M - g(w/p))\; u(b) \tag{10}$$

Applying the first order conditions, the following equation is the condition for a maximum[2]:

$$\frac{u(w) - u(b)}{u'(w)} = \frac{-pg(w/p)}{g'(w/p)} \tag{11}$$

The comparative static result for $N < M$ is:

$$\left.\frac{dw}{dp}\right| N < M = \frac{\frac{w}{p^2} g''(w/p)(u(w) - u(b)) - g(w/p)u'(w) + \frac{w}{p} g'(w/p)u'(w)}{\frac{1}{p} g''(w/p)(u(w) - u(b)) + 2g'(w/p)u'(w) + pg(w/p)u''(w)} \tag{12}$$

For linear labour demand the sign of the above is unambiguously positive. For non-linear labour demand the sign is ambiguous. However, we can get some additional insight by examining the case of constant elasticity labour demand. The constant elasticity form of production function is:

$f(N) = N^{\beta}/\beta$ where $\beta < 1$ and thus

$$g(w/p) = (w/p)^{1/(\beta-1)} \tag{13}$$

Substituting (13) into expression (12) and using the first order condition (11) we get:

$$\left.\frac{dw}{dp}\right| N < M = 0 \tag{14}$$

The above result combined with relation (9) implies that when there are unemployed insiders, an increase in product price will always lead to an increase in employment in the case of constant elasticity labour demand. In this special case, the slope of the labour demand is given by:

$$\frac{dw}{dN} = \frac{(\beta - 1)w}{N} \tag{15}$$

Therefore a given wage rate is inversely related to employment level. Thus a doubling of employment level would halve the slope of the demand function. The slope of the indifference curve (see (5)) is also inversely related to the employment level, such that at a given wage rate a doubling of employment would again halve the slope. Thus if initially the optimal wage is w^* an increase in prices would leave this wage unchanged at w^*. This implies that a price increase will, with constant elasticity of labour demand, only have employment effects. This result can also be verified by using the constant elasticity of demand in the first order condition and observing that expression (11) now reduces to:

$$\frac{u(w)-u(b)}{u'(w)}=(1-\beta)w \tag{11$'$}$$

Hence for any price level a unique wage rate exists, supporting (14) and implying pure employment effects in response to price changes.

Let us now consider the second part of the union utility function, namely when $N > M$. As before, the union sets the wage rate subject to labour demand. Thus:

$$\operatorname*{Max}_{w}\ U = M^{\alpha}(g(w/p))^{(1-\alpha)}u(w)$$

Applying the first order conditions, the following equation is the condition for a maximum:

$$\frac{(1-\alpha)\ u(w)}{u'(w)}=\frac{-p\ \ g(w/p)}{g'\ \ (w/p)} \tag{16}$$

Bearing in mind the above, the comparative static result for $N>M$ is as follows.

$$\left.\frac{dw}{dp}\right|N>M=\frac{(1-\alpha)w/p^2g''(w/p)u(w)-g(w/p)u'(w)+\frac{w}{pg'}(w/p)u'(w)}{(1-\alpha)1/pg''(w/p)u(w)+(2-\alpha)g'(w/p)\ u'(w)+pg(w/p)u''(w)} \tag{17}$$

With linear labour demand – or $\alpha = 1$, the Carruth-Oswald model – the sign of the above expression is unambiguously positive. The non-linear labour demand case is ambiguous. However, as before, the constant elasticity labour demand might provide some conclusive results. Substituting relation (13) into the above relation and using the first order condition (16), gives:

$$\left.\frac{dw}{dp}\right|N>M=0 \tag{18}$$

The intuition for this result is the same as for price changes for employment levels below membership, and it is therefore omitted.

The combination of the above with relation (9) implies that the sign of dN/dp is positive. Thus with constant elasticity labour demand, a positive shock will always result in an increase in employment and this is true regardless of the membership or the employment level. Having in mind the constant elasticity results we can draw a wage path by taking four values of α (Figure 2).

For $\alpha = 1$ we are back to the Carruth-Oswald case which implies that the union puts no weight on outsiders and employment level exceeds membership. Thus when employment equals membership, any positive shock will increase the wage only.

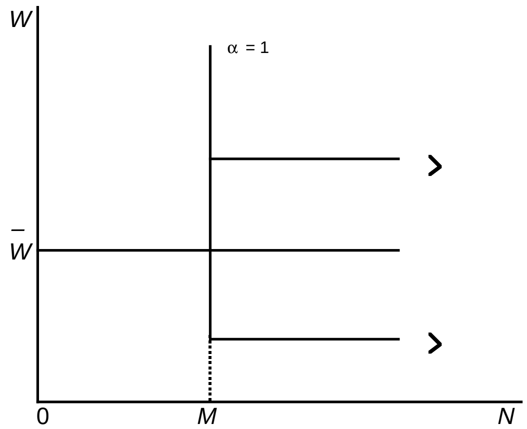

Figure 2.
Wage path drawn taking four values of α

If $\alpha = \alpha_m$, the union preferences do not change when employment exceeds membership, and consequently the wage remains constant. However, when $\alpha < \alpha_m$, the union puts more weight on employment, and this causes a lower constant wage when employment exceeds membership. In the opposite case, $\alpha > \alpha_m$, the converse is true.

Returning to the general case, we can show that:

$$\left.\frac{dw}{dp}\right|N < M \leq \left.\frac{dw}{dp}\right|N > M \text{ for all } \alpha \in [\alpha_m, 1]$$

This implies that if wages increase with product demand at $N < M$ they will also do so for $N > M$. Furthermore if dw/dp for $N > M$ is sufficiently positive, all the adjustment in response to an increase in product demand will be through wage alone (see (5)). However, the sign does depend on the weight, α, that the union puts on insiders. Thus we take $\partial^2 w/\partial p \partial \alpha$ and attempt to sign it.

$$\begin{aligned}\text{sign}\frac{\partial^2 w}{\partial p \partial \alpha} &= \text{sign}[-w/p \;\; g(w/p) \;\; g''(w/p) \;\; u''(w) \;\; u(w) \\ &-1/p \;\; g(w/p) g''(w/p) \;\; u'(w) u(w) - g(w/p) g'(w/p)\,(u'(w))^2 \\ &+ w/p\,(g'(w/p))^2\,(u'(w))^2] \qquad (19)\end{aligned}$$

Regardless of the type of labour demand (linear or non-linear), the above is always positive. Thus the more weight that the union puts on insiders, the steeper the wage path. We can show one possible wage path (see Figure 3).
As we have shown previously, if the wage path is positive for $N < M$, it is also positive but steeper for $N > M$ as long as outsiders are weighted marginally less than insiders.

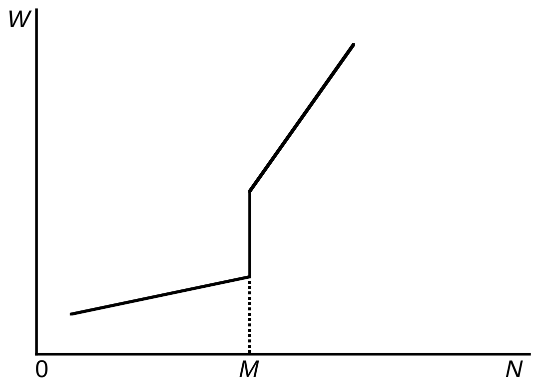

Figure 3.
One possible wage path

It should also be mentioned that the vertical segment of the graph above, is due to the fact that at the lowest price level where $N = M$ we need a large increase in demand in order to get adjustment in employment. The reason for this is the kinked nature of the utility function. Another implication is that the wage is more upwardly flexible and this is true for all possible wage paths.

Efficient bargains

Under efficient bargains there is one union which negotiates with one employer and contrary to the monopoly model, the union has some influence in setting the employment level. Thus union and employer fix a Pareto optimal bargain and the result of this bargain is an efficient wage-employment combination (see McDonald and Solow, 1981). The formal equivalent here is the union maximizes its utility function subject of a given profit constrain. The solution of the problem will give a contract curve. By definition the contract curve implies that the slope of the union indifference curve and the slope of the isoprofit curve should be equal.

Taking the first part of the utility function (for $N < M$), the slope of the union indifference curve is:

$$\frac{dw}{dN} = -\frac{u(w) - u(b)}{Nu'(w)} \tag{20}$$

The slope of the isoprofit curve is:

$$\frac{dw}{dN} = \frac{pf'(N) - w}{N} \tag{21}$$

And the contract curve equation for $N < M$ is:

$$u(w) - u(b) = [w - pf'(N)] \; u'(w) \tag{22}$$

By differentiation of (22) we get the slope of the contract curve:

$$\frac{dw}{dN} = \frac{-pf''(N)u'(w)}{u''(w)\,[\,pf'(N) - w]} > 0 \tag{23}$$

Thus the contract curve has a positive slope for the first part of the utility function.

For $N > M$ the slope of the indifference curve is:

$$\frac{dw}{dN} = \frac{-(1-\alpha)\;u(w)}{Nu'(w)} \tag{24}$$

From (21) and (24), the contract curve equation is the following:

$$(1-\alpha)\;u(w) = [w - pf'(N)]u'(w) \tag{25}$$

From the above equation the slope of the contract curve is:

$$\frac{dw}{dN} = \frac{u'(w)\;\;pf''(N)}{\alpha u'(w) + u''(w)[w - pf'(N)]} \quad \begin{matrix} < \\ > \end{matrix} \quad 0 \tag{26}$$

The sign is ambiguous. For $\alpha = 0$ it is exactly the same as the slope for $M > N$. If α increases enough, the denominator will become sufficiently positive and thus:

$$\frac{dw}{dN} < 0 \text{ for high values of } \alpha$$

Another way of verifying this is to assume a constant elasticity individual worker's utility function. This implies that:

$$u(w) = w\gamma \quad 0 < \gamma < 1$$

The contract curve (relation 22) becomes:

$$(1-\alpha)\;w\gamma = [w - pf'(N)]\;\;\gamma w^{\gamma-1} \tag{27}$$

And the slope of the contract curve is:

$$\frac{dw}{dN} = \frac{-\gamma pf''(N)}{(1-\alpha-\gamma)} \tag{28}$$

Now $1-\gamma > 0$ and if $\alpha = 0$ (maximum weight is put on outsiders) then the above is positive. On the other hand if the relative weight that the union puts on insiders is above a critical value, $\alpha > (1-\gamma)$, then relation (15) is negative. It is clear that the slope of the contract curve depends on both α, the relative weight on insiders, and on γ, the shape of the indifference curves. This result can be connected to the Carruth and Oswald finding that a fall in the price of output is necessary to produce growth in employment beyond membership, M. Our result implies that in order to get an increase in employment above membership, the profit share of the firm has to increase by lowering the wage given $\alpha > (1-\gamma)$. In a way the firm compensates for the increase in employment by paying a lower wage on the labour demand curve. (The inclusion of outsiders (α is low) implies that the firm becomes worse-off by accepting lower p, given the price level.)

As a final note, it has to be mentioned that our analysis implicitly assumed that the demand curve remains unchanged. However, it would be useful to mention that one might also allow the possibility of labour reorganization which implies variation of the hours of work. Furthermore, in a model which deals with changes in employment, the concept of fixed employment costs might enter the picture. In particular, the firm could face two types of fixed labour costs: turnover costs and recurring fixed costs. The first type refers to costs associated with the hiring and firing of workers.The second type of costs occur throughout the period of the individual's employment and include administrative costs, pension contributions, *per capita* labour taxes and other (see Hart, 1983; Hamermesh, 1993).

The above issues might enter the firm's options when there is a change in its product demand. For instance, if there is an increase in the firm's product demand, the firm could increase the hours of work or alternatively hire more workers. Each case implies different employment costs (in the latter case, the firm would have to face fixed employment costs). These factors might have important consequences for the structure of labour demand (Hart and Moutos, 1995).

Conclusion

This article provides a general approach for the incorporation of the influence of insiders and outsiders in the union utility. The paper shows that the previous works on that subject were special cases of this general approach. The strong characteristic of our theoretical specification is that the weight of the influence of the outsiders can vary. This enables us to consider different degrees of union altruism.

The article first examined the case of Monopoly union. One of the main results was that the wage was shown to be more upwardly flexible. For comparison purposes the constant elasticity case was also examined. In the efficient bargain framework, our comparative static results were not as definite. In particular, they were shown to depend on the concavity of the utility function and the weight that the union places on outsiders. It can be maintained that this paper supplies the basis for future work on the influence of outsiders on union preferences.

Notes

1. In Figure 1, indifference curve I'' implies that the union puts more weight on outsiders than on insiders. Although this not theoretically impossible we consider it to be unrealistic and thus we examine only convex indifference curves.
2. Having in mind footnote 1 and assuming that labour demand is not sufficiently convex, relation (11) is unique.

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