Bargaining, efficiency wages, and the price–cost markup

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Abstract

The size of the negative effect of unions on the price–cost markup in efficient bargain models depends on the extent to which the union cares about employment rather than wages. A negative effect in labour demand models can also arise under efficiency wages. © 1998 Elsevier Science S.A.

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1. Introduction

In models of imperfect competition, the determination of the markup of prices over costs has been studied extensively in the industrial relations literature. In a recent paper, Sen and Dutt (1995) show that, when there is efficient Nash-bargaining over wages and employment between a union and a firm, the markup of the firm’s product price over average variable cost depends negatively on the union’s relative bargaining power. The intuition is that when a union cares about both wages and employment, a rise in its bargaining power pushes the negotiated outcome up the contract curve, leading to increases in both the wage and the level of employment. In a symmetric equilibrium, higher employment in all firms leads to higher output, and hence a move down the product demand curve, leading to a lower price.

In this paper, I extend Sen and Dutt’s (1995) analysis in two ways. First, I consider a more general union utility function, which allows the relative concern of the union for wages rather than employment to vary.1 I demonstrate that, the less the union cares about employment, the lower the value of the markup, and in the limiting case where the union cares about wages only, due for example to majority voting and layoffs-by-seniority rules (see Oswald, 1993), the markup is independent of the union’s bargaining power.

The above argument suggests that a negative relationship between the markup and wage rents is consistent with efficient bargaining, but not with a labour demand curve model, such as the

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1Sen and Dutt (1995) assume a utilitarian function, with risk-neutral members.
right-to-manage model. However, the second part of the paper argues that unions may decrease the markup even along the labour demand curve if efficiency wage effects are present. The reason is that an exogenous rise in wages, due to an increase in the union’s bargaining power, will not necessarily decrease employment and may instead lead to an increase, even when the firm chooses employment unilaterally (see Manning, 1995). In this case, I show that the markup definitely falls, and I derive a new result for the conditions under which a rise in union bargaining power reduces the markup.

2. The model

Initially, I adopt the same model as Sen and Dutt (1995), modified with a more general union utility function, and for ease of comparison, I use the same notation. The key equations therefore are:

\[ X = KP^{-e}, \]  
\[ x_i = aL_i, \]  
\[ \pi_i = Px_i - w_iL_i, \]  
\[ U_i = (w_i - w_u)L_i^\delta, \]  
\[ \partial \sum_{j \neq i} x_j / \partial x_i = \alpha_i, \]

where \( i \) represents one of the \( n \) identical firms/unions in an industry, \( X \) is total output, \( P \) is the price level, \( x \) is one firm’s output, \( L \) is employment, \( w \) is the wage, \( w_u \) is unemployment compensation, \( \pi \) is profit, \( U \) is union utility, and \( K, e, a, \delta \) and \( \alpha \) are non-negative parameters, \( \delta \) being the elasticity of union utility to employment. Eq. (5) represents firm \( i \)’s conjectural variation about the response of other firms’ output to a change in \( i \)’s output. An efficient Nash-bargain over wages and output, with fall-back levels of profit and union utility set equal to zero (for simplicity) solves,

\[ \text{Max:} S = \left[ (P - (w_i/a))x_i \right]^b \left[ (w_i - w_u)L_i^\delta \right]^{1-b}, \]

where \( b \) captures the firm’s bargaining power (0\( < b < 1 \)).

The first-order condition with respect to \( x \), after imposing symmetry (and dropping the \( i \)-subscripts), can be written (following Sen and Dutt, 1995) as,

\[ P = (1 + z)(w/a), \]

where \( (1 + z) \) is the markup of the price level over average cost, and

\[ z = b(1 + \alpha)/[n\epsilon(b + \delta(1 - b)) - b(1 + \alpha)]. \]

Two results can be derived immediately:

\[ ^2 \text{Dowrick (1990) provides empirical evidence for a negative relationship from the UK manufacturing sector.} \]
Result 1. If the union is indifferent to the level of employment ($\delta = 0$), the markup is independent of $b$.

Proof. It is immediate from (8) that, if $\delta = 0$, one can divide through by $b$ to give $z = (1 + \alpha)/[n \epsilon - (1 + \alpha)]$, which does not depend on $b$.

Result 2. The markup is decreasing in $\delta$.

Proof. From Eq. (8), $\partial z / \partial \delta = -b(1 - b)(1 + \alpha)n \epsilon /[n \epsilon \{b + \delta(1 - b)\} - b(1 + \alpha)]^2 < 0$.

Result 1 is consistent with Dowrick’s (Dowrick, 1990) point that, when outcomes are on the labour demand curve (as is the case under efficient bargaining when the union does not care about employment), the union’s influence on wages does not affect the markup. Result 2 emphasizes that it is rather the union’s concern for employment that depresses the markup.

3. An efficiency wage model

Can rising union power erode the price–cost margin, even if the bargained outcome is on the labour demand curve? One way in which this is possible is if output is a function not only of employment but also of the wage, as is assumed in the efficiency wage literature. Manning (1995) and Rebitzer and Taylor (1995) have demonstrated that, when efficiency wage considerations are present, a rise in the wage due to, for example, an exogenous increase in the minimum wage, may lead to a rise in employment. If this is the case, then it must lead to a decline in the markup. To see this, note that Eq. (7) can be rearranged to give,

$$1 + z = Px/wL,$$  \hspace{1cm} (9)

and hence,

$$z = \pi/wL.$$  \hspace{1cm} (10)

If, evaluated at the optimum for the firm, a rise in $w$ leads to a rise in $L$, then the denominator of (10) increases, while the numerator decreases (because the firm was maximizing profits before), and so the markup falls.

Under what circumstances will $dL/dw > 0$? To answer this question, I replace Eq. (2) with a more general function that allows for output to depend on wages as well as on employment:

$$x = x(w, L), x_w > 0, x_L > 0,$$  \hspace{1cm} (11)

where subscripts denote partial derivatives. The firm chooses $w$ and $L$ to maximize profits, leading to the first-order conditions (in a symmetric equilibrium):

$$PCx_L - w = 0,$$  \hspace{1cm} (12)

$$PCx_w - L = 0,$$  \hspace{1cm} (13)

where $C = 1 - (1 + \alpha)/n \epsilon$. If the firm now has to bargain over wages with a union, and the union raises
the wage above the level determined by solving Eqs. (12) and (13), then the response of employment is given by,

\[
dL/dw = \left[ x - PC(xLw - xLxw/e) \right]/PC(xLL - (xL)^2/e).
\]

(14)

The second-order conditions guarantee that the denominator of (14) is negative. Hence,

**Result 3.** At the efficiency wage, \( dL/dw > ( < )0 \) if the elasticity of the marginal effect of the wage on output with respect to employment is greater (less) than 1 plus the product of the elasticity of output with respect to employment, and the inverse of the elasticity of product demand.

**Proof.** Eq. (14) implies that \( \text{sgn}(dL/dw) = \text{sgn}[PC(xLw - xLxw/e) - x] \). Using Eq. (13), this can be written as \( \text{sgn}[xLw/L - x(1 + xL/Lx)] \), which establishes the result.

Note that this is a straightforward extension, by incorporating imperfect product market competition, of a result in Manning (1995). While it has been established above that a rise in the wage will definitely reduce the markup if \( dL/dw \geq 0 \), one might wonder whether this will also be the case if \( dL/dw < 0 \). Using Eq. (12), the markup can be written as,

\[
1 + z = x/Cx_L L,
\]

(15)

and hence,

\[
d(1 + z)/dw = \left[ L(xLxw - xxLw) + \{L(xL)^2 - xxL - xLxLL\} \ dL/dw \right]/(Cx_L L)^2.
\]

(16)

In general, one cannot sign this expression without knowledge of the functional form of \( x(w, L) \). Interestingly however, in the special case considered by Solow (1979), one can show the following:

**Result 4.** If output is given by \( x = f(e(w)L) \), where \( f(.) \) is an increasing concave function, \( e \) is effort, and \( e_w > 0, e_{ww} < 0 \), then the effect of a change in wage on the markup is 0.

**Proof.** Immediate from substituting in the appropriate derivatives to Eq. (16).

This example serves as a warning that in the presence of efficiency wage considerations, it is not guaranteed that an increase in wages, due perhaps to a rise in union bargaining power, will reduce the markup.

4. Conclusion

This note has examined some circumstances under which unions have a negative effect on the price–cost markup. I have argued that unions reduce the markup when they care about, and have the ability to bargain over, employment as well as wages. Alternatively, they may reduce the markup if higher wages increase effort and hence output. However, such efficiency wage considerations are neither necessary nor sufficient for this effect to hold, and the question of whether unions reduce markups is ultimately an empirical one.
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