

THE MONOPOLY LABOR UNION AND THE SIZE OF THE PUBLIC SECTOR

by

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Abstract

A monopoly labor union is assumed to have power over the size of the public sector, by commanding a majority of votes, in addition to the wage. An increase in the size of the public sector accommodates unemployment following from a higher wage but leads to a distorted mix in consumption between public services and private goods. The union optimum in general involves some consumption distortion as well as some unemployment. Freer international mobility of capital is predicted to reduce the size of the public sector in countries with strong unions and large public sectors such as in Scandinavia.

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1. Introduction

A significant fact of post World War II economic development in Western Europe is that the public sector has come to command a substantially larger share of total employment and output. To take the perhaps extreme example of Sweden, the public sector's share of total employment has grown from about 10 per cent in 1950 to about 32 per cent in 1986. There exists many and varied explanations. A common argument in the literature on labor unions and wage formation is that governments have accommodated the unemployment effects of higher real wages by expanding the public sector, see e.g. Söderström and Viotti, 1978, Calmfors, 1982, Sampson, 1983, and Calmfors and Horn, 1985.

The way in which wage setting by unions determines the size of the public sector has not been modelled in a satisfactory way. One weakness in existing models is that the government behaves according to a postulated, *ad hoc* policy rule (as in Calmfors and Horn, 1985, 1986), or that its behaviour is derived from a utility function without micro-economic foundation (as in Gylfason and Lindbeck, 1986, Driffill, 1985, and Hersoug, 1985). It is often unclear what influence, if any, the union has on the government. Another weakness is that relative costs (or prices) are unaffected by changes in the wage rate. If a higher wage rate makes government services relatively more costly, this should have an independent effect on the size of the public sector. To take a specific example, in the economy-wide monopoly labor union model by Calmfors and Horn, 1986, the government accommodates, that is, it expands the public sector,

when it has a lower preference for public services than the union or a higher preference for employment. (It will also be made to expand when the union members carry no cost for the additional public services).

The earlier analysis may certainly be valid, but it fails to bring out important aspects of the tradeoff between the wage rate and the size of the public sector. To this end we employ a model without direct redistribution to union members through the way in which the public sector is financed or public services are distributed, and where preferences of all agents are identical. We assume that the government acts exclusively in the interest of the political majority. This means that we assume that the workers, who presumably are more numerous than the capitalists, control the government completely and thereby the size of the public sector (in addition to the wage rate). Two factors of production are explicitly brought into the model. Wage rate changes therefore cause changes in relative costs, which in turn have an effect on the size of the public sector. Three equilibria are compared: (i) the union does not exercise any power, (ii) it maximizes utility only with respect to the wage rate, and (iii) it maximizes utility only with respect to the size of the public sector. In the second case the public sector must contract and the private sector expand compared to the first case. In the third case, which corresponds to complete accommodation, the reverse is always true. The outcome in the general case, the combination of (ii) and (iii), is ambiguous. Another notable result is that in addition to the familiar tradeoff between the wage rate and employment, there exists a tradeoff between the wage rate and a distorted mix in consumption of private goods and public services, which has been overlooked by previous contributions.

2. The Model

There exists two sectors in the economy, one public and one private. The economy can be thought of as open or closed. If it is open, the private sector constitutes the tradables sector and the public sector the nontradable sector. Firms in the private

sector maximize profits in a perfectly competitive market. The public sector does not itself produce services. Instead, it contracts private firms to supply a specified amount at a specified price. The private firms that choose to produce for the public sector behave like any firm in a competitive market, that is, they maximize profits given prices of the output and inputs and given the technology.

The public sector is assumed to be financed by a per unit fee equal to the average per unit cost of production and the services are assumed to be distributed in proportion to the income of the recipients. It follows that the public sector does not supply any pure public goods, which can be justified on the grounds that such goods command a minor and shrinking part of the public sector in modern welfare states. Our assumptions serve to facilitate the analysis greatly and to bring out the main points clearly.

There exists two factors of production, labor and capital. Each laborer and capitalist is assumed to own one unit of the respective factor. They have identical and homothetic utility functions:

$$(1) \quad U_i = U_i(G_i, Q_i) \quad i = 1, \dots, L + K$$

where G_i and Q_i denote amounts of public services and private goods respectively, and L and K denote the number of laborers and capitalists.

The laborers have formed a union that has monopoly power to set the wage rate. It also has the power to determine the size of the public sector. Labor has more votes than capitalists and therefore control the government. The government has no separate interests of its own with regard to the size of the public sector - it simply represents the voting majority. Note, however, that the union does not use its power over the public sector to redistribute in favor of labor and against capital via progressive tax rates and regressive distribution of public services. Changing the size of the public sector does redistribute income between labor and capital in a different way, namely by changing

the demand for labor.

The labor union is assumed to maximize utility over labor's aggregate consumption of public services and private goods with respect to the wage and the size of the public sector:

$$(2) \quad \begin{aligned} \text{Max}_{w, G_L} &= U(G_L, Q_L) \\ \text{s.t. } pG_L + Q_L &= wE, \end{aligned}$$

where p denotes the per unit fee for public services and w the wage rate, both in terms of the numeraire good, which is the private good. We will denote the capital rental by r . It is assumed that the labor union runs an insurance scheme that equalizes income and thereby consumption between those who are employed, E , and those who are unemployed, $L - E$, and that no utility or disutility is attached to work effort (leisure). Employed and unemployed laborers have the same level of consumption and therefore of utility.

Firms operate under constant returns to scale. This assumption in conjunction with the assumption of perfect competition yields the equilibrium conditions

$$(3) \quad a_{LG}w + a_{KG}r = p$$

$$(4) \quad a_{LQ}w + a_{KQ}r = 1,$$

where a_{ij} denotes input of factor i ($i = L, K$) per unit of output j ($j = G, Q$). Under constant returns to scale the a_{ij} 's are functions only of the factor price ratio:

$$a_{ij} = a_{ij}(w/r).$$

The equilibrium employment of labor is simply the sum of the sectoral demands for labor,

$$(5) \quad a_{LG}G + a_{LQ}Q = E.$$

Demand for labor will in general be less than supply. Capital, on the other hand, will always be fully employed in equilibrium:

$$(6) \quad a_{KG}G + a_{KQ}Q = K.$$

In order to close the model we need to specify the relation between labor's aggregate consumption of the two commodities and total consumption. The assumption of homothetic preferences, the fee-equal-to-cost principle for public services and the assumption that public services are distributed in proportion to income make labor's share of total consumption equal to labor's share of total income:

$$(7) \quad G_L/G = wE/(wE + rK)$$

$$(8) \quad Q_L/Q = wE/(wE + rK).$$

3. Anatomy of Union Optimum

When the union maximizes utility with respect to the wage rate and the size of the public sector, it is faced with trading off a higher wage against, first, lower employment and, second, a distorted consumption mix. In order to see the tradeoffs clearly and have a point of reference against which to judge the effects of the union's actions, we will consider four cases. In the first case, which provides a point of

reference, it is assumed that the union maximizes (2) and takes the wage rate, the price of public services and employment as given. In other words, the union does not use its power and acts in the same way as an individual member maximizing (1) subject to the individual budget constraint $pG_i + Q_i = w$, ($i = 1, \dots, L$). In the second case the union maximizes (2) subject to the budget constraint with respect to the wage rate only. This case contains the standard tradeoff between the wage rate and employment, but in contrast to earlier analysis the absence of accommodation is shown to result in a smaller public sector. In the third case we assume that the union maximizes utility only with respect to the size of the public sector and under the constraint of full employment. This experiment can be thought of as the case of complete accommodation in earlier analysis. It demonstrates that it may not be optimal to raise the wage rate without limit, since there will be a cost in the form of "too much" public services in consumption. Finally, we show that the union can achieve a higher level of utility by using both instruments at its disposal instead of only one.

No union power

Consider first a union that maximizes (2) subject to the budget constraint and takes all prices and employment as given. After substitution of the budget constraint into the utility function we obtain the first-order condition

$$(9) \quad U_{G_L} = pU_{X_L},$$

which is the standard condition for consumer utility maximization, namely that the value of marginal utility is equal between commodities, or, alternatively, that the ratio of marginal utilities is equal to the ratio of prices.

Condition (9) and equations (3)-(8) give solutions for p , w , r , G , G_L , Q and Q_L . Note that labor and capital must be fully employed; w and r are determined

endogeneously. In other words, employment E must be equal to the supply of labor L .

This equilibrium is depicted in **Figure 1** and **Figure 2**. **Figure 1** is an Edgeworth box diagram and describes factor endowments, factor demands, choice of factor combination at the given factor prices, and the amount produced of each commodity. The equilibrium allocation and choice of factor combination is denoted by A . The length of the rays QA and GA shows the amounts produced of private goods and public services respectively, while the slope of the rays shows the factor combination. Note that the ray QA is steeper than GA ; production of private goods is assumed to be capital intensive relative to production of public services. This is a crucial assumption in what follows. **Figure 2** shows the production possibilities of the economy, the relative price of public services, and the aggregate utility of laborers and of capitalists. The equilibrium outputs of private goods and public services are shown by A , and the relative price by the slope of p^A . Labor consumes according to A_L , which yields the utility level U_L^A . Aggregate utility is U^A and the utility of capital owners is simply $U^A - U_L^A$. Capital owners consume the difference between the quantities given by A and A_L . (The assumptions of identical, homothetic preferences and of how public services are financed and distributed makes the consumption mixes of laborers and capitalists the same and the comparison of utility simple.)

Union power over the wage rate

Consider next the case of a labor union that acts to maximize utility by control over the wage rate and is restricted to a consumption mix that makes the value marginal utility of public services equal to that of private goods. One interpretation of this case is that the union sees as its task to maximize the total income of its members (which it, strictly speaking, does not do), and then leaves to the members to determine an optimal mix between public services and private goods, where the members take prices and incomes as given.

The first-order condition for union utility maximization with respect to the wage rate is

$$(10) \quad \frac{\partial U}{\partial w} = (U_{G_L} - pU_{Q_L}) \frac{\partial G_L}{\partial w} + U_{Q_L} w \frac{\partial E}{\partial w} + U_{Q_L} E - U_{Q_L} G_L \frac{\partial p}{\partial w} = 0.$$

In addition to this condition we impose that value marginal utilities are equalized, that is, that the individual members maximize (1) in the usual way so that condition (9) follows. Looking at the middle part of (10), this means that the first term vanishes. The union ends up balancing the positive income effect of a higher wage rate, the third term, against the negative employment effect, the second term, and the higher price of labor intensive public services, the fourth term. We assume that in equilibrium A the positive income effect of a higher wage rate outweighs the two negative effects, so that there exists a new equilibrium with a higher wage rate. We also assume that this equilibrium is an interior optimum. Note that the lower the employment and the higher the wage rate, the smaller is the income effect and the bigger the employment effect. Equations (3)-(10) give equilibrium values of p , w , r , G , G_L , Q , Q_L and E .

Such an equilibrium is denoted by B in Figure 1 and 2. When the union raises the wage rate, it makes labor cost more relative to capital. It also raises the price of public services, since they are relatively labor intensive. Demand is homothetic; a higher price results in a smaller proportion of public services in the consumption of both laborers and capitalists, regardless of changes in income. In Figure 1 it can be seen that the rays QB and $G_B B$ are steeper than QA and GA , that is, firms in both sectors have substituted capital for labor. In addition, the ratio $G^B B/QB$ is smaller than GA/QA , that is, less public services relative to private goods are produced and demanded than in A. As a result of substitution both in production and consumption, the demand for labor must fall short of supply; GG^B labor is unemployed. In Figure 2 consumption and production

must fall on a ray that is steeper than OA, such as OB. B is on a new production possibility frontier that everywhere lies inside the old frontier since it is a function of a lower level of employment. At B the slope of the new frontier is steeper than at A, as shown by p^B which is steeper than p^A . B is the new equilibrium because B_L , the new consumption basket of labor, lies on indifference curve U_L^B , which is outside U_L^A and is the highest indifference curve that the union can reach when it has power only to set the wage rate. Labor's choice set in this case may be described by a curve such as $A_L N$, which gives an interior optimum at B_L .

Union power over the size of the public sector

Consider now the case when the labor union maximizes utility with respect to the size of the public sector, that is, with respect to the amount of public services that its members consume, instead of with respect to the wage rate. In contrast to the first case, the union is assumed to know and take into account the general equilibrium effects of an expansion of the public sector. In particular, it knows that the wage rate will rise. To bring out the effects more clearly, we assume that the union restricts itself to an expansion of the public sector that maintains full employment.

The first-order condition for utility maximum in this case is

$$(11) \quad \frac{\partial U}{\partial G_L} = U_{G_L} + U_{Q_L} L \frac{\partial w}{\partial G_L} - U_{Q_L} p - U_{Q_L} G_L \frac{\partial p}{\partial G_L} = 0.$$

Condition (11) together with equations (3)-(8) yield equilibrium values for p , w , r , G_L , Q and Q_L . (E is equal to L .) The first term in the middle expression is the positive effect of more consumption of public services, the second term the positive income effect of a higher wage, the third term the negative effect of less consumption of private goods (at a given income), and the fourth term the negative effect of a higher price of public services. The terms of special interest are the first and third. For standard consumer

utility maximization, these two terms must sum to zero. Here, however, their sum must be negative. A consequence of the expansion of the public sector to maximize utility is that laborers (and capitalists) end up with a mix of public services and private goods with too much of the former and too little of the latter from the viewpoint of standard consumer utility maximum. This negative effect is compensated by the positive income effect.

It is clear in Figure 1 that an expansion of the public sector at full employment from the level at A can only come about if at least one of the sectors substitute capital for labor, which in turn means that the wage-rental ratio must rise. In general, both sectors will change factor combination. C shows the new equilibrium allocation and factor combinations in the private and public sector. (To simplify it is assumed that equilibrium B and C entail the same wage-rental ratio. Ray QC is therefore on QB and GC is parallel with $G^B B$.) Laborers and capitalists will both consume the same mix of public services and private goods, in which the proportion of public services is bigger than in A in Figure 2, such as that given by the ray OC, which is steeper than OA. C must be on the same production possibility curve as A, since both factors are fully employed. It immediately follows that aggregate utility at C must be lower than at A. For simplicity we assume that U^C is equal to U^B . Again we assume that there exists an interior optimum for the labor union. G_L and w is higher in the new optimum than in A. This implies that the negative effects of the distortion in consumption and the higher price of public services are negligible compared to the positive income effect sufficiently close to A, but that the consumption distortion eventually comes to dominate. The curve $A_L M$ describes a possible choice set for the union. The curve is tangent to an indifference curve $U_L^C (= U_L^B)$ at C_L . Note that the price p^C (which is equal to p^B) is not equal to the marginal rate of substitution in consumption at this point.

Union power over both the wage rate and the size of the public sector

A union that has power over both the wage rate and the size of the public sector can of course achieve a higher level of utility than at B_L and C_L . One way of seeing this diagrammatically is to make the experiment that the union initially has exercised power over the wage rate and is at B_L . It then starts to expand the public sector, holding the wage-rental ratio constant. In Figure 1 this is tantamount to sliding $G^B B$ in a parallel fashion downwards along QB . In Figure 2 the same experiment means moving along the straight dashed line between B_L and C_L , and between B and C . Utility is higher everywhere between the end points. However, it is in general possible to attain a higher level of utility than what is attainable along $B_L C_L$. The full labor union optimum will be characterized by some unemployment and some distortion in consumption. The public sector may be bigger or smaller than in the absence of a monopoly labor union. The more elastic the demand for labor and the less sensitive consumers are to the consumption distortion, the more is gained by expanding the public sector.

4. Concluding Comments

The assumption that the monopoly labor union directly controls the size of the public sector must be interpreted to mean that it controls a political party which then acts as a mere executor of the union's decisions. This is admittedly a strong assumption, but it contains more than an element of truth in countries such as Austria, Denmark, Norway and Sweden, where labor unions are strong and decision-making is centralized, and where labor governments have been in power during a large part of the post-war period. The reader that is not prepared to accept this view can interpret the model in a different way. Labor unions may be much weaker than is assumed in the economy-wide monopoly labor union models; they may not be able to influence either the wage rate or the size of the public sector much to their members' advantage. But political parties

that are in power and represent labor interests do have a decisive influence over the size of the public sector. One effect of expanding the production of labor intensive public services is to raise the demand for labor and thereby the real wage rate. The parties and their members may recognize the effect, and take it into account. In other words, political parties may succeed where labor unions fail.

An important implicit assumption in the model is that capital and labor are mobile in the home market, but not internationally. If capital is internationally mobile and tradables are perfect substitutes across countries, there exists no scope for the economy-wide monopoly labor union to raise the wage rate above the level determined in the international economy either directly or through changes in the size of the public sector. The trend in the post-war period has been towards increasing capital mobility, and, presumably, towards increased substitutability of goods from different countries. One effect of these trends may therefore be to lower the wage rate in countries where labor unions have been strong and/or labor parties have been in government for a long time. According to our model, labor will then find that the public sector is over-sized and seek to make it smaller.

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FIGURE 1

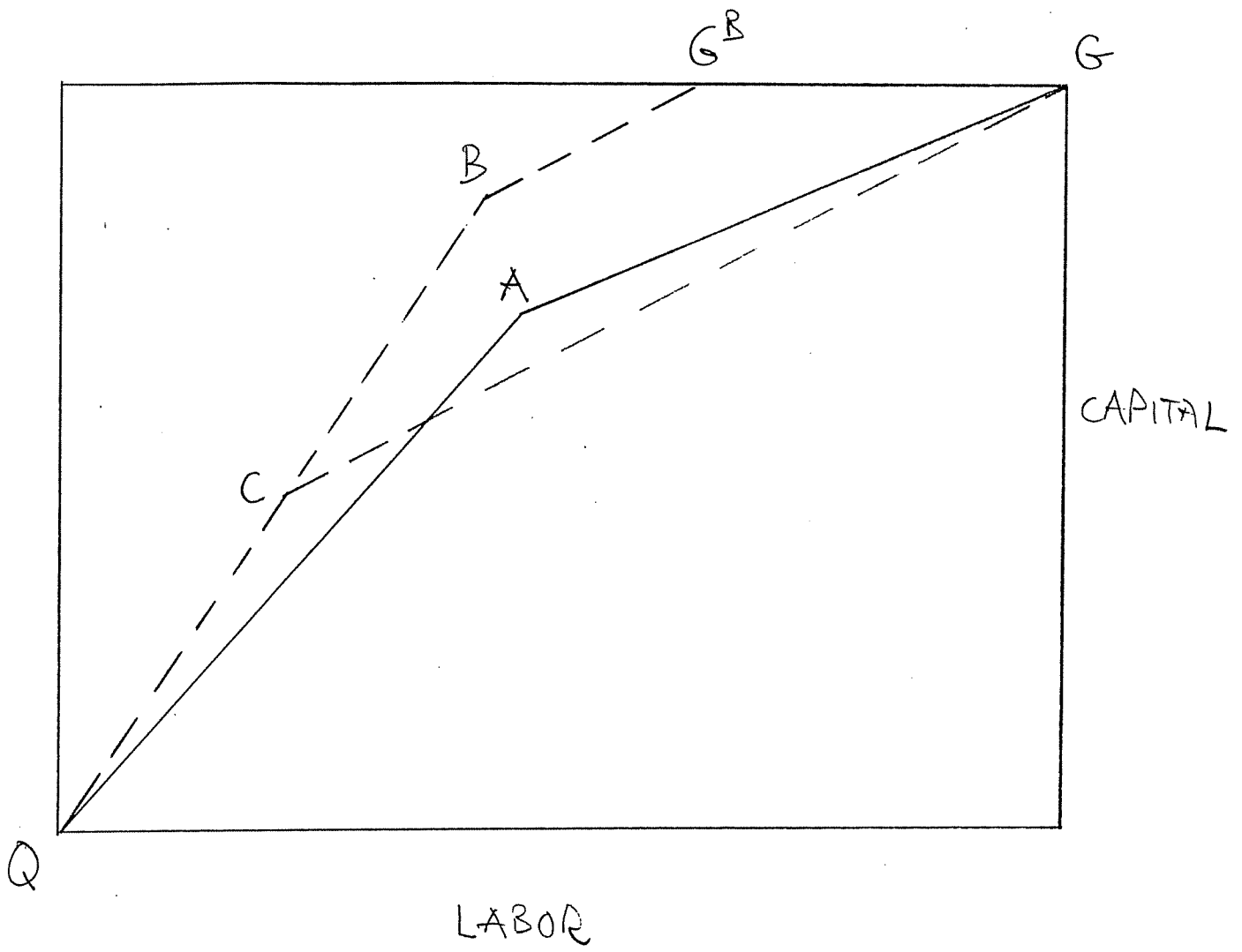


FIGURE 2

