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I INTRODUCTION

The last years have witnessed a remarkable growth in the number of studies on the economics of trade unions.[1] One important branch of this field explores the consequences of a monopoly union, i.e., a union that is sufficiently strong to control the wage rate. The union utility function typically includes the real wage and the level of employment as arguments and the union sets the wage rate in order to maximize this objective function, taking the aggregate labor demand schedule as given.

The monopoly union approach appears to capture significant aspects of wage setting in countries with strong unions, a small non-union sector and centralized wage setting (e.g., the Scandinavian countries). However, there are a number of well-known objections to this model, including its lack of explicit treatment of the bargaining process and its failure to produce a Pareto-efficient outcome for the parties involved in the negotiations. An additional questionable element of the model is the strict monopoly assumption itself; wages are determined only through centralized union wage setting with no explicit role for firms, "market forces", or local wage negotiations.

A large part of wage increases in countries with nation-wide or industry-wide settlements has not been the direct consequences of central wage negotiations but instead shown up as "wage drift", i.e., wage increases in addition to the wage rates

agreed upon in central negotiations. An early analysis by Phelps Brown (1962) notes (p. 339) that wage drift "has been conspicuous in the democracies with predominantly industry-wide settlements - in Scandinavia, the Netherlands, the United Kingdom, and Australia".

Several empirical studies show a marked covariation between wage drift and measures of unsatisfied demand for labor (such as the number of vacancies). Negotiated wage increases, on the other hand, appear less sensitive to demand conditions in the labor market.[2] Very little is known, however, about the interrelationships between wage drift and centralized wage setting, although causal empiricism suggests that the parties engaged in central negotiations take expected wage drift into consideration when calculating the "room" for negotiated wage increases. A centralized union may therefore be able to influence wage drift, but an idea of perfect wage drift control by the union seems too far-fetched to be taken seriously.

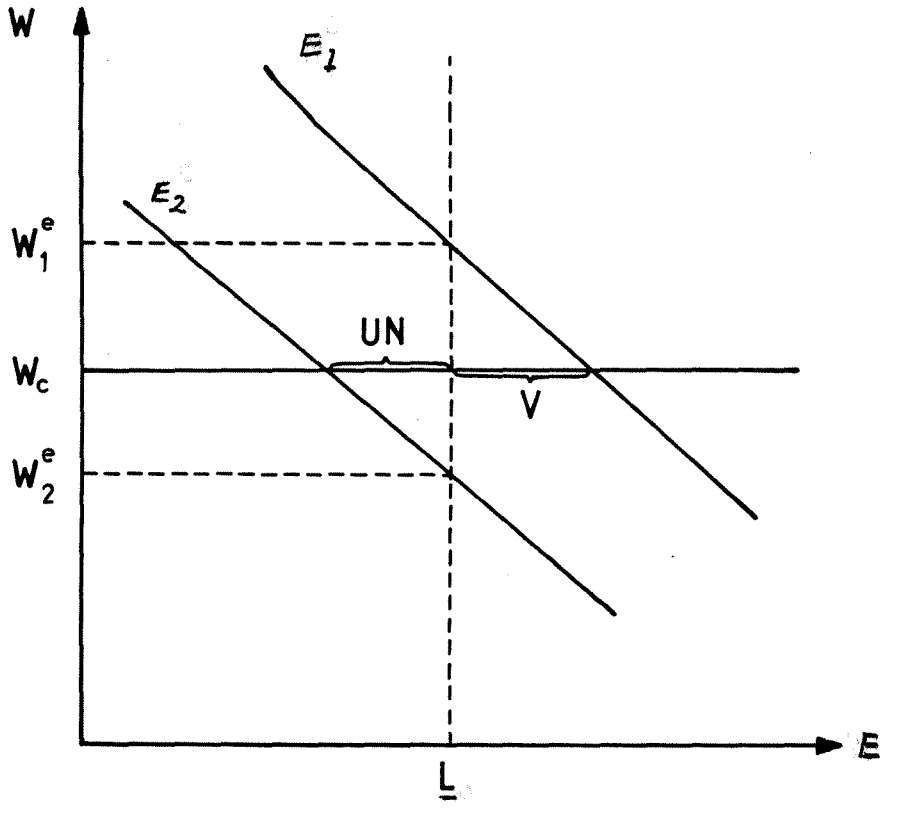
This paper attempts to provide a framework in which the interrelations between centralized wage setting and wage drift can be illuminated. The basic idea is that the union's wage setting takes place under uncertainty about aggregate labor demand. When uncertainty is resolved, the labor market will (typically) be in either excess demand or excess supply, given the pre-set contractual wage. Wage drift occurs if excess demand is realized and a fraction of the initial disequilibrium is thereby eliminated. The union takes this possible outcome into consideration in its wage decision.

II BASIC ASSUMPTIONS

Consider a singel unionised industry in a small open economy. The industry is exposed to foreign competition but cannot influence prevailing world market prices. Assume for expository simplicity that the sector faces only two possible states of nature - a good state (or boom) as well as a bad state (or slump). The good state occurs with probability P_1 and the bad state occurs with probabilty $P_2 = 1-P_1$. In Figure 1, these possibilities are illustrated by two labor demand schedules, E_1 and E_2, and W is the nominal wage rate. The aggregate labor demand schedule may shift for various reasons, such as changes in output prices, changes in prices of other inputs than labor or fluctuations in the level of aggregate demand. In the short run, the size of the sector's labor force is exogenously given as L and all labor force participants are members of the same union.

Suppose that the union sets a particular wage, W_c, in central negotiations. Realization of the good state implies excess labor demand or vacancies (V). Realization of the bad state produces excess supply or unemployment (UN). By assumption, the contractual wage is not contingent on the realized state of nature. This assumption fits well with actual practice in most countries. Needless to say, it would be desirable to derive rather than postulate this feature of the model; however, to do so would presumably require several extensions, including considerations of negotiation costs and costs of monitoring state contingent contracts.

Figure 1 The Basic Framework



In the event of a good state, wage drift, W_d, occurs as a response to excess demand. In each period, wage drift eliminates a fraction, λ, of initial excess demand. This implies that wage drift is proportional to the number of vacancies (if the labor demand function is linear in the relevant interval).[3]

If excess supply is realized, we assume that the contractual wage sets an effective floor, which cannot be undercut through competition among workers (at least within the short-run period under consideration in this paper). It is trivial to extend the model to incorporate negative wage drift, but this case does not appear as very interesting.

The union objective function includes the (real) wage rate and employment as arguments. The private sector's output prices and prices of consumption goods are treated as exogenous by the union.

It is obvious that $W_c > W_2^e$ must hold; the union will never set the wage below the full employment wage in the bad state. However, union preferences may be such that some unemployment occurs also in the good state. In what follows we ignore this possibility and consider the case where $W_2^e < W_c < W_1^e$, implying full employment in the good state and unemployment in the bad state. Frictional unemployment, involving the simultaneous existence of unemployment and vacancies, is abstracted from.

Unemployed union members have access to public employment opportunities outside their industry. The aggregate demand function facing the union is then

$$E_i = N_i(W_i) + G_i \qquad i = 1,2 \qquad (1)$$

where the first term is the private sector's demand schedule and G_i is the number of union members hired by the public sector.

For simplicity, the private sector's labor demand function is specified as linear

$$N_i = \alpha_0 + \alpha_1 W_i + z_i, \quad i=1,2 \tag{2}$$

where $\alpha_1<0$, $W_1=W=W_c+W_d$, $W_2=W_c$ and $z_1>z_2$. The linearity-assumption is not crucial but simplifies exposition. All comparative static results carry over to the case with non-linear labor demand schedules. (Of course, the second order condition for maximum involves restrictions on the second derivate of the demand function.)

The size of the total labor force is given as

$$\underline{L} \equiv L_1 + G_1 \equiv L_2 + G_2, \tag{3}$$

where L_1 is the number of private sector employees in a good state and L_2 is the number of employed workers in the private sector in a bad state plus the number of unemployed (which, in turn, equals $\underline{L} - E_2$).

All workers receive the same contractual wage rate and private sector employees obtain wage increases in excess of the union determined wage in good times. Wage rates for government sector employees in good states are given by

$$W_g = W_c + rW_d, \quad 0<r<1, \tag{4}$$

where r captures the degree of wage drift adjustment that public sector workers are entitled to according to law (r exogenous) or union decision (r endogenous).

Government Policy Rules

The policy rules for the government are such that public sector employment is expanded in bad times in order to absorb a fraction of the unemployment that otherwise would have occurred. Analogously the government sector contracts in good times, thereby reducing excess demand. In short, the government hires in slumps and fires in booms.

The policy rules in explicit form are similar to those specified by Calmfors (1982). Let G_0 denote the predetermined initial level of public employment. When excess demand occurs, the government decreases public employment in order to reduce the initial number of vacancies by a fraction, γ_1. In the event of excess supply, the government increases public employment in order to reduce unemployment by another fraction, γ_2. The government reaction functions are:

$$G_1 = G_0 + \gamma_1(\underline{L} - N_1(W_c) - G_0), \quad 0<\gamma_1<1, \tag{5}$$

$$G_2 = G_0 + \gamma_2(\underline{L} - N_2(W_c) - G_0), \quad 0<\gamma_2<1. \tag{6}$$

It is reasonable to assume that γ_1 and γ_2 have values in the unit interval. Negative reaction coefficients correspond to deliberately destabilizing policy rules.

The government's policy for a good state, given by Eq. (5), produces a steeper labor demand schedule below the equilibrium wage for this state of nature. A fraction, γ_1, of the initial number of vacancies is filled by "releasing" workers from the public sector. Analogously, if a bad state occurs, the government reacts according to Eq.

(6), which implies a steeper demand schedule above the equilibrium wage for bad times. A fraction, γ_2, of initial unemployment is eliminated by an expanding public sector.[4]

The reaction functions capture countercyclical rule-of-thumbs behavior on part of the government. Is there any evidence of such behavior? The use of temporary public jobs (relief works) in Sweden is a good example. The number of workers employed in the programme have on average been close to one percent of the total labor force during the past two decades. The cyclical variations have been substantial, however. In good times, such as the cyclical peaks in 1970, 1974 and 1980, employment in temporary public jobs accounted for less than 0.5 percent of the total labor force. In recession years the volume of the programme has been much larger, in the late 70s employment in relief works amounted to 1.5 percent of the labor force and at the end of 1983 the figure approached 2 percent.

The Swedish programme with temporary public jobs appear to have been used as a countercyclical device with fine-tuning ambitions. Increases in unemployment - or a fall in the number of vacancies - have been followed, with short lags, by increased public employment.[5]

In good times, the pool of workers available for the private sector is $L_1 \equiv \underline{L} - G_1$ <u>after</u> the government has acted. The wage drift adjustment function is given by

$$W_d = k(N_1(W_c) + G_1(W_c) - \underline{L}) \qquad (7)$$

where $k = (-\lambda/\alpha_1)$, implying that wage drift is proportional to excess demand for labor (i.e., vacancies) in the private sector. This simple Walrasian wage adjustment rule has proved to "work" surprisingly well in econometric studies of wage drift. The union has good reasons to believe that wage drift primarily is driven by excess demand for labor - and to take this relationship into consideration in its wage demands.

The model abstracts from taxes and from utility affects of changes in the public sector's output. The assumptions are not unreasonable when considering a single industry-wide union; the tax changes and the output effects are likely to be distributed over (more or less) all individuals in the economy rather than being specific to the union members. We also rule out experience rating of the unemployment insurance system; employers or employees in the sector do not confront predictable tax consequences of changes in unemployment.

III UTILITY MAXIMIZATION

The union takes the initial level of public employment as given and chooses a contractual wage for a period of a given length (two years, for example). For a utilitarian union, the objective function takes the form

$$\Gamma(W_c) = P_1\left[L_1 U(W) + G_1 U(W_g)\right] + P_2\left[(N_2+G_2)U(W_c) + (\underline{L}-N_2-G_2)\bar{U}\right] \qquad (8)$$

where $U(\cdot)$ is the individual worker's concave utility function and $\bar{U}$ is the utility available for the unemployed.

The first bracket includes the utility sum for private and government workers in good times whereas the second refers to slumps and captures utilities for private and public employees and utilities for unemployed workers.

The union selects r and W_c in order to maximize expression (8). Expectations are "rational" in the sense that the union knows the government policy rules, as given by (5) and (6). When the government discovers the state of world and the resulting level of unemployment or vacancies, it immediately adjusts the level of public employment.

Given the structure of the model, the union will set r - the wage drift adjustment for public sector workers - at its upper limit, i.e., r=1. This can be verified by inspection of the appropriate Kuhn-Tucker conditions, although intuition may suffice in this case. A public sector worker's utility is an increasing function of his wage rate, and the latter can be increased by choosing a higher r; there are simply no costs, such as employment reductions, associated with such a policy. This, of course, reflects the limitations of the model, including its focus on the short run.

The wage rate for private and public workers in good states is accordingly $W = W_c + W_d$. The contractual wage rate is determined as given by the first-order condition

$$\Lambda(W_c) = P_1 L(1-\lambda(1-\gamma_1))U'(W) +$$

$$P_2[(N_2+G_2)U'(W_c)+\alpha_1(1-\gamma_2)(U(W_c)-\bar{U})] = 0, \quad (9)$$

and the second-order is always fulfilled:

$$\frac{\partial \Lambda}{\partial W_c} = P_1 L\,(1-\lambda(1-\gamma_1))^2 U''(W) +$$

$$P_2((N_2+G_2)U''(W_c) + 2\alpha_1(1-\gamma_2)U'(W_c)) < 0. \quad (10)$$

Consider the first term in (9). An increase in the union-set wage by one unit implies an increase in the full employment wage as given by $(1-\lambda(1-\gamma_1))$. This term is less than one ($\lambda<1$ and $\gamma_1<1$) and $-\lambda(1-\gamma_1)$ captures the reduction in wage drift that occurs as a result of the higher union-determined wage. The utility gain that accrues to the worker

in good times if the contractual wage is increased by one unit is then given by
$(1-\lambda(1-\gamma_1))U'(W)$.

Note that this gain is increasing in the government's reaction function coefficient, γ_1. A larger γ_1 corresponds to a more ambitious countercyclical policy in good times, i.e., a larger release of public sector employees. A contractual wage increase will always reduce the private sector's labor force in good states, but the reduction will be larger the larger the value of γ_1 is; hence, the reduction in wage drift induced by a contractual wage increase will be offset to a larger extent.

An increase in the contractual wage will involve a utility gain for those who are employed in bad states; this is captured by the term $(N_2+G_2)U'(W_c)$ in the first-order condition. However, a higher union determined wage also causes a decrease in employment in the event of a bad state. The utility loss associated with this effect is given by the last term in (9). The term $\alpha_1(1-\gamma_2)$ gives the net employment effect; the private sector's demand for labor falls by α_1 units as W_c increases by one unit but public employment expands as given by the term $-\alpha_1\gamma_2$.

IV EFFECTS OF STABILIZATION POLICIES

The comparative static implications of the problem are obtained from additional differentiations of (9). Obviously, sign $(\partial W_c/\partial\alpha)$ = sign $(\partial\Lambda/\partial\alpha)$, where α is a parameter of the problem. We will focus on wage and employment responses to changes of the policy parameters.

Stabilization Policy and Wages

The policy parameters γ_1 and γ_2 show how public employment adjusts to realized labor market imbalances. An increase in γ_1 means that more public employees are laid off at a given initial number of vacancies. The union wage response is given by

$$\frac{\partial\Lambda}{\partial\gamma_1} = P_1\underline{L}\left[\lambda U'(W) - kV\left(1-\lambda(1-\gamma_1)\right)U''(W)\right] > 0. \qquad (11)$$

Hence, a more ambitious countercyclical policy in good states (larger γ_1) will increase the contractual wage chosen by the union. Why? Because the policy reduces the "price" of contractual wage increases in terms of lower wage drift. There will be a lower level of government demand for labor in good states, implying less wage drift - and a lower total wage - at a given contractual wage. To offset this adverse wage effect the union counteracts by setting a higher contractual wage. In a sense, the union faces a less favorable opportunity set - a lower wage at a given level of (expected) employment - and it responds by accepting some reduction in employment (through an increase in the contractual wage).[6]

The policy rule for slumps involves expansion of public employment in order to reduce a fraction, γ_2, of initial unemployment. A larger γ_2 corresponds to more ambitious unemployment reducing goals. How is then the union's wage choice affected by an increase in γ_2? The partial derivative of interest is

$$\frac{\partial \Lambda}{\partial \gamma_2} = P_2 \left(U'(W_c)UN - \alpha_1 (U(W_c)-\bar{U}) \right) > 0, \qquad (12)$$

where UN is initial unemployment. Again, stabilization policy produces an increase in the union determined wage. The union experiences an improved opportunity set; expected employment increases at a given contractual wage. The union responds by demanding an increase in the expected wage, which is achieved by choosing a higher contractual wage rate. This result, well-known from other studies (see, e.g., Calmfors and Horn, 1985), hinges on the fact that the accommodation policy reduces the marginal cost of contractual wage increases in terms of lost employment.

We have considered two ingredients of a countercyclical stabilization policy - wage stabilization in good states and employment stabilization in bad states. The former policy reduces wage drift at a predetermined contractual wage whereas the latter reduces unemployment at a given contractual wage. We have shown that both policies will induce the union to set a higher contractual wage. Clearly, a symmetric countercyclical policy - with government hirings in slumps and firings in booms - will also produce this union wage effect.

Other wage effects remain to consider. Consider, first, the wage drift responses. Expected wage drift ($\tilde{W}_d$) is affected as given by

$$\frac{\partial \tilde{W}_d}{\partial \gamma_1} = -P_1\left(\lambda(1-\gamma_1)\frac{\partial W_c}{\partial \gamma_1} + W_d\right) < 0, \tag{13}$$

$$\frac{\partial \tilde{W}_d}{\partial \gamma_2} = -P_1\left(\lambda(1-\gamma_1)\right)\frac{\partial W_c}{\partial \gamma_2} < 0. \tag{14}$$

Wage stabilization in good states reduces wage drift for two reasons, as is obvious from (13). It reduces excess demand directly by the release of public sector employees; this is captured by the last term in (13). The other, indirect, effect works through the higher contractual wage - and the associated reduction in excess demand in good times - that is induced by the policy. Employment stabilization in slumps also causes a decrease in expected wage drift, since the union sets a higher contractual wage and thereby reduces the level of excess demand in good states. A symmetric counter-cyclical policy will thus unambiguously produce lower wage drift.

The expected total wage is $\tilde{W} = W_c + P_1 W_d$ and it is affected by stabilization policies according to

$$\frac{\partial \tilde{W}}{\partial \gamma_1} = \left(1-P_1\lambda(1-\gamma_1)\right)\frac{\partial W_c}{\partial \gamma_1} - P_1 W_d \gtrless 0, \tag{15}$$

$$\frac{\partial \tilde{W}}{\partial \gamma_2} = (1-P_1\lambda)\frac{\partial W_c}{\partial \gamma_2} > 0. \tag{16}$$

Government hirings in slumps will unambiguously increase the expected total wage; the increase in the contractual wage is larger than the induced decrease in wage drift. Government layoffs in

booms, on the other hand, have an ambiguous wage effect, as is seen by (15). Wage drift is certainly reduced, but the associated increase in the contractual wage may offset this effect. A symmetric countercyclical policy will accordingly have ambiguous effects on the total wage.

Stabilization Policy and Employment

Consider now the employment effects. The expected level of employment is $\tilde{E} = P_1\underline{L} + P_2(N_2+G_2)$ and the effects of stabilization policies are obtained from

$$\frac{\partial \tilde{E}}{\partial \gamma_1} = P_2\alpha_1(1-\gamma_2)\frac{\partial W_c}{\partial \gamma_1} < 0, \qquad (17)$$

$$\frac{\partial \tilde{E}}{\partial \gamma_2} = P_2\left(UN + \alpha_1(1-\gamma_2)\frac{\partial W_c}{\partial \gamma_2}\right) \gtrless 0. \qquad (18)$$

Government layoffs in good times will lead to lower employment in bad states, since the contractual wage is driven up and private employment reduced. The presence of employment stabilization in slumps offsets this effect, but the counter-effect is incomplete given that $\gamma_2<1$.

Government hirings in bad states may or may not increase the level of employment. Employment is clearly increased if there is no change in the contractual wage. However, since the union settles for a higher contractual wage, private sector employment will fall. Expression (18) is thus ambiguous in sign, indicating that the employment stabilization rule may, in fact, produce a <u>lower</u> level of employment compared to a non-intervention policy.

The sign-ambiguity of (18) means that a symmetric stabilization policy, including simultaneous increases in γ_1 and γ_2, will have ambiguous employment effects. However, since the contractual wage is driven up, it follows that employment in the private sector falls in bad states. Private employment in good states is also affected, since government layoffs will allow the private sector to expand. The level of expected employment in the private sector is $\tilde{N} = P_1(\underline{L}-G_1) + P_2N_2$, and the effects of stabilization policies are

$$\frac{\partial \tilde{N}}{\partial \gamma_1} = \alpha_1(1-P_1(1-\gamma_1))\frac{\partial W_c}{\partial \gamma_1} + P_1V \gtrless 0, \tag{19}$$

$$\frac{\partial \tilde{N}}{\partial \gamma_2} = \alpha_1(1-P_1(1-\gamma_1))\frac{\partial W_c}{\partial \gamma_2} < 0. \tag{20}$$

A wage stabilization policy may or may not increase private employment, whereas employment stabilization unambiguously decreases employment in the private sector. We would expect that these effects have a mirror image regarding public sector employment. Expected public employment is $\tilde{G} = P_1G_1 + P_2G_2$ and stabilization policies have effects as given by

$$\frac{\partial \tilde{G}}{\partial \gamma_1} = -P_1V - (\alpha_1(P_1\gamma_1+P_2\gamma_2))\frac{\partial W_c}{\partial \gamma_1} \gtrless 0, \tag{21}$$

$$\frac{\partial \tilde{G}}{\partial \gamma_2} = P_2UN - \alpha_1(P_1\gamma_1+P_2\gamma_2)\frac{\partial W_c}{\partial \gamma_2} > 0. \tag{22}$$

Hence, employment stabilization does increase public employment whereas wage stabilization has ambiguous effects.

Limits to Government Growth

Employment in the public sector has so far been treated as endogenous to the union's wage choice; the government hires unemployed workers according to the specified reaction function (6) whatever the absolute level of the resulting public employment will be. There are presumably several circumstances that will rule out an unlimited expansion of employment in the public sector, in the short run as well as in the long run. The long run includes considerations regarding future tax payments that may be required to close soaring budget deficits. The short run, which is in focus for our analysis, may be associated with capacity constraints in the public sector. Aside from such "technical" constraints, the government may also be constrained by (self-imposed or constitutional) precommitments concerning the level of public employment.

There are likely to be restrictions on government employment policy also in good states of the world. The size of the "reserve pool" of labor may be insufficient to allow the government to follow its public employment contraction according to a reaction function like (5).

If public employment is constrained by $G_2 < \underline{G}_2$, the pool of workers available for the private sector becomes fixed at $\underline{L}_2 = \underline{L} - \underline{G}_2$. If the constraint is binding, a unit increase in the contractual wage will produce a reduction in total employment as given by the slope of the private sector's labor demand curve.

In what follows we consider the case with "double constraints" on public employment. The union then knows that a good state involves public employment equal to $\underline{G}_1$ and that a bad state implies $\underline{G}_2$ public employees. The size of the private labor force is stochastic, but not influenced by the union's wage choice.

The first-order condition in this case is

$$\Psi(W_c) = P_1\underline{L}(1-\lambda)U'(W) +$$

$$P_2\left[(N_2+G_2)U'(W_c) + \alpha_1\left(U(W_c)-\bar{U}\right)\right] = 0. \qquad (23)$$

How is then union behavior affected by changes in public employment in the two states? We have

$$\frac{\partial\Psi}{\partial\underline{G}_1} = P_1\underline{L}(1-\lambda)kU''(W) < 0, \qquad (24)$$

$$\frac{\partial\Psi}{\partial\underline{G}_2} = P_2U'(W_c) > 0. \qquad (25)$$

Expressions (24) and (25) correspond to outward shifts of the aggregate labor demand schedule in good and bad states, respectively. An outward shift of the labor demand schedule in the good state implies a wage increase at a given contractual wage (through higher wage drift). As a response to this improvement of its opportunity set, the union will demand an increase in employment, and it can achieve this goal by reducing its contractual wage. An outward shift of the labor demand function in the bad state implies an increase in

expected employment at a given contractual wage (and a given expected level of wage drift). The union will respond by increasing its wage demand in order to obtain a higher wage; this effect is captured by expression (25). (Clearly, a "general demand improvement" in the form of outward demand shifts in both states of nature will have ambiguous effects on the contractual wage.)

Suppose that the government's desired level of expected public employment is $\tilde{G}^*$ and that $P_1=P_2=P$. This implies $\underline{G}_2 - \tilde{G}^* = \tilde{G}^* - \underline{G}_1$ so that government hirings in bad times are exactly offset by an equal number of government layoffs in good states. We note that

$$\left.\frac{\partial \Psi}{\partial \underline{G}_2}\right|_{d\underline{G}_2=-d\underline{G}_1} = P(U'(W_c) - \underline{L}(1-\lambda)kU''(W)) > 0 \qquad (26)$$

corresponds to a more ambitious countercyclical policy which obeys the restriction imposed. The positive union wage response comes as no surprise, given the previous analysis. A countercyclical policy of the type represented in (26) is equivalent to a reduction in demand uncertainty. In fact, it is not difficult to show that a mean-preserving decrease in the riskiness of demand will induce the union to settle for a higher contractual wage (which, in turn, implies lower wage drift in the event of a good state).[7]

V STABILIZATION POLICY AND UNION WELFARE

We have found that a countercyclical employment policy will induce an increase in the contractual wage chosen by the union. Whether or not stabilization policies will increase welfare among union members remains to be seen.

A symmetric stabilization policy, where the government expands in good times and contracts in bad ones, is equivalent to a reduction in demand uncertainty. We explore the implications for union welfare by inspecting the union's <u>indirect</u> utility function, $\Phi = \Phi(\underline{G}_1, \underline{G}_2, \ldots)$. Suppose, again, that the government's employment restriction is $\underline{G}_1+\underline{G}_2 = 2\tilde{G}^*$ and consider the welfare effect of an increase (decrease) in public employment in bad (good) states. We obtain

$$\left.\frac{\partial \Phi}{\partial \underline{G}_2}\right|_{d\underline{G}_2=-d\underline{G}_1} = P\left(U(W_c) - \bar{U} - k\underline{L}U'(W)\right) \gtrless 0, \qquad (27)$$

where $P=P_1=P_2$. Expression (27) can be of either sign, so a countercyclical employment policy may or may not increase union welfare. A prerequisite for a negative welfare effect is that wage drift occurs in good states, i.e., $k>0$. Government layoffs in good times will reduce wage drift, and the associated utility loss may be strong enough to outweigh the utility gains from government hirings in bad states.

In general, it is not possible to sign (27) but a parameterized example may be instructive. Suppose that the individual worker's utility function is logarithmic and that utility in the unemployment state is a function of unemployment benefits (B). Hence, $U(W_c) = \ell n\ W_c$, $\bar{U} = \ell n\ B$ and $U'(W) = 1/W$.

We note that $k = (-\lambda/\alpha_1)$ and translate (27) into

$$\left.\frac{\partial \Phi}{\partial \underline{G}_2}\right|_{d\underline{G}_2=-d\underline{G}_1} = P(\ell n W_c - \ell n\ B + \underline{L}\ \frac{\lambda}{\alpha_1 \bar{W}}) =$$

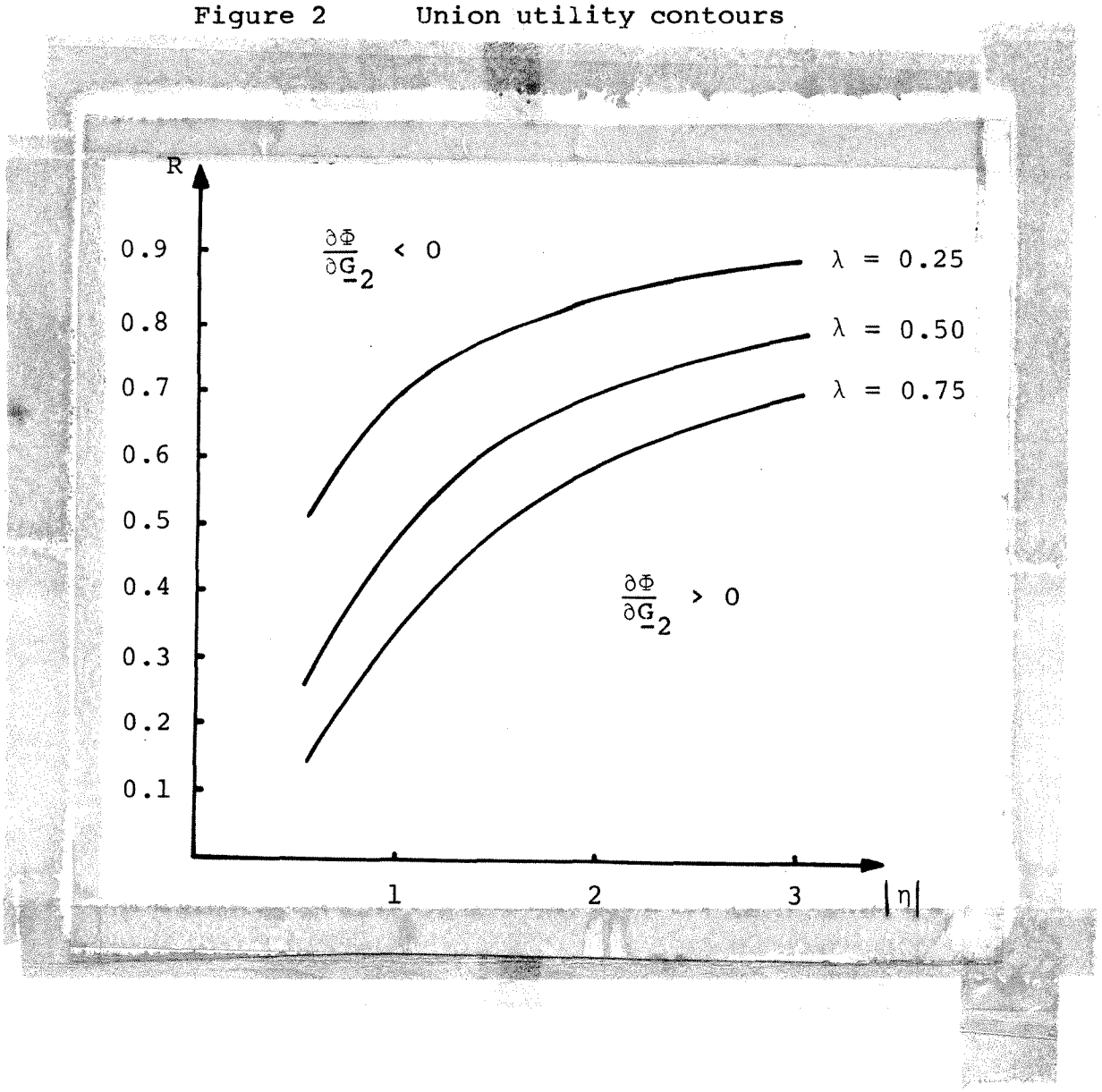
$$P(-\ell n\ R + \frac{\lambda}{\eta\delta}), \qquad (28)$$

where $R = B/W_c$ is the replacement ratio, η is the private sector's elasticity of labor demand ($\eta = \alpha_1 W/N$) and δ is the private sector's share of the labor force. Clearly, $\partial\Phi/\partial\underline{G}_2$ is decreasing in the replacement ratio and increasing in (the absolute value of) the demand elasticity. These relationships make intuitive sense. If the replacement ratio is high, the utility gains from countercyclical employment policies are small or negative. And if the labor demand schedule is inelastic, any given number of vacancies will produce more wage drift, which is the basic rationale for a union to be risk-loving.

Figure 2 illustrates alternative values of the replacement ratio and the demand elasticity for which stabilization policy has no welfare effect (i.e., $\partial\Phi/\partial\underline{G}_2 = 0$). The utility contours are calculated for δ=0.7.

We conclude by noting that the possibility of a risk-loving union arises from the presence of a wage drift opportunity for union members. Furthermore, if labor demand is inelastic, any given number of vacancies will cause more wage drift compared to a situation with more elastic demand (at a given contractual wage). Other things equal, unions whose members face an elastic demand for their services are likely to advocate a countercyclical government employment policy.

Figure 2 Union utility contours



VI STABILIZATION POLICY AND CAPITALISTS' WELFARE

Do capitalists prefer a procyclical or a countercyclical employment policy? Suppose that capitalists are risk-neutral and care about expected profits, $E(\pi) = \Sigma P_i \pi_i$, where π_i refers to capitalists' income in state i (i=1,2). Integrating under the linear labor demand curves yields the expected profit function as

$$E(\pi) = P_1 \left[\frac{L_1^2 - 2(\alpha_0+z_1)L_1}{2\alpha_1} - L_1(W_c+W_d)\right] + P_2 \left[\frac{(\alpha_0+z_2-\alpha_1 W_c)(\alpha_0+z_2+\alpha_1 W_c)}{-2\alpha_1}\right] \qquad (29)$$

where the first bracket includes capitalists' income in a good state and the second includes their income in the event of a bad one. Note that profits depend not only on wage rates but also on the pool of workers available to the private sector in good times (i.e., L_1). Profits are of course increasing in L_1, holding the contractual wage rate and wage drift constant.

We know that $\underline{L} \equiv L_1+G_1$ holds, implying that a unit increase in public employment in good states involves a simultaneous unit decrease in private sector employment. Hence, if $P_1=P_2$, we have

$$\frac{\partial W_c}{\partial L_1} = \frac{\partial W_c}{\partial \underline{G}_2}\bigg|_{d\underline{G}_2 = -d\underline{G}_1} \qquad (30)$$

It is obvious that profits in bad states are decreased by stabilization policy, since the contractual wage is increased:

$$\frac{\partial \pi_2}{\partial \underline{G}_2} = - N_2 \frac{\partial W_c}{\partial \underline{G}_2} < 0. \qquad (31)$$

Profits in good states are affected in a less transparent way, as given by

$$\frac{\partial \pi_1}{\partial \underline{G}_2} = (W_1^e - W) + kL_1 - L_1(1-\lambda) \frac{\partial W_c}{\partial \underline{G}_2} \gtrless 0, \qquad (32)$$

where $W_1^e = (L_1 - \alpha_0 - z_1)/\alpha_1$ is the equilibrium wage associated with the good state. The first parenthesis captures the profit increase that occurs if wages are unaffected and the term kL_1 reflects the profit increase related to the induced reduction in wage drift. The last term, however, is negative, representing the profit reduction that occurs because of the higher contractual wage $(\partial W_c/\partial \underline{G}_2 > 0)$.

Capitalists may be risk-loving for other reasons than unions. For example, if there is no wage drift, (i.e., $\lambda=k=0$), the union unambiguously prefers countercyclical employment policy; this does not hold for capitalists. It appears difficult to give a precise characterization of conditions under which capitalists will prefer such a policy; it depends on whether the profit increasing labor force effect will or will not dominate the profit decreasing wage effect.

VII CONCLUDING REMARKS

Recent models of wage determination in unionized economies often adhere to a strict monopoly assumption; wages are set by an all encompassing union with no role for market adjustment through competition among employers. This assumption does not always fit well with actual experience; a large part of wage increases in a number of countries has shown up as wage drift, i.e., wage increases in addition to the contractual wage rates agreed upon in central negotiations.

This paper attempts to illuminate the interrelationships between centralized wage setting and wage drift in a context where the union's wage choice takes place under uncertainty about aggregate labor demand and where wage drift occurs in the event of realized excess demand for labor. In particular, we explore how a utilitarian union's wage demand is affected by government employment policies.

Stabilization policy works in our model through variations in the size of the public sector: the government hires in bad times in order to reduce unemployment and fires in good ones in order to reduce wage drift. It turns out that public employment expansion in slumps will induce an increase in the union's desired contractual wage, a result well-known from certainty versions of models of union wage setting. However, we also show that a contraction of public employment in good times

implies a higher contractual wage. A symmetric countercyclical policy - with government hirings in slumps and firings in booms - will accordingly produce an increase in the contractual wage desired by the union. This type of policy is equivalent to a reduction in demand uncertainty, which always increases the contractual wage.

A countercyclical policy may or may not be welfare-improving for union members. Government layoffs in booms will reduce wage drift and the associated utility loss may be sufficiently strong to outweigh the utility gains from government hirings in bad times. Among other things, the union welfare effect depends on the prevailing system of unemployment compensation; the lower the replacement ratio is, the "more likely" is it that a countercyclical policy will be welfare-improving for union members.

The framework outlined in this paper can be extended in several directions. For example, it should be of interest to explore the behavior of a union with heterogenous members (for instance skilled and unskilled workers). The simultaneous existence of excess demand for skilled labor and unemployment among unskilled workers represents a "stylized fact" in several countries. To what extent is it possible to influence employment and wage rates by selective policies, such as variations in employment subsidies or taxes? And how does the behavior of a utilitarian union compare to a union with strong egalitarian ambitions?

Another topic for future research involves empirical work. Macroeconometric applications of models

of union wage setting have been few to date, and with mixed success.[8] Hopefully, the framework of this paper offers a useful point of departure for empirical studies of wage formation in economies where unions exert some, albeit imperfect, wage control.

NOTES

[1] Oswald (1985) and Pencavel (1985) provide surveys of recent theoretical and empirical work in this area.

[2] Hansen and Rehn (1956) is an early statistical study on wage drift. Phelps Brown (1962) reports on a number of European studies for the early post-war period. More recent studies for Sweden include Jacobsson and Lindbeck (1969), Isachsen (1977), Holmlund (1978), Schager (1981) and Söderström-Jondahl (1982).

[3] It is wellknown that various institutional and "structural" factors may contribute to the level of wage drift. For example, the proportion of workers on piece-rates has often been offered as an explanation of wage drift differentials across industries. We abstract from such structural factors and focus completely on the cyclical component.

[4] Calmfors and Horn (1985) analyze this latter "accommodation case" in detail, using a certainty version of the monopoly union model.

[5] We have estimated the following equations on Swedish quarterly data for the period after 1970:

$$G_t = a_0 + a_1 UN_{t-1} + \text{seasonals}$$

$$G_t = b_0 + b_1 V_{t-1} + \text{seasonals}.$$

G is the number of workers employed in relief works, UN is the total number of unemployed individuals and V is the number of vacancies registered at the employment exchange offices. The regressions yield:

$$\hat{a}_1 = 0.42 \quad (t=5.23,\ \hat{\rho}=0.57,\ R^2=0.69)$$

$$\hat{b}_1 = -0.48 \quad (t=-3.69,\ \hat{\rho}=0.35,\ R^2=0.65).$$

Taken at face values, the estimations indicate that an increase in unemployment by 10 000 is followed by an increase in relief work employment by 4 000 the following quarter.

[6] The sign of (11) is ambiguous when wage drift adjustment is incomplete for public employees, i.e., $r<1$. A wage differential between private and public employees in good states imply a reallocation gain to the union when workers are transfered from the public to the private sector. The union "demands" a somewhat larger private sector, which implies an incentive to settle for a lower contractual wage than otherwise.

[7] Oswald (1982) offers a number of results regarding union wage setting under uncertainty, using the monopoly union model without wage drift.

[8] A recent example is Hersoug et al. (1984), who deal with wage formation in Norway.

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