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No. 461

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TAX POLICIES UNDER CENTRAL AND LOCAL WAGE BARGAINING

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ABSTRACT: The effects of taxation on the economy depend on the wage bargaining regime. Under central bargaining taxes are perceived as endogenous because the impact of the negotiators' own decisions on the government's budget constraint is discernible. On the local level this impact is negligible, and taxes are regarded as given. Tax changes may have drastically different effects, even to opposite directions, on wages, employment and the distribution of income between workers and firms.

KEY WORDS: Taxes, local vs. central bargaining, government budget constraint

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TIIVISTELMÄ: Veropolitiikan vaikutukset muuhun talouteen riippuvat työmarkkinoiden neuvottelujärjestelmästä. Keskitetyissä palkkaneuvotteluissa rationaaliset neuvottelijat sisäistävät verotustekijät, koska neuvottelijoiden omat päätökset vaikuttavat merkittävästi verokertymään ja julkisen sektorin budjettirajoituksen kautta myös veroparametreihin. Hajautettujen neuvottelujen järjestelmässä yksittäisten neuvottelutulosten vaikutus verotukseen on mitätön, ja verotukseen voidaan suhtautua eksogeenisena tekijänä. Veropolitiikan vaikutukset voivat näissä kahdessa tilanteessa poiketa toisistaan huomattavasti: vaikutukset palkkoihin voivat olla jopa eri suuntaisia. Tutkimuksessa tarkastellaan palkkatuloverojen ja voittoverojen vaikutuksia palkkoihin, yritysten voittoihin ja työllisyyteen Nash-neuvottelumallin avulla.

AVAINSANAT: Verotus, keskitetty tai hajautettu neuvottelujärjestelmä, julkisen sektorin budjettirajoitus

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1 Introduction

The degree of centralization can affect the outcome of wage negotiations in several ways. Central bargainers may internalize various effects that remain external to local bargainers. Fiscal externalities, such as taxation here, is one example. These externalities usually affect employment, and the perceived wage - employment tradeoff is thus different under the two regimes, even though preferences about wages and employment may be the same.

We shall study the importance of the degree of centralization on the effects of tax policies to wages and employment. The basic idea, that the government's budget constraint is important to central negotiators but not to local decision makers, is not new. Calmfors and Driffill (1988), for example, mention that one difference between local and central bargaining is that central bargainers may internalize fiscal externalities. The novel feature of this article is to study the differences, due to these externalities, in tax policy effects under the two regimes.

Studies that consider the effects of taxes on wages and employment, such as Padoa-Schioppa (1990), Hersoug (1984) and Hersoug et al. (1986), do not include the government budget constraint. The constraint is explicit in Lockwood (1990) and Rødseth (1991), but Lockwood considers only local wage setting. Rødseth's focus is on employment policies under central bargaining, not on specific taxes, but the results derived herein are similar in spirit to his. Holden and Raaum (1991) also include the government's budget constraint in their study about the conditions under which wage moderation is the result of cooperation between industry-level trade unions.

A large part of the literature tends to suggest that wages are lower and employment higher under central bargaining than under local bargaining. The general reason for this is that externalities tend to worsen the wage - employment tradeoff. There are, however, factors that may lead to lower wage setting under local bargaining than under central. Hoel (1990) shows that under local bargaining firms can decide their capital stock so that their position in bargaining is better than under central bargaining.

With a very simplified model, we show that wages may be higher or lower under central bargaining than under local bargaining, depending on the values of tax parameters. These parameters affect the bargaining in different ways under the two regimes. Although in both cases the interests focus on net incomes, central bargainers perceive the effects of their wage

decisions differently from local bargainers, because they have internalized the consequences of the government's budget constraint for taxation. If taxes are proportional, tax policies can be used to change net income distribution but not gross incomes under local bargaining. Under central bargaining quite the opposite is true: tax policies have little effect on net incomes but are very effective in changing gross incomes and thus also employment. Progressive taxation makes these differences less clear-cut.

We also show that if the central bargainers decide the same set of wages as all the local bargainers put together - an assumption of efficient use of a vast amount of information - then local bargaining can be described as a more restricted maximization problem than central bargaining. This in turn facilitates the use of the Le Chatelier - Samuelson principle in analyzing the effectiveness of tax policies under the two cases. Generally speaking, if some tax policy measures change wages in the same direction in both cases, the change is smaller under local bargaining.

Section 2 describes the government budget constraint, considers wage bargaining and employment under the two regimes and presents the basic implications for tax policies. Section 3 considers progressive taxation and optimal tax adjustment. In section 4 the problem is restated, the bargaining regimes compared and the Le Chatelier - Samuelson principle applied. Concluding remarks are presented in section 5.

2 Taxes and wage bargaining

2.1 Government budget constraint and tax adjustment

With fixed tax parameters, the total amount of taxes depends on the amounts of tax bases. But this is not a sufficient description of actual taxation. The government has certain outlays, and there is a need to collect a sufficient amount of tax revenue to finance the expenditure. Tax parameters are changed in order to collect that amount. Taxes and expenditures need not be exactly matched: the government can borrow or lend. That does not, however, change the basic nature of this question: the accrual of tax revenue is monitored by government officials, and if sufficient amounts are not coming in, tax parameters may be changed.

The need for tax income might also vary with the bargaining results. A great deal of public expenditure in most countries consists of wages for civil servants. Also, the sum of unemployment benefits depends on the number of employed persons, and unemployment depends on wages. Both these factors would suggest that the higher the wages, the more taxes must be collected. But this feature is not essential for the purposes of this paper. We also leave out borrowing and lending and use a fixed total tax requirement.

The government budget constraint is

$$\mathbf{G} = \mathbf{T} \quad (1)$$

The total tax revenue consists of income taxes and profit taxes.

$$\mathbf{T} = t\mathbf{B} + u\mathbf{P} \quad (2)$$

where $\mathbf{B}$ is the gross wage bill and $\mathbf{P}$ the gross profits in the economy, and t and u are the corresponding tax rates.

We assume that both income taxes and profit taxes are adjusted to ensure the equality of tax revenue to government expenditure. The parameters t and u are endogenous, determined by the following equations.

$$t\mathbf{B} = \alpha\mathbf{T}, \quad 0 \leq \alpha \leq 1 \quad (3)$$

$$u\mathbf{P} = (1 - \alpha)\mathbf{T} \quad (4)$$

Both t and u are required to be between 0 and 1. Depending on the structure of the economy, this may set tighter limits for α than in (3). We do not dwell on this further, but assume that the requirements are satisfied.

2.2 Bargaining framework

There are n identical firms in the economy, and also n trade unions, one union corresponding to one firm. There is also a central association of the firms (employers), and a corresponding central association of the unions. The employers and the workers negotiate how to divide the total net revenue. We consider two situations. In central bargaining the negotiation takes place between the central associations, in local bargaining between each firm and the corresponding union.

The gross revenue F of the firm is assumed to be a strictly concave function of the labor input L . The price level is assumed fixed and set to unity.

$$F = F(L) \ , \ F_L > 0 \quad (5)$$

The gross wage income is the wage rate W times the labor input L . Net wage income Y^W is thus

$$Y^W = (1 - t)WL \quad (6)$$

The gross profit of the firm is $F - WL$ and the net profit Y^F is

$$Y^F = (1 - u)(F - WL) \quad (7)$$

The adjustment equations thus become the following.

$$t \sum_i W_i L_i = t\mathbf{B} = \alpha\mathbf{T} \ , \ i = 1, \dots, n \quad (8)$$

$$u \sum_i (F_i - W_i L_i) = u\mathbf{P} = (1 - \alpha)\mathbf{T} \quad (9)$$

With all firms identical, they become

$$tWL = \alpha T \ , \ 1 \geq \alpha \geq 0 \quad (10)$$

$$u(F - WL) = (1 - \alpha)T \quad (11)$$

where $T = \mathbf{T}/n$ is simply the total tax need divided by the number of firms n , that is, expressed on a per firm basis.

The union utility is assumed to be an increasing function of the net wage bill. The firm is assumed to maximise net profits.

The Nash bargaining is characterised by the function (14), which is maximized. The maximization can be done with respect to different variables. In all cases it is done with respect to the wage rate W . In the efficient bargaining case it is done also with respect to the labor input L . We choose the “right to manage” model, where employment is determined unilaterally by firms, after the wage negotiations. So labor is used to the point where the marginal revenue equals the marginal cost.

$$F_L(L) = W \quad (12)$$

Employment may now be expressed as a function of the wage rate:

$$L = L(W), \quad L' = \frac{1}{F_{LL}} < 0 \quad (13)$$

$$\max(Y^W - A)^\beta (Y^F - B)^{1-\beta} \quad (14)$$

Parameter β denotes the union's bargaining power, and $1 - \beta$ is the firm's power. One explanation of the bargaining power comes from non-cooperative bargaining theory, developed by Ståhl and Rubinstein: power describes the relative impatience of bargaining parties. A survey of bargaining models is presented in Moene et al. (1991); see also de Menil (1971). An important assumption here is that the distribution of power is assumed to be exogenous. It does not depend on wages, taxes or other variables in our model. Also, we assume that bargaining powers can be aggregated; central negotiators have the same relative powers as local bargainers.

A is the threat point of the union, and B is the threat point of the firm. The threat points describe what happens if the negotiations do not reach an agreement. Several possibilities have been presented in the wage bargaining literature. One is the "work to rule" consequence: production continues but at a lower speed, and the incomes of both bargaining parties are smaller than under a possible agreement (see Moene et al., 1991). Alternatively, it has been assumed that if no agreement is achieved, the workers can be on strike, or go to work elsewhere, or become unemployed. The respective threat points would then be zero income or strike benefits from the union, the wage rate paid elsewhere, or income from unemployment benefits. The firm's threat point has often been assumed to be zero, describing the situation where no production takes place. Another alternative would be a fixed positive value, describing e.g. profits that the firm would expect to get if it transferred production elsewhere, for example abroad.

In order not to let the ambiguity concerning the threat points complicate the analysis of tax policy effects, we disregard the threat points by setting them to zero. Thus, when the participants negotiate over wages, the problem is

$$\max_W (Y^W)^\beta (Y^F)^{1-\beta} \quad (15)$$

The dismissal of the threat points does not change the nature of the results, while allowing simpler verbal description of them. We may speak of net incomes and distribution of incomes instead of net incomes over some threat point values or ratios of incomes over threat points.

2.3 Two bargaining problems

How do parties take account of the government budget constraint and the tax adjustment rules? Let us start with local bargaining. The negotiators are well aware of the tax system (10) - (11). We assume that union i and firm i are not aware of the wage decisions other firms and unions are making. They know the situation in firm i alone, and also observe the tax rules. When taxes change according to (10) and (11), union i and firm i renegotiate, but they do not anticipate the negotiations of other firms and unions. Each negotiating party knows that the effects of its own wage decision on both the total tax need and the total tax revenue is of the order $1/n$. We assume that n is sufficiently large so that these effects can be ignored.

Under local bargaining, the problem then is

$$\max_W (Y^W)^\beta (Y^F)^{1-\beta} \quad (16)$$

subject to

$$L = L(W)$$

The first-order condition for a maximum is, under local bargaining

$$\frac{Y^W}{Y^F} = \frac{\beta}{1-\beta} \left(\frac{\partial Y^W}{\partial W} \right) / \left(-\frac{\partial Y^F}{\partial W} \right) \quad (17)$$

In equilibrium the tax adjustment rules must also be fulfilled, but they cancel out in the solution for W .

The solution is

$$\frac{WL}{F - WL} = \frac{\beta}{1-\beta} h(W) \quad (18)$$

where

$$h(W) = 1 + \frac{WL'}{L} = \frac{W}{WL} \frac{\partial(WL)}{\partial W}$$

The term h equals the elasticity of the wage bill with respect to the wage rate. Thus h is always non-negative and less than one, since an increase in wages reduces employment. We assume that there is a wage level which would maximize the wage bill. A monopoly union would choose that wage level. As employers also have bargaining power, the relevant wage range in this study is below the wage-bill maximizing wage. As that wage is approached the elasticity of the wage bill will decrease, so we assume that $h_W < 0$.

The solution is different under central bargaining. The central negotiators know that the impact of their decision about wages is crucial to total tax income, and that tax rates are adjusted according to (10) and (11). The bargaining problem then is not merely (16) but rather (16) subject to (10) and (11). The demand for labor is still the same, since employment decisions are made at the firm level after the wages are set, and regarding taxes as given.

The solution to the centralized bargaining problem is given in the following equation.

$$\frac{Y^W}{Y^F} = \frac{\beta}{1 - \beta} h(W) \quad (19)$$

Equations (18) and (19) express one of the key results of this study. The left-hand sides are ratios of labor income to profits. The right-hand sides tell that these income ratios are proportional to bargaining power ratios. The crucial difference between the equations is that in the former the incomes are before-tax incomes and in the latter they are after-tax incomes. So, the central bargainers negotiate over net incomes, while local bargainers negotiate over gross incomes ¹.

It may seem that the maximization problem is more restricted under central bargaining than under local bargaining, because of restrictions (10) and (11), but in fact the case is the other way round. Although taken as given by the negotiators, taxes still are adjusted to meet the total tax needs. In a market equilibrium, therefore, the “given” tax rates must satisfy equations (10) and (11). Together with (18), these equations determine the market solution for wages. We return to this in section 4.1.

Our aim is not so much to solve the effects of various taxes but to present

¹This distinction would not be as sharp if income or profit taxes were non-proportional. See section 3.1.

the problem in such forms that the basic properties of the solutions become clear. An informative way to express the wage rates is the following.

$$W_{local} = \alpha^* \frac{F}{L} \quad (20)$$

$$W_{central} = \alpha^* \frac{F}{L} + (\alpha - \alpha^*) \frac{T}{L} \quad (21)$$

where

$$\alpha^* = \frac{\beta h}{1 - \beta(1 - h)}$$

Notice that since h , F and L are all functions of W , the wage rates are not solved in (20) and (21). They could be solved, but that is not necessary for our purposes.

The wage equations are easily interpreted. Under local bargaining the wage rate is at most the share β of total revenue per labor unit. If employment were fixed ($L' = 0$), the wage would equal that share. Under central bargaining the wage rate is similar to that under local bargaining, but there is an additional term, which may be labelled a tax compensation term. If the ratio of taxes relative to wage income is high, the term is positive, and if the ratio is low, the term is negative.

We may notice that α^* is increasing in $h(W)$ and

$$0 < \alpha^* < 1 \quad (22)$$

We notice that the wage rate under central bargaining is an increasing function of α (see Appendix) whereas wages under local bargaining are independent of α .

We may now state the following proposition:

Proposition 1 *The wage rate under central bargaining is higher, equal, or lower than under local bargaining, depending on whether α is greater, equal, or lower than α^* , where $\alpha^* = \frac{\beta h}{1 - \beta(1 - h)}$.*

Heuristically, the endogenous tax system must be in line with the bargaining powers of the parties and other economic factors, otherwise compensative actions are taken. If a high share of taxes is collected from wage income, wages must be high to achieve the desired net income share. But if the tax

share is low, high wages would result in too large a share of net incomes for labor, so lower wages are needed. From (20) we notice that the share of income taxes that leads to the same wage levels under both regimes is just the ratio of wage costs to total revenue under local bargaining.

2.4 Implications for tax policies

The basic implications for tax policies follow from the difference between local and central bargaining: local bargainers negotiate over gross incomes while central bargainers over net incomes. When tax parameters are changed, under local bargaining the wage rates adjust to keep the share of labor costs at a desired level, whereas under central bargaining wages react to keep the net income shares at desired levels.

Proposition 2 *Tax policies are effective in changing net incomes but ineffective in changing gross incomes and the wage rate under local bargaining. In contrast, tax policies are effective in changing gross incomes and the wage rate but less effective in changing net income shares under central bargaining.*

The first part of the proposition follows from the proportionality of taxes: By maximizing gross incomes also net incomes are maximized. The difference between regimes is a direct consequence of the tax adjustment rules that central bargainers have internalized but local have not. As employment is determined solely by the wage rate, we may state:

Proposition 3 *Tax policies can affect employment under central bargaining but not under local bargaining.*

Proposition 4 *Under central bargaining, an increase in total taxes increases or decreases the wage rate, depending on whether the share of income taxes α is greater or smaller than α^* . Under local bargaining the amount of total taxes does not affect the wage rate.*

If the share of income taxes is very low, an increase in total taxes would increase the share of net wage income to total net incomes. To prevent that, wages must fall. If the share of income taxes is high, wages must rise to keep net income shares at desired levels.

Proposition 5 *An increase in the share of income taxes α increases the wage rate under central bargaining. Under local bargaining an increase in the share of income taxes has no effects on the wage rate.*

This proposition follows from differentiating the wage with respect to α (see Appendix).

3 Two enlargements

3.1 Progressive taxation

Proportional taxes, such as income and profit taxes above, have the nice feature that maximizing net incomes is achieved by maximizing gross incomes if taxes are regarded as given. To see how the results above change when taxes are non-proportional, we introduce progressive income taxes to the system. Assume that the income tax rate t is replaced by

$$t = \tau_0 + \tau_1 W \quad (23)$$

where τ_1 is assumed to sufficiently small so that t stays below unity over the relevant income range. Assume now that parameter τ_0 adjusts so that just the amount αT is collected from wage income:

$$\tau_0 = \alpha T / WL - \tau_1 W \quad (24)$$

The central bargaining problem has not changed, and the solution is as before. The local bargaining problem has changed, and the solution is different from (18):

$$\frac{WL}{F - WL} = \frac{\beta}{1 - \beta} [h(W) + k] \quad (25)$$

where

$$k = \frac{-\tau_1 W}{1 - t}$$

The term k is the elasticity of the net wage with respect to the wage level. It is negative, and depends negatively on the wage level. We may derive an expression similar to (20) for the wage level:

$$W_{local} = \alpha^{**} \frac{F}{L} \quad (26)$$

where

$$\alpha^{**} = \frac{\beta(h+k)}{1 - \beta[1 - (h+k)]}$$

Comparing α^* and α^{**} we notice that the wage level under local bargaining is higher with proportional income tax than with progressive income tax. Under the latter system the net wage - employment trade-off is worse: an increase in wages yields less net income while causing the same reduction in employment as with proportional taxes.

With proportional taxes, the parameter α had no effects under local bargaining. With progressive taxes it has, through (24). The higher α is, the harder the progressivity of taxes are perceived. The sign of the effect is not unambiguous, but if income taxation is not extremely hard, increasing α decreases the wage level (see Appendix). The effects of α are of different sign under local bargaining compared to central bargaining, when income taxes are progressive. As α and T appear symmetrically in (24), an increase in total taxes decreases the wage level under local bargaining with progressive income taxes.

Proposition 6 *With progressive income taxes, both an increase in the share of income taxes α and an increase in total taxes T decrease the wage rate under local bargaining.*

We notice that all the results concerning local bargaining in propositions (2) - (5) change when income taxes are progressive. Proposition (1) changes also:

Proposition 7 *The wage rate under central bargaining is higher, equal, or lower than under local bargaining, depending on whether α is greater, equal, or lower than $\alpha^* - (\alpha^* - \alpha^{**})\frac{F}{T}$.*

Progressive taxation has made the differences of tax policy effects between the bargaining regimes less clear-cut compared to proportional taxes. Some differences have enlarged, some changes are minor. The results for proportional taxes can also be used as approximative when progressivity is very mild.

3.2 Optimal tax adjustment

The total tax requirement makes the model in a way indeterminate. We could design a more general linear adjustment system, where there are “predicted” tax rates and marginal adjustment to them. There is an infinite number of ways to balance the budget, and our assumptions do not give sufficient information. In this respect the model may describe reality also. Bargainers may not have enough information about taxation. One could also say that tax policy is then more than adjusting tax parameters. It is basically choosing the balancing rule.

Of the multitude of possible adjustment schemes, we have used only one. We justify its use by noting that it is sufficient to achieve optimal outcomes for the whole economy under central bargaining. The optimal situation would be a full-employment wage level, negotiated by the central bargainers, with sufficient tax revenue. As $\partial W/\partial \alpha > 0$, the government could set α so that the resulting wage rate is low enough to yield labor demand equal to full employment. A similar policy could be designed for local bargaining, utilizing $\partial W/\partial \alpha < 0$.

4 Tax policies as constraints to bargaining

4.1 Restating the problem

We restate the earlier problem in a form that shows the basic structure. Let us denote by V the Nash product with the labor demand function replacing L :

$$V(W, t, u) = [(1 - t)WL(W)]^\beta [(1 - u)(F(L(W)) - WL(W))]^{1-\beta} \quad (27)$$

We may express the maximization problem under central bargaining as follows.

$$\max_W V(W, t, u) \quad (28)$$

subject to

$$\begin{aligned} tWL(W) &= \alpha T \\ u[F(L(W)) - WL(W)] &= (1 - \alpha)T \end{aligned}$$

whereas under local bargaining the problem is

$$\max_W V(W, t, u) \quad (29)$$

subject to

$$\begin{aligned} tWL(W) &= \alpha T \\ u[F(L(W)) - WL(W)] &= (1 - \alpha)T \\ V_1(W, t, u) &= 0 \end{aligned}$$

The latter problem is rudimentary: there is no maximization needed because the constraints determine W . The third constraint is the first-order maximizing condition of the local bargaining problem, which was solved by keeping the tax parameters t and u fixed.

Expressing the bargaining situations this way, we notice that the value of the maximized function must be higher under central bargaining than under local, or at least as high. The maximization problem is the same, but there is one constraint less. But are both parties necessarily better off under central bargaining?

Let us again look at the economy with proportional taxes. Under local bargaining the wage level is independent of the level of taxes. Consider now the situation where $\alpha > \alpha^*$, that is, wages are higher under central bargaining. Thus the total revenue is lower under central bargaining than under local. As the amount of taxes is the same, also total net incomes are lower under central bargaining. But both net wage income and net profits cannot be lower, or otherwise V would also yield a lower value under central bargaining. Thus either one of the net incomes must be higher under central bargaining. It is wage income, as under local bargaining a high α would simply cut net wages, but under central wages react to preserve a desired net income distribution. Thus comparing the regimes yields the following.

Proposition 8 *With a given proportional tax system, central bargaining is preferable to the workers but local bargaining would be better for employers, if taxes are collected more from wage income ($\alpha > \alpha^*$). With α lower than α^* the situation is likely to be reversed, but if the demand for labor is very elastic, it may be that central bargaining is better also for workers.*

The latter part of the previous proposition states that although the share of net wage income of all net incomes increases when wages become lower (see equation 19), which under central bargaining happens when α gets smaller, net wage bill is likely to be larger under local bargaining, because there is no compensatory wage decline when α becomes smaller. The total revenue increases with a lower wage level, however, and if the demand for labor is very elastic, this increase may be rapid enough to make central bargaining better also for workers.

With progressive income taxes the above proposition holds also, and the possibility that central bargaining would be better also for workers when α is low is smaller than with proportional income taxation.

Strong implications can be drawn from the fact that the bargaining problems are related as shown above. Define function f as function V with the endogenous tax adjustment rules inserted, and assuming α fixed:

$$f(W, T) = V(W, \alpha T/WL, (1 - \alpha)T/WL) \quad (30)$$

Define a function g as the function V_1 with the endogenous tax adjustment rules again inserted:

$$g(W, T) = V_1(W, \alpha T/WL, (1 - \alpha)T/WL) \quad (31)$$

Now the central bargaining problem is to maximize (30) with respect to W , while the local problem is to maximize (30) subject to $g(W, T) = 0$. The maximizing wages, W^* for central and $\hat{W}^*$ for local bargaining, may then be expressed as functions of T :

$$W^* = W^*(T) \quad \hat{W}^* = \hat{W}^*(T) \quad (32)$$

Furthermore, there is a value for α and T for which the two problems yield the same wage. That is the value $T^0 = \frac{\alpha^* - \alpha^{**}}{\alpha^* - \alpha} F$, when $\alpha^* > \alpha > \alpha^{**}$. We may now show that

$$C^0 \left[\frac{\partial W^*(T^0)}{\partial T} - \frac{\partial \hat{W}^*(T^0)}{\partial T} \right] \leq 0 \quad (33)$$

where

$$C^0 = -f_{TW}(W^0, T^0)$$

The condition (33) is an expression of the Le Chatelier - Samuelson principle (see Appendix). It can be interpreted as in other applications of the same principle: it implies a more sluggish response of wages to parameter changes under local bargaining than under central bargaining. Here this holds only if a parameter change affects the wage in the same direction. But from proposition (5) and proposition (6) we know that an increase in T decreases W in both cases.

Similar conditions could be calculated also for α and τ_1 . In the first case (33) does not imply much of anything, since the signs of the effects of α on the wage level are different under the two regimes with progressive taxation. The information content in the latter case would be zero, since $f_{\tau_1 W} = 0$ everywhere.

4.2 Are the same wages set?

The empirical relevance of applying the Le Chatelier - Samuelson principle to tax policies is not straightforward. There is a strong hidden assumption about a very efficient use of information in the central bargaining case. The assumption is that the same wage is determined in the two regimes. The empirical counterpart would be that the same wages are set. But do the central negotiators really know all the wages in the economy? With a single wage rate in each firm, and all firms alike, that is easily imaginable. With different kinds of firms one has to stretch the imagination. With different kind of jobs and different wage rates in each firm, the assumption is far from innocuous. There is n times information under central bargaining compared to local bargaining. If that information is too much to handle, they are not discussing about the same wages under the two regimes. Then the optimizing descriptions would not be related as they are in our model.

But if central bargaining can be described as maximizing behavior, and if this maximizing is done with respect to the same set of variables than under local bargaining, and if there is a parameter value set that yields the same wage outcome in both regimes, then the problems are related as above, and the difference in tax policy effects is obtained from the Le Chatelier - Samuelson principle.

5 Concluding remarks

Using a simple bargaining model we showed that, because of the government's budget constraint, tax policies can have drastically different effects under local bargaining than under central bargaining. Using proportional income and profit taxes, and effectively setting the threat points in the bargaining model to zero, the bargaining can be described as bargaining over gross incomes locally and over net incomes centrally. The main outcome concerning tax policies is that under local bargaining the amount of total taxes and the share of income taxes have no effect on the wage rate. Put another way, these taxes are highly effective in changing net incomes under local bargaining, because they do not result in changes in gross income demands. Under central bargaining in our model, these taxes may change net income distribution, but only through changing demand for labor.

Progressive taxation makes the situation more complex. Still the policy effects on wages, employment and net incomes are totally different under the two bargaining regimes. The effects may even go to opposite directions.

The Le Chatelier - Samuelson principle was also applied to tax policy analysis. The key question turned out to be whether the same wages are determined under central bargaining as under local bargaining. If not, the optimizing descriptions would not be nested. Where would that leave us? Many of the descriptive features of the foregoing analysis remain: the wage level may be higher or lower under central bargaining than under local, tax policies have different effects, some parameters may not have effects at all under one regime, etc.

It should be stressed that no assumption of different behavior between local and central bargaining is made. The aggregate tax equations are the same in both cases, and the parties negotiating are equally aware of them. The difference is that under local bargaining, the effect of those aggregate constraints on optimal decisions is of such a small magnitude that it is negligible. Under central bargaining the magnitude is crucial.

Appendices

The effect of α on W under central bargaining:

Differentiating (21) we get

$$dW/d\alpha = (1 - \beta + \beta h)T/D \quad (34)$$

where

$$D = (1 - \beta + \beta h)\frac{\partial(WL)}{\partial W} + \beta h F_L L' - \beta[F - WL - (1 - \alpha)T]h_W$$

Under the assumptions, all the terms in D are positive.

The effect of α on W under local bargaining with progressive income taxes

$$W_{local} = \alpha^{**} \frac{F}{L} \quad (35)$$

where

$$\alpha^{**} = \frac{\beta(h + k)}{1 - \beta[1 - (h + k)]}$$

$$k = -\frac{\tau_1 W}{1 - t}$$

Replacing $1 - t$ in k with $1 - \frac{\alpha T}{WL}$ and differentiating, we get

$$[1 - \alpha^{**} F_L L' / T - \frac{F}{T} \frac{\partial \alpha^{**}}{\partial k} \frac{\partial k}{\partial W}] dW = \frac{F}{T} \frac{\partial \alpha^{**}}{\partial k} \frac{\partial k}{\partial \alpha} d\alpha \quad (36)$$

All the terms in the coefficient of dW are positive, if $\partial k / \partial W$ is negative. Expressing k as $k = -\tau_1 W^2 L / (WL - \alpha T)$ and differentiating yields a sufficient condition:

$$\frac{\partial k}{\partial W} < 0 \iff 2\alpha T < WL - W^2 L' \quad (37)$$

The condition gives an upper limit for income taxes. The condition is always met if less than half of the wage bill is taxed from the workers. If taxation is harder than that, then the magnitude of $-W^2 L'$, which is positive, comes into play. Even if taxation is so hard that the condition (37) is not met, there are other terms in the coefficient of dW that may well make the coefficient positive. Evidently that is the likeliest case by far, when thinking about empirical magnitudes of the terms.

Direct differentiation yields $\partial k / \partial \alpha < 0$, so assuming that the sufficient condition (37) is met, $dW/d\alpha < 0$.

Exactly the same derivation will yield $dW/dT < 0$.

The Le Chatelier - Samuelson principle:

We have used notations close to those of Hatta (1980, 1987). Our case is a simplified and straightforward application of Hatta's Proposition 4 (1987).

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