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Monopoly union, unemployment benefits and labour taxes: The unemployment problem revisited

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Abstract

Unemployment is undoubtedly one of the most important concerns in developed countries, especially in Europe. Most of the related economic literature has discussed the possible influence of unemployment benefits on unemployment and welfare, assuming a lump-sum type benefit system, while the more realistic earnings-related (replacement rate) regime has been scarcely considered. Applying a fairly standard monopoly union model, we show that when unemployment benefit is related to the existing wage, the rate of unemployment can be reduced by increasing both the replacement rate and the labour tax.

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1. Introduction

Unemployment benefits have been recognised as an important feature of modern economies (especially in European Union countries) and as playing a preeminent role in determining labour market outcomes. Most of the economic literature discussing the possible influence of unemployment benefit policies on unemployment and welfare assumes a lump-sum type benefit system (e.g., Acemoglu and Shimer, 1999; Daveri and Tabellini, 2000). However, in several OECD countries unemployment benefits consist of both unemployment insurance and unemployment assistance, with the former being related either to current or to previous labour earnings (see Heer, 2006).[1] In other words, unemployment benefits are generally paid according to a replacement rate fixed by law as a fraction of either the past or existing gross wage.

Two other distinctive features of several European Union countries are represented by (*i*) the widespread unionisation of labour markets and (*ii*) the presence of high labour income taxation. All these features (unemployment benefit policies, unionisation, large wage taxation) are held to some extent responsible for a typical scourge of modern European economies: i.e., the persistently high rates of unemployment. In particular, Daveri and Tabellini (2000, pp. 50–51) argued: "European labour costs have increased for many reasons, one of which is particularly easy to identify: higher taxes on labour… if workers are organised in monopolistic unions and their income, if unemployed, is taxed at a lower rate than wages, then they can succeed in shifting the burden of labour taxes onto firms. In this case, a permanent rise in labour taxes permanently increases unemployment." In order to explain this line of reasoning, Daveri and Tabellini (2000) presented an overlapping generations (OLG) model of growth where equilibrium unemployment is caused by a monopolistic union which seeks to set the wage (fixed as a mark-up over the lump-sum unemployment benefit) above the prevailing competitive level, while leaving employment to be chosen by firms according to their labour demand curves, and concluded that employment is permanently damaged in the occurrence of an increase in labour costs due to increased labour taxation.

In this paper we address the following issue: how the prevailing common wisdom linking increasing unemployment with the high degree of unionisation of labour markets, high labour income taxation and the generous unemployment benefit system, may change when unemployment benefits are determined as a fraction of the existing gross wage paid to employees (defined as the replacement rate – RR – regime)?[2] We show that when the monopoly union chooses the wage in the RR unemployment benefit regime, then – in contrast with the lump-sum (LSB) unemployment benefit regime – the resulting equilibrium unemployment is negatively related with both the labour tax and the replacement rate. Therefore, when the union fixes the wage in the RR regime, the policymaker may permanently reduce the rate of unemployment by increasing either the

[1] Note that while in this paper we investigate the effects of (lump-sum and earnings-related) unemployment benefits and labour taxes on the rate of unemployment within a theoretical partial equilibrium monopoly union model, Heer (2006) considered a calibrated general equilibrium OLG economy with elastic labour supply and income uncertainty, and then analysed the effects of both types of unemployment benefit regimes on output, employment and welfare, but without considering the role of unions. Unlike Heer (2006), who studied – in particular – the effects of switching from a lump-sum type benefit system to an earnings-related scheme assuming also that the unemployment benefit budget balances, we concentrate here on the effects of moving the benefit system toward a replacement-rate regime on the rate of unemployment when the labour market is unionised and no government balanced budget policies exist. However, following the suggestion of both an anonymous referee and the editor John Conley, we show that our findings hold even when the overall feedback effect of the government balanced budget is taken into account, i.e., labour tax receipts are equal to unemployment benefits (see the Appendix).

[2] For instance, the Italian unemployment insurance system (*Cassa Integrazione Guadagni*) pays benefits for unemployed hours due to temporary and partial layoffs, and includes almost 80 per cent of the current wage. It is evident that, in practice, if wages subsequently increase, firms will lay off the appropriate number of workers, and unemployed people will receive a fraction of the existing wage; the union will then rationally take this fact into account when choosing the wage for its members.

replacement rate or the labour tax or both. This result appears in sharp contrast with the preceding literature.[3]

Moreover, the model has been extended in a twofold direction. In particular, besides the basic case in which the unemployment benefit is untaxed, as in Daveri and Tabellini (2000), we considered (*i*) a taxed unemployment benefit, and (*ii*) a balanced budget unemployment benefit policy. Interestingly, in the RR regime, the negative monotonic relationship between the unemployment rate and the replacement rate is preserved in both cases.

The remainder of the paper is organised as follows. In Section 2 we develop the monopoly union model and the main results of the paper are analysed and discussed in both the LSB and the RR regimes. Section 3 concludes. Moreover, in the Appendix we extend the RR model by assuming that the unemployment insurance budget balances.

2. The monopoly union model

In this section we analyse and discuss the role played by the monopolistic union in determining the wage received by its members, w_t, (see, for instance, Booth, 2002; Layard et al., 2005) under two different unemployment benefit regimes: the lump-sum regime and the replacement rate regime. Then we study how the aggregate rate of unemployment reacts to a permanent increase in both the labour tax and the benefit payment. In particular, we closely follow the structure adopted, amongst many others, by Daveri and Tabellini (2000).

Workers of each firm are represented by a union. We assume that a given fraction $0 < q \leq 1$ of current workers belongs to the union. Notice that union membership is exogenously fixed, whereas the number of employed individuals is endogenously determined.[4] Moreover, we assume that:

1) the union is large enough to have market power, but small enough to neglect the effects of their action on the macroeconomic variables (e.g., fiscal policy variables and the interest rate are taken as given);

2) it operates at the firm level, such that the welfare of the current elderly is not affected;

3) it affects the welfare of those currently active only through their current income;

4) it neglects risk aversion and maximises the expected income (rather than the expected utility) of its members.

In what follows we analyse the effects of both the LSB and the RR unemployment benefit regimes on the aggregate rate of unemployment.

2.1. Monopoly union: the LSB regime

In order to set the wage in each period the union faces the following static optimization problem (given by the maximisation of the expected income of a risk neutral representative member):[5]

[3] In fact, in the fight against unemployment it is held that "Moderating the overall level of taxation, and mostly of taxes on labour, is thus one of the main challenges currently faced by the European Union." (Daveri and Tabellini, 2000, p. 54), and "the general argument usually put forward is that unemployment benefits improve the pay off of not working."(Heer, 2006, p. 530).

[4] As is usually assumed, if the number of union members is higher than the number of employed individuals, then all employed people belong to the union; otherwise, the union's wage would no longer be "binding".

[5] It is worth noting that the seemingly myopic behaviour of the union, which only cares about the income of current members, is a simple shortcut for a more general setting where the union is infinitely lived but cannot commit itself to the future course of action, as noted by Daveri and Tabellini (2000). Notice also that problem (1) implies that the union

$$\max_{\{w_t\}} I_t = \frac{1-u_t}{q} w_t(1-\tau) + \left(1-\frac{1-u_t}{q}\right) b_t, \tag{1}$$

subject to

$$u_t = 1 - \left[\frac{(1-\alpha)A}{w_t}\right]^{\frac{1}{\alpha}} \cdot k_t, \tag{2}$$

where $b_t > 0$ (the – untaxed – lump-sum unemployment benefit) and q are given, $0 < \tau < 1$ is the constant labour income tax, and the ratio $(1-u_t)/q$ represents the fraction of the union members that find a job with u_t being the time-t aggregate rate of unemployment. Notice also that firms have the right to hire workers according to their labour demand curves. Therefore, once the wage has been fixed by the union, the corresponding aggregate employment rate is lower than the equilibrium with full-employment. Assuming identical firms endowed with a Cobb-Douglas technology, i.e. aggregate production takes place according to $Y_t = AK_t^{\alpha} L_t^{1-\alpha}$, where Y_t, K_t and $L_t = (1-u_t)N_t$ represent aggregate production, the capital stock and the labour input hired in the representative firm, respectively, with N_t being the number of individuals at time t, the aggregate unemployment rate is determined by Eq. (2). Moreover, $A > 0$ is a production scale parameter, $0 < \alpha < 1$ is the capital's weight in technology and $k_t := K_t / N_t$ represents the per capita stock of capital at time t.

The economic interpretation of Eq. (1) is straightforward: the first term is the net wage times the probability of finding a job, while the second term is the unemployment benefit times the probability of being unemployed.

Firstly, we note that, in any case, the level of the lump-sum unemployment benefit must be lower than the prevailing wage; otherwise, nobody would have obviously the incentive to work.

Secondly, for the sake of analytical comparison with the RR model which is analysed in the next section, we now consider, in line with the above consideration, that the level of the lump-sum unemployment benefit may be seen as equivalent to a fraction of the prevailing competitive wage ($w_{c,t}$), that is, $b_t = \gamma \cdot w_{c,t}$ with $0 < \gamma < 1$. Of course, such an equivalence is implicit in all models with a lump-sum unemployment benefit because it must be smaller than the existing wage.

Maximisation of (1), taking b_t as given, results in the following union's wage:

$$w_{LSB,t} = \frac{b_t}{(1-\alpha)(1-\tau)}, \tag{3}$$

which may be written equivalently as

$$w_{LSB,t} = \frac{\gamma w_{c,t}}{(1-\alpha)(1-\tau)}, \tag{3.1}$$

where $w_{c,t} = (1-\alpha)Ak_t^{\alpha}$ holds in equilibrium. Eq. (3.1) reveals that the optimal wage for the union is a constant mark-up over the competitive wage. In order to guarantee $w_{LSB,t} > w_{c,t}$ we need the constant fraction of the prevailing market wage to be sufficiently high, that is $\gamma > \bar{\gamma}$, where $\bar{\gamma} := (1-\alpha)(1-\tau)$. As can easily be seen from Eq. (3.1), the union's wage depends positively on both the unemployment benefit and the wage tax, that is, the higher the labour tax or, alternatively, the unemployment benefit, the higher the wage required by the union for its members.

Given this wage setting formulation, and knowing that the representative firm has the right to hire as many workers as dictated by the perceived labour demand curve, the resulting equilibrium unemployment is:

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maximises the aggregate income of current members or, alternatively, it maximises the income distribution among employed and unemployed individuals by equating their marginal utilities.

$$u_{LSB} = 1 - \left[\frac{(1-\alpha)(1-\tau)}{\gamma}\right]^{\frac{1}{\alpha}}. \tag{4}$$

From Eq. (4) it is easy to see that $0 < u_{LSB} < 1$ if and only if $\gamma > \bar{\gamma}$.

2.2. Monopoly union: the RR regime

We now assume that the union faces the problem of maximising Eq. (1) subject to Eq. (2) and

$$b_t = \gamma \cdot w_t, \tag{5}$$

where $0 < \gamma < 1$ is a constant fraction of the current wage (i.e., the replacement rate).

Therefore, the union's wage is now:

$$w_{RR,t} = \left[\frac{(1-\alpha)(1-\gamma-\tau)}{\alpha\gamma q}\right]^{\alpha} \cdot w_{c,t}. \tag{6}$$

Given Eq. (6), the equilibrium unemployment rate is determined by:

$$u_{RR} = \frac{(1-\alpha)(1-\tau) - \gamma[1-\alpha(1-q)]}{(1-\alpha)(1-\gamma-\tau)}. \tag{7}$$

Without loss of generality, we set $q = 1$, i.e. all workers belong to the union. Therefore, Eqs. (6) and (7) become:

$$w_{RR,t} = \left[\frac{(1-\alpha)(1-\gamma-\tau)}{\alpha\gamma}\right]^{\alpha} \cdot w_{c,t}, \tag{8}$$

$$u_{RR} = \frac{(1-\alpha)(1-\tau) - \gamma}{(1-\alpha)(1-\gamma-\tau)}. \tag{9}$$

From Eq. (8), it can easily be seen that the replacement rate must be low enough, that is $\gamma < \bar{\gamma}$, to guarantee that $w_{RR,t} > w_{c,t}$. This is exactly the opposite of the condition required in the LSB regime.

Eq. (8) shows that the union's wage depends negatively on both the unemployment benefit and the wage tax, that is, the higher is the labour income tax or, alternatively, the replacement rate, the lower is the wage required by the union for its members. Moreover, from Eq. (9) it is easy to see that $0 < u_{RR} < 1$ if and only if $\gamma < \bar{\gamma}$.

2.3. Unemployment: LSB versus RR

We now compare the unemployment rate determined according to the LSB regime with that obtained under the RR hypothesis.

From Eqs. (4) and (9) the following proposition holds:

Proposition 1. *(1) Let $\gamma > \bar{\gamma}$ hold. Then, in the LSB regime a rise in γ and/or in the wage tax τ increases monotonically the unemployment rate; (2) Let $\gamma < \bar{\gamma}$ hold. Then, in the RR regime a rise in γ and/or in the wage tax τ reduces monotonically the unemployment rate.*

Proof. The proof uses the following derivatives.

In the LSB regime:

$$\frac{\partial u_{LSB}}{\partial \gamma} = \frac{1-u_{LSB}}{\alpha\gamma} > 0,$$

$$\frac{\partial u_{LSB}}{\partial \tau} = \frac{1-u_{LSB}}{\alpha(1-\tau)} > 0,$$

for any $\gamma > \bar{\gamma}$.

In the RR regime:

$$\frac{\partial u_{RR}}{\partial \gamma} = \frac{-\alpha(1-\tau)}{(1-\alpha)(1-\gamma-\tau)^2} < 0,$$

$$\frac{\partial u_{RR}}{\partial \tau} = \frac{-\alpha\gamma}{(1-\alpha)(1-\gamma-\tau)^2} < 0,$$

for any $\gamma < \bar{\gamma}$. **Q.E.D.**

Proposition 1 reveals that under the RR hypothesis a rise in the replacement rate and/or in the labour tax permanently reduces the unemployment rate. In fact, when the union chooses the wage in the RR regime it takes into account the effects of the existing wage on the unemployment benefit. For this reason the wage fixed by the union depends negatively on both the labour tax and the replacement rate. As a consequence, given the positive relationship between unemployment and wages, a higher labour income tax as well as a higher replacement rate is found to reduce aggregate unemployment permanently.

Moreover, comparison of Eqs. (4) and (9) gives the following remark:

Remark 1. *In both the LSB and the RR regimes, a rise in the capital's weight in technology, α, monotonically reduces the unemployment rate.*[6]

Therefore, the LSB and the RR systems give rise to opposite effects as regards the role played by the unemployment benefit on the rate of unemployment, while showing the same effect as regards the role played by the capital's weight in technology.

2.4. Taxing unemployment benefit

So far, following Daveri and Tabellini (2000),[7] we assumed the unemployment benefit to be untaxed in both the LSB and the RR models. In what follows, we test the robustness of our previous results, showing that Proposition 1 in Section 2.3 still holds even if the unemployment benefit is taxed at the same rate as the existing wage.

Therefore, by relaxing the hypothesis of untaxed unemployment benefits (and setting $q = 1$ without any loss of generality), Eq. (1) becomes:[8]

$$\max_{\{w_t\}} I_t = \left[(1-u_t)w_t + u_t\, b_t\right] \cdot (1-\tau), \tag{1'}$$

where u_t is still determined by Eq. (2).

As regards the LSB system, straightforward algebra leads to:

$$w_{LSB,t} = \frac{b_t}{1-\alpha}, \tag{3'}$$

which may be written equivalently as

[6] This can easily be ascertained by differentiating Eqs. (4) and (9) with respect to α, i.e., $\partial u_{LSB}/\partial\alpha < 0$ and $\partial u_{RR}/\partial\alpha < 0$.

[7] Daveri and Tabellini (2000) assumed an untaxed unemployment benefit regime, claiming (p. 58) that: "this assumption is correct if income when unemployed is earned in the underground economy, or if it proxies for the utility from additional leisure time. Indeed, in a number of industrial countries the underground economy is the main source of income for many unemployed workers." Moreover, in Table 3 (p. 59) they showed that in several developed countries (such as Germany, Italy, Japan, UK and US), unemployment benefits are either slightly taxed or even untaxed.

[8] It is worth noting that introducing a tax on unemployment benefit is equivalent to assuming that the payment of benefits is based on the net rather than on the gross wage.

$$w_{LSB,t} = \frac{\gamma w_{c,t}}{1-\alpha}. \tag{3.1'}$$

Therefore, the unemployment rate is

$$u_{LSB} = 1 - \left(\frac{1-\alpha}{\gamma}\right)^{\frac{1}{\alpha}}. \tag{4'}$$

In the RR model, instead, by taking into account the effects of the benefit system in Eq. (1'), i.e. $b_t = \gamma \cdot w_t$, we obtain:

$$w_{RR,t} = \left[\frac{(1-\alpha)(1-\gamma)}{\alpha\gamma}\right]^{\alpha} \cdot w_{c,t}, \tag{8'}$$

$$u_{RR} = \frac{1-\alpha-\gamma}{(1-\alpha)(1-\gamma)}. \tag{9'}$$

Therefore, if the unemployment benefit is taxed at the same rate as the existing wage, both the union's wage and the equilibrium unemployment rate are independent of the labour income tax. By simple inspection of Eqs. (8') and (9'), it follows that both Proposition 1 as regards the role of γ and Remark 1 as regards the role of α still hold.

3. Conclusions

Using the standard monopoly union model, we analysed the effects of unemployment benefits and labour taxes on the unemployment rate when the former are related to the existing wage (the replacement rate – RR – regime) rather than assumed to be of the lump-sum type (LSB). We showed that when a monopolistic union fixes the wage in the RR regime, then in contrast with the LSB regime, the resulting equilibrium unemployment depends negatively on both the labour tax and the replacement rate. This occurs because the unemployment benefit is a fraction, e.g., fixed by law, of the wage earned by current employees, and the union will rationally take this fact into account when choosing the wage for its members. Interestingly, this result holds if unemployment benefits are either untaxed or taxed at the same rate as the existing wage. Moreover, the negative relationship between the unemployment rate and the replacement rate is preserved even when the overall feedback effect of the government balanced budget is taken into account, that is, the labour tax receipt is equal to the unemployment benefit (see the Appendix). The essential message of the present paper, therefore, is that, under our assumption of RR regime, a policymaker should increase (rather than decrease) both the unemployment benefit and the labour tax in order to reduce the unemployment rate permanently.

The interest of these results lies not only in the simplicity with which are obtained, that is, within the conventional monopoly union model, but also in the fact that it shows a new perspective for unemployment benefit and (labour) tax policies when the former are determined as a percentage of the existing wage (the replacement rate). Finally, as regards the future research agenda, a natural extension of the present paper might be to consider the effects of both lump-sum and earnings-related unemployment benefit systems on the unemployment rate when (*i*) the labour supply is endogenously determined, (*ii*) the union cares not only about the wage but also the unemployment rate, and (*iii*) the union maximises the expected utility rather than the expected income of its members.

Appendix

Analysis of the monopoly union model in the main text was performed in a partial equilibrium context where both the unemployment benefit and the labour tax were exogenously given, and thus unrelated to each other. Below we extend the RR untaxed model (see Section 2.2 in the main text)

to include a government balanced budget unemployment benefit policy, i.e. labour taxes are equal to unemployment benefits. We then investigate whether the counterintuitive negative relationship between the unemployment rate and the replacement rate still remains valid as long as the labour tax τ is chosen endogenously by the government to finance the benefit system.[9]

Let the unemployment benefit policy

$$\tau_t w_t(1-u_t) = b_t u_t, \tag{A1}$$

hold (i.e., unemployment benefits are assumed to be entirely financed by the government with labour taxes at balanced budget). Using Eq. (A1) and knowing that $b_t = \gamma \cdot w_t$ we get:

$$\tau_t = \frac{\gamma u_t}{1-u_t}. \tag{A2}$$

In the untaxed RR regime, the union's wage is determined by Eq. (8) and thus the equilibrium unemployment rate is expressed by Eq. (9). Therefore, exploiting (9) and the government budget (A2) to eliminate τ_t, the constant equilibrium unemployment rate in the balanced budget untaxed RR regime is given by:

$$u_{RR} = \frac{1-\alpha-\gamma}{1-\alpha}. \tag{A3}$$

Eq. (A3) reveals that $0 < u_{RR} < 1$ if and only if $\gamma < \overline{\overline{\gamma}}$, where $\overline{\overline{\gamma}} := 1-\alpha$.

Therefore, the following proposition holds:

Proposition A.1. *Let $\gamma < \overline{\overline{\gamma}}$ hold. Then, in a balanced budget RR regime, a rise in γ reduces the unemployment rate monotonically.*

Proof. Differentiating Eq. (A3) with respect to γ gives:

$$\frac{\partial u_{RR}}{\partial \gamma} = \frac{-1}{1-\alpha} < 0.$$

for any $\gamma < \overline{\overline{\gamma}}$. **Q.E.D.**

Proposition A.1 reveals that a rise in the replacement rate permanently reduces the rate of unemployment even under the hypothesis of a balanced budget RR regime. Therefore, the negative relationship between the unemployment rate and the replacement rate is found to be a robust feature of the unionised-wage economy with RR systems, both when unemployment benefits and labour taxes are exogenously given (thus implying no feedback effects of the government budget on the equilibrium unemployment rate) and when the overall feedback effect of the government balanced budget is taken into account.

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[9] In particular, we keep the assumption of a fixed replacement rate, while adjusting the wage tax to balance out the budget.

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