

ISSN 1750-4171

**DEPARTMENT OF ECONOMICS**

**DISCUSSION PAPER SERIES**

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Unemployment Insurance Contributions to  
Reduce Unemployment**

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**WP 2005 - 11**

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# On Substituting Consumption Taxes for Unemployment Insurance Contributions to Reduce Unemployment

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September 21, 2005

## Abstract

The German conservative party (consisting of two sister parties) planned in case of victory in the national election on 18 September 2005 to reduce the unemployment insurance contributions by 2 percent and to finance this with an increase in the consumption tax by 2 percent. The present paper shows in a Layard-Nickell-Jackman type wage bargaining model that this tax reform does not reduce unemployment; neither in the short to medium run, nor in the long run. When there is short-to-medium-run real wage resistance, then in the short to medium run unemployment depends on the overall tax burden, but not on the composition of the tax burden. In the long run the wage setting curve is vertical and hence in the long run unemployment is even invariant of the overall tax burden.

**Keywords:** Consumption taxes, unemployment insurance contributions, payroll taxes. wage bargaining, unemployment.

**JEL-classification:** H20, J51.

## 1 Introduction

Germany is currently the sick man in Germany. Germany's unemployment rate was with 9.2 in 2003 one of the highest in Europe and its growth rate of

GDP was with 1.7 percent in 2003 one of the lowest in Europe.<sup>1</sup> Not surprisingly, the German social democrates (SPD), which are currently governing Germany, lost in the German states one election after the other. In May this year the social democrates lost even the state North Rhine-Westphalia, which the social democrates had ruled for 39 years. After this defeat German Chancellor Gerhard Schröder decided in favour of an early national election in 18 September this year, which was approved by the German parliament, the German president Horst Köhler, and the German Federal Constitutional Court this year. In the election campaign of the coming election Germany's high unemployment rate is on the top of the agenda. In particular, the two conservative sister parties in Germany (the CSU in Bavaria and the CDU in the rest of Germany) gave a press conference on 11 July this year at which they announced that they plan in case of victory in the election to reduce in 2006 the unemployment insurance contributions by two percent and to finance this with an increase in the consumption tax by two percent. This revenue-neutral tax reform is considered to reduce unemployment. During the last years repeatedly the high labour taxation in Germany and in particular the high social security contributions in Germany are blamed in various political talk shows to be responsible for the high unemployment rate in Germany. It is argued that a shift of taxation away from labour to consumption could reduce the German unemployment problem.

In contrast to this common wisdom in Germany, the present paper argues that a substitution of consumption taxes for unemployment insurance contributions does not reduce unemployment. To understand this paper, one should note that in Germany employers and employees pay both half of the unemployment insurance contributions. The starting point of the present paper's view is the believe that European unemployment is the result of wage bargaining in a Layard-Nickell-Jackman type of model, where bargaining results in a wage that is a markup over a reference wage. Since workers who do not find a job in their sector might be unemployed and receive unemployment benefits, the reference wage depends on the level of unemployment benefits. The present paper argues that there is short-to-medium-run real wage resistance of unions in the form that in the short to medium run unions take the reference wage as given and are not aware that unemployment benefits are indexed to the wage, as well as, that the alternative income of the unemployed

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<sup>1</sup>See for the unemployment rate Gordon, (2005, Appendix B, Table B-4) and see CIA World Factbook (2005) for the growth rate of GDP.

depends on consumption taxes and unemployment insurance contributions of employees, features which are all the case in Germany.<sup>2</sup> Since the wage income of the employed depends on consumption taxes and unemployment insurance contributions of employees, changes of these two forms of “taxes” change the wage income of the employed relative to the fixed reference wage and increase the wage pressure of unions. The paper shows that if only the composition of the tax burden, but not the overall tax burden, changes, then this increased wage pressure of unions exactly offsets the labour costs savings of firms from a reduction of the unemployment insurance contributions of employers. This leaves the unemployment rate unaffected. The overall tax burden on labor is often referred as the tax wedge and is defined as the wedge between producer and consumer wages. A substitution of consumption taxes for unemployment insurance contributions changes the composition of the tax wedge, but leaves the size of the tax wedge unchanged. The present paper’s result that only the size of the tax wedge, but not the composition of the tax wedge, matters is consistent with the view of Carlin and Soskice (2005, ch. 4) and Layard et al. (1991).<sup>3</sup> In fact, this paper can be seen as a micro foundation of their views.

The present paper argues that in the long run, unemployment is even invariant to the size of the tax wedge. The reason for this is the argument that in the long run, unions should not take the reference wage as given. Instead they should in the long run be aware of that unemployment benefits are indexed to the wage and that the alternative income of the unemployed depends on consumption taxes and unemployment insurance contributions of employees. This in turn implies that wage changes and tax changes do not affect the relation between the wage income of the employed and the alternative income of the unemployed. The paper shows that this implies that the unions’ preferred employment is independent of the real wage. Technically, this implies a vertical wage setting curve in a real wage/employment-graph, where a wage setting curve is the combination of the real wage and employment that results from wage bargaining between unions and firms. The paper shows that in case of a vertical wage setting curve changes of the tax wedge

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<sup>2</sup>In Germany, first the wage after taxes including social security contributions of employees is calculated and then unemployment benefits are calculated as a fixed fraction of this net wage income.

<sup>3</sup>See also Sinn (2005). However, Sinn also argues that substituting consumption taxes for unemployment insurance contributions improves the international competitiveness of domestic firms slightly. The present paper does not confirm this claim.

only affect the real wage, but do not affect the unemployment rate. This long-run result is consistent with Layard et al. (1991). After the election the German liberal party (FDP) planned to reduce the unemployment insurance contributions by two percent as well (in 2007 instead of already in 2006). But contrary to the conservative parties, it planned to finance this lower contributions with reductions in manpower policies or other already existing tax revenues. If it should be possible to reduce the unemployment insurance contributions without an increase in consumption taxes, then, according to the argument in the present paper, this would indeed lead to a reduction of the unemployment rate in the short to medium run, as this policy would reduce the tax wedge. However, the present paper shows that in the long-run even this policy cannot reduce unemployment. Finally, the argument of the present paper implies also that the plan of the conservative parties to substitute consumption taxes for unemployment insurance contributions reduces the value of existing wealth in prices of consumption goods by two percent.<sup>4</sup> Given the need to finance old age consumption with private savings as Germany faces a pension crises in the near future, this is not good news at all.

The results of the present paper are directly opposed to the result in Pflüger (1997). In Pflüger substituting consumption taxes for payroll taxes (of which unemployment insurance contributions of employers are a special case) does reduce unemployment. He assumes that not only the wage income of the employed depends on consumption taxes and unemployment insurance contributions of employees, but also the alternative income of the unemployed depends on these two forms of “taxes”. For this reason, in his model the reference wage depends on these two forms of taxes, as well. For this reason, on the one hand, changes of these two forms of taxes do not change the wage income of the employed relative to the reference wage and do hence not lead to a change of the wage pressure of unions. On the other hand, a reduction of the unemployment insurance contributions of employers leads to a reduction of firms’ labour costs. As a consequence, the unemployment rate falls. Pflüger assumes that unemployment benefits are not indexed to wages, although they are indexed to wages in Germany. For this reason, the model does not imply a vertical wage setting curve in a real wage/employment-graph, in which case the unemployment rate would be invariant to the tax wedge. The assumption of unemployment benefits that are not indexed to

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<sup>4</sup>This confirms the argument of Sinn (2005).

wages are justified in Michaelis and Pflüger (2000) with the argument that empirical data show short-to-medium-run real wage resistance. The present paper argues, however, that it is not very consistent that, on the one hand, unions are in the short to medium run unaware of the fact that unemployment benefits are indexed to the wage, but are on the other hand rational enough to understand the impact of tax changes on the alternative income of the unemployed. Instead, this paper proposes to model unions to have in the short to medium run a fixed reference wage, which implies that in the short to medium run unions are unaware of indexation of unemployment benefits to the wage and the impact of tax changes on the alternative income of the unemployed, but understand in the long run completely that the alternative income of the unemployed depends on the wage and on taxes. In turn, this implies that substituting consumption taxes for unemployment insurance contributions does not have an effect on the unemployment rate; neither in the short to medium run, nor in the long run.

Apart from Pflüger (1997), my paper is closely related to Fuest and Huber (2000) who also model short-to-medium-run real wage resistance different from me. Picard and Toulemonde (2001) investigate the equivalence of taxes paid by employers and employees in various more general models than mine, where my model is a special case of theirs (see also Creedy and McDonald, 1992, and Goerke, 1996). Goerke (2001) argues that in a unionised economy with tax evasion the composition of the tax wedge between wage and payroll taxes matters. Koskela and Schöb (1999) show that in a wage bargaining model with progressive taxation the composition of the tax wedge between wage and payroll taxes matters. Goerke (1999, 2000a, 2000b) investigates in an efficiency wage model under what conditions and in which direction various changes of the composition of the tax wedge change unemployment. Related work investigates in a wage bargaining model the effect of a progressive tax system to reduce wage pressure of unions and therefore to reduce unemployment (see among others Lockwood and Manning, 1993, Fuest and Huber, 1997, 2000, and Picard and Toulemonde, 2003).

## 2 The model

According to Layard et al. (1991, Ch. 2) long-run unemployment in Europe is explained as the equilibrium unemployment rate that results at the point of intersection of a price setting curve and a wage setting curve. The price

setting curve is the labour demand curve of firms, which can set the prices of their products due to imperfectly competitive product markets. The wage setting curve is the combination of the real wage and employment that results from wage bargaining between firms and unions. In this framework equilibrium unemployment is voluntary from the perspective of unions and involuntary from the perspective of individual households (cf. Burda and Wyplosz, 2005, p. 83). Each firm's real profit,  $\Pi_i/P$ , is defined as

$$\frac{\Pi_i}{P} = \frac{R_i}{P} - \frac{W_i(1 + t_P)L_i}{P}, \quad (1)$$

where  $\Pi_i$  are nominal profit of firm  $i$ ,  $P$  is the aggregate price of domestic products and  $R_i$  is the revenue of firm  $i$  defined as  $R_i = P_i Y_i$ , where  $P_i$  is the price of the product in sector  $i$  and  $Y_i$  denotes output for product  $i$ . In addition,  $W_i$  is the nominal wage in sector  $i$ ,  $t_P$  is the unemployment insurance contribution rate of employers and  $L_i$  is employment in sector  $i$ . Consistent with the Germany case it is assumed that employers pay half of the unemployment insurance contributions. Hence, the conservative parties' plan to reduce the unemployment insurance contributions by two percent implies a reduction of  $t_P$  by one percent. The production function of product  $i$  is assumed to be

$$Y_i = A_i L_i^\alpha, \quad \text{with } 0 < \alpha < 1, \quad (2)$$

where  $A_i$  is an index of technical efficiency in producing product  $i$ . For simplicity  $A_i$  is assumed to be constant. The assumption  $0 < \alpha < 1$  ensures a diminishing marginal product of labour which ensures a negatively sloped price setting curve in a real wage/employment-graph. As shown in Appendix A, the production function in (2) implies a constant wage elasticity of labour demand. A constant wage elasticity of labour demand is crucial for this paper's result. Adding capital to the production function would also imply a constant wage elasticity of labour demand, provided one assumes a Cobb-Douglas production function, which has an elasticity of substitution between capital and labour that is equal to one. Various estimates from mainly industrial sectors suggest a value of the elasticity of substitution between capital and labour below one (see Rowthorn, 1999). However, any model result that depends on the assumption of an elasticity of substitution between capital and labour below one is inconsistent with the stylised fact of a constant factor share of labour in GDP. Because of this, most macroeconomists, including

Layard et al. (2001), assume a production function with a constant wage elasticity of labour demand.

Each firm faces the following demand for its product

$$Y_i = \left( \frac{P_i}{P} \right)^{-\eta} Y, \quad (3)$$

where  $\eta$  represents the price elasticity for product  $i$  and  $Y$  denotes aggregate domestic output. Rearranging (3) yields  $P_i = Y_{i,t}^{-\frac{1}{\eta}} Y^{\frac{1}{\eta}}$ . Substituting this expression for  $P_i$  in the revenue definition  $R_i = P_i Y_i$  gives  $R_i/P = Y_{i,t}^{\kappa} Y^{\frac{1}{\eta}}$ , with  $\kappa \equiv 1 - \frac{1}{\eta} > 0$ . Substituting (2) in the latter expression leads to

$$\frac{R_i}{P} = A_i^{\kappa} L_i^{\alpha \kappa} Y^{\frac{1}{\eta}}. \quad (4)$$

Substituting (4) in (1) gives rise to the optimisation problem

$$\max_{L_i} \frac{\Pi_i}{P} = A_i^{\kappa} L_i^{\alpha \kappa} Y_t^{\frac{1}{\eta}} - \frac{W_i(1+t_P)L_i}{P}, \quad (5)$$

Differentiation of  $\Pi_i/P$  with respect to  $L_i$ , using (4) and substituting (2) yields the monopoly pricing rule

$$\begin{aligned} \left(1 - \frac{1}{\eta}\right) P_i &= (\alpha A_i)^{-1} W_i(1+t_P)L_i^{1-\alpha} \\ \text{or } P_i &= (\kappa \alpha A_i)^{-1} W_i(1+t_P)L_i^{1-\alpha} \end{aligned} \quad (6)$$

Finally, rearranging (6) and aggregating gives the aggregate price setting equation as

$$w \equiv \frac{W}{P} = \left( \frac{1}{1+t_p} \right) \kappa \alpha A L^{\alpha-1}. \quad (7)$$

Following the WebAppendix of Burda and Wyplosz (2005), available at [www.oup.com/uk/booksites/content/0199264961/student/appendix/wa12.pdf](http://www.oup.com/uk/booksites/content/0199264961/student/appendix/wa12.pdf) and extended to an open economy, each union is assumed to have the following Stone-Geary utility function

$$V_i = \left\{ \frac{W_i}{P[(1-\phi) + \phi\theta](1+t_C)} - \bar{W} \right\}^{\gamma} \{L_i - \bar{L}\}^{1-\gamma}, \quad (8)$$



where  $V_i$  denotes each union's utility,  $\phi$  is the share of imports in expenditures of domestic consumers,  $\theta \equiv P^*e/P$  is the real exchange rate (with  $P^*$  denoting the aggregate price of imports in foreign currency and  $e$  denoting the nominal exchange rate) and  $t_C$  denotes the consumption tax rate. The term in the denominator is the domestic price level  $P_C$ , where use was made of factoring out, so that  $P_C = [(1 - \phi)P + \phi(P^*e)](1 + t_C) = P[(1 - \phi) + \phi\theta](1 + t_C)$ . Further,  $L_i$  denotes employment in sector  $i$ ,  $\bar{W}$  and  $\bar{L}$  denote each union's reference levels of the wage and employment,  $\gamma$  is a constant and time indexes are omitted. A positive value of  $\bar{L}$  ensures in a real wage/employment-graph a positively sloped wage setting curve for given value of  $\bar{W}$ .

Following Layard (1991) I assume a right-to-manage model in which unions and firms bargain over the wage and, once the wage is chosen, firms choose employment. The qualitative results would be the same in a monopoly union model, but since Layard (1991) use a right-to-manage model and this model has the monopoly union model as a special case, the present paper uses a right-to-manage model. In this model unions and firms in sector  $i$  choose the real wage that maximises the Nash product  $\Omega_i$ :

$$\Omega_i = \beta \ln V_i + (1 - \beta) \ln \Pi_i/P, \quad (9)$$

where  $\beta$  measures the bargaining power of unions. If  $\beta = 1$ , we would get exactly the same result as in a monopoly union model. In Appendix B it is shown that the bargaining optimisation problem gives after aggregating the aggregate wage setting equation as

$$w \equiv \frac{W}{P} = \left\{ \left( \frac{[(1 - \phi) + \phi\theta](1 + t_C)}{1 - t_I} \right) \mu \right\} \bar{W}, \quad (10)$$

$$\text{with } \mu \equiv \frac{\lambda(1 - \gamma) + (1 - \lambda)\kappa\alpha \left(1 - \frac{\bar{L}}{L}\right)}{\lambda(1 - \gamma) + (1 - \lambda)\kappa\alpha \left(1 - \frac{\bar{L}}{L}\right) - \lambda\gamma(1 - \kappa\alpha) \left(1 - \frac{\bar{L}}{L}\right)},$$

where the expression between curly brackets is the markup of the wage over the reference wage  $\bar{W}$ . The expression between curly brackets is independent of the unemployment insurance contributions of employers. This is due to the assumption of a constant wage elasticity of labour demand. Holmlund (1989) has shown that in a model with a production function with capital and labour and an elasticity of substitution between capital and labour different from one, which implies a non-constant wage elasticity of labour demand,

the wage setting equation depends on payroll taxes (of which unemployment insurance contributions of employers are a special case). However, as discussed before, only a constant wage elasticity of labour demand is consistent with the stylised fact of a constant factor share of labour in GDP.

Figure 1 shows the real wage in prices of domestic goods  $w = W/P$  on the vertical axis and employment  $L$  on the horizontal axis. Due to a diminishing marginal product of labour as employment expands the price setting curve (PS) is negatively sloped. Due to the assumption of a Stone-Geary utility function of unions, there is a positively sloped wage setting curve (WS), provided  $\bar{L} > 0$ . When drawing the wage setting curve, it was assumed that there is short-to-medium-run real wage resistance in the form that unions take in the short to medium run the reference wage  $\bar{W}$  as given, as was motivated in the introduction.<sup>5</sup> Finally, there is a labour supply curve (LS) representing the labour force at a given real wage and for simplicity assumed to be vertical. In the figure, the equilibrium real wage  $w_1^*$  and the equilibrium employment level  $L^*$  are determined by the point of intersection of the price setting curve  $PS_1$  and the wage setting curve  $WS_1$ . There is equilibrium unemployment due to the markup of the real wage over the reference wage  $\bar{W}$ . The equilibrium unemployment  $U^*$  equals the difference between equilibrium employment  $L^*$  and labour supply  $N^*$ .

From (7) follows that a reduction of the unemployment insurance contributions of employers by one percent leads to an upwards shifts of the price setting curve to  $PS_2$ . From (10) follows that an increase of the consumption tax by two percent together with a reduction of the unemployment insurance contributions of employees by one percent leads to an upwards shifts of the wage setting curve to  $WS_2$ . Since there is only a change of the composition of the tax wedge both curves shift up by the same amount.<sup>6</sup> This leaves unem-

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<sup>5</sup>A richer framework would assume that in the short to medium run  $\bar{W}$  is a moving averages of past labour costs and tax rates (see Layard et al., 1991, p. 109). In such a framework unions would slowly learn about changes in tax rates. While this would show an economy's transition from a short-to-medium-run equilibrium to a long-run equilibrium, the present paper abstracts from these complications for simplicity. Note also that I assumed for simplicity absence of technical progress.

<sup>6</sup>One could add an unemployment insurance budget constraint to the model to calculate the increase in the consumption tax rate necessary to finance the reduction in the unemployment insurance contributions. Instead, this paper believes the calculations of the conservative parties that an increase of consumption taxes by two percent is required to finance the reduction of the unemployment insurance contributions by the same percent rate.

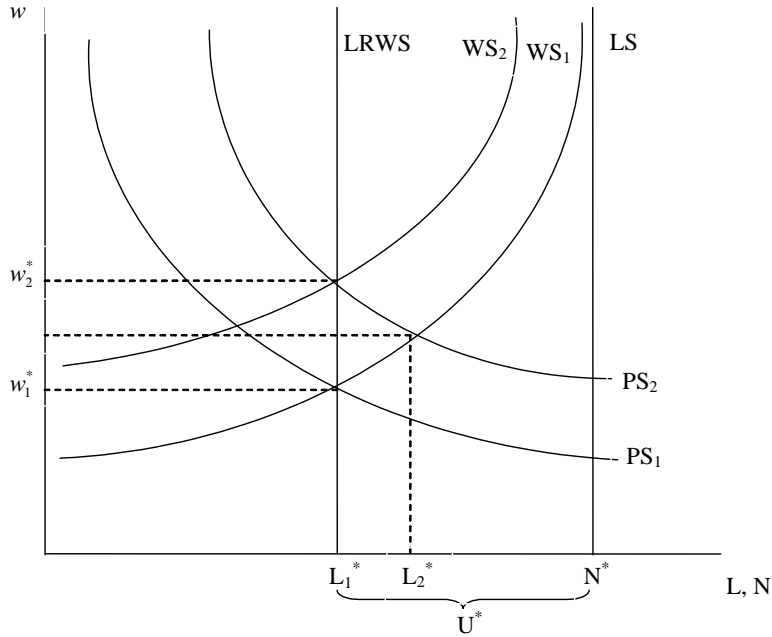


Figure 1: Employment effect of a substitution of consumption taxes for unemployment insurance contributions

employment unaffected. What actually happens is that in the new equilibrium the nominal wage  $W$  is increased by one percent as, due to the reduction of the unemployment insurance contributions of employers by one percent, firms can afford this increase of the nominal wage  $W$ . The purchasing power of workers is unchanged because the increase of the nominal wage is offset by the net effect of an increase of the consumption tax by two percent and a reduction of the unemployment insurance contributions of employees by one percent. Further, labour costs of firms are also unchanged because the reduction of the unemployment insurance contributions of employers by one percent is offset by the increase of the nominal wage nominal wage by one percent. This in turn implies that the price of domestic products and therefore the international competitiveness of domestic firms does not improve from the tax reform, contrary to a claim by the conservative parties and the media.

In the long run unions should not take the reference wage  $\bar{W}$  as given. Instead, in the long run the reference wage should equal the real income in consumer prices that workers receive if they cannot find a job in their sector. I assume for simplicity that, due to sector-specific skills, workers in sector  $i$  cannot move to a job in another sector. Therefore, a worker is unemployed, if he cannot find a job in his sector. Under this assumption and assuming consistent with the German case that unemployment benefits are a fixed proportion  $b$  of the net wage, the reference wage  $\bar{W}$  becomes in the long run

$$\bar{W} = \frac{bW(1 - t_I)}{P[(1 - \phi) + \phi\theta](1 + t_C)}. \quad (11)$$

Substituting (11) in (10) yields

$$w \equiv \frac{W}{P} = \mu b \frac{W}{P}. \quad (12)$$

Since  $W/P$  cancels out in (12), the long run wage setting curve (LRWS) in Figure 1 is vertical. Substituting the definition of  $\mu$  in (10) in (12) and solving for employment gives

$$\begin{aligned} L &= \varpi \bar{L}, \\ \varpi &\equiv \frac{\lambda\gamma(1 - \kappa\alpha) - (1 - b)(1 - \lambda)\kappa\alpha}{\lambda\gamma(1 - \kappa\alpha) - (1 - b)(1 - \lambda)\kappa\alpha - (1 - b)\lambda(1 - \gamma)}, \end{aligned} \quad (13)$$

where  $\varpi$  is the markup of long-run employment over the reference employment level  $\bar{L}$ . The markup  $\varpi$  is independent of the consumption tax rate and the unemployment insurance contribution rate of employees. As can be seen from Figure 1, in long run unemployment would even remain unaffected from a reduction in the unemployment insurance contribution rate that is not financed by an increase of the consumption tax. In addition, Figure 1 shows that, due to an upwards shift of the price setting curve, also in the long run a reduction of the unemployment insurance contributions of employers by one percent leads to an increase of the nominal wage by one percent, leaving the price of domestic products and therefore the international competitiveness of domestic firms unchanged. However, an increase of the consumption tax by two percent reduces the value of existing wealth in prices of consumption goods by two percent. This is certainly not good news for private savers for

old age consumption. In contrast, with no increase in the consumption tax rate this drop of the value of existing wealth in prices of consumption goods can be avoided.

As mentioned in the introduction, the result of the present paper is directly opposed to the result of Pflüger (1997), who finds an effect from substituting consumption taxes for payroll taxes. Why is this so? This is so, because Pflüger assumes the reference wage to be<sup>7</sup>

$$\bar{W} = \frac{B(1 - t_I)}{P[(1 - \phi) + \phi\theta](1 + t_C)}, \quad (14)$$

where  $B$  are the unemployment benefits. Substituting (14) in (10) gives

$$w \equiv \frac{W}{P} = \mu \frac{B}{P}, \quad (15)$$

where the wage setting curve is positively sloped because  $\mu$  depends in (10) on  $L$ . Since neither consumption taxes nor unemployment insurance contributions of employees appear in (15), substituting consumption taxes for unemployment insurance contributions do, on the one hand, not leads to an upwards shifts of the wage setting curve. On the other hand, a reduction of the unemployment insurance contributions of employers by one percent still leads to an upwards shifts of the price setting curve to  $PS_2$ . Hence, in the new equilibrium in Figure 1 employment is increased to  $L_2^*$ . What happens here is that the wage setting curve is independent of consumption taxes and unemployment insurance contributions of employees because not only the wage income of the employed depends on these two forms of “taxes”, but also the alternative income of the unemployed depends on these two forms of taxes. Therefore, these two forms of taxes cancel out in (15). In contrast, unemployment insurance contributions of employers do neither affect the wage income of the employed, nor the alternative income of the unemployed. Hence, while a reduction of the unemployment insurance contributions of employers shifts the price setting curve upwards, this is not offset by a shift of the wage setting curve by the same amount.

My objection to the latter framework is, however, that in (14) the unemployment benefits are not indexed to the wage, although in practice they are

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<sup>7</sup>Pflüger actually assumes that workers who cannot find a job in their sector can possibly find a job in another sector. For simplicity, but without loss in generality, I abstract from this possibility in (14).

indexed to it in Germany. Michaelis and Pflüger (2000) justify such an assumption with the argument that empirical data show short-to-medium-run real wage resistance. While true, it was argued before that short-to-medium-run real wage resistance is better modelled with a fixed reference wage  $\bar{W}$ . This is so, because (14) has the not very consistent implication that, on the one hand, unions are in the short to medium run unaware of the fact that unemployment benefits are indexed to the wage, but are on the other hand rational enough to understand the impact of tax changes on the alternative income of the unemployed. The present paper argues that it is more consistent that unions are in the short to medium run unaware of indexation of unemployment benefits to the wage, as well as, of the impact of tax changes on the alternative income of the unemployed and understand both factors completely in the long run, as was modelled in the present paper.<sup>8</sup>

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<sup>8</sup>In Germany unemployment benefits of unemployed, who are longer than one year unemployed, is not indexed to the net wage. However, long-term unemployment seem not to affect the wage bargaining process, as unions seem to view long-term unemployed as having in effect withdrawn from participation in the labour market, because potential employers see long-term unemployed as less attractive for employment than short-term unemployed (see, e.g., Carlin and Soskice, 2005, Ch. 4).

## Appendix A: Derivation of the wage elasticity of labour demand

Optimisation problem (5) yields

$$\frac{\partial \Pi_i}{\partial L_i} = \kappa \alpha A_i^\kappa L_i^{\kappa \alpha - 1} Y^{\frac{1}{\eta}} - \frac{W_i(1+t_p)}{P} = 0 \quad (16)$$

Collecting terms in (16) gives

$$L_i = \left\{ A_i^\kappa \kappa \alpha \left[ \frac{W_i(1+t_p)}{P} \right]^{-1} Y^{\frac{1}{\eta}} \right\}^{\frac{1}{1-\kappa \alpha}}. \quad (17)$$

(17) implies the constant wage elasticity of labour demand

$$\frac{\partial L_i}{\partial W_i} \frac{W_i}{L_i} = -\frac{1}{1-\kappa \alpha}. \quad (18)$$

## Appendix B: Derivation of first order condition of the wage bargaining optimisation problem

The wage bargaining optimisation problem in the text (i.e. maximization of (9)) gives the first order condition

$$\frac{d\Omega_i}{dW_i} = \lambda \left[ \frac{\partial V_i}{\partial W_i} \frac{1}{V_i} \right] + (1-\lambda) \left[ \frac{\partial \Pi_i/P}{\partial W_i} \frac{1}{\Pi_i/P} \right] = 0. \quad (19)$$

Using the union's utility function (8), the real profit definition (5), noting that in the optimization problem  $\partial L_{uit}/\partial w_{uit} \neq 0$ , using (18) in Appendix A and Hotelling's lemma  $d(\Pi_i/P)/dW_i = -(1+t_p)(L_i)$  gives

$$\begin{aligned} \frac{d\Omega_i}{dW_i} &= \lambda \gamma \left[ \frac{1-t_I}{W_i(1-t_I) - P[(1-\phi) + \phi\theta](1+t_C)\bar{W}} \right] \\ &+ \lambda(1-\gamma) \left( \frac{1}{1-\frac{\bar{L}}{L_i}} \right) \frac{\partial L_i}{\partial W_i} \frac{1}{L_i} - (1-\lambda) \frac{(1-t_p)L_i}{\Pi_i} = 0. \end{aligned} \quad (20)$$

After many rearrangements of (8) and aggregating one finally ends up with (10) in the text.

## References

- Burda, M., and Wyplosz, C. (2005) *Macroeconomics: A European Text*, 4th edition, Oxford University Press, Oxford.
- Carlin W., and Soskice, D. (2005) *Macroeconomics: Imperfections, Institutions & Policies*, Oxford University Press, Oxford, forthcoming in December 2005, drafts available at
- <http://www.ucl.ac.uk/~uctpa36/book.htm>.
- Creedy, J., and McDonald, I.M.(1992), Union Wage Responses to a Shift from Direct to Indirect Taxation, *Bulletin of Economic Research* 44, 221-232.
- CIA World Factbook available at
- <http://www.cia.gov/cia/publications/factbook/rankorder/2003rank.html>.
- Fuest, C., and Huber, B. (1997), Wage Bargaining, Labor-Tax Progression, and Welfare, *Journal of Economics (Zeitschrift für Nationalökonomie)* 66, 127-150.
- Fuest, C., and Huber, B. (2000), Finanzpolitische Reformen und Arbeitslosigkeit, in: Andel, N. (ed.), *Probleme der Besteuerung III*, Schriften des Vereins für Socialpolitik, Duncker und Humblodt, 141-176
- Fuest, C., and Huber, B. (2000), Is Tax Progression Really Good for Employment? A Model with Endogenous Hours of Work, *Labour Economics* 7, 79-93.
- Goerke, L. (1996), Taxes on Payroll, Revenues and Profits in Three Models of Collective Bargaining, *Scottish Journal of Political Economy* 43, 549-565.
- Goerke, L. (1999), Value-added Tax versus Social Security Contributions, *Jahrbücher für Nationalökonomie und Statistik* 219, 308-325
- Goerke, L., (2000a), The Wedge, *Manchester School* 68, 608-621.



- Goerke, L. (2000b), Labour Taxation, Efficiency Wages and the Long Run, *Bulletin of Economic Research* 52, 341-352.
- Goerke L. (2001), Tax Evasion in a Unionised Economy, IZA Discussion Paper No. 382, IZA, Bonn, Germany.
- Gordon, R.J. (2005) *Macroeconomics*, 10th edition, Pearson, Boston MA.
- Holmlund, B. (1989), Wages and Employment in Unionized Economies: Theory and Evidence, in: Holmlund, B., Löfgren, K.-G. and Engström, L. (eds), *Trade Unions, Employment, and Employment Duration*, Oxford, 10-45.
- Koskela, E., and Schöb, R. (1999), Does the Composition Between Wage and Payroll Taxes Matter Under Nash bargaining?, *Economic Letters* 64, 343-349.
- Layard, R., Nickell, S, and Jackman, R. (1991) *Unemployment: Macroeconomic Performance and the Labour Market*, Oxford University Press, Oxford.
- Lockwood, B., and Manning, A. (1993), Wage Setting and the Tax system - Theory and Evidence for the United Kingdom, *Journal of Public Economics* 52, 1-29.
- Michaelis, J., and Pflüger, M. (2000), The Impact of Tax Reforms on Unemployment in a SMOPEC, *Journal of Economics (Zeitschrift für Nationalökonomie)* 72, 175-201.
- Picard, P.M., and Toulemonde, E. (2001), On the Equivalence of Taxes Paid by Employers and Employees, *Scottish Journal of Political Economy* 48, 461-470.
- Picard, P.M., and Toulemonde, E. (2003), Taxation and Labor Markets, *Journal of Economics (Zeitschrift für Nationalökonomie)* 78, 29-56.
- Pflüger, M. (1997), On the Employment Effects of Revenue Neutral Tax Reforms, *Finanzarchiv* 54, 430-446.
- Rowthorn, R. (1999), Unemployment, Wage Bargaining and Capital-Labor Substitution, *Cambridge Journal of Economics* 23, 413-425.

Sinn, H.-W. (2005), Verfehlte Hoffnungen, in: Wirtschaftswoche of 21.07.2005,  
122.

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