Earnings-related Severance Pay*

by

Laszlo Goerke

Johannes Gutenberg-University Mainz+, IZA (Bonn) and CESifo (München)

+ Department of Economics (FB 03)
55099 Mainz
Germany
Phone: ++49(0)613139-20143
Fax: ++49(0)613139-23827
E-mail: Laszlo.Goerke@uni-mainz.de

Abstract:

Lump-sum severance pay from which shirkers can be excluded raises employment in an efficiency wage economy. However, severance payments are usually related to wages. It is shown that earnings-related, mandated severance pay will have ambiguous employment effects if effort can be varied continuously. A substitution of the earnings-related for the lump-sum component reduces employment. Thus, the predominating form of severance payments in OECD countries might have less advantageous employment effects than previously conjectured.

Keywords: earnings relationship, efficiency wages, employment, severance pay

JEL-classification: J 32, J 41, J 65

* I am grateful for very constructive comments by participants of the workshop on 'European Labour Markets in Perspective' in Regensburg and the 15th annual EALE conference in Seville.

1. Introduction

What are the employment effects of severance pay? One line of argument when responding to this question stresses the fact that severance payments represent a tax on dismissals. This tax increases employment, for a given wage, in the bad state of the nature since there are fewer dismissals. However, employment declines in the good state, because firms hire fewer workers. Consensus seems to be that the overall labour demand effects of pure firing cost are small (Bentolila and Bertola 1990, Bertola 1999, Pissarides 2001). From a different perspective, severance payments do not constitute a tax on dismissals but a transfer to dismissed workers. Such a transfer can induce a wage adjustment. For a competitive labour market Lazear (1990) has shown that a wage reduction may exactly offset the increase in labour cost due to severance pay such that no change in employment occurs.[1]

The above interpretation of severance payments as being akin either to a tax on dismissals or to a transfer to dismissed workers neglects the fact that severance pay may alter the payoff of workers and, hence, their alternative income, respectively bargaining position. Taking into account this effect in an individual matching framework, Millard and Mortensen (1997) find negative employment consequences of severance payments for a particular specification of the bargaining solution which determines the wage (cf. Ljungqvist 2002). Belot et al. (2002) show that legislated severance payments may be welfare enhancing if they raise the employees' firm-specific human capital. Unemployment declines for sufficiently high levels of severance pay. In an insider-outsider setting, hiring and firing cost generate union bargaining power and can, thus, have negative employment effects (Sanfey 1995, Lindbeck and Snower 2001). In efficiency wage models, severance payments can increase employment as they mitigate the incentives to shirk if disciplinary dismissals do not trigger such transfers (Saint-Paul 1995, Fella 2000, Goerke 2002). If every worker - regardless of the cause of the job loss - obtains severance pay, employment effects of such transfers will be ambiguous (Staffolani 2002). Finally, if only dismissals for economic reasons entitle to severance pay, while a worker fired for disciplinary reasons can go to court and claim the dismissal not to be justified, then severance pay for such an unfair dismissal may lower employment (Galdón-Sánchez and Güell 2003).

The aforementioned studies generally assume that severance payments are lump-sum transfers. However, severance pay usually is a function of tenure, age, and especially of the wage prior to dismissal (OECD 1999). From the analysis of tax variations in imperfectly competitive labour markets it is well known that a change in a pure level variable can have a different employment effect than a variation in a wage-dependent one.[2] This is because a higher tax level only has an income effect, while a higher marginal rate also implies a substitution impact. Modelling severance pay as a lump-sum transfer may, accordingly, neglect its substitution effect and give rise to inadequate

[1] For according results in models of imperfectly competitive labour markets see, inter alia, Burda (1992), Booth (1997), and Garibaldi and Violante (2002).

[2] See, for example, Lockwood and Manning (1993) for a model of collective wage determination, Hoel (1990) for an efficiency wage setting, and Pissarides (2000, pp. 210ff) for a search and matching approach.

employment predictions. Therefore, in this paper, lump-sum and earnings-related severance payments are compared. In particular, it is investigated how altering the composition of severance pay changes employment.[3]

The analysis presumes firms which pay efficiency wages to restrict shirking. Only those workers who lose their job for other reasons than shirking obtain severance pay. The income effect of mandated severance pay opens up the possibility of positive employment consequences. Since a dichotomous choice of effort does not allow for a substitution effect, Section 2 develops a continuous trade-off between effort and its determinants, extending the set-up by Shapiro and Stiglitz (1984). In order to separate the employment effects of firing cost – i.e. the tax component – and transfers to workers, (implicit) government subsidies for severance payments are allowed for. Section 3 shows that if a unit of wage payments is more costly to the firm than a unit of severance pay, lump-sum severance pay will induce a wage reduction, lower labour cost and thereby raise employment. This mirrors findings for a setting with dichotomous effort decision (Saint-Paul 1995, Fella 2000, Goerke 2002). An increase in earnings-related severance payments weakens the firm's incentives to reduce wages and mitigates or even reverses the positive employment consequences owing to the level impact. Finally, Section 3 demonstrates that substituting earnings-related severance payments for lump-sum transfers reduces employment because the income effect no longer occurs, while the substitution impact induces firms to raise the wage. These findings - summarised and discussed in Section 4 - indicate that the type of severance payment prevailing in the OECD may be detrimental to employment, even if shirkers are excluded from such transfers.

2. An Efficiency Wage Economy with Continuous Effort Function

Firms are subject to firm-specific shocks which alter marginal revenues and pay efficiency wages since workers' effort is only imperfectly observable. Firms and workers are risk-neutral, have an infinite life and discount future payoffs with the common rate r, $r > 0$.

2.1 Effort Decision

The instantaneous utility of a worker equals the difference between income and effort e which, without loss of generality, is restricted to the interval [0, 1]. Given the wage, the worker decides about the effort to exert.[4] Higher effort reduces the probability c(e) of being caught shirking, which automatically results in a dismissal. This probability c is declining with effort e at a decreasing rate, $c' < 0 < c'', c'''$. A dismissal for shirking is feasible for any effort level $e < 1$. The probability of being

[3] An exception to the general approach of modelling severance payments as lump-sum transfers is Staffolani (2002) who investigates variations in the *level* of earnings-related severance payments. In the present paper, a change in the *composition* of severance pay allows to isolate the substitution effect.

[4] For qualitatively similar approaches see Chatterji and Sparks (1991), Altenburg and Straub (1998), or Carter (1998).

fired owing to an exogenous, economic shock is given by b. The probabilities b and c(e) are sufficiently small, implying bc(e) ≈ 0. Denote by V_t^J the utility stream of a worker who has job at the beginning of period t and by $V_{t+1}^{U,l,e}$ the utility stream of a worker who *loses* the job at the end of period t due to *exogenous* reasons and is, therefore, *unemployed* at the beginning of t + 1.

Severance payments Ψ are only handed out to a worker who loses the job owing to exogenous, i.e. economic reasons. They consist of a lump-sum component S, S ≥ 0, and a wage-related element σ w, σ ≥ 0, where w represents the wage. Severance payments can either be modelled as transfers per unit of time or as one-off payments. In the former case, the duration of such transfers must be limited, since otherwise the expected utility of a worker would not be bounded, given an infinite life. Alternatively, severance pay can be viewed as a single transfer, for example, in the period subsequent to a dismissal. On the one hand, this approach may be regarded as unsatisfactory insofar, as that saving is impossible in the traditional Shapiro-Stiglitz model.[5] On the other hand, real world severance pay is akin to a single transfer. In the present paper, the main approach in the literature is followed and severance payments are modelled as one-time payments. Assume, finally, that a dismissal implies at least one period of unemployment. In such a set-up, the utility stream $V_{t+1}^{U,l,e}$ of a worker who *loses* the job for exogenous reasons at the end of period t consists of the utility stream in period t + 2 of an unemployed worker who *has lost* the job due to exogenous reasons $V_{t+2}^{U,e}$, plus severance payments in period t + 1, $V_{t+1}^{U,l,e} = V_{t+2}^{U,e} + \Psi_{t+1}$.

Since dismissed shirkers do not obtain severance pay, their utility stream of becoming and being unemployed is the same and denoted by $V_t^{U,s}$. Given these assumptions, the utility stream of an employed worker at time t is given by V_t^J, where:

$$rV_t^J = w_t - e_t + b\left[V_{t+1}^{U,l,e} - V_{t+1}^J\right] + c(e_t)\left[V_{t+1}^{U,s} - V_{t+1}^J\right] \tag{1}$$

When selecting the optimal level of effort, a worker takes as given the utility streams in the event of unemployment $V_{t+1}^{U,l,e}$, $V_t^{U,s}$, of future employment V_{t+1}^J, and the wage w_t. Maximisation of V_t^J with respect to current effort e_t yields:

$$\frac{\partial V_t^J}{\partial e_t} = -1 + c'(e_t)\left(V_{t+1}^{U,s} - V_{t+1}^J\right) = 0 \tag{2}$$

The subsequent analysis focuses on a steady-state in which endogenous variables do not change over time. Moreover, since all workers shirk in (a pure strategy) equilibrium, being dismissed for

[5] Phelps (1994, chap 15) and Brecher at al. (2002) allow for optimal savings decisions in long-run versions of the Shapiro-Stiglitz model.

shirking does not convey any information about work behaviour. Moreover, all unemployed find a new job with the same probability and then obtain an instantaneous utility stream V_t^J. Thus, the utility streams of unemployed shirkers and of workers who have lost their job for exogenous reasons are the same, implying $V_t^{U,e} = V_t^{U,s} \equiv V_t^U$. Thus, differential (expected) payoffs for unemployed shirkers and non-shirkers can only result due to severance pay entitlements. Combination of equations (1) and (2) and omission of the time index then gives rise to:

$$[r + b + c(e)] + c'(e)\{w - e - rV^U + b\Psi\} = 0 \tag{3}$$

While the above considerations apply for an individual worker and, accordingly, a given utility stream V^U from unemployment, in equilibrium V^U is determined endogenously. This utility stream from unemployment consists of unemployment benefits $\overline{w}$ and the expected utility gain from finding a new job, $rV^U = \overline{w} + a(V^J - V^U)$, a being the endogenously determined re-employment probability. A steady-state requires the inflow into unemployment (b + c(e))N to equal the outflow a(1 - N), where N is aggregate employment and labour supply is normalised to unity. Substituting for V^J in accordance with equation (1) and for the job acquisition rate a using the steady-state constraint implies:

$$V^U = \frac{\overline{w}(r + b + c(e)) + N\kappa(e)[w - e + b\Psi]}{r[r + \kappa(e)]}, \quad \text{for } \kappa(e) \equiv \frac{b + c(e)}{1 - N} > 0. \tag{4}$$

Taking into account these equilibrium repercussions, effort is determined by a modified equation (3), where V^U and b + c(e) have been substituted in accordance with (4):

$$\Omega = [r + \kappa(E)] + c'(E)\{w - E + b(S + \sigma w) - \overline{w}\} = 0 \tag{5}$$

To indicate that the variations in effort are calculated for changes in variables which affect the entire economy, the respective effort level is denoted E. The change in E, for example, due to a higher wage, is determined by $E_w = -\Omega_w/\Omega_E$, where Ω_w is the partial derivative of Ω with respect to wages. Differentiation of Ω yields:

$$\Omega_E = c''(E)\{w - E + b\Psi - \overline{w}\} + \frac{Nc'(E)}{1 - N} \tag{6}$$

$$\Omega_N = \frac{\kappa(E)}{1 - N} > 0 \tag{7}$$

$$\Omega_w = c'(E)(1 + b\sigma) < 0 \tag{8}$$

While the sign of Ω_E is theoretically ambiguous, since higher effort reduces the utility from unemployment V^U and also κ(E), effort E only rises with wages and declines with employment for $\Omega_E >$ 0. This sign restriction is assumed to hold, henceforth. If it were not warranted, an equilibrium with minimal wages and maximal employment would exist. Accordingly, the present framework can only help to analyse the unemployment effects of earnings-related severance pay if $\Omega_E > 0$ applies.

2.2 Firm Behaviour

There is a fixed number of firms in the economy which is normalised to unity. As a consequence, the firm's maximisation problem can be expressed in terms of aggregate variables, thereby bypassing any aggregation issues. The timing of decisions is as follows: at the beginning of a period, the firm sets a wage which determines the level of effort and also chooses employment. Production occurs and workers exert their optimal level of effort. At the end of the period, shirkers are dismissed and an exogenously given number of jobs becomes unprofitable, such that those workers who have performed the relevant tasks become superfluous. They are dismissed for economic reasons and obtain severance pay. In order to allow for a steady-state, the same number of jobs as have been closed down are re-opened at the beginning of the next period. Hiring workers for these new jobs is costless and has to take place from the pool of unemployed. The firm's production function f is strictly concave in effective employment ($f'(EN) > 0$, $f'' < 0$), while the capital stock is fixed and its cost are normalised to zero. The firm pays taxes τ, $\tau \geq 0$, on its payroll. These taxes include all wage-related, non-wage cost of employment. Given these assumptions, expected profits are invariant over time and the firm's behaviour can be derived from the maximisation of its expected profits per period.

According to the tax interpretation of severance payments, dismissals may involve cost in addition to transfers to workers (Bentolila and Bertola 1990, Burda 1992). However, it is also conceivable for the government to subsidise severance payments, for example, by exempting them from income taxation. Let, thus, the cost of severance pay to the firm be a fraction or multiple ξ of the transfers which workers receive, $0 \leq \xi$. If $\xi = 1$ holds, there will neither be additional cost nor subsidies. Accordingly, profits per period can be expressed as:

$$\Pi = f(NE) - N\left[w(1+\tau) + b\Psi\xi\right] \tag{9}$$

The firm chooses wages w and employment N to maximise profits.[6] This yields:

$$\frac{\partial \Pi}{\partial N} \equiv \pi_N = f'E - w(1+\tau) - b\Psi\xi = 0 \tag{10}$$

$$\frac{\partial \Pi}{\partial w} \equiv \pi_W = N\left[f'E_W - (1+\tau) - b\sigma\xi\right] = 0\,, \tag{11}$$

The second-order condition requires the effort function to be strictly concave in the wage, implying $E_{WW} < 0$. As shown in the appendix, this requirement is warranted for $\Omega_E > 0$. From inspection of equation (10) it is, moreover, obvious that pure firing cost always lower employment in the present set-up.

[6] It could be argued that the firm can promise workers severance payments in the case of a dismissal. However, given a dismissal, a firm always has an incentive to renege. Therefore, severance payments are assumed to be set by a legal institution and to represent an exogenous variable from the firm's perspective.

2.3 Equilibrium

The equilibrium of the economy is defined by the firm's first-order condition (10) and a modified Solow-condition (Solow 1979), resulting from equations (10) and (11):

$$F \equiv f'(E(w,N,\Psi)\times N)\times E(w,N,\Psi) - w\times(1+\tau) - b\times\xi\times(S+\sigma w) = 0 \qquad (12)$$

$$H \equiv \frac{E(w,N,\Psi)}{E_W(w,N,\Psi,\sigma)} - w - \frac{b\xi S}{1+\tau+b\xi\sigma} = 0 \qquad (13)$$

The endogenous variables of the system are the wage w and employment N, the exogenous ones are the determinants of severance payments S and σ. Differentiation of F with respect to wages and employment yields:

$$F_W = f''ENE_W + f'E_W - 1 - \tau - b\xi\sigma = f''ENE_W < 0 \qquad (14)$$

$$F_N = f''E^2 + (f''EN + f')E_N < 0\text{, for } f''EN + f' \geq 0.^7 \qquad (15)$$

Moreover, given the restriction on c(E), H_W and H_N will be positive if at least 50% of the labour force are employed (see appendix). Equations (12) and (13) will define a stable equilibrium if the labour demand curve has a steeper slope in the wage-employment space than the Solow-condition, so that the determinant of the system is negative, $D = F_N H_W - H_N F_W < 0$. This restriction is assumed to hold.

3. Employment Effects of Severance Payments

Initially, a higher lump-sum component S of severance pay is analysed. Subsequently, an increase in the earnings-related element σ is looked at. Both investigations prepare for the main issue, the substitution of the earnings-related for the lump-sum component of severance pay.

3.1 Lump-sum Severance Payments

The effects of lump-sum severance payments on the labour demand schedule F and the modified Solow-condition H can be ascertained from equations (12) and (13):

$$F_S = (f''EN + f')E_S - b\xi \qquad (16)$$

$$H_S \equiv \frac{E_S E_W - EE_{WS}}{(E_W)^2} - \frac{b\xi}{1+\tau+b\xi\sigma} \qquad (17)$$

In order to evaluate these expressions, the impact of wages w and lump-sum severance pay S on effort E has to be known. According calculations using equations (5), (6), and (8) show that E_S/E_W

[7] This sign restriction, which has usually been made (Akerlof and Yellen (1985), Pisauro (1991), and Chang et al. (1999)), and is also assumed subsequently, holds, for example, for a Cobb-Douglas production function.

$= \Omega_{ES}/\Omega_{Ew} = E_{wS}/E_{ww} = b/(1 + b\sigma) \equiv \beta$ hold (see also the appendix). Since F_w, $D < 0$ and $H_w > 0$, substitution in (16) and (17), also using $\gamma \equiv 1 + \tau + b\zeta\sigma > 0$, yields:

$$\frac{dN}{dS} = \frac{H_S F_w - F_S H_w}{D} = \frac{\beta(\tau + 1 - \xi)}{D}\left[F_w / \gamma - H_w\right] \tag{18}$$

Findings are summarised in:

Proposition 1

If the cost of wage and severance payments are the same ($\tau = \xi - 1$), mandated, lump-sum severance payments S will have no employment effects. If a unit of wage payments is more costly than a unit of severance pay ($\tau > \xi - 1$), lump-sum severance pay S will raise employment.

Garibaldi and Violante (1999) calculate that the non-transfer component of firing cost in Italy and the UK is less than 15%.[8] Given an effective tax rate on labour in many countries in the range of 30% to 40%, this suggests $\tau > \xi - 1$ and that mandated severance payments raise the number of jobs.[9] To provide an intuition for this prediction assume, first, that the cost of wage and severance payments are the same ($\tau = \xi - 1$), entailing the absence of any employment effect. Severance payments are only received by workers who have not been caught shirking. The wage reaction to the change in severance payments is determined by the modified Solow-condition (13). Since $E_S/E_w = E_{wS}/E_{ww} = \beta$ holds, a rise in lump-sum severance payments induces a wage reduction by β, for a given level of employment, as the combination of H_S (see equation (17)) and H_w (derived in the appendix) shows. This implies constant labour cost per worker $w + b[S + \sigma w]$. Moreover, for a given level of employment, the effort level of workers is unaffected, since $dE/dS = E_S + E_w dw/dS = 0$. If each worker provides the same level of effort and labour cost are constant, employment will be the same as before the increase in severance payments. Lazear's (1990) finding that a wage adjustment may exactly offset the increase in labour cost due to severance pay can, hence, be replicated in an efficiency wage setting (cf. Goerke 2002).

Suppose, second, that the payroll tax rate is positive or the government subsidises severance payments, or more generally, that a unit of wage payments is more costly than a unit of severance pay ($\tau > \xi - 1$). For a given level of employment it can be derived from the modified Solow-condition that wages fall more strongly with severance pay than in the absence of payroll taxes or subsidies. This is because a positive payroll tax or subsidies for severance payments make wages more costly, relative to severance pay. If wage cost fall more strongly than expected expenditure for severance pay rises, expected labour cost will decline and employment will go up. Higher employment increases the utility stream from unemployment V^U. The ensuing reduction in effort and employment only mitigates but does not reverse the positive employment effect of lump-sum severance pay.

---

[8] In a later study, Garibaldi and Violante (2002) find for Italy that dismissal cases which go to trial and, thus, involve an above average fraction of firing cost, still entail a transfer component of up to 75%.

[9] The assumption of $\tau > \zeta - 1$ is discussed further in the concluding section.

3.2 Earnings-Related Severance Payments

In OECD countries, severance payments are usually defined as a linear function of the wage which has been paid prior to the dismissal, although minimum payments are also well-known (OECD 1999). An increase in the lump-sum component S can be interpreted as a higher minimum payment. The question ,therefore, is whether the same qualitative employment effects as for minimum payments occur when strengthening the earnings-related component. Staffolani (2002) has shown that such earnings-related severance payments to which also shirkers are entitled, have ambiguous employment consequences. Focusing on transfers from which shirkers are excluded one obtains from equation (5), and employing the same procedure as it has been used for the calculation of E_S and E_{wS}, that $E_\sigma = E_w w\beta$ and $E_{w\sigma} = [E_{ww}w + E_w]\beta$ hold. This gives rise to the following relationship between H_w and H_σ:

$$H_\sigma = \beta\left[H_w w - b\xi S(\tau + 1 - \xi)/\gamma^2\right] \tag{19}$$

Moreover, note that $F_\sigma = F_S w$. Using the same methodology as for the calculation of the effects of a rise in S, the variation in employment owing to an increase in the earnings-related component of severance payments is found to be:

$$\frac{dN}{d\sigma} = -\frac{\beta(\tau + 1 - \xi)}{D}\left[H_w w + F_w b\xi S/\gamma^2\right] \tag{20}$$

Since F_w and H_w have the opposite sign, the employment effect of earnings-related severance pay is generally ambiguous. This is due to the potentially wage increasing impact of a rise in the earnings-related component σ. Results are summarised in:

Proposition 2

If the cost of wage and severance payments to the firm are the same ($\tau = \xi - 1$), respectively differ ($\tau \neq \xi - 1$), mandated, earnings-related severance payments σ will have no, respectively ambiguous employment effects. If a unit of wage payments is more costly than a unit of severance pay ($\tau > \xi - 1$), there is no minimum payment ($S = 0$) or severance pay has no cost effect for the firm ($\xi = 0$), employment will rise with earnings-related severance payments.

To illustrate the employment effects assume, first, that the cost of wage and severance payments to the firm are the same ($\tau = \xi - 1$). In this case, a variation in severance pay induces an adjustment in the efficiency wage such that only the composition but not the level of expected labour cost and a worker's income change. Since the firm and workers are risk-neutral, there is no employment effect. Presume, second, that a unit of wage payments is more costly than a unit of severance pay ($\tau > \xi - 1$). In this case, a change in the composition of the worker's expected income alters expected labour cost and employment will vary with a variation of earnings-related severance pay. In order to determine this employment effect, assume lump-sum payments to be zero (S = 0). For a given level of employment, the sum of wages and expected severance pay $w + bw\sigma$ will remain constant if severance payments are increased, because wages decline accordingly. This finding can be derived from the modified Solow-condition (13) which indicates the wage change to be given by $dw/d\sigma = -H_\sigma/H_W = -E_\sigma/E_W = -w\beta < 0$. If the sum of wages and expected severance pay does not vary, effort will remain constant. However, as a unit of wage payments is more costly than a unit of severance pay ($\tau > \xi - 1$), expected labour cost decline. This entails more employment.[10] If, third, a unit of wage payments is more costly than a unit of severance pay and minimum severance payments exist (S > 0), the wage declines with earnings-related severance pay by less than in the absence of lump-sum payments (S = 0), for a given level of employment. This implies $dw/d\sigma = -H_\sigma/H_W > -w\beta$ and is the case because lump-sum severance payments, which are qualitatively the same as fixed employment cost, provide an incentive to increase the wage above the level which is optimal for a firm without lump-sum payments (Goerke 1997, Pisauro 2000). This incentive to drive up wages in order to reduce fixed employment cost is mitigated but not abolished by the increase in earnings-related severance payments. If the wage falls by less than in the absence of lump-sum payments, effort will rise but so will labour cost. While the employment enhancing effect of a positive payroll tax persists, given that the wage falls, the net effect on labour cost is uncertain and might be positive. Since an increase in labour cost can more than compensate the rise in effort, employment effects of earnings-related severance pay will be ambiguous if earnings-related and lump-sum elements co-exist.

3.3 Substituting Earnings-Related for Lump-Sum Payments

In the light of previous results, the issue of the relative employment performance of lump-sum and earnings-related severance payments arises. In order to evaluate their impact, the two types of transfers need to be comparable. Accordingly, a substitution of earnings-related severance payments for lump-sum transfers is analysed, holding constant their overall level at $\overline{\Psi}$. The respective constraint is then given by $K \equiv \overline{\Psi} - S - w\sigma = 0$. Treating the lump-sum payment S, the wage w and employment N as endogenous variables, and the earnings-related component σ as exogenous one, while making use of $F_S w = F_\sigma$ and $H_\sigma = H_S w - Z$, for

$$Z \equiv \beta(\tau + 1 - \xi)(w(1+\tau) + b\xi\Psi)/\gamma^2, \tag{21}$$

the variation in employment is found to be:

[10] A similar reasoning applies to the case of severance payments which are paid for entirely by the government in the form of subsidies. In such a setting, the decline in wages will unambiguously reduce labour cost, irrespective of whether wages are taxed or not.

$$\left.\frac{dN}{d\sigma}\right|_{d\overline{\Psi}=0} = \frac{Z\left[F_W + F_S K_W\right]}{K_W\left[F_N H_S - H_N F_S\right] - D}, \tag{22}$$

where $D = F_N H_W - H_N F_W < 0$ by the stability argument (Section 2.3). Assume, first, that earnings-related are substituted for lump-sum severance payments, holding constant their overall level at the initial wage. This implies that severance pay is not adjusted to wage alterations ($K_W = 0$). Under this assumption, employment declines for $\tau + 1 - \xi > 0$ and, hence, $Z > 0$. The same consequences will result if the introduction of earnings-related severance payments is analysed, that is if the employment impact is evaluated at $\sigma = 0$. The intuition for the negative employment effect is the following: if the level of severance payments is held constant, effort and labour demand will be unaffected (see equations (5) and (12)). Raising the earnings-related component σ, however, increases marginal effort $E_W = - c'(E)(1 + b\sigma)/\Omega_E$. Higher marginal effort induces the firm to raise the efficiency wage, according to equation (13). This wage increase reduces the quantity of labour demanded, despite its effort effect, as can be noted from equations (14) and (15), because wages are chosen optimally by the firm. Holding constant severance payments at the initial wage ensures that the income effect due to the wage adjustment described above does not counteract the substitution impact.

Suppose, second, that the level of severance payments is not held constant at the initial wage but that wage changes are taken into account. In this case, the employment effect becomes ambiguous for $\sigma > 0$. This is because a substitution of an earnings-related component of severance pay for the lump-sum part, holding constant its overall level at the initial wage, raises the wage. Thus, if the wage change is taken into account, severance payments increase. In order to retain their original level, for example, the lump-sum component has to be lowered. If a unit of wage payments is more costly than a unit of severance pay ($\tau > \xi - 1$), as it has been assumed, the reduction in lump-sum severance pay strengthens the negative employment effect (see equation (18)). However, a lower lump-sum component of severance payments induces a rise in the wage, in order to retain the worker's expected income. Thus, the impact of a reduction in S on overall severance payments, $S + \sigma w$, is uncertain and depends, inter alia, on the magnitude of the earnings-related component σ. If, therefore, the consequences of wage adjustments on the level of severance payments are taken into account, the impact of a stronger earnings relationship on expected labour cost can no longer be ascertained. Results may be summarised in:

Proposition 3

Assuming a unit of wage payments to be more costly than a unit of severance pay ($\tau > \xi - 1$), a substitution of the earnings-related for the lump-sum component will reduce employment if severance payments are held constant at the initial wage. Taking into account the wage change, employment will also decline with an according substitution if higher lump-sum severance payments raise the level of these transfers, having incorporated the wage change.

4. Conclusions

In this paper, it is assumed that firms cannot make credible a commitment with respect to severance payments and, accordingly, cannot choose such transfers optimally. Instead, the government mandates severance payments. It is shown that such legislated severance payments can increase employment in an economy in which efficiency wages are paid in order to raise workers' productivity if they are only granted to workers who are dismissed for economic reasons. In the present framework, positive employment effects require a unit of wage payments to be more costly than a unit of severance pay. Given positive employment effects of lump-sum payments, the impact of earnings-related severance payments is ambiguous, such that a substitution of earnings-related for lump-sum payments, holding constant their overall level at the initial wage, reduces employment. Therefore, the predominant form of severance payments in OECD countries may have less desirable employment effects than previously conjectured, even if shirkers are excluded from the receipt of such transfers.

How robust is this result to modifications of the basic model? Three assumptions seem to be potentially noteworthy: first, the restriction on the differential cost effect of wages and severance payments. Second, the assumption of fixed dismissal probabilities and a given job acquisition rate and, third, the exclusion of shirkers from severance pay entitlements.

The assumption of a unit of wages being more costly to firms than a unit of severance pay will always be warranted if the wage wedge, defined as entire wage cost relative to the net wage, exceeds the severance pay wedge, where the latter consists of the complete cost of dismissing a worker, relative to the amount of money received by a dismissed worker. This wedge differential is likely to be positive since severance payments are exempted from social security contributions more often or to a greater extent than wages, can be subject to higher levels of tax exemption or may be taxed at a lower rate, respectively not at all. Moreover, the - scarce - empirical evidence suggests that firing cost in excess of severance payments are relatively small. More generally, the assumption of a unit of wage payments to be more costly than a unit of severance pay can be interpreted as a means of generating positive employment effects of lump-sum severance pay. Alternatively, it could have been presumed in line with Fella (2000) that severance pay reduces wages in the good state of nature but does not raise them in the bad state, as it occurs in the Lazear (1990) model. Accordingly, severance payments reduce expected labour cost in Fella's alternative set-up. The qualitative employment consequences of lump-sum severance pay granted to non-shirkers would not have been affected by this more elaborate modelling strategy. Therefore, the assumption of a unit of wage payments being more costly than a unit of severance pay not only seems to be broadly warranted empirically, but may also be interpreted as a convenient modelling short-cut.

Assuming fixed dismissal probabilities and a given job acquisition rate obviously excludes the effects of severance payments which arise due to a reduction in labour turnover. Instead, the emphasis has been on the direct cost impact and on the influence on wage formation. This simplification is unlikely to alter the main findings of the paper: first, a given change in lump-sum and earnings-related severance pay would affect dismissal probabilities in the same manner. Second, the main result of the paper concerns a change in the composition of severance pay. However, the dismissal probabilities depend on the (given) level of such transfers. Accordingly, it is possible to focus on the wage effects of a change in the composition of severance pay. Moreover, any change in the job acquisition rate would then be conditional on the wage induced variation in employment and could, hence, mitigate but not reverse the employment predictions.

The exclusion of shirkers from severance pay entitlements may, at first sight, be regarded as the most crucial assumption. If every dismissal entailed severance payments and the probabilities of dismissing a shirker were unaffected by this modification, severance payments would become akin to one-time unemployment benefits. If severance pay were lump-sum, the employment consequences would, accordingly, be negative. However, the impact of earnings-related severance payments on employment is ambiguous (Staffolani 2002), since the income effect may be counteracted by a substitution effect. This is because a stronger earnings relationship will tend to lower marginal effort if every dismissed worker is entitled to severance payments. The firm reacts to the fall in marginal effort by lowering wages, such that the employment impact of a higher level of earnings-related severance pay for all dismissed workers is uncertain. Hence, a stronger earnings relationship of severance pay, holding constant its level, also has uncertain employment consequences. Accordingly, a similar finding obtains as for earnings-related severance payments which only non-shirkers receive. Moreover, granting shirkers severance pay entitlements may alter the firms' dismissal behaviour, causing further uncertainties in the employment consequences.

Summing up, the previous discussion suggests that the main result of this paper, according to which the employment impact of strengthening the earnings relationship of severance payments is uncertain, holding constant the level of such transfers, and may well be negative, also applies under alternative modelling assumptions.

5. Appendix: Signs of H_w, H_N, E_{ww}, and E_{wS}

The derivatives of the modified Solow-condition H with respect to the wage w and employment N are positive for $N \geq 0.5$ and given by:

$$H_w = -\frac{EE_{ww}}{(E_w)^2} = -\frac{E}{(E_w)^2}\left(-\frac{\Omega_E \Omega_{wE} E_w - \Omega_w \Omega_{Ew} - \Omega_w \Omega_{EE} E_w}{(\Omega_E)^2}\right)$$

$$= \frac{E}{E_w \Omega_E}\left(2\Omega_{wE} + E_w \Omega_{EE}\right)$$

$$= \frac{E}{E_w 2\Omega_{wE}}\left(2c''(E)(1+b\sigma) + E_w\left(c'''(E)\{w - E + b\Psi - \overline{w}\} - c''(E)\frac{1-2N}{1-N}\right)\right) > 0 \quad \text{(I)}$$

$$H_N = \frac{E_N E_w - EE_{wN}}{(E_w)^2} > 0, \text{ since} \quad \text{(II)}$$

$$E_{wN} = \frac{-\Omega_E \Omega_{wE} E_N + \Omega_w(\Omega_{EN} + \Omega_{EE} E_N)}{(\Omega_E)^2}$$

$$= E_N \frac{\frac{\Omega_w}{\Omega_E}\left[\frac{c'(E)}{(1-N)^2 E_N} + c'''(E)\{w - E + b\Psi - \overline{w}\} - c''(E)\frac{1-2N}{1-N}\right] - \frac{c''(E)}{(1+b\sigma)^{-1}}}{\Omega_E} > 0 \quad \text{(III)}$$

The derivative of marginal effort E_w with respect to minimum severance payment S is:

$$E_{wS} = -\frac{\Omega_E \Omega_{wE} E_S - \Omega_w \Omega_{ES} - \Omega_w \Omega_{EE} E_S}{(\Omega_E)^2}$$

$$= \beta \frac{-\Omega_E \Omega_{wE} E_w + \Omega_w \Omega_{Ew} + \Omega_w \Omega_{EE} E_w}{(\Omega_E)^2} = E_{ww}\beta < 0 \quad \text{(IV)}$$

Since Ω_E, Ω_{wE}, Ω_{EE}, $E_w > 0$ from (6) and (8) and the assumptions on c(E), while $\Omega_w < 0$, E_{ww}, $E_{wS} < 0$ obtains.

6. References

Akerlof, George A. and Janet L. Yellen (1985), A Near-Rational Model of the Business Cycle with Wage and Price Inertia, *The Quarterly Journal of Economics* 100, 823-838.

Altenburg, Lutz and Martin Straub (1998), Unemployment Benefits in a Unionized Economy with Efficiency Wages, *Oxford Economic Papers* 50, 726-746.

Belot, Michèle, Jan Boone and Jan C. van Ours (2002), Welfare Effects of Employment Protection, CEPR Discussion Paper No. 3396.

Bentolila, Samuel and Guiseppe Bertola (1990), Firing Costs and Labor Demand: How Bad is Eurosclerosis?, *Review of Economic Studies* 57, 381-402.

Bertola, Guiseppe (1999), Microeconomic Perspectives on Aggregate Labor Markets, 2985-3028, in: Ashenfelter, O. and D.C. Card (eds.), *Handbook of Labor Economics*, IIIC, Elsevier.

Booth, Alison L. (1997), An Analysis of Firing Costs and Their Implications for Unemployment Policy, 359-388, in: Snower, D.J. and G. de la Dehesa (eds), *Unemployment Policy: Government Options for the Labour Market*, Cambridge University Press.

Brecher, Richard A., Chen, Zhiqi and Eshan U. Choudhri (2002), Unemployment and Growth in the Long Run: an Efficiency Wage Model with Optimal Savings, *International Economic Review* 43, 875-894.

Burda, Michael C. (1992), A Note on Firing Costs and Severance Benefits in Equilibrium Unemployment, *Scandinavian Journal of Economics* 94, 479-489.

Carter, Thomas J. (1998), Minimum Wage Laws: What Does an Employment Increase Imply about Output and Welfare?, *Journal of Economic Behavior and Organization* 36, 473-485.

Chang, Juin-jen, Chung-Cheng, Lin and Ching-Chong Lai (1999), The Unemployment and Wage Effects of Shifting to an Indirect Tax in an Efficiency Wage Model, *The Economic Record* 75, 156-166.

Chatterji, Monojit and R. Sparks (1991), Real Wages, Productivity, and the Cycle: An Efficiency Wage Model, *Journal of Macroeconomics* 13, 495-510.

Fella, Guilio (2000), Efficiency Wages and Efficient Redundancy Pay, *European Economic Review* 44, 1473-1490.

Galdón-Sánchez, José E. and Maia Güell (2003), Dismissal Conflicts and Unemployment, *European Economic Review* 47, 127-139.

Garibaldi, Pietro and Giovanni L. Violante (1999), Severance Payments in Search Economies with Limited Bonding, Mimeo, University College London.

Garibaldi, Pietro and Giovanni L. Violante (2002), Firing Tax and Severance Payment in Search Economies: a Comparison, CEPR Discussion Paper No. 3636.

Goerke, Laszlo (1997), Taxes in an Efficiency Wage Economy in the Short-run and in the Long-run, *Finanzarchiv* 54, 447-470.

Goerke, Laszlo (2002), On Dismissal Pay, *Labour Economics* 9, 497-512.

Hoel, Michael (1990), Efficiency Wages and Income Taxes, *Journal of Economics/ Zeitschrift für Nationalökonomie* 51, 89-99.

Lazear, Edward P. (1990), Job Security Provisions and Employment, *The Quarterly Journal of Economics* 105, 699-726.

Lindbeck, Assar and Dennis J. Snower (2001), Insiders versus Outsiders, *Journal of Economic Perspectives* 15, 165-188.

Ljungqvist, Lars (2002), How Do Layoff Costs Affect Employment?, *The Economic Journal* 112, 829-853.

Lockwood, Ben and Alan Manning (1993), Wage Setting and the Tax System, *Journal of Public Economics* 52, 1-29.

Millard, Stephen P. and Dale T. Mortensen (1997), The Unemployment and Welfare Effects of Labour Market Policy: A Comparison of the USA and the UK, 545-572, in: Snower, D.J. and G. de la Dehesa (eds), *Unemployment Policy: Government Options for the Labour Market*, Cambridge University Press.

OECD (1999), Employment Protection and Labour Market Performance, 47-132, in: *Employment Outlook*.

Phelps, Edmund S. (1994), *Structural Slumps*, Harvard University Press.

Pisauro, Guiseppe (1991), The Effect of Taxes on Labour in Efficiency Wage Models, *Journal of Public Economics* 46, 329-345.

Pisauro, Guiseppe (2000), Efficiency Wages, Fixed Employment Costs, and Dual Labor Markets, *Labour* 14, 213-244.

Pissarides, Christopher A. (2000), *Equilibrium Unemployment Theory*, 2nd. ed., MIT Press.

Pissarides, Christopher A. (2001), Employment Protection, *Labour Economics* 8, 131-159.

Saint-Paul, Gilles (1995), Efficiency Wage, Commitment and Hysteresis, *Annales D'Economie et de Statistique* 37/8, 39-53.

Sanfey, Peter J. (1995), Insiders and Outsiders in Union Models, *Journal of Economic Surveys* 9, 255-284.

Shapiro, Carl and Joseph E. Stiglitz (1984), Equilibrium Unemployment as a Worker Discipline Device, *American Economic Review* 74, 433-444.

Solow, Robert M. (1979), Another Possible Source of Wage Stickiness, *Journal of Macroeconomics* 1, 79-82.

Staffolani, Stefano (2002), Firing Costs, Efficiency Wages and Unemployment, *Labour* 16, 803-830.