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Severance Payments and Firm-Specific Human Capital

Peter Rühmann, Jens Südekum

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Peter Rühmann
University of Goettingen

Jens Südekum
University of Goettingen

ABSTRACT

An increase in legally binding severance payments creates both an incentive and a disincentive for workers to invest in firm-specific human capital. Which effect prevails on balance depends on the productivity of the worker's human capital investment.
For strong positive reactions, increases in severance payments can even be mutually beneficial for workers and firms.

Keywords: Severance Payments, Employment Protection, Human Capital

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*) Correspondence address:

Jens Suedekum, Department of Economics, University of Goettingen. Platz der Goettinger Sieben 3, 37073 Goettingen, Germany.
Tel.: +49/551/39-7633. FAX: +49/551/39-4875. e-mail: jsuedekum@wiwi.uni-goettingen.de

1) *Introduction*

Economic research on severance payments (SP), i.e. government-mandated payments from the firm to the employee in case of firing, not in case of a quit, has long focussed on the overall implications for employment and efficiency. Following Lazear's (1990) neutrality result, the subsequent literature found that SP can be efficiency and employment enhancing if they are suited to cure for certain types of market or coordination failure[1].

This paper takes a different stand towards the problem. We want to focus on the effects that SP have on the behaviour of employed workers. This is an issue much less explored[2]. At various places in the literature one can find informal reasoning, that SP produce incentives for workers to invest more in firm-specific human capital[3]. Yet, this assertion has not found a substantial theoretical treatments so far.

This paper aims to contribute to this task. We present a simple two-period model with uncertainty, in which workers decide on firm-specific human capital investments. Our main result is that increases in legally binding SP *can* stimulate human capital investments. The channel for this result is a decreasing perceived risk of plant closure. Yet, increases in SP *can also* decrease the optimal investment amount, because the value of staying with one particular firm relative to receiving the firing compensation deteriorates. We refer to these two effects as the incentive and the lethargy effect of SP that are always present. Which effect prevails on balance

[1] See Pissarides (2001), Alvarez/Veracierto (2001) for incomlete insurance markets; Cahuc/Zylberberg (1999) for imperfectly renegotiable labor contracts; Levine (1991) for adverse selection; Houseman (1990), Kuhn (1992) for asymmetric information. For an empirical survey see Addison/Teixeira (2001). For the implications if SP are interpreted as exit costs see e.g. Bertola/Bentotola (1990).

[2] Some empirical results are available. Ichino/Riphahn (2001) e.g. analyse the impacts of employment protection on the absenteeism behaviour of Italian bank employees, and find that higher perceived job security reduces work effort. Some evidence for the positive impact of employment protection on productivity is presented by Freeman/Medoff (1984). A related result comes from Acemoglu/Pischke (2001) who show for the case of minimum wages it can be better to train workers rather than to fire them.

[3] Franke (1996 : 13); Butler/Walwei (1990: 388); Schmid (1995 : 307).

depends on the productivity of human capital investments. If the induced human capital formation is strong, an increase in SP can even be in the interest of the firm.

Our results do not point to the essential need for legislation[4]. SP are imposed to be an exogenous restriction, which they mostly are in reality. The reason why firms and workers can not privately agree on insurance schemes for human capital investments is not made explicit, but the usual arguments on coordination failures and incompleteness of labor contracts apply here. Asymmetric information is a very important issue in this regard[5]. This caveat and the partial character of the model notwithstanding, we believe that the point made in this paper sheds some light on a potential merit of SP that deserves to receive more attention.

The rest of the paper is organized as follows: Sections 2 and 3 present the basic decision problems of the firm and the representative worker respectively. Section 4 analyses the impacts of a marginal increase in SP on the optimal human capital investment of the worker. Section 5 draws implications for firm's profits. Section 6 concludes.

2) The firm's decision problem

Consider a firm that is maximizing profits π_t over two periods t=1,2.

$$\text{Max } \{ \pi_1 + \delta\pi_2 \} \qquad (1)$$

[4] This is one caveat of the analysis. Pissarides (2001 : 133) points out that "*it is difficult to see why firms will need legislation to protect them from not wasting firm-specific skills.*"

[5] See e.g. Houseman (1990 : 188): "*Firms typically possess better information on demand conditions than do workers. Firms may withhold information on pending layoffs or closures to avoid problems with employee morale and with suppliers and creditors. If they do, workers may overinvest in firm-specific human capital and underinvest in job search during the pre-layoff period*"

with time discount rate $0<\delta<1$. Profits π_1 are given and known to be positive.

The profits π_2 are an additive function of a deterministic component $\pi_2^e = \pi_1 + \pi(h)$, and a stochastic shock term ε_2 which occurs and is perceived by the firm at the beginning of t_2.

$$\pi_2 = \pi_2^e + \varepsilon_2 = \pi_1 + \pi(h) + \varepsilon_2 \qquad \text{with } \pi(h)' > 0,\ \pi(h)'' < 0 \qquad (2)$$

The term π_2^e positively depends on the level of human capital h that the worker has accumulated during the first period. The firm has to take this level of h as given, it will be determined by the worker's decision specified below. We assume that the exogenous shock ε_2 has a uniform distribution over the range (-c ; c), i.e. it has a mean 0 and variance $\frac{1}{3}c^2$. We abstract from any employment adjustments like partial hirings and firings. The only decision the firm makes is whether to keep on operating or to shut down the plant after having perceived ε_2. In a world without SP, the firm would close whenever $\varepsilon_2 < -\pi^e_2$. With a level of SP equal to s, the *plant closure condition* is $\varepsilon_2 < -(\pi^e_2 + s)$. If the firm closes at the beginning of t_2, the accumulated human capital for the worker is lost without compensation.

With the assumptions on ε_2, (3) gives the probability ρ that the firm will operate in t_2

$$\rho = \int_{-(\pi^e + s)}^{c} \frac{1}{2c}\, d\varepsilon \quad \rightarrow \quad \rho = \frac{c + \pi_2^e + s}{2c} \qquad (3)$$

ρ is increasing in both s and h, as can be seen from the partial derivatives in (4).

$$\rho_h = \frac{\pi'}{2c} > 0 \qquad \rho_{hh} = \frac{\pi''}{2c} < 0 \qquad \text{(4a)}$$

$$\rho_s = \frac{1}{2c} > 0 \qquad \rho_{hs} = 0 \qquad \text{(4b)}$$

The interrelations of the firm's decision problem are illustrated in figure 1. The striped area represents the probability (1-ρ) that the firm will shut down for a given level of h and s. The existence of s > 0 opens up the possibility that the firm keeps on operating with losses. This is represented by the grey area. An increase in s would enlarge the grey area. An increase in h would shift the grey area to the left at unchanged size.

3) The worker's decision problem

The (risk neutral) worker earns w_1 in the first period and chooses how many time units h to invest in firm-specific human capital. In t_2, the attainable wage increases with h:

$$w_2 = w_1 + w(h) \qquad \text{with } w' > 0,\ w'' < 0. \qquad (5)$$

We assume that the workers finances human capital investments, following Becker (1962). Each time unit devoted to learning imposes an opportunity cost α. The investment payoff is uncertain since the firm only keeps on operating with probability ρ. With probability (1-ρ) the worker will be fired, in which case she receives s. Moreover, in case of a layoff, she will look for another job elsewhere. Since her human capital is firm specific, she will only be able to get wage offers equal to λw_1. The parameter λ reflects the general labour market tightness and is equal to one

under full employment. Note that she has no incentive to quit herself. The worker's choice problem with respect to h is

$$Max\ \psi = \{w_1 - \alpha h + \delta\rho\ w_2 + \delta(1-\rho)(s + \lambda w_1)\}. \qquad (6)$$

The first-order condition to this problem is

$$\frac{\alpha}{\delta} \quad = \quad w'\rho + \rho_h(\tilde{w} - s) \qquad (7)$$

with $\tilde{w}$ = w(h)+(1-λ)w_1. This maximum condition for ψ consists of three terms. On the left hand side there are the constant opportunity costs α/δ. In equilibrium, they need to equal the sum of two effects that we label the *direct wage effect* w´ρ and the *job security effect* $\rho_h(\tilde{w}$-s). The intuition for the direct wage effect is the elementary story that marginal costs must equal marginal revenues. The job security effect stems from the (endogenous) uncertainty. Since ρ_h is positive, any increase in h makes the job of the worker c.p. more secure. The overall sign of the *job security effect*, however, depends on the difference between the wage in t_2 with this specific firm and the attainable income in case of a lay-off.

If a maximum for (6) exists at all, the second-order condition needs to be negative.

$$\frac{\partial \psi^2}{\partial^2 h} = w''\rho + \rho_{hh}(\tilde{w} - s) + 2\rho_h w' \ = \ w''\rho + \pi''\frac{(\tilde{w} - s)}{2c} + \frac{\pi' w'}{c} \ \overset{!}{<}\ 0 \qquad (8)$$

The sign of (8) is ambiguous to begin with, but functional forms of w and π can easily been chosen is such a way to ensure the existence of a maximum, even with s > $\tilde{w}$.

4) An increase in severance payments

We can now further evaluate (7) and check what effect a marginal increase in s has on the optimal choice $\hat{h}$. Total differentiation of (7) yields.

$$\left(w''\rho + 2\rho_h\, w' + \rho_{hh}(\tilde{w} - s)\right)d\hat{h} + \left(w'\rho_s + \rho_{hs}(\tilde{w} - s) - \rho_h\right)ds = 0 \qquad (9)$$

Using the partial derivatives from (4), we can rewrite (9) to

$$\frac{d\hat{h}}{ds} = -\frac{\frac{1}{2c}\left(w' - \pi'\right)}{w''\rho + \pi''\,\frac{(\tilde{w} - s)}{2c} + \frac{\pi' w'}{c}} \qquad (10)$$

The denominator has been imposed to be negative in (8) to ensure the maximum condition. Hence, if at any internal maximum of ψ the marginal effect $\frac{d\hat{h}}{ds}$ is positive, the following surprisingly simple condition needs to hold:

$$w' > \pi' \qquad (11)$$

Upon an increase in s, the worker perceives two changes: Firstly, the probability ρ (and thereby the direct wage effect) has increased. Secondly, the utility of maintaining the job relative to receiving s, i.e. the job security effect, has decreased. Subsequently, she re-optimises over h such that the sum of the two matches the unchanged opportunity costs. It turns out that for all cases with w´>π´ the direct wage

effect reacts stronger in the positive direction than the job security effect in the negative. Consequently, she will increase $\hat{h}$ in order for (7) to match.

The opposite happens if $w' < \pi'$. In that case, the worker feels induced to devote less time to learning. She rather gains more by increasing the chance of receiving SP instead of the attainable wage w_2 with that firm. All she can do here fore is to invest less in specific human capital. This is what we refer to as the *lethargy effect* of SP.

5) Increases in s and firm's profits

So far we have worked out the effects of an increase in s on the worker's optimal choice of human capital investment. Now we show that an increase in s can even be in the profit maximizing interest of the firm. A necessary condition here fore is $\frac{d\hat{h}}{ds} > 0$, but not a sufficient one.

From (2) we can write down a function of *realized profits* in t_2

$$P_2 = \rho\pi_2 - (1-\rho)s \qquad (12)$$

With probability ρ the firm actually realizes $\pi_2 = \pi_1+\pi(h)+\varepsilon_2$, with (1-ρ) negative profits of the magnitude s. For any *given value of h* this realized profit function looks like figure 2.

The range of realized profits above the level s is represented by the upward sloping 45°- line. On the lower end of this range ρ there are negative realized profits. Due to

the assumption on the distribution of ε_2, all the realizations along the thick line are equally likely. One can rewrite the realized profit function (12) to

$$P_2 = \rho \frac{\pi^e + c - s}{2} - (1-\rho)s = \rho \frac{\pi^e + c + s}{2} - s \qquad (13)$$

The interesting question is how P_2 changes if s is increased. First we want to put forward a graphical illustration. If s increases, h and π^e increase. The box that represents the range (-c ; c) is shifted to the right top. The thick line 45°-line has its kink later, since 1-ρ decreases. The range of possible negative realized profits increases in total. Additionally, the negative profits -s are on a more adverse level. All this can be seen in fig. 3, the solid and the dotted set of lines represent the situations with the old level of s from fig. 2 and a higher level.

Now we develop the analytical condition under which an increase in s also produced gains in profits. Here fore we take the derivative of (13) with respect to s.

$$\frac{dP}{ds} = \left(\rho_s + \rho_h \frac{dh}{ds}\right)\frac{\pi^e + c + r}{2} + \frac{\rho}{2}\left(\pi' \frac{dh}{ds} + 1\right) - 1 \qquad (14)$$

Under the use of the definitions of ρ, ρ_r and ρ_h we obtain the condition that needs to hold for (14) to be positive.

$$\frac{\partial P}{\partial s} = \frac{dh}{ds}\rho\pi' - (1-\rho) > 0 \qquad \rightarrow \qquad \frac{dh}{ds} > \frac{1-\rho}{\rho}\ \frac{1}{\pi'} > 0 \qquad (15)$$

In equation (10) we have derived an expression for $\frac{d\hat{h}}{ds}$. If this expression is positive, a marginal increase of s is associated with an increase of learning activities. Now we have derived in (15) the condition under which this increase in s is also beneficial for the firm. The marginal reaction here fore must not only be positive, but also larger than an endogenously given limit. If $\frac{d\hat{h}}{ds}$ is positive but below (15), the associated level of severance payments is not in the interest of the firm ex ante. But it is associated with human capital formation of the worker.

5) Conclusion

Severance payments make an existing job more secure. The worker perceives a lower risk for non-transferable human capital investments. This can be an incentive for the worker to devote more time to firm-specific learning. On the contrary, if an increase in SP just makes job termination less likely, but human capital investments are not worthwhile anyway, the worker feels induced to lower the optimal investment amount in response. This lethargy effect stems from the increasing attractiveness to get fired due to the higher compensation in that case.

In sum, SP can have a positive and stimulating character on human capital formation not because they increase job security per se, but because they can lower the default risk of productive human capital investments. In environments where such investments are unproductive to begin with, SP do harm, not good.

If an increase in SP induces a strong human capital formation, this can even be mutually beneficial for both the workers and the firm. Note, however, that the framework adopted in the model is only suited to analyse marginal effects of increases in s, not to derive a level of severance payments that is optimal.

FIGURES

Figure 1: The schock ε_2

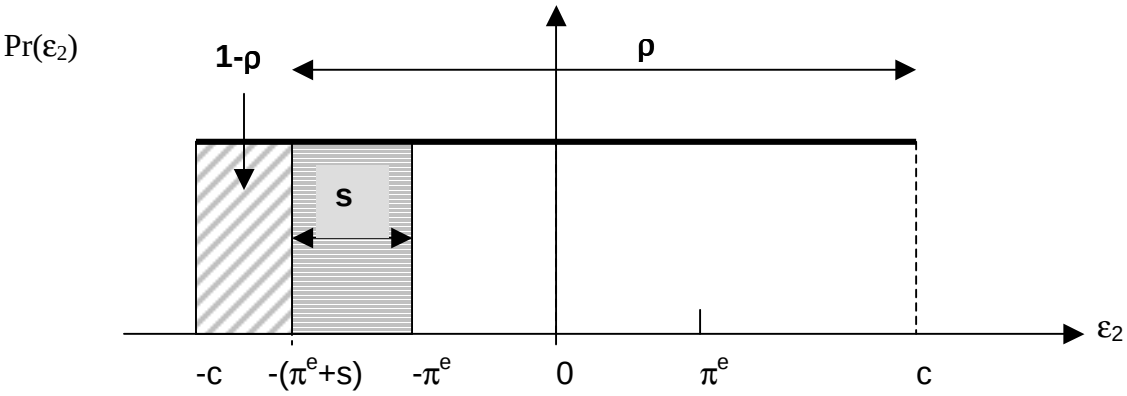


Figure 2: The realized profit function

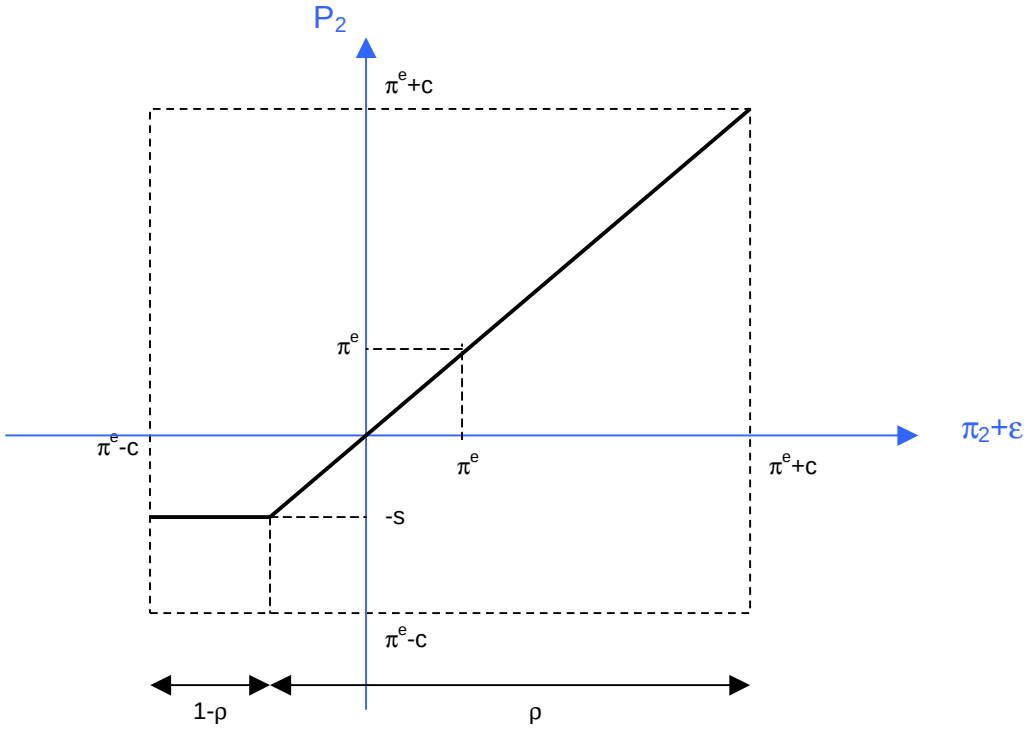
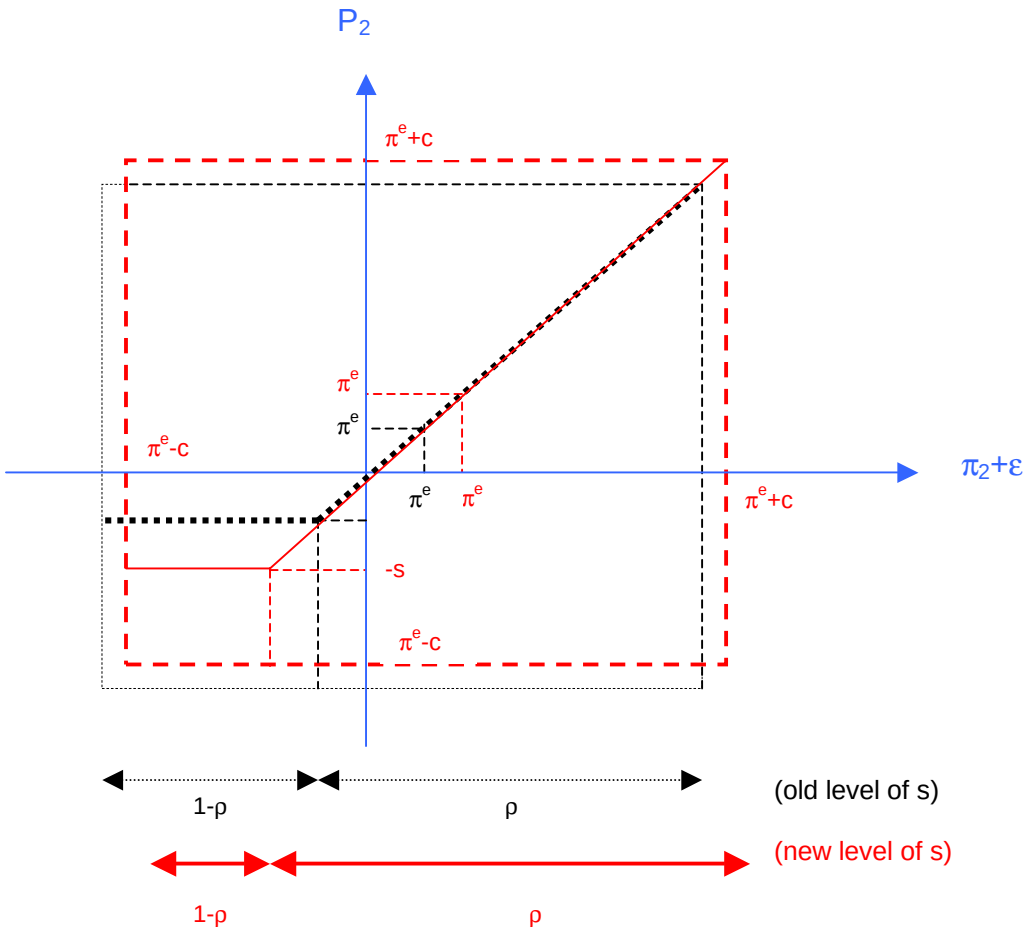


Figure 3: The effect of an increase in s on the realized profit function



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