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Collective wage setting when wages are generally binding An antitrust perspective*

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Abstract

This paper explores the anticompetitive product market effects that wage agreements between employers' associations and labor unions can have when wages are generally binding. In particular, it is shown that both employers' associations and unions may have a common interest in increasing the standard wage rate if coverage extension rules can be used to raise rivals' costs. This may help to explain why both employers' associations and labor unions appear to oppose the removal of the coverage extension rule provided for in Germany's labor law, the so-called *Allgemeinverbindlicherklärung* (AVE). Consequently, the paper argues that coverage extension rules should be a subject matter of antitrust policy, not only for their labor market implications, but also for their effects on product markets. The paper also shows, however; that there are constellations where unions actually prefer a wage rate below the entry deterring limit wage. In these cases, a strong labor union can serve as an efficiency enhancing countervailing power to employers' associations.

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1. Introduction

While modes of labor market organization and wage bargaining processes differ widely between countries, a common feature of many labor market systems in continental Europe are coverage extension rules. Under these rules, the coverage of collectively negotiated wage contracts can be extended to entire industries through legal means. With coverage extension, some or all employment terms are made generally binding not only for the members of unions and employers' associations, but for all industry participants.

In Germany, for example, collective wage agreements between a union and an employers' association can be made compulsory even for independent employers through the so-called *Allgemeinverbindlicherklärung* (AVE), a legal instrument provided for in §5 *Tarifvertragsgesetz* (TVG). The Ministry of Labor can, on application of either unions or employers' associations, use an AVE to make some or all terms of a collectively negotiated employment contract generally binding for an entire industry, where otherwise only those unions, employers and employers' associations that have actually negotiated and signed the contract would be directly bound by it (§3 I TVG).[1]

Similar coverage extension rules exist in many other countries.[2] As a consequence, the number of employees covered by collectively negotiated employment contracts considerably exceeds the number of union members (see OECD, 1997, Table 3.3). In France, for example, "around half of all sectorial agreements are usually extended by government decree" (OECD, 1994, p. 171). In spite of its very low union density rate of 10 per cent (the lowest rate of all OECD countries) the coverage rate of collective bargaining agreements is, at a level of 90 per cent, extremely high (OECD, 1994, p. 173).

In Germany, AVEs directly affect only about one million workers (Meyer, 1992, p. 366).[3] Therefore, it is sometimes argued that the AVE's impact on wage levels is relatively low, as, for example, in 1998 only 588 out of 47,334 collective agreements were declared generally binding. And only 89 of those generally binding wage agreements directly concerned wage rates (see Bundesministerium für Arbeit und Sozialordnung, 1999).[4] However, this argument is flawed, because there is little need for using AVEs as long as most firms are members of an employers' association and, therefore, directly bound by collectively negotiated wage agreements anyway.

And what is even more important is the AVE's threat-point character and its indirect effects, even if direct effects may appear to be of minor importance. As the German Monopolies Commission has commented, "the cartel effect of collective agreements is increased by the possibility to declare them generally binding. It is misleading to play down the importance of this legal institution by pointing at the small number of collective bargaining agreements declared generally binding. In January 1994, 544 out of 41,700 collective bargaining agreements have been declared generally binding. However, they aim exactly at those industries in which the eroding effects on collective bargaining agreements

through outside competition would be extremely strong. . .Moreover, this legal institution contains a normative threat-point potential which aims at stabilizing the system" (Monopolkommission, 1994, p. 380).

An instructive illustration is the *Holzmann* case where an AVE prevented the German construction company *Holzmann* from lowering its wages even though its employees were willing to accept a 6 percent wage cut as the company was facing bankruptcy and, hence, market exit (see FAZ, 2000). However, the respective employers' association made clear that the wage cut would have to apply to all firms in the industry. The AVE is to the labor market what most-favored nation clauses are to international trade.

AVEs are mainly applied in low wage sectors, where they appear to effectively set minimum wage standards (Sachverständigenrat, 1995, p. 228). These sectors are often characterized by many small firms, low skilled workers, low capital-labor ratios, a slow expansion of domestic demand and a comparatively low degree of unionization or membership in employers' associations (see Deregulierungskommission, 1991, p. 151).

The use of AVEs also appears to increase as the organizational density of employers' associations decreases. In East Germany, where organizational membership is rather low (see Keller, 1997, p. 16; OECD, 1994, p. 176), the number of generally binding wage agreements has been increasing from 7 in 1991 up to 163 in 1998. With fewer and fewer firms being automatically bound by collectively negotiated employment contracts through their membership in the employers' association, the remaining member firms (which are directly bound by collective wage agreements) seem to request AVEs more often (see Sachverständigenrat, 1995, p. 231). Not surprisingly, many East German firms not only leave the employers' association, but—in contrast to their West German competitors—also voice much louder concerns about the use of AVEs.

The majority of both employers' associations and unions, however, appear to heavily oppose any change to or removal of the AVE provisions even though both parties claim that AVEs do not really matter much and that their impact is minor.[5]

In order to offer an explanation for this maybe surprising position our paper examines the strategic effects that AVEs can have. We analyze how coverage extension rules affect wage determination and product market competition among heterogeneous firms and how incentives of the incumbent employers' association and the industry's labor union regarding wage setting are affected.

In our model, both the labor union and the incumbent members of the employers' association benefit from generally binding standard wages when compared to a reference situation with a competitive wage. The idea is that generally binding standard wages can be used to enforce an industry cartel. High minimum standard wages can be a means to limit competition and to secure monopolistic rents on product markets.

In contrast to conventional wisdom, our analysis shows that an employers' association will eventually prefer a higher standard wage than the industry's labor union. In this case, a strong labor union can serve as an efficiency enhancing countervailing power, because it keeps the employers' association from raising the standard wage up to the limit wage.

The rest of the paper is organized as follows. Section 2 briefly explores the paper's relation to the literature before the model is presented in Section 3. In Section 3.1 we derive the firms' equilibrium quantities in the second stage of the game. The employers' association's and the

union's optimal wage schedules are presented in Section 3.2, which also identifies conditions for the union setting a wage below the limit wage. Section 3.3 briefly analyzes the union's interest in coverage extension rules. In Section 4 we analyze the East German wage agreements after reunification in the light of our model, and Section 5 presents policy implications and conclusions.

2. A short digression into the literature

The idea that firms may accept high wage rates if this also raises their rivals' costs is not entirely new.[6] In fact, when Williamson (1968) analyzed the so-called *Pennington* case, he already argued that industrywide wage contracts, which increase the costs of relative labor-intensive firms to a larger extent than the costs of relative capital-intensive firms, can be used to force labor intensive firms to exit from an industry. However, Williamson's paper neglects oligopolistic interactions on the product market, and the behavior of unions—or workers in general—is not subject to analysis either. Instead, Williamson (1968, p. 91) simply assumes that "an agreement exists between the principal large scale firms in the industry and the union to impose a uniform wage on all firms in the industry independent of ability to pay." In contrast, our paper also analyzes the unions' incentives in the wage-setting process, and we introduce oligopolistic interactions into Williamson's basic analysis.

This paper is related to our work in Haucap, Pauly & Wey (2000) where we explore the incentives of employers' associations to raise rivals' costs in the case of powerless unions. While in our companion paper we consider the case of a union which can just accept or reject the employers' association's wage offer, this paper analyzes the case of a strong union with bargaining power and examines the union's incentives in the wage setting process and its optimal wage demand. Furthermore, in this paper we also briefly examine the union's interests in coverage extension rules vis-à-vis a more flexible wage system with price or wage discrimination.

Finally, the effects of coverage extension rules have recently also been analyzed by Roberts, Staehr & Tranaes (2000). In their two-sector general equilibrium model, they analyze a dual labor market with a primary sector where unions are active and a secondary non-unionized sector. Similar to our paper they find a commonality of interest between firms and unions in the primary sector with respect to raising the standard wage in the non-unionized sector. However, Roberts, Staehr & Tranaes do not address the cartel effects of centralized wage bargaining institutions, as bargaining is efficient in their model and has only distributional effects. Similarly, Petrakis & Vlassis (1996) and Vlassis (1999) show that centralized bargaining can lead to wages above the market clearing level.

3. The model

Our model consists of a simple two-stage game, where a generally binding standard wage is determined in the first stage of the game, before firms compete on the product market in the second stage.

The product market is characterized by Cournot competition with k incumbent firms and n potential entrants, all of which produce a homogeneous good. Labor is the only factor of production, and each firm's output level depends linearly on its employment level (labor input level). That means, we assume a constant-returns-to-scale technology. However, incumbents and potential entrants are assumed to differ in their labor productivity, with the k incumbents being homogeneous and at least as efficient as the potential entrants. The labor-input-output ratio is given by α_I for incumbents and by α_E for potential entrants with $\alpha_I \leq \alpha_E$.[7] For any given standard wage w, an incumbent has marginal costs of $c_I = \alpha_I w$ which are (weakly) lower than the entrants' marginal costs, $c_E = \alpha_E w$. Incumbents are indexed by $i = (1, \ldots, k)$ and potential entrants by $j = (k + 1, \ldots, N)$, with $N - k = n$.

Quantities are denoted by q and prices by p. The aggregate output, Q, is the sum of all quantities produced by incumbent firms, $Q_I \equiv \sum_{i=1}^{k} q_i$, and the potential entrants' aggregate output, $Q_E \equiv \sum_{j=k+1}^{N} q_j$; i.e., $Q = Q_I + Q_E$. The inverse demand schedule is linear and given by $p = a - bQ$ for positive quantities. Hence, the incumbents' and potential entrants' profit functions are given by $\Pi_I = (a - bQ - \alpha_I w)\, q_I$ and $\Pi_E = (a - bQ - \alpha_E w) q_E$, respectively.

3.1. Cournot oligopoly equilibrium

Using backward induction, we now solve for the unique product market equilibrium, taking the industry's standard wage, w, as given. The Cournot-Nash equilibrium output pair (q_I, q_E) can be determined by solving the $k + n$ best response functions for each firm:

$$q_t(Q_{-t}) = \frac{1}{2b}\left(a - b\sum_{i=1, i\neq t}^{k} q_i - bQ_E - \alpha_I w\right), \text{ for } t = 1, \ldots, k, \tag{1}$$

and

$$q_t(Q_{-t}) = \frac{1}{2b}\left(a - bQ_I - b\sum_{j=k+1, j\neq t}^{N} q_j - \alpha_E w\right), \text{ for } t = k + 1, \ldots, N, \tag{2}$$

where Q_{-t} is the aggregate output of firm t's competitors. Solving (1) and (2) for q_t we obtain the unique (and type-symmetric) Cournot-Nash equilibrium[8]

$$q_I = \frac{a + w(n\alpha_E - (n + 1)\alpha_I)}{b(N + 1)}, \tag{3}$$

$$q_E = \frac{a - w((k + 1)\alpha_E - k\alpha_I)}{b(N + 1)}, \tag{4}$$

so that the equilibrium industry output level is given by

$$Q = kq_I + nq_E = \frac{Na - w(n\alpha_E + k\alpha_I)}{b(N + 1)}. \tag{5}$$

If potential entrants do not enter the market and only the k incumbent firms are active, equation (3) reduces to

$$\tilde{q}_I = \frac{a - \alpha_I w}{b(k+1)}. \tag{6}$$

Calculating the reduced profit functions shows that the equilibrium profit for firm t is equal to bq_t^2. Hence, firm t's profit only depends on its equilibrium quantity.

In order to analyze how an increase in the standard wage affects firms' equilibrium outputs, let us examine the derivative of equation (4) with respect to the standard wage w. For entrant firms this is

$$\frac{dq_E}{dw} = -\frac{(1+k)\alpha_E - k\alpha_I}{b(N+1)} < 0.$$

The entrants' equilibrium output is strictly decreasing in the standard wage, w. An entrant's production decision depends on whether or not it can earn a positive profit. From equation (4) we can calculate the limit wage, w_0, such that for all $w \geq w_0$ potential entrants refrain from entry. The result is stated in Lemma 1.

Lemma 1. *Entrant firms do not produce if and only if* $w \geq w_0$, *with* $w_0 = \dfrac{a}{\alpha_E + k(\alpha_E - \alpha_I)}$.

Proof. By definition of w_0, $q_E(w_0) = 0$. Thus, $\dfrac{a - w((1+k)\alpha_E - k\alpha_I)}{b(N+1)} = 0$, and hence $w_0 = \dfrac{a}{\alpha_E + k(\alpha_E - \alpha_I)}$. **Q.E.D.**

Now let us examine how changes in the wage rate affect the incumbents' equilibrium output level. The respective derivative is

$$\frac{dq_I}{dw} = \frac{n\alpha_E - (n+1)\alpha_I}{b(N+1)}, \tag{7}$$

which is non-negative if and only if

$$\frac{\alpha_E}{\alpha_I} \geq \frac{n+1}{n}. \tag{8}$$

As long as entrants are active, the incumbents' equilibrium output strictly decreases with increasing standard wages if $\dfrac{\alpha_E}{\alpha_I} < \dfrac{n+1}{n}$. If, however, $\dfrac{\alpha_E}{\alpha_I} \geq \dfrac{n+1}{n}$, the incumbents' output level (weakly) increases with an increasing standard wage. Lemma 2 characterizes the incumbents' output (profit) level as a function of the industry's standard wage.

Lemma 2. *The incumbent firm's output (profit) reaches a global maximum at* $w = w_0$ *if* $\dfrac{\alpha_E}{\alpha_I} \geq \dfrac{n+1}{n}$. *For* $\dfrac{\alpha_E}{\alpha_I} < \dfrac{n+1}{n}$ *the incumbent firm's output (profit) is maximized at* $w = 0$.

Proof. We first prove the first part of the lemma. From equation (7) we know that q_I is

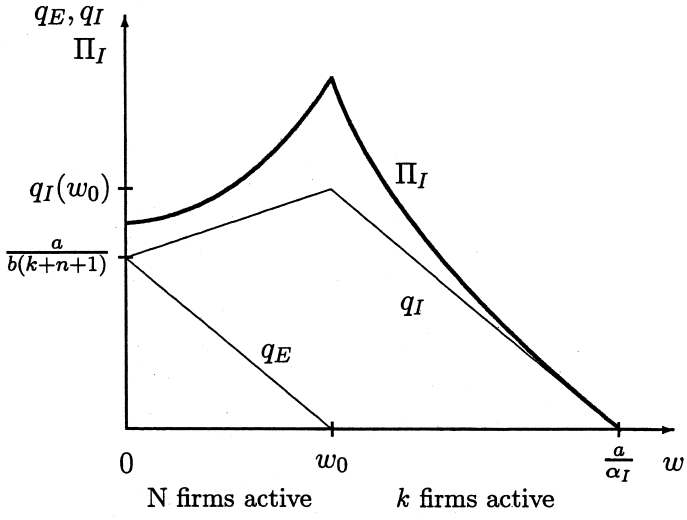

Figure 1.

(weakly) increasing over the interval $w \in [0, w_0)$ if and only if $\frac{\alpha_E}{\alpha_I} \geq \frac{n+1}{n}$. For $w \in [w_0, (a/\alpha_I))$ Lemma 1 and equation (6) imply that only the incumbents are active and that their output, $\bar{q}_I$, is strictly decreasing in w. Therefore, q_I reaches a global maximum at w_0 with $q_I(w_0) = \frac{a(\alpha_E - \alpha_I)}{b(\alpha_E + k(\alpha_E - \alpha_I))}$. The lemma's second part follows now directly from inspection of equation (3). **Q.E.D.**

Lemma 2 states that the incumbents' profits are maximized at the limit wage, if condition (8) holds. Hence, as long as condition (8) is fulfilled, the (efficient) incumbent firms benefit from an industrywide wage increase up to the point where the (inefficient) entrant firms cease to produce and do not enter the market. Because $\frac{\alpha_E}{\alpha_I} \geq 1$ holds by assumption, condition (8) is the more likely to hold the larger the number of potential entrants is. Also note that total industry output is strictly decreasing as w increases, so that total industry employment is maximized at $w = 0$.

Figure 1 shows the incumbents' and entrants' equilibrium quantities if condition (8) is strictly fulfilled. For positive standard wages, incumbent firms have strictly larger individual market shares than entrants. The incumbents' profits are maximized at the limit wage, w_0, as can be seen from the bold curve in Figure 1 which represents an incumbent firm's equilibrium profit, $\Pi_I(q_I(w), q_E(w))$. The latter is a strictly convex function in w.[9]

3.2. Wage setting

Let us now turn our attention to the wage setting stage of the game. In order to derive the optimal wage demand for both the employers' association and the labor union, we take the

(optimal) product market strategies as given. For our analysis, we assume that firms retain the right to manage their business; i.e. each individual employer determines its employment level, given the standard wage.[10] The union's utility function is assumed to take the form $W = (w - \hat{w})l$, where $\hat{w}$ stands for the employees' reservation wage, and l denotes the industry-wide employment level.[11] That means, the union maximizes its wage revenues, being the surplus income on top of the wage bill under perfect labor market competition.[12] For reasons of simplicity, let all workers be union members, so that $l = Q_I\alpha_I + Q_E\alpha_E$ holds. The workers' reservation wage, $\hat{w}$, is the wage rate that would be realized on a perfectly competitive market, in absence of any labor market institution such as employers' associations or unions. We assume $\hat{w}$ to be exogenous and normalize it to zero.[13] In order to illustrate the parties' incentives in the wage setting process when wages are generally binding, let us consider two hypothetical benchmark cases, namely:

1. *Strong Employers' Association* (EA): The employers' association has all the bargaining power on the labor market; it monopsonistically sets the (generally binding) standard wage; and
2. *Strong Labor Union* (U): The labor union has all the bargaining power and determines the industry's standard wage.

3.2.1. Strong employers' association (EA)

Since we assume that only incumbents are organized within the employers' association, its members are identical and homogeneous in their interests. Accordingly, the optimal strategy of the employers' association in the first stage of the game, w^{EA}, is defined as[14]

$$w^{EA} = \arg\max_{w} \sum_{i=1}^{k} \Pi_i(q_I(w),\, q_E(w)), \tag{9}$$

subject to the constraint that w^{EA} cannot be less than the workers' reservation wage, $\hat{w}$. The solution to this maximization problem is stated in Proposition 1.

Proposition 1. *The employers' association maximizes its members' profits by setting the standard* w^{EA} *equal to the limit wage* w_0, *if and only if* $\frac{\alpha_E}{\alpha_I} \geq \frac{n+1}{n}$ *holds. Otherwise, the employers' association chooses* $w^{EA} = \hat{w} = 0$.

Proof. Proposition 1 follows directly from Lemma 2 and the fact that the objective function of the employers' association is the sum of its identical members' profits. **Q.E.D.**

From Lemma 2 we know that the incumbent firms' profits are maximized at w_0 if and only if condition (8) holds. In this case, the incumbent firms prefer to raise rivals' costs by increasing the standard wage to the limit wage, w_0. This leads to decreasing total industry output, and hence, to a reduction in labor input and employment levels. If, however, the difference between incumbents' and entrants' labor productivity is small $\left(\text{i.e., } \frac{\alpha_E}{\alpha_I} < \frac{n+1}{n}\right)$, the employers' association maximizes its members' profits by setting the industry's standard wage equal to the workers' reservation wage, with $w^{EA} = \hat{w} = 0$.

3.2.2. Strong labor union (U)

Let us now turn to the union's optimal wage demand. The union's optimal wage setting strategy, w^U, in the first stage of the game is[15]

$$w^U = \arg\max_w W(q_I(w), q_E(w)), \tag{10}$$

subject to $w^U \geq \hat{w} = 0$. The union's wage revenues, $W(q_I(w), q_E(w))$, are given by

$$W \equiv \begin{cases} W_N = [\alpha_I Q_I(w) + \alpha_E Q_E(w)]w & : \quad 0 \leq w < w_0 \\ W_k = [\alpha_I Q_I(w)]w & : \quad w_0 \leq w < \dfrac{a}{\alpha_I} \\ 0 & : \quad \dfrac{a}{\alpha_I} \leq w. \end{cases} \tag{11}$$

Hence, there are three parts to the union's revenue function (11): Firstly, for wage levels $w \in [0, w_0)$ both incumbent and entrant firms are active and contribute to industry wage revenues. Secondly, for wages above the limit wage, w_0, only the (efficient) incumbent firms produce and pay wages, so that wage revenues are given by W_k. And finally, even incumbent firms cease production for wages above $\dfrac{a}{\alpha_I}$, in which case there are no wage revenues.

In order to obtain the union's optimal wage offer, we now derive some properties of the wage revenue schedule. As both wage revenue functions W_N and W_k are strictly concave in w, there are, in principle, two candidate values of w at which the union's overall wage revenue function is maximized. Wage revenues can either reach their absolute maximum at a wage below or above the limit wage, w_0. While the union prefers all $N = k + n$ firms to be active on the product market in the former case, in the latter the union maximizes its overall wage revenue when only the incumbent firms produce and the entrant firms refrain from market entry.

Substituting the equilibrium quantities q_I, q_E, and $\tilde{q}_I$ from (3), (4), and (6) into (11), we obtain

$$W \equiv \begin{cases} W_N = \dfrac{w[\alpha(k\alpha_I + n\alpha_E) - w(n\alpha_E^2 + nk(\alpha_E - \alpha_I)^2 + k\alpha_I^2)]}{b(N+1)} & : \quad 0 \leq w < w_0 \\ W_k = \dfrac{wk\alpha_I(a - w\alpha_I)}{b(K+1)} & : \quad w_0 \leq w < \dfrac{a}{\alpha_I} \\ 0 & : \quad \dfrac{a}{\alpha_I} \leq w. \end{cases} \tag{12}$$

Differentiation of W_N and W_k with respect to w gives us the respective revenue maximizing wage levels:[16]

$$w_N = \frac{a(k\alpha_I + n\alpha_E)}{2(n\alpha_E^2 + nk(\alpha_E - \alpha_I)^2 + k\alpha_I^2)} \tag{13}$$

and

$$w_k = \frac{a}{2\alpha_I}, \tag{14}$$

where the subscripts "N" and "k" indicate the number of active firms being $N = k + n$ or k, respectively. Comparison of (13) and (14) reveals that $w_N < w_k$ holds for all parameter values α_E, α_I, k, $n > 0$, with $\alpha_E \geq \alpha_I$. Lemma 3 gives a necessary and sufficient condition for the union's optimal wage being smaller than the limit wage; i.e. $w_N \leq w_0$.

Lemma 3. *For all parameter vectors* $(\alpha_E, \alpha_I, k, n) \in R_+^2 \times N_+^2$, *with* $\alpha_E \geq \alpha_I$, *the inequality* $w_N \leq w_0$ *is satisfied if and only if*

$$\left(\frac{\alpha_E}{\alpha_I}\right)^2 n(k+1) - \frac{\alpha_E}{\alpha_I} k(3n + k + 1) + k(2n + k + 2) \geq 0. \tag{15}$$

In particular, $w_N < w_0$ *holds for all* $k \leq 7$ *and* $n > \bar{n}(k)$, *with* $\bar{n}(1) = \bar{n}(2) = 0$, $\bar{n}(3) = 2$, $\bar{n}(4) = 5$, $\bar{n}(5) = 10$, $\bar{n}(6) = 21$, *and* $\bar{n}(7) = 56$.

Proof. We have to specify the range of parameters for which $w_N \leq w_0$ holds. Comparison of w_N and w_0 yields

$$w_N \leq w_0 \Leftrightarrow \frac{a[k\alpha_I^2(k + 2(n+1)) + n\alpha_E^2(k+1) - k\alpha_E\alpha_I(3n + k + 1)]}{2(\alpha_E + k(\alpha_E - \alpha_I))[kn(\alpha_E - \alpha_I)^2 + k\alpha_I^2 + n\alpha_E^2]} \geq 0.$$

Since the denominator of the inequality's left-hand side is strictly positive, rewriting gives condition (15). The left-hand side of inequality (15) is a U-shaped function in $\frac{\alpha_E}{\alpha_I}$ which has two potential roots along the real axis. By inspection of (15), if no real root exists, $w_N < w_0$ holds for all parameter vectors under consideration. Calculating the roots of the left-hand side of condition (15) with respect to $\frac{\alpha_E}{\alpha_I}$, one obtains two solutions

$$\left(\frac{\alpha_E}{\alpha_I}\right)_1 \leq \frac{k(3n + k + 1) - \sqrt{\rho}}{2n(k+1)} \equiv \underline{\mu},$$

$$\left(\frac{\alpha_E}{\alpha_I}\right)_2 \geq \frac{k(3n + k + 1) + \sqrt{\rho}}{2n(k+1)} \equiv \bar{\mu},$$

where $\rho \equiv k[n^2(k-8) + 2n(k^2 - 3k - 4) + k(k+1)^2]$. For those solutions being real ρ has to be non-negative. Obviously, ρ can only be negative if $k \leq 7$. Let $\bar{n}(k)$ be the maximum number of entrant firms, $\bar{n}$, for all $k \leq 7$, such that ρ is non-negative. By inspection of ρ, we obtain the function $\bar{n}(k)$ as defined in the proposition. Note that, e.g., to obtain a real solution for $k = 3$ the maximum number of entrant firms is 2. For $k \leq 7$ and $n > \bar{n}$, there

exists no real solution to inequality (15). This means that this condition is satisfied for all parameter constellations considered. **Q.E.D.**

From Lemma 3 we observe that the union's objective function reaches a (relative) maximum at a wage below the limit wage, w_0, if condition (15) holds. Inspection reveals that this condition is the more likely to be fulfilled, the closer $\frac{\alpha_E}{\alpha_I}$ is to one. Indeed, (15) is fulfilled for all parameters α_E, α_I, k, $n > 0$, whenever the productivity difference between the incumbent and the entrant firms vanishes. In particular, Lemma 3 states that wages revenues always reach a (relative) maximum with all firms $n + k$ active if the number of incumbent firms is very low, namely for $k \in \{1, 2\}$.

We now turn to the second candidate optimal wage for which only the k incumbent firms enter the market. If only the k incumbent firms are active, the following condition ensures that the maximum of the wage revenue function W_k is reached at a wage $w = w_k$ that is strictly greater than the limit wage, w_0:

$$w_k > w_0 \Leftrightarrow \frac{\alpha_E}{\alpha_I} > \frac{k+2}{k+1}. \tag{16}$$

If condition (16) is not met, the wage revenue function W_k is strictly decreasing over the interval $w \in \left[w_0, \frac{a}{\alpha_I}\right)$, where only the k incumbent firms remain in the market. Assume now that condition (15) is satisfied. Then, a sufficient condition for the union's objective function to reach its global maximum at w_N is given by $W_N(w_N) > W_k(w_k)$, which is equivalent to

$$\frac{\alpha_E}{\alpha_I} < \frac{N+2}{N+1-\frac{n}{k}}. \tag{17}$$

As can be easily verified the right-hand side of inequality (17) is strictly greater than one. Based on these intermediate results concerning the wage revenue function, we can now state the labor union's optimal wage demand in the following proposition.

Proposition 2. *The standard wage, w^U, which maximizes the labor union's objective function, is given by*

(*i*) $w^U = w_N$, *if* $1 \le \frac{\alpha_E}{\alpha_I} < \min\left\{u, \frac{N+2}{N+1-\frac{n}{k}}\right\}$, *or* $\bar{\mu} < \frac{\alpha_E}{\alpha_I} < \frac{N+2}{N+1-\frac{n}{k}}$ *holds, and*

(*ii*) $w^U = w_k$, *if* $\underline{\mu} \le \frac{\alpha_E}{\alpha_I} \le \bar{\mu}$, *or* $\frac{\alpha_E}{\alpha_I} \ge \frac{N+2}{N+1-\frac{n}{k}}$ *is satisfied.*

Proof. Assume $\underline{\mu} \le \frac{\alpha_E}{\alpha_I} \le \bar{\mu}$ holds. Hence, W_N is strictly increasing over the interval $w \in [0, w_0)$. Since $\underline{\mu} > \frac{k+2}{k+1}$, we know that W_k is strictly increasing at the point w_0, at which

$W_N = W_k$ holds. Hence, $W_k(w_k)$ is greater than $W_N(w)$, for all $w < w_0$ if $\frac{\alpha_E}{\alpha_I} \in [\underline{\mu}, \bar{\mu}]$. Inequality (17) is a sufficient condition for w_N being the global maximum. Therefore, we know that the global maximum is reached at w_N if condition (17) holds and $\frac{\alpha_E}{\alpha_I} \notin [\underline{\mu}, \bar{\mu}]$. This proves (i) and the first part of (ii). For the second part of (ii), we have $W_k(w_k) \geq W_N(w_N)$, for all $\frac{\alpha_E}{\alpha_I} \geq \frac{N+2}{N+1-\frac{n}{k}}$, since $\frac{k+2}{k+1} < \frac{N+2}{N+1-\frac{n}{k}}$ holds, for all $k, n > 0$. **Q.E.D.**

The next proposition specifies the intervals such that the employers' association (union) demands a higher standard wage than the labor union (employers' association).

Proposition 3. *Comparison of the optimal wage setting strategies of the employers' association, w^{EA}, and the labor union, w^U, yields:*

(i) The employers' association prefers a higher standard wage than the union, $w^{EA} > w^U$, if $\frac{n+1}{n} \leq \frac{\alpha_E}{\alpha_I} < \min\left\{\underline{\mu}, \frac{N+2}{N+1-\frac{n}{k}}\right\}$, *or* $\bar{\mu} < \frac{n+1}{n} \leq \frac{\alpha_E}{\alpha_I} < \frac{N+2}{N+1-\frac{n}{k}}$ *holds.*

(ii) The union prefers a (weakly) higher standard wage than the employers' association, $w^U \geq w^{EA}$, *if* $1 \leq \frac{\alpha_E}{\alpha_I} < \frac{n+1}{n}$, *or* $\underline{\mu} \leq \frac{n+1}{n} \leq \frac{\alpha_E}{\alpha_I} \leq \bar{\mu}$, *or* $\frac{N+2}{N+1-\frac{n}{k}} \leq \frac{n+1}{n} \leq \frac{\alpha_E}{\alpha_I}$ *holds.*

Proof. It follows from Proposition 1 that the employers' association prefers the limit wage, w_0, if $\frac{\alpha_E}{\alpha_I} \geq \frac{n+1}{n}$ is satisfied, and from Proposition 2 we know that the union prefers w_N, if $1 \leq \frac{\alpha_E}{\alpha_I} < \min\left\{\underline{\mu}, \frac{N+2}{N+1-\frac{n}{k}}\right\}$, or $\bar{\mu} < \frac{\alpha_E}{\alpha_I} < \frac{N+2}{N+1-\frac{n}{k}}$ holds. Since $w_N < w_0$, part (i) of Proposition 3 follows. Part (ii) follows from $w_N, w_k > \hat{w} = 0$ and $w_0 \leq w_k$. **Q.E.D.**

According to Proposition 3, under certain conditions a strong employers' association demands an even higher standard wage than a strong union. While the optimal wage of the employers' association is strictly below the union's optimal wage whenever the incumbents' productivity advantage is small $\left(\frac{\alpha_E}{\alpha_I} < \frac{n+1}{n}\right)$, the employers' association prefers the limit wage, if the productivity difference between incumbents and entrants is relatively large; i.e., $\frac{\alpha_E}{\alpha_I} \geq \frac{n+1}{n}$. If conditions (15) and (17) are fulfilled for some $\frac{\alpha_E}{\alpha_I} > \frac{n+1}{n}$, then there exists a set of vectors of parameters $(\alpha_E, \alpha_I, k, n) \in R_+^2 \times N_+^2$, such that the labor union prefers a lower wage than the employers' association. In this case, the union benefits from accommodating entry and wants to set a wage strictly below the limit wage. Hence, in contrast to

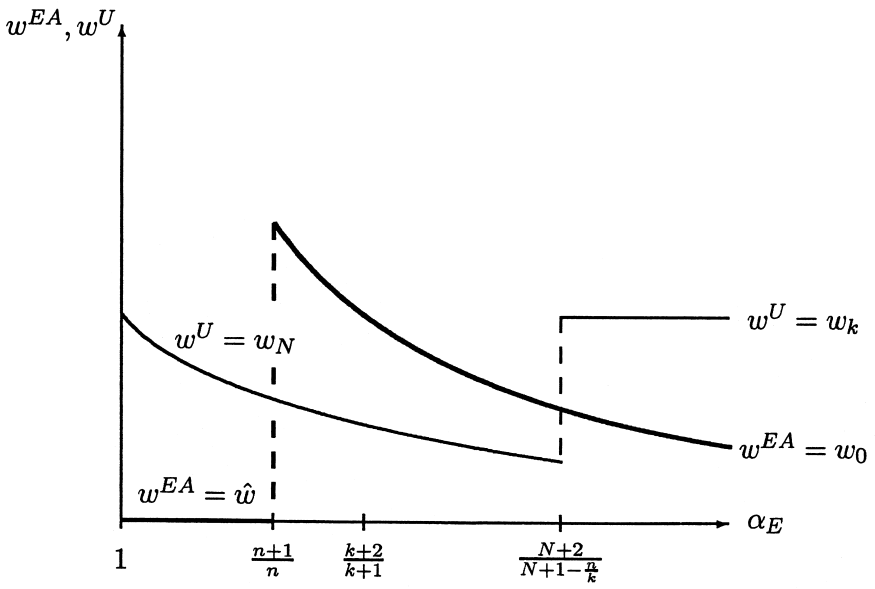

Figure 2.

conventional wisdom, the existence of a strong union *can* be efficiency enhancing. If wage agreements are generally binding, a strong union *can* act as a countervailing power to prevent the employers' association from setting the entry deterring wage.

As Proposition 3 shows, however, for a range of parameter values the union prefers a wage strictly higher than the limit wage. If the union had all the bargaining power, it would push the standard wage to even higher levels than the employers' association would do. While many people appear to believe that this is always the case, our analysis has identified conditions under which the contrary is true.

Figure 2 compares the optimal wage demands of the employers' association and the union for different values of α_E, holding everything else constant. It is also assumed that the number of potential entrants is strictly larger than the number of incumbent firms,[17] and that the intersection between the w_N-curve and the w_0-curve is to the right of $\frac{N+2}{N+1-\frac{n}{k}}$. Figure 2 illustrates that the union's incentives to deter entry are on average lower compared with those of the employers' association. Entry deterrence is optimal from the union's perspective, whenever the incumbent firms' productivity advantage is relatively large. As a result, there is a range of parameters for which the employers' association wants to deter entry, while the union prefers a wage, w_N, at which entry is accommodated.

Finally, let us point out that both employers' association and union benefit from collective wage settlements which are generally binding for the entire industry compared with the competitive equilibrium, where $\hat{w} = 0$ prevails.

3.3. Union interest in coverage extension rules

While we have identified conditions where both unions and employers' associations benefit from generally binding wage agreements compared to a competitive equilibrium with $\hat{w} = 0$, an industry union would obviously maximize its wage revenues through price or wage discrimination between entrants and incumbents with a lower wage rate for entrants. As is well-known, an upstream monopolist maximizes its profits through price discrimination, whenever downstream firms have different productivity levels (see, e.g., Yoshida, 2000). In particular, wage discrimination allows the union to set a higher wage for the efficient firms which results in relatively higher output levels of the inefficient firms and, accordingly, to higher employment levels by inefficient firms. As a result, the union always prefers all firms entering the market and sets a wage profile which equates firms' marginal costs. In our case, the union maximizes its wage revenues by charging a higher wage for the more efficient firm and setting wage rates of $w_E = \frac{a}{2\alpha_E}$ and $w_I = \frac{a}{2\alpha_I}$.

Why should the union favor an industrywide standard wage (AVE regime) and not a more "flexible system" with different firm-level wages which maximize wage revenues? One obvious answer is that usually not all workers are unionized, as is, for example, often the case when foreign firms enter a market. In the following we show that the incentive to extend a standard wage agreement to non-unionized firms depends on two factors: (i) the degree of unionization and (ii) the exogenous wage rate paid by non-unionized entrant firms.

Building on our analysis in Sections 3.1 and 3.2, suppose now that in addition to the n unionized entrants there are m entrants of equal efficiency (α_E) whose workers are not unionized. In the absence of an AVE, a wage discriminating union now maximizes its revenues by setting $w_E = \frac{a + m\alpha_E w_F}{2(m+1)\alpha_E}$ and $w_I = \frac{a + m\alpha_E w_F}{2(m+1)\alpha_I}$, where w_F is the exogenous wage rate paid by the non-unionized entrants. In contrast, with an AVE in place all firms in the industry have to pay the same standard wage, which we now denote by w'_N. We examine the case in which the union prefers all entrant firms to enter the market under an AVE system. Then, with an AVE in place, the revenue maximizing standard wage which applies to unionized incumbents and entrants as well as non-unionized entrants is given by

$$w'_N = \frac{a(k\alpha_I + n\alpha_E)}{2(n\alpha_E^2 + nk(\alpha_E - \alpha_I)^2 - mk\alpha_I(\alpha_E - \alpha_I) + k\alpha_I^2)}.$$

Let us now compare the union's wage revenues under an AVE with its revenues with wage discrimination. Simple algebra yields the following expression for the equilibrium wage revenues with wage discrimination:

$$W^D = \frac{(a + m\alpha_E w_F)^2(n + k)}{4b(k + n + m + 1)(m + 1)}. \tag{18}$$

Inspection of (18) yields that the union's wage revenues are strictly increasing in w_F. Hence, as the union benefits from an increase in w_F, the union may benefit from raising the wages in non-unionized firms through means of an AVE. From (18) we also see that an increase of

the number of non-unionized firms, m, reduces wage revenues, whenever the wage rate w_F is zero (or close to zero). Thus, wage discrimination becomes less attractive the lower the organizational density of entrant firms becomes.

If all firms are active on the product market, the union's equilibrium wage revenues with an AVE are given by

$$W^{AV} = \frac{a^2(k\alpha_I + n\alpha_E)^2}{4b(k+n+m+1)(n\alpha_E^2 + nk(\alpha_E - \alpha_I)^2 - mk\alpha_I(\alpha_E - \alpha_I) + k\alpha_I^2)}. \tag{19}$$

Hence, whenever W^{AV} exceeds W^D it is profitable for the union to apply for an AVE. We now show that an AVE system is the more attractive for the union the lower the degree of unionization of entrant firms. In order to simplify our analysis, we assume that in the absence of AVE non-unionized firms pay the competitive wage rate of $w_F = \hat{w} = 0$. Let us also define $\bar{m}$ as the maximum number of non-unionized firms for which all entrants' equilibrium quantities with an AVE are strictly positive; i.e., $q_E(w'_N(\bar{m})) > 0$, for all parameter constellations $(\alpha_E, \alpha_I, k, n) \in R_+^2 \times N_+^2$, with $\alpha_E \geq \alpha_I$. Since the optimal output level of an entrant firm is given by $q_E = \max\left\{\frac{a - w[(k+1)\alpha_E - k\alpha_I]}{b(n+m+k+1)}, 0\right\}$, we obtain the critical value

$$\bar{m} = \frac{2(n\alpha_E^2 + nk(\alpha_E - \alpha_I)^2 + k\alpha_I^2) + (k\alpha_I + n\alpha_E)((k+1)\alpha_E - k\alpha_I)}{2k\alpha_I(\alpha_E - \alpha_I)} \tag{20}$$

such that for all $m < \bar{m}$ all entrant firms' equilibrium outputs are strictly positive. We can now state the following proposition which shows existence of parameter constellations for which even a strong union prefers an AVE over a flexible system where it can wage differentiate.

Proposition 4. *Consider all sets of parameters* $(\alpha_E, \alpha_I, k, n, m) \in R_+^2 \times N_+^3$, *with* $\alpha_E \geq \alpha_I$, *and* $m < \bar{m}$. *Then, the union's wage revenues are strictly higher with an AVE than with wage differentiation (i.e.,* $W^{AV} > W^D$*), if* $m > m^*$.

Proof. By definition, at $m = m^*$ the union is indifferent between an AVE and wage discrimination, so that $W^{AV}(m^*) = W^D(m^*)$. By equating the right-hand expressions of (18) and (19), we obtain the critical value $m^* = \frac{nk(n+k+1)(\alpha_E - \alpha_I)^2}{k(n+k)(\alpha_E - \alpha_I) + (n\alpha E + k\alpha_I)^2}$, what gives $W^{AV}(m) > W^D(m)$ if and only if $m > m^*$. Next we have to ensure that for $m > m^*$ all entrant firms choose positive output levels. The optimal output level of an entrant firm in the second stage of the game is given by $q_E = \max\left\{\frac{a - w((k+1)\alpha_E - k\alpha_I)}{b(n+m+k+1)}, 0\right\}$. A sufficient condition for $q_E(w'_N) > 0$ is that $m < \bar{m}$, where $\bar{m}$ is given by (20). One can show that there are parameter constellations $(\alpha_E, \alpha_I, k, n) \in R_+^2 \times N_+^2$, with $\alpha_E \geq \alpha_I$, such that $m^* < \bar{m}$. In particular, $m^* < \bar{m}$ holds if the productivity difference between incumbent and entrant firms vanishes. **Q.E.D.**

Finally, we compare (18) and (19) with respect to w_F. We find that $W^{AV} > W^D$ holds if and only if

$$w_F < \bar{w}_F = \frac{a(k\alpha_I + n\alpha_E)\sqrt{m+1} - \xi}{m\xi\alpha_E},$$

with $\xi \equiv [(n+k)(n\alpha_E^2 + nk(\alpha_E - \alpha_I)^2 - mk\alpha_I(\alpha_E - \alpha_I) + k\alpha_I^2)]^{1/2} > 0$. Hence, an AVE system is the more attractive from the union's perspective the lower the wage rate, w_F, that non-unionized entrants pay in the absence of an AVE. Thus, we can conclude that our model confirms the supposition that, from the union's perspective, generally binding standard wages are the more attractive the lower the organizational density among entrant firms and/or the lower the wage level that non-unionized firms pay in the absence of an AVE.

We will not further elaborate this analysis at this point, but rather turn our attention to the East German experience with the collective wage setting system in the last decade.

4. Wage setting in East Germany after reunification

East Germany's experience following the German reunification in 1990 illustrates how collective wage agreements can be used to lessen product market competition and how devastating the effects for employment levels may potentially be. In general, East Germany's prospects for economic prosperity were believed to be rather shiny, mainly because of its well-educated and skilled labor force and the massive capital injections from its richer brother state in the West. However, as has been painfully experienced in the last decade, "one of the worst and sharpest depressions in European history had begun" with the economic union (Akerlof, Rose, Yellen & Hessenius (1991, p. 1). The effects on unemployment have been nothing but devastating.[18]

Akerlof, Rose, Yellen & Hessenius (1991) mainly blame unions for recklessly pushing wage parity between East and West Germany, and their analysis "clearly singles out West German unions as the villains in the collapse" (Dornbusch, 1991, p. 89). While there is certainly some merit to this argument, the analysis presented in this paper rather suggests that employers' associations are not as innocent as Akerlof, Rose, Yellen & Hessenius (1991) implicitly suggest. As part of the reunification process the West German system of collective bargaining was immediately implemented in East Germany. West German employers' associations joined the collective bargaining table,[19] and as Sinn & Sinn (1992, pp. 165 ff.) have convincingly argued, West German employers did not have any interest in keeping wages low in the East, as low wage levels would have made the less efficient East German firms more competitive. Not surprisingly, West German employers' associations and West German unions agreed to tremendously increase wages and to settle on a rather high wage level.[20]

The collective bargaining agreement reached in March 1991 aimed at equalizing the wage rates in East and West Germany by 1994. This agreement significantly raised barriers to entry for the less efficient firms from the East and forced them to exit from the market. Both unions and employers' associations were quite successful in securing the interests of the majority of their respective members, as the increased wages helped limiting product market competition from the East. The often conflicting interests of unions and employers' associations were set aside in order to stabilize the wage setting cartel.

Today more and more East German firms are leaving the employers' association and voice their criticism against the AVE, as it raises their costs and makes it difficult for them to compete with their often more efficient West German counterparts. For instance, in the East German state of Saxony only one in three workers in the metal and electronics industry is still unionized, and only one in four employers are members of an employers' association. As it becomes much more difficult under these circumstances to make collective wage agreements generally binding, we expect unions and employers' associations to lobby for an extension of the AVE's applicability. One step into this direction is the so-called *Arbeitnehmer-Entsendegesetz* (AEntG) which makes it even easier to declare collective wage agreements generally binding.

5. Conclusion

In this paper, we have developed a simple model to analyze the effects of coverage extension rules—such as the AVE in Germany—on wage setting and product market competition. Our analysis has shown that collective agreements about generally binding standard wages can induce industry concentration on the product market accompanied with a reduction in sectorial employment levels because both the union and the employers' association may have incentives to increase the standard wage above the market clearing level. Moreover, the cartelization effect of generally binding collective wage agreements is largely independent from the distribution of bargaining power between the two parties involved. This result stands in some contrast to more traditional reasoning which emphasizes the efficiency aspects of employers' associations in the bargaining process. As, for example, Nickell (1997, p. 68) argues, "unions are bad for jobs, but these bad effects can be nullified if both the unions and the employers can coordinate their wage bargaining activities." According to our model exactly the opposite can also be true. Employers' associations which are dominated by incumbent firms may even worsen wage bargaining outcomes in terms of product market competition and sectorial employment levels. In this setting a strong labor union can serve as an efficiency enhancing countervailing power, because it keeps the employers' association from raising the standard wage up to the limit wage.

The AVE's entry deterring effects illustrate that labor market organization directly affects product market competition. Given the potentially adverse effects of centralized wage bargaining for product market competition and employment, it seems appropriate to extend antitrust measures to labor markets. The use of instruments designed to extend the coverage of labor contracts to entire industries should be deemed anticompetitive, and the use of such instruments should induce investigations by antitrust authorities.

While we do not claim that collective wage agreements and coverage extension rules cannot be efficiency enhancing for transaction and bargaining cost reasons, this does not warrant a general antitrust exemption of labor markets. If transaction cost savings do outweigh the welfare loss associated with reduced competition (as well as the additional contract enforcement costs), it is more appropriate from a public policy perspective to impose a requirement on the bargaining parties to apply for an authorization for the respective agreement from antitrust or competition agencies rather than granting them a

general antitrust exemption. This means the bargaining parties would have to demonstrate the efficiency gains associated with their agreement.

In summary, legal instruments that are designed to make wage agreements generally binding not only reduce competition on the labor market, but they can also serve anticompetitive purposes and limit competition on product markets by making new entry less profitable. Based on this analysis, a substantial reform of the German labor law and the AVE system appears to be highly desirable.

We should clarify, however, that our model ignores international trade. Given that international trade barriers are now relatively low between many other jurisdictions, we would expect the AVE to be of lesser importance for tradeable than for non-tradeable goods. For non-tradeable goods and services and for industries where international trade is relatively costly, however, AVEs can still play a significant role. This is particularly true for service industries, which are often especially labor-intensive.

We are also aware of the fact that our analysis is limited to those industries where wage bargaining is highly centralized at the industry level and where the majority of incumbent firms is organized in one single employers' association, which bargains on behalf of its members with one single trade union. We have treated small scale inefficient firms as entrants, which are not represented in the centralized wage bargaining process, which, at least for East Germany, concurs with the facts. Under these circumstances, the AVE dictates a mandatory extension of the standard wage, so that the sectorial wage acts as a minimum wage floor for all firms in the industry. Therefore, it is not surprising that more and more firms in East Germany have been criticizing the use of AVEs and the collective bargaining system, as it raises their costs and makes it difficult for them to compete with the often more efficient West German counterparts.

Finally, let us point to a well-known efficiency rationale for coverage extension rules: Generally binding standard wages can protect efficient firms from "unfair wage-dumping" (Schmutzkonkurrenz) which again provides them with incentives to increase their labor productivity. The argument, which in Germany is known as the "wage-whip" (*Lohnpeitsche*) argument, assumes that low-wage competition leads to inefficiently low investment in labor productivity increasing measures if inefficient firms can simply react by lowering their wages. While we cannot explore the relationship between different modes of labor market organization and firms' investment incentives in more detail here, we believe it provides an interesting topic for future research.

Notes

1. In more detail, for a collectively negotiated wage contract to be declared generally binding through an AVE at least 50 per cent of the employees in the particular tariff area have to be employed by contract-bound employers anyway (§5 I 1. TVG). Furthermore, the AVE has to meet a public interest criterion (§5 I 2. TVG). However, an AVE can also be put into force in case of a "social emergency" (sozialer Notstand) even if the two other conditions are not met. In fact, the Ministry of Labor has

considerable discretion in its use of AVEs (see Lindena & Höhmann, 1988a). The AVE's legal basis is further analyzed in Haucap, Pauly & Wey (2000).

2. For a cross-national comparison of wage bargaining arrangements and institutions see Bunn (1984), Layard, Nickell & Jackman (1991), and OECD (1997).
3. Kreimer-de Fries (1995, p. 212) estimates that 1.5 to 1.7 million workers are directly affected.
4. It should be noted, however, that the number of AVEs almost continuously increased from 448 in 1975 to 588 in 1998.
5. For the employers' associations' arguments see Lindena & Höhmann (1988b, 1989), for the unions' side Kreimer-de Fries (1995).
6. For a general analysis of raising rivals' costs strategies see Salop & Scheffman (1983, 1987) and Krattenmaker & Salop (1986).
7. The subscript "I" stands for an incumbent and the subscript "E" for a potential entrant.
8. The second-order conditions are satsfied for both incumbent and entrant firms.
9. Strict convexity of Π_I can be easily checked by substituting the equilibrium quantities into the incumbent firm's profit function $\Pi_I = bq_I^2$, and differentiating with respect to w twice. For wages below w_0, we obtain $\frac{d^2\Pi_I}{dw^2} = \frac{2}{b}\left(\frac{n\alpha_E - \alpha_I(n+1)}{N+1}\right)^2 > 0$, and for wages $w \in \left[w_0, \frac{a}{\alpha_I}\right)$, we get $\frac{d^2\Pi_I}{dw^2} = \frac{2}{b}\left(\frac{\alpha_I}{k+1}\right)^2 > 0$.
10. In contrast to the right-to-manage model (see for example Nickell & Andrews, 1983), the efficient-bargaining model stipulates that the unions and the firms bargain over wages and firms' employment levels. For discussions of both approaches see Layard, Nickell & Jackman (1991) and Bughin (1999).
11. The wage bill utility function, which is a specific form of a more general quasi-concave union utility function, follows the utilitarian hypothesis with risk-neutral members (see McDonald & Solow, 1981; Oswald, 1982, 1985). For other specifications of the union's utility function see Oswald (1985).
12. In the case of Germany, this assumption reflects the fact that unions receive about 1 per cent of their members' payroll.
13. Under the Nash bargaining solution the term $\hat{w}$ is the union's threat point. It is common practice in the literature to normalize the workers' reservation wage $\hat{w}$ to zero (see, e.g., Bughin, 1999, p. 1032).
14. The superscript "EA" indicates Regime EA.
15. The superscript "U" stands for Regime U.
16. The second-order condition is satisfied: $-(n\alpha_E^2 + nk(\alpha_E - \alpha_I)^2 + k\alpha_I^2) < 0$.
17. This condition follows from $\frac{n+1}{n} \leq \frac{k+2}{k+1}$.
18. By the end of 1993 employment in the manufacturing sector had declined by 74 per cent (Deutsche Bundesbank, June 1994, p.84). In total, some three million people lost their jobs between fall 1989 and 1992, being one in three workers. For a detailed discussion of the labor market situation after reunification see Franz (1991), Scheremet (1992), and Scheremet & Schupp (1992).

19. Unions were already well established in East Germany before 1990, and membership numbers in East Germany were comparatively high. Furthermore, the largest employer was the *Treuhand*, a state agency, supervising all state-owned enterprises. The labor-managers of the firms under *Treuhand* supervision were in a conflicting situation. On the one hand, they were employers at the bargaining table. On the other hand, they were simply employees of the *Treuhand* in the end. Therefore, it was not surprising that these "employers" did not show strong resistance to wage increases which devalued the existing capital (not owned by themselves).
20. Although the productivity in East Germany is well below the West German level, workers in the East were paid about 69 per cent of their western colleagues' wage per hour in 1996 (Institut der Deutschen Wirtschaft, 1997, chart 137). The resulting increase in unit labor costs seems to be the major factor for the excessive employment problems in East Germany. Dornbusch (1992) already identified this problem shortly after the reunification.

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