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ABSTRACT

German Trade Unions after Unification:
Third Degree Wage Discriminating Monopolists?*

After unification, real wages in Eastern Germany rose rapidly relative to labour productivity despite high and rising levels of unemployment. This substantial increase in wage levels relative to those in Western Germany is difficult to explain without recourse to models of union behaviour or collective bargaining. This paper applies and extends such models and evaluates plausible explanations for recent short-run wage developments in the ex-GDR.

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NON-TECHNICAL SUMMARY

The unification of the two Germanies was an event of considerable economic impact in both financial and real areas. History will probably show, however, that monetary union is relatively uninteresting in comparison with real economic processes that are currently under way. Economic union has created a single labour market from two disparate regions with vastly different productivity levels. A simple two-sector analysis merging the two Germanies in a perfectly competitive context suggests that while labour in the East and capital should gain, Western labour is an unambiguous loser.

It is thus perhaps not surprising that real wages in Eastern Germany have risen since monetary union. They have done so, however, at an astonishing rate: as of summer 1991 they stood at approximately 60% above the previous year's level. This is hard to reconcile with the rapid increase in both open and hidden unemployment that has occurred over the same period. While it is likely that wages would have eventually converged to West German levels, high and rising unemployment would be expected to restrain such a wage surge. Productivity improvement cannot be used to explain recent developments, since measured output per worker has actually declined. At the same time, real wages in the West continue to rise at previous rates of growth.

It is difficult to identify the cause of such rapid wage increases in the face of high and rising unemployment without reference to institutional structures such as collective bargaining. The suspicion that this might be the cause is reinforced by the fact that most wage contracts in the East were in fact negotiated by Western labour unions. This paper examines existing models of wage determination and seeks to reconcile West German union behaviour with the predictions of those models.

In the first model we examine the simplest monopoly union model, in which the union can discriminate perfectly between two regions: East and West. The union sets wages relative to its fallback position, i.e. the wage that would obtain in its absence (the competitive wage). The outcome is such that the wage differential reflects both economic conditions in East and West (demand and supply) as well as the elasticity of labour demand in the two regions. Just as a price discriminating monopolist will mark up more aggressively in regions where the elasticity of labour demand is lower, so will a wage discriminating monopsonist. We then argue that current economic conditions suggest that mark-ups should be higher in the West than in the East. This implies, however, large differentials inconsistent with those currently observed.

We next consider the case of migration. In the absence of unions migration would simply enforce equality of wages net of costs of moving etc. Migration affects the

behaviour of the monopoly union in two ways. First, to the extent that migration depends on relative wages, it affects the 'fallback wage' or opportunity cost of labour to the union in a bargain. Alternatively, it may affect the fallback wage that would clear the market in the union's absence. Both cases are considered in turn. In the latter case, migration unambiguously compresses East-West wage differentials. In the case of perfect labour mobility, the fallback wage would be equal in both parts of the country; the wage differential would merely reflect any difference in the elasticity of the demand for labour in the two regions. To the extent that labour is not perfectly mobile, the monopolist union remains able to 'segment' its market. The conclusion that the union incorporates migration into its calculus suggests that it will price labour more expensively in the East. This will depend on the weight placed by the (Western) union on rents earned in the East.

Monopolist union models are often criticized for ruling out Pareto-superior contracts that lie above the labour demand curve, or for ignoring countervailing power of management. Bargaining models that allow for either or both of these elements yield some additional insights in the determination of wages. A key conclusion is that subsidization of firms (by the government) will reduce the fallback position of the firm and increase the bargained wage. A danger thus exists in subsidizing firms in the East as the Treuhandanstalt (state trust office) has done, as it may lead to higher Eastern wage outcomes. This is one potential way of thinking about the 'soft budget constraint' in transforming East European economies.

I. Introduction

The economic integration of Germany has given economic science a windfall of interesting phenomena to study. The economic, monetary and social union of the two Germanies was an event of considerable economic impact in both financial and real areas. History will probably show, however, that monetary union was relatively uninteresting in comparison with economic processes that are currently underway in the real economy. Economic union has created a single labor market from two disparate regions with vastly different productivity levels and thus standards of living. As integration proceeds, real wages should rise in the East and rise less rapidly, if not fall absolutely, in the West placing West German labor market institutions under considerable strain. A simple sector-specific analysis of the merging of the two Germanies with different factor endowments suggests that while labor in the East and capital should win, labor in the West is the unequivocal loser.[1]

Recent developments have certainly confirmed at least half of this prognosis. Real wages have risen dramatically in East Germany since July 1 1990, ie in the period during which their evolution over time can be meaningfully compared. This is true whether measured in nominal terms or in terms of consumption goods. Most importantly for firms making their market debut, wages have risen in terms of the price of their output. Table 1 documents these increases in nominal, consumption and product wage terms. Although wages in the East were already been above the market-clearing level in July 1990, further wage increases have been negotiated since then. From July through October 1990, average monthly earnings rose by 15.5 percent.[2] This pressure for wage parity within a single country despite the economic collapse in the East was accompanied by significant declines in East German producer prices which were roughly halved following currency union. Contrary to the development of producer prices, consumer prices remained almost unchanged until 1/1991 when subsidies on energy and transportation were

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1) See for example Sinn (1990).
2) Because there were also reductions in working hours negotiated in most contracts, the increase in *hourly* earnings is even higher.

eliminated.[3] As a result a significant wedge between real pro-
ducer and consumption wages emerged. While labor productivity
has yet to rise in the East, it can hardly justify observed
wage settlements.[4]

Table 1:
Changes in Wages and Prices Following Currency Union

	W_E	W_E/W_W	P_O	P_C	W_E/P_O	W_E/P_C
1/90	1184	0.31	–	–	–	–
2/90	–	–	–	–	–	–
3/90	–	–	–	–	100.0	100.0
4/90	1168	0.30	98.4	98.3	–	–
5/90	–	–	–	87.9	–	–
6/90	–	–	64.2	94.5	182.8	124.1
7/90	1393	0.35	63.1	94.9	–	–
8/90	–	–	62.8	96.6	–	–
9/90	–	–	62.9	98.2	215.5	137.9
10/90	1609	0.40	62.5	98.1	–	–
11/90	–	–	62.1	99.1	–	–
12/90	–	–	63.3	106.4	255.0	151.6
1/91	1916	0.50	63.4	106.8	–	–
2/91	–	–			–	–

Notes: W_E (W_W) = Average gross monthly wages in the East,
including East Berlin (West); W_E/W_W = wage ratio East to West
in percent; Source: Statistisches Bundesamt, FS 16, Reihe 2.1
(the figure for 1/91 has been estimated by the authors based
upon recent wage settlements); P_O (P_C) = price index of in-
dustrial producer prices (price index of the cost of living),
1989=100; Source: Statistisches Bundesamt, FS 17, Reihe 2, No.
3/91; W_E/P_O (W_E/P_C) = real product (consumption) wages, 4/90 =
100. Due to missing data the real wages indices for 4/90 have
been calculated using the price indices for 5/90.

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3) The cost of living index P_C is based on a *fixed consumption
bundle*. The real measured consumption wage is probably biased
downwards for four reasons. First, P_C underweights prices of
goods which declined the most, such as consumer durables - es-
pecially cars and electronic appliances - which represented a
smaller budget share at the outset. Second, at the same time P_C
magnifies the effect of subsidy elimination for food and trans-
port. Third, simple comparisons ignore quality improvements
which by any account have been substantial. Finally, the disap-
pearance of waiting queues has reduced the effective cost of
consumption goods. Thus, the data provided on consumption wages
are best regarded as a *lower bound*.
4) On the eve of monetary union it was thought that producti-
vity could soon be improved by 20-40 percent as firms shed ex-
cess labor. Instead, productivity has actually fallen as output
declined much faster than employment. Among the reasons for low
productivity growth rates in the East is the postponement of
layoffs through collective bargaining agreements until June
1991.

These wage increases have worsened the already deteriorating business climate in Eastern Germany. Firms facing collapsing domestic market demand for their relatively undifferentiated and unattractive output are confronted with an abrupt increase in product wages, or put differently, a collapse of their operating margins. This development has brought most of East German industry to the brink of bankruptcy. As predicted by many economists, open unemployment has increased sharply in the East, reaching 10% of the labor force, while at least another 20% of the labor force is engaged in short time work. Short time work is invoked by firms in economic distress, and entails a subsidy of up to two-thirds of the wage bill. Figure 1 to 3 display the evolution of unemployment and involuntary short time work in the ex-GDR since June 1990.[5]

Figure 1:

Unemployment Rate

(Registered Unemployed as per cent of Civilian Labor Force)

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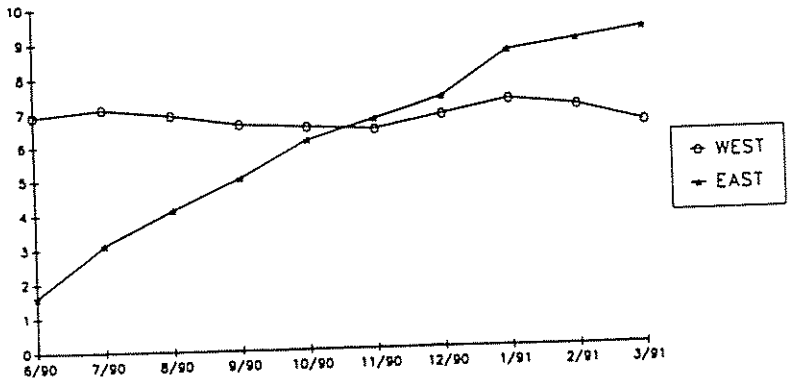
5) It is commonly assumed that at a minimum, short-time workers with working hours of less than 50 percent (compare Figure 3) will ultimately become unemployed. See, for example, Deutsches Institut für Wirtschaftsforschung (1991) and Sachverständigen-rat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (1991).

Figure 2:

Total Short-Time Employment in the Five New Eastern States
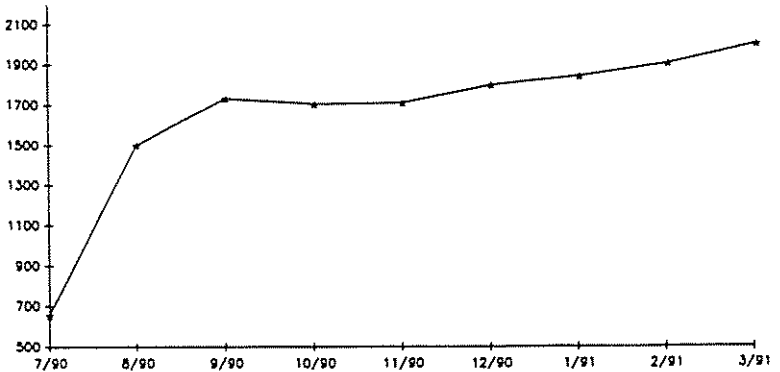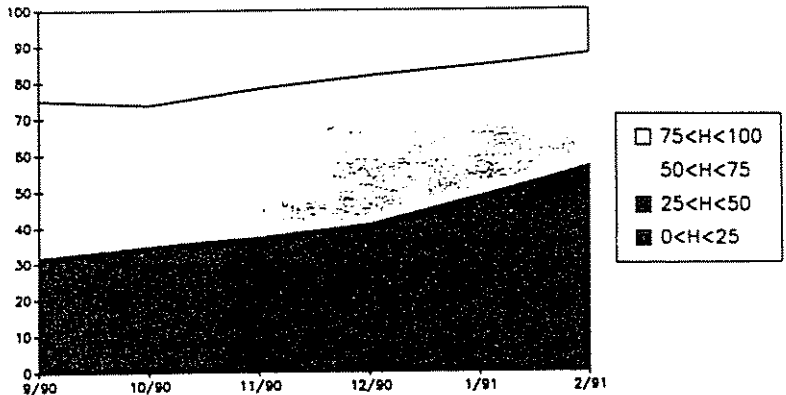### (Including East Berlin, 1000s)

Figure 3:

Distribution of Short-Time Employment
(Remaining Working Hours in per Cent)

It is difficult to identify the cause of drastic wage increases in the face of high unemployment without reference to institutional structures such as collective bargaining. Both theoreti-

cally and empirically, high and especially rising unemployment should evoke *wage moderation*.[6] The wage explosion in the East can only be explained by recourse to models of union wage setting with reference the special position enjoyed by West German labor unions at the outset of unification. In this paper we therefore apply and extend some of the many models of union behavior and collective bargaining which offer insights for current developments in East and West Germany. The specific questions we would like to address include: (1) Can union models explain the sharp rise in Eastern wages despite high unemployment? (2) What role does mobility play in the union wage setting calculus? (3) Can subsidies play a role? In general, what parameters influence unions behavior in this context?

The paper is organized as follows. In sections II and III the question of wage discrimination is analysed within the monopoly union framework under alternative assumption about mobility. In sections III and IV the optimization problem of the union is extended to alternative bargaining models. The final section provides a brief summary and some conclusions.

II. Models of monopoly union behaviour and wage discrimination

In the immediate aftermath of unification, the ex-GDR was effectively a "right to work" region. The old communist union, the *Freie Deutsche Gewerkschaftsbund*, had been discredited by its collaborative behavior under the old regime. Consequently, its West German counterpart, the *Deutsche Gewerkschaftsbund* (DGB), the umbrella organization for sixteen constituent industrial unions, was able to move into this virgin territory and organize workers with impressive ease. Within six months after monetary union, it had received than 900,000 applications for membership.[7] More importantly, it was recognized by East German employers as the *de facto* negotiating partner in collective bargaining and was thereby able to conclude wage agreements in almost every industrial sector, in the public sector and many of the service branches. The adoption by the GDR of

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6) For references, see Layard and Nickell (1986), Gordon (1988) or more recently Blanchflower and Oswald (1990).
7) See "Verzicht Schadet Nur," *Die Zeit* February 1 1991, p. 31.

West German labor law, including those governing severance, made this organizational campaign easier.[8]

II.1. The monopoly union model: A review

Given the power of national labor unions in Germany, a natural starting point for an analysis of German trade union behavior after unification is the *monopoly union model*, in which wages are set unilaterally by the union and employers choose labour input according to the profit-maximising principle.[9] Here we ask the question: what is the optimal wage-setting behavior of a union which is able to enjoy an accretion to its organization base?

In the most general model, the labor union is assumed to maximise a utility function defined over real consumption wages (w) and employment (L) of the general form

(1) $U = U(w,L)$ $U_w > 0; \ U_L > 0; \ U_{ww} < 0; \ U_{LL} < 0.$

The union does not suffer from money illusion and correctly prices its labor in terms of consumption goods. The restrictions on the derivatives of the utility function imply that marginal utility from both real wages and employment is positive but diminishing. Unions face an industry labour demand curve which is downward sloping in the real product wage. For a given ratio of the output price deflator to the consumption wage, labor demand will be negatively related to the consumption wage:

(2) $L^D = L(w)$ $L' < 0.$

Maximisation of (1) subject to (2) yields the familiar first-order condition

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8) See Blyth (1979), Flanagan et al. (1983) or Burda and Sachs (1988) for some of the institutional details surrounding collective bargaining in Germany.
9) For an overview of the microeconomic theory of trade unions, see Oswald (1982, 1985).

$$(3) \quad \frac{\partial U/\partial w}{\partial U/\partial L} = -L'$$

Equation (3) establishes the well-known result that the union's optimum is located at the tangency between the labour demand curve and the unions indifference curve. In words, the marginal rate of substitution of wages for employment is equal to the economic rate of transformation offered by the industry it faces. A more precise version of the first order condition (3) can be derived if we assume that union preferences are given by the *expected* utility function

$$(4) \quad U = (L/N)[U(w)-U(w^*)]$$

where L_U and w^* denote unionised employment and the alternative wage in the competitive sector, respectively, and N is *fixed membership*.[10] In this case equation (3) takes the form

$$(5) \quad \frac{L\partial U/\partial w}{U(w)-U(w^*)} = -L'$$

The resulting level of wages and employment therefore depends upon the form of the utility function. If the utility function $U(\cdot)$ takes the simple *linear form*

$$(6) \quad U = (L/N)(w-w^*),$$

then the first-order condition rearranges to

$$(7) \quad w - w^* = -\frac{L}{L'}$$

or

$$(8) \quad w = \frac{w^*}{1-1/\eta} \ .$$

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10) w^* may alternatively denote the level of unemployment benefits.

where η is the elasticity of demand, defined as $-L'w/L$. In words, the optimal union markup is higher, the more inelastic the labor demand curve it faces. In the limiting case of η going to infinity, w goes to w^*.
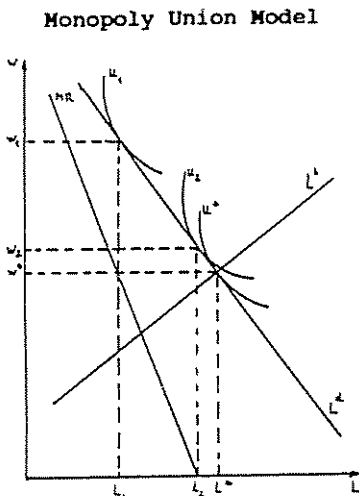
Figure 4:

Monopoly Union Model

Figure 4 shows wage determination in a labour market with a monopoly union. The linear labour demand curve (L^d) aggregates the marginal revenue products of firms that compete to buy labour. The labour supply curve (L^s) describes labour supply in the absence of monopoly power. Therefore the competitive outcome would be L^* workers receiving the wage w^*. In the monopoly union case unions choose the wage rate and the corresponding amount of labour supplied. If union membership is given by L_1 and union members are *risk neutral*, then the wage-employment combination (w_1, L_1) will be chosen.[11] If the union maximises total wages, it would choose the employment level L_2 at a wage

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11) The optimal level of employment for the union is reached at the intersection of the marginal revenue curve to the union (MR) which gives the increment of the total employee's renumeration created by reducing the wage rate sufficiently to lead the firm(s) to employ an additional worker and the labour supply curve which represents the opportunity cost of workers being employed.

rate of w_2.[12] Alternatively, if we assume some degree of *risk aversion*, the slope of the indifference curves will become steeper at any (w,L) combination, and therefore we move to an equilibrium with higher employment compared with L_1.[13]

II.2. Wage Discrimination in a Segmented Labour Market

We can now use the analytical framework described above to analyze the recent behaviour of the German trade unions.[14] Three conditions are necessary in order for perfect wage discrimination to be a viable solution to a union's wage setting problem. First, the union must have some market power. Second, the union must have the ability to sort the employers.[15] Third, the union must be able to prevent mobility of the work force. Given the importance of *mobility*, we think about the union strategy in two steps. For the time being we will assume that labour is immobile, i.e. wage discrimination is perfectly feasible. Afterwards we analyze modifications to the model that arise from labor mobility. In Figure 5 we represent graphically the case of two separate labour markets.

12) The marginal revenue to the union will then be zero.
13) In the limit, if union members are unwilling to bear *any* risk of job loss, the competitive outcome (w^*, L^*) will result.
14) Given the analogue to the theory of third-degree price discrimination, we characterize German unions behaviour as *third-degree wage discrimination*.
15) This precondition may also become a problem if, for example, workers are commuting from the East to the West and vice versa or in case of subcontracting.

Figure 5:

Third-degree wage discrimination without mobility
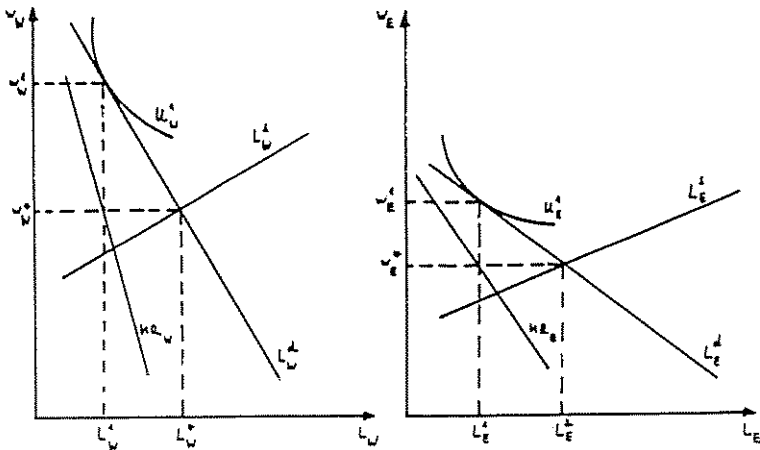
Suppose that after unification the labour market facing the monopoly union were to expand by an additional group of employers and employees. We account for this adding a second graph for labour demand in the five new Eastern states.[16] Note that the labour demand curve in the West (L_W) is *less* elastic than the corresponding curve (L_E) for the East, reflecting the division in the current economic situation in both parts of the country.[17] In determining the optimal wage and employment level, we are on familiar ground. At the extreme, suppose that both labour markets are separated, i.e. the unions can enforce the division in wages. Considering again the case of the risk neutral union, the rent maximization problem can be written as

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16) Throughout the paper the suffix "W" ("E") indicates the eleven Western (five Eastern) German states.

17) If the production functions in the East and in the West can be represented by CES functions, then the elasticity of labor demand in both parts of the country is given by σ/α_K, where σ is the elasticity of substitution and α_K is the capital share at the point of linearization. Empirical evidence generally (see Tooze (1976), for example) shows a negative correlation between σ and the employment experience, ie declining industries are more "elastic". Therefore it appears reasonable to suppose that declining East German industries possess more elastic labor demand functions.

(9) $\max_{w_W, w_E} (w_W - w_W^*)L_W + (w_E - w_E^*)L_E$

where $w_i(L_i)$ is the inverse labour demand function for group i
(i=E,W), w_i^* represents the opportunity cost of labour in re-
gion i, which is the equilibrium wage in the absence of union
representation. From (9) we can immediately find the condition
under which wage discrimination, i.e. $w_W \neq w_E$, will take place,
and also the relation between the wages. From the first-order
conditions it immediately follows that

(10) $\dfrac{w_W}{w_E} = \dfrac{[1 - 1/\eta_E]}{[1 - 1/\eta_W]\alpha}$

where $\alpha = w_E^*/w_W^*$ is assumed to be less than or equal to unity,
and as before η_i (i=W,E) is the elasticity of labour demand in
market i.[18] It follows that maximizing behavior by the union
leads to $w_W > w_E$ if and only if $\eta_W < \eta_E$ with $\alpha = 1$. In the more
reasonable case $\alpha < 1$, the wage differential will be even lar-
ger. In Figure II the Western employees L_W^d receive w_W^1, and
Eastern employees L_E^d, receive the lower wage w_E^1. For example,
if the elasticity of labour demand is 2 in the West, 4 in the
East, and $\alpha = 0.8$, we have $w_W/w_E = (1-0.25)/[0.8(1-0.50)] =$
1.875, or that the wage charged to Western employers should be
87.5% higher than that charged to the Eastern employers.

III. Optimal Wage Discrimination with Labour Mobility

III.1. General Issues

In practice, perfect wage discrimination will not be feasible
for a union. If sufficiently large, wage differentials will in-
duce labor to move to regions where wages are higher, and firms
to relocate where labor is cheaper.[19] Focusing on the short
run, we consider here only the migration of labor. The effects

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18) In other words, the union behaves as a price-discriminating
monopoly. Surveys of price discrimination can be found in
Phlips (1983), Tirole (1988) and Varian (1989).
19) For models of migration see Sjaastad (1962), Greenwood
(1975) or Malko (1986).

of migration on union wage setting policies are however not clear-cut. If the opportunity cost of labor in both regions is fixed and equal to some level of unemployment benefits, for example, the union will be indifferent to migration.[20] On the other hand, if migration affects the competitive wage say, through increased labor supply, the union will incorporate induced migration in its wage setting calculus. In this section we isolate some of the effects that might arise and bound their impact on wage setting. We isolate two cases. In the first, the union recognizes its effect on the opportunity cost of labor. In the second, the union takes the opportunity cost of labor as given. In both cases we shall see that migration can influence the wage discriminating behavior of the monopolist union.

III.2. The General Case: The Union Can Influence the Opportunity Cost of Labor

Suppose now that the monopoly union cannot separate completely the two labour markets as assumed in Figure 5 due to the mobility option available to Eastern employees.[21] We assume that aggregate mobility from the East to the West (M) is a simple function of the wage differential

$$(11) \quad M = \psi(\frac{w_W}{w_E}) \qquad \psi(\cdot) \geq 0, \ \psi(1) = 0, \ \psi(\cdot)' > 0.$$

We also generalize here the benchmark problem for the unions set out in Section II by giving the union some influence over its "alternative wage", ie the opportunity cost of its labor.[22]

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20) In fact, it is possible to show that if the union cares equally about members in both East and West and if the higher Western unemployment benefits are available to migrants, the union's optimal wage policy will *encourage* westward migration, thus allowing members to take advantage of higher social insurance payments.

21) Mobility from the East to the West may be prevented if Western employers separate the labour market on the basis of readily verifiable characteristics, such as educational qualifications, but it is hardly in their interest to do so unless quality diffferences are significant.

22) In Section II we assumed that the w^*'s were the wages that would obtain in a perfectly competitive market, an outcome over which the union has no influence.

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This supply price of labor is given by the respective (inverse) labor supply schedules in the two regions:

(12) $w_i{}^S(L_i{}^S)$ $\qquad\qquad$ $0 \le w_i{}^{S\prime} < \infty$

These will be evaluated at the effective demand for Western employees, that is labor demand forthcoming at chosen wage w_i net of migration, or $L_W{}^{D-M}$ for the West, and $L_E{}^{D+M}$ for the East. Ignoring risk aversion on the part of the membership, the union thus solves the following problem:

(13) $\max\limits_{w_W, w_E} (w_W - w_W{}^*)L_W + \varphi(w_E - w_E{}^*)L_E$

subject to the restrictions that L_W and L_E lie along the labor demand curves and

(14)
$$w_W{}^* = w^S{}_W[L_W - \psi(w_W/w_E)]$$
$$w_E{}^* = w^S{}_E[L_E + \psi(w_W/w_E)]$$

As before, $\varphi \ge 0$ is the relative weight attached to union rents accruing in the East. First order conditions are[23]

(15) $(w_W - w_W{}^*)L_W{}' + L_W[1 - w_W{}^{S\prime}(L_W{}' - \psi'/w_E)] - \varphi L_E w_E{}^{S\prime}\psi'/w_E = 0$

and

(16) $(w_E - w_E{}^*)L_E{}' + L_E[1 - w_E{}^{S\prime}(L_E{}' - \psi' w_W/w_E{}^2)] - \varphi^{-1}L_W w_W{}^{S\prime}\psi' w_W/w_E{}^2 = 0$

As before, the optimum is characterized by the union balancing the costs of an an extra DM in wages through employment loss, (the first term) against the benefit of the wage increase accruing to currently employed, *including* the increased pressure on the opportunity wage resulting from lower employment and increased migration (second term). If $\varphi > 0$ ie the union is altruistic towards the East, it will calculate this gain net of

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23) In what follows we shall assume that the second order conditions are also satisfied; ie that the solution characterizes a maximum.

costs to the Easterners (third term). The Eastern first-order condition has a symmetric interpretation. The solutions can be characterized as in Part II:

$$(17) \quad w_W = w_W^* [1-1/\eta_W]^{-1} [1+1/\epsilon_W + (\xi/\eta_W)(1/\epsilon_W - \varphi w_E^*/\epsilon_E w_W^*)]$$

$$(18) \quad w_E = w_E^* [1-1/\eta_E]^{-1} [1+1/\epsilon_E + (\xi/\eta_E)(L_W/L_E)(1/\epsilon_E - w_W^*/\varphi \epsilon_W w_E^*)]$$

where $\epsilon_i \equiv (1/w^S{}_i{}')(w_W^*/L_i)$ is the elasticity of labor supply to region i by residents and $\xi \equiv (w_W/w_E)\psi'/L_W$ is defined as the elasticity of migration to the West with respect to the wage gap as a percent of Western labor demand.

In this more general setting, the optimal wage is related to the elasticity of labor supply and labor demand. Heuristically, the less elastic the supply of labor, the greater influence the union has on its opportunity cost, and thus the greater the markup.[24] This will be accentuated to the extent migration occurs, but at the same time this will have a negative impact on union rents in the other half of the country by *raising* the supply price of labor there.

We can now characterize the "wage gap" across the two Germanies that would obtain:

$$(19) \quad \frac{w_W}{w_E} =$$

$$\frac{[1-1/\eta_E][1 +1/\epsilon_W + (\xi/\eta_W)(1/\epsilon_W - \varphi w_E^*/\epsilon_E w_W^*)]w_W^*}{[1-1/\eta_W][1+1/\epsilon_E - (\xi/\eta_E)(w_W^* L_W/\varphi w_E^* L_E)(1/\epsilon_W - \varphi w_E^*/\epsilon_E w_W^*)]w_E^*}$$

A crucial relationship that emerges is $1/\epsilon_W - \varphi w_E^*/\epsilon_E w_W^*$. If this expression is positive, then higher sensitivity of migration to the wage differential will be associated with a *wider* wage gap, all things equal. Contrary, if $1/\epsilon_W - \varphi w_E^*/\epsilon_E w_W^* < 0$, the possibility of migration will reduce the wage differential. In the more plausible case of higher labor supply elasticity in the

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24) The analogy to price discriminating monopolists may be helpful here: if marginal cost is rising, an extra unit of output will yield less profit than if marginal costs were constant, and the firm will supply less to the market.

West (around the level of employment benefits) versus less ela-
stic labor supply in the East (where in fact benefits are
considerably lower and are less likely to be a lower bound on
wages), the potential for migration will act to reduce the wage
differential. In the absence of wage sensitive migration, of
course, we simply have

$$(20) \quad \frac{w_W}{w_E} = \frac{[1 - 1/\eta_E][1 + 1/\epsilon_W]w_W^*}{[1 - 1/\eta_W][1 + 1/\epsilon_E]w_E^*} \; .$$

III.3. The Effect of Migration on the Fallback Wage

The result of the last section -- that union wage policy re-
sults in less third-degree price discrimination -- holds under
only particular conditions. Furthermore, expression (19) says
nothing about the relative supply price of labor (w_W^*/w_E^*), so
we cannot compare (19) with the benchmark case (10). However,
there is one simple and robust comparable result: the case when
the union has no influence on the opportunity cost of its
labor. This was of course the case of Section II, and can be
thought of as a special case of (19) with $\epsilon_W = \epsilon_W = \infty$, or with
w_W^* and w_E^* simply fixed at levels that would obtain if there
were no union at all. Under such conditions,

$$(21) \quad \frac{w_W}{w_E} = \frac{[1 - 1/\eta_E]w_W^{**}}{[1 - 1/\eta_W]w_E^{**}}$$

but now with w_W^{**} and w_E^{**} as solutions to the following system
of equations:

$$(22) \quad \begin{aligned} L_W^S(w_W^S) &= L_W^D - \psi(w_W/w_E) \\ L_E^S(w_E^S) &= L_E^D + \psi(w_W/w_E) \end{aligned}$$

The effect of migration is to drive the two competitive wages
closer together. In doing so, the optimal regional wage
structure for the union also becomes more compressed.
We have sketched out the implications of mobility to the wage
maximisation problem of the union in the following diagram.

Figure 6

Third-degree wage determination with mobility
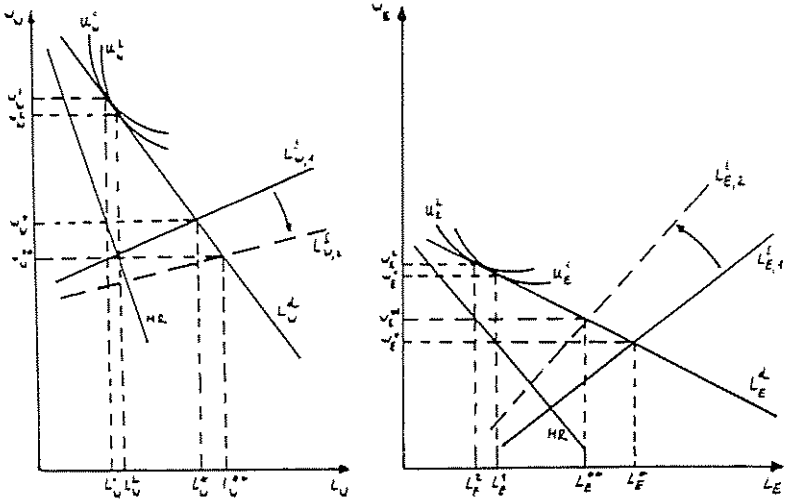
In Figure 6, we depict the original situation from Section 5 before migration (solid curves) and after migration (broken curves). Even with unchanging elasticities of demand, the effect of migration is to drive the "fallback" or competitive wages in the two regions closer together, thus moderating the markup. In the Figure, this is in that both labour supply curves are shifting and the resulting wage differential w_W^2/w_E^2 is smaller than the original wage differential w_W^1/w_E^1. Given (20) we immediately see that the threat of mobility to the Western union members implies the following relationship:

$$(23) \quad \frac{w_W}{w_E} = \frac{[1 - 1/\eta_E]w_W^{**}}{[1 - 1/\eta_W]w_E^{**}} < \frac{[1-1/\eta_E]w_W^{*}}{[1-1/\eta_W]w_E^{*}}$$

where $\alpha = w_W^*/w_E^*$ is the ratio of competitive wages under perfect separation of the two labor markets. The possibility of migration here leads unambigously to higher East German wages relative to West German levels, attenuating the markups predicted by the benchmark model of Section II.

IV. Bargaining Solutions and the Fallback Level of Profit

IV.1. Critique of the Monopolist Union Paradigm

The monopoly union modelled in Sections II and III is standard in labor economics, but has been criticized for ruling out Pareto superior wage-employment combinations that are "off the labor demand curve". Referring to Figure 4, points above and to the right of say (w_W^1, L_W^1) are associated with both higher rents to the union as well as higher profits for the firm. This critique has given rise to a variety of models that allow for such bargains.[25] In this section we consider some of these variants on the monopoly model that allow for bargaining between a monopoly union and an employers' association.

IV.2. The Leontief/McDonald-Solow Bargaining Model

One class of bargaining models assumes that the union is juxtaposed against an employer (in the German case: employers' associations) rather than a simple demand curve. In such models the wage is not dictated by the union but is the product of a *Nash bargaining process* which, following practice, we condense into the following setup.

Consider an employer's association which maximizes profits π_i given by the difference between revenues $R_i(\theta_i, L_i)$ for $i=E,W$ and costs $F_i + L_i w_i - S_i$, where F_i denotes fixed costs of operation, and S_i denotes a lump-sum subsidy. The term θ_i is a demand or output price shifter, so $R_{\theta i} > 0$. This formulation thus allows for both perfect and imperfect competition in product markets. In the short run, the firm will continue to operate as long as its revenues plus subsidy cover variable costs, or $R_i(\theta_i, L_i) - L_i w_i + S_i > 0$. At the *shutdown point* $\pi_i = -F_i$ the firm is indifferent between producing and closing its doors. Thus the short run gain to the firm to continuing operations is $R_i(\theta_i, L_i) - L_i w_i + S_i$. For simplicity, we model the net gain to the union as in Section II.2 as $(w_i - w_i^*)L_i$. The *Nash bargaining so-*

25) See Leontief (1946) or more recently, McDonald and Solow (1981). A discussion of the issues can be found in Oswald (1985) or Farber (1986).

lution is the pair of wage-employment combininations (w_W, L_W), (w_E, L_E) in East and West which solves

(24) $\max_{\substack{w_W, w_E \\ L_W, L_E}}$ $[R_W(\theta_W, L_W) - L_W w_W + S_W](w_W - w_W^*)L_W + \varphi[R_E(\theta_E, L_E) - L_E w_E + S_E](w_E - w_E^*)L_E$ $\varphi \geq 0$

where we have weighted equally the gains from a bargain to each region, but allow for a differential weighting of the East German bargain. In the absence of cross effects, ie if $\partial R_E/\partial w_W = \partial R_W/\partial w_E = 0$, we have the following characterization of the wage outcome in either sector[26]

(25) $w_i = [w_i^* + (R_i + S_i)/L_i]/2$

The familiar solution to this problem is that the wage may be characterized as an average of the fallback wage w^* and total revenue plus subsidies available to the firm at the chosen level of operation.[27] Note that employment is no longer restricted to lie on the labor demand curve. Indeed, it is possible to show that the wage at the solution will exceed marginal revenue R_L. The ratio of West to East wages can be characterized as

(26) $\dfrac{w_W}{w_E} = \dfrac{[1 + (R_W + S_W)/w_W^* L_W]}{[1 + (R_E + S_E)/w_E^* L_E]\alpha}$

The bargaining East-West margin will be higher (lower) than in the pure monopoly union case when

(27) $[1 + (R_W + S_W)/w_W^* L_W]/[1 + (R_E + S_E)/w_E^* L_E] \gtrless [1 - 1/\eta_W]/[1 - 1/\eta_E]$.

It is also clear that subsidies will play a key role here. We return to this point below.

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26) This assumption presumes that the competitiveness of each region is independent of wages in the other. It is an important assumption, but does not affect the results significantly.
27) The "split-the-difference" outcome is due to the equal weighing of the two parties gains from a bargain assumed in the maximization problem. In more general formulations the weighting reflects relative bargaining power of the two parties.

IV.3. The Right-to-Manage Bargaining Model

The Leontief/McDonald-Solow bargaining models has been criticized on several grounds. First, bargaining over employment is rarely observed. Even contracts which specify the workweek do not limit the employer's prerogative to hire overtime labor. Second, such contracts assume information symmetry between union and employer over business conditions; ie its preferred employment at any given wage. Under more realistic conditions, firms could unilaterally increase profits by misrepresenting its labor demand schedule, reducing employment back to L_1.[28]
A variant of the bargaining model restricts bargains to lie along the labor demand curve (Nickell and Andrews (1983), Carruth and Oswald (1987) and Oswald and Blanchflower (1990)). In the following we sketch the solution to one variant of this "right-to-manage" model of wage determination. It turns out that, even in the absence of migration, the collectively bargained outcome implies a lower wage differential than in the pure discriminating monopolist model under plausible conditions. Consider the Nash bargaining solution to the problem

$$(28) \quad \max_{w_W, w_E} \ (\pi_W^* + F_W)(w_W - w_W^*)L_W + \varphi(\pi_E^* + F_E)(w_E - w_E^*)L_E \qquad \varphi \geq 0$$

where $\quad \pi_i^* \equiv \max_{L_i} \ R_i(\theta_i, L_i) - L_i w_i + S_i - F_i$

for $i = W, E$. The first order conditions to this problem are

$$(29) \quad \frac{\partial \pi_W^*}{\partial w_W} (w_W - w_W^*)L_W + (\pi_W^* + F_W)[L_W + L_W'(w_W - w_W^*)] = 0$$

$$(30) \quad \frac{\partial \pi_E^*}{\partial w_E} (w_E - w_E^*)L_E + (\pi_E^* + F_E)[L_E + L_E'(w_E - w_E^*)] = 0$$

By Shepard's Lemma, $\partial \pi^*/\partial w = -L$ since the firm is already maximizing profits over L given w, so for $i = E, W$ we have

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28) Espinoza and Rhee (1989) have considered conditions under which such solutions can be supported by trigger strategies of punishment on the part of unions.

(31) $w_i = w_i^*[1 - 1/\eta_i + (w_i - w_i^*)L_i/(\pi_i^* + F_i)]^{-1}$

and the ratio of wages in West and East is

(32) $\dfrac{w_W}{w_E} = \dfrac{[1 - 1/\eta_E + (w_E - w_E^*)L_E/\eta_E(\pi_E^* + F_E)]}{[1 - 1/\eta_W + (w_W - w_W^*)L_W/\eta_W(\pi_W^* + F_W)]\alpha}$

Equation (32) resembles (26), with the key difference that in addition to the relative fallback positions of the union and the employers' association, the ratio is once again related to labor demand elasticities in the respective regions.
We thus continue to find the result - considered desirable by many analysts of labor markets - that profit plays a role in wage determination.[29] It follows that the *lower* the alternative wage or the *larger* the variable profit margin above the shut-down point in the East, the more likely w_W/w_E will be less than $(w_W^*/w_E^*)[1-1/\eta_W]/[1-1/\eta_E]$ the benchmark monopoly union case.
This result is more readily applicable to the East-West German situation if one explicitly accounts for *subsidies*. Recalling the definition of π_i^*, we set $S_W = 0$, $S_E > 0$ and differentia-ting (31) totally we see that $dw_W^*/dS_E = 0$ and

(33) $\dfrac{dw_E^*}{dS_E} = \dfrac{(w_E - w_E^*)L_E}{(\pi_E^* + F_W)^2(w_E/w_E^*) + (w_E - w_E^*)w_E L_E^2}$

which is unambiguously positive. *All other things equal*, higher actual or anticipated subsidies to Eastern enterprises will lead to a lower wage gap between West and East as a result of Nash bargaining along the labor demand curve. Thus the fallback level, the actual level of profit, and subsidies are all impor-tant in determining the markup that will result from right to manage bargaining. Both the present and the previous model sug-gest that a government commitment to subsidize East German firms losses (especially those still in the hands of the state trust office, or *Treuhandanstalt*) could lead to higher East German wages relative to West German wages, will play a role in

29) For some examples, see Dunlop (1944), Slichter (1950), and Blanchflower, Oswald and Garrett (1990).

a bargaining setup (whereas they are irrelevant for the benchmark case), and will lead to lower wage differentials than those implied by the monopoly model. The role of profits and subsidies can be extended to a large number of variations on this theme, with the robust result that profits and subsidies will matter.[30]

V. Concluding Remarks

This paper has examined some of the explanations existing theory of union behavior can offer to explain the wage explosion in East Germany. We conclude that, from the perspective of the DGB, higher wages are justified in the East if they were near competitive levels at the outset of unification. Yet in the benchmark case of a rent maximizing monopoly union, optimal wage policy will reflect higher elasticity of labor demand in East German enterprises and East German wages will thus remain lower, possibly considerably lower than the West German level. This situation which will change over time as the capital share increases and redundant workers are laid off, and in a fully dynamic model the union would incorporate these effects as well.

Other considerations will further narrow the wage gap between the two regions. Migration represents one possibility. In the case that the fallback position of West German unions is relatively inelastic, the extended model with migration predicts more aggressive East German wage setting. Another factor that will affect the outcome is the degree to which the East German rents are weighted in the DGB's calculus. A higher weight for the East, *ceteris paribus*, will result in higher East German wages under fairly general conditions.

Similarly under certain conditions, bargaining models also predict more aggressive wage setting in the East than in the pure wage discriminating monopolistic case. The institutional commitment of the Treuhandanstalt is crucial in this regard: as long as Eastern enterprises are spared the threat of

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30) Blanchflower, Oswald and Garrett (1990) consider a setup similar to the right to manage, in which the deciding union member (perhaps as the median voter) is indifferent to employment. In this case the optimal wage is $w_i = w_i^* + \pi_i^*/L_i$.

bankruptcy, a rational bargain between unions and employers'
associations will account for the reduced fallback and result
in higher East German wages.[31]

Two important limitations characterize the analysis. First, we
have limited ourselves to models of union behavior in order to
explain *short run* wage development. Alternatively, fairness
considerations could be regarded as a motivation for the rapid
wage increases documented in the first Section.[32] Second, wage
determination in the two regions of Germany has a *longer run*
dimension that we have ignored in this paper. Unions may take
into account the effect their wage setting can have on profita-
bility and capital formation.[33] In contrast, aggressive wage
setting may also have positive effects on productivity via
efficiency wage effects or endogenous technical progress. Human
capital formation may be stimulated by high wages as well with
salutory growth effects.[34] Despite these limitations, the
models we have considered capture some of the most important
determinants of wages in the short run.

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31) Some of these issues are probably best addressed in a game-
theoretic context in which the union and government are allowed
to make commitments to various policies and when preferences of
the players are not fully known. See Johnson (1991) for an ex-
ample of such an approach applied to the Polish context.
32) See Akerlof and Yellen (1990), for example.
33) In such models, wage moderation is observed, but due to the
time-consistency aspects of wage setting capital formation is
also lower unless binding contracts are possible. See van der
Ploeg (1987) for an analysis of wage determination and invest-
ment in such a dynamic setting.
34) For a discussion of these effects in the context of an
overlapping generations growth model, see Burda and Funke
(1991).

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