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Western and Eastern Germany, 1980-2004:  
What Can We Learn from a Decomposition Analysis?**

Claus Schnabel  
Joachim Wagner

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**Claus Schnabel**

*University of Erlangen-Nuremberg  
and IZA Bonn*

**Joachim Wagner**

*University of Lueneburg  
and IZA Bonn*

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IZA

P.O. Box 7240  
53072 Bonn  
Germany

Phone: +49-228-3894-0  
Fax: +49-228-3894-180  
Email: [iza@iza.org](mailto:iza@iza.org)

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## ABSTRACT

### **The Persistent Decline in Unionization in Western and Eastern Germany, 1980-2004: What Can We Learn from a Decomposition Analysis?\***

An empirical analysis of various waves of the ALLBUS social survey shows that union density fell substantially in western Germany from 1980 to 2004 and in eastern Germany from 1992 to 2004. Such a negative trend can be observed for men and women and for different groups of the workforce. Regression estimates indicate that the probability of union membership is related to a number of personal and occupational variables such as age, public sector employment and being a blue collar worker (significant in western Germany only). A decomposition analysis shows that differences in union density over time and between eastern and western Germany to a large degree cannot be explained by differences in the characteristics of employees. Contrary to wide-spread perceptions, changes in the composition of the workforce seem to have played a minor role in the fall in union density in western and eastern Germany.

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Corresponding author:

Claus Schnabel  
Friedrich-Alexander-University Erlangen-Nuremberg  
Chair of Labour and Regional Economics  
Lange Gasse 20  
90403 Nuremberg  
Germany  
E-mail: [claus.schnabel@wiso.uni-erlangen.de](mailto:claus.schnabel@wiso.uni-erlangen.de)

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\* This paper uses data from various ALLBUS surveys provided by the Zentralarchiv für Empirische Sozialforschung in Cologne. The authors alone are responsible for the use of the data in this study and for any conclusions drawn here.

## 1. Motivation

Today, German unions are in a parlous state. Total membership in the three major union organizations DGB, DBB and CGB, which had been boosted to 13.7 million members in the wake of German unification, has fallen to 8.3 million in 2005. Since 2001 total membership in united Germany is lower than it was in West Germany before unification. The corollary is declining density. Estimates based on union statistics indicate union density of about 24 percent in 2005, but these data include retired and unemployed members. Representative survey data, relating to employees only, suggest a union density value closer to 20 percent. In other words, whereas in 1980 one in three West German employees belonged to a union, by 2004 this was true of just one in five employees (see Table 1 below). It is an open question whether such a low degree of penetration is consistent with a corporatist model built on encompassing trade unions and whether the German union movement will be able to reverse this negative trend.<sup>1</sup>

The reasons for the rather dramatic decline in union density are still open to debate. While the importance of social, political and economic factors such as the transition process in eastern Germany, unions' own policies and business cycle effects should not be overlooked, many explanations focus on structural or compositional factors, which will also be at the centre of our analysis.<sup>2</sup> Given that the employment shares of traditional union core groups such as men, blue collar workers and full time employees have fallen considerably in the last several decades, the decline in aggregate union density seems not surprising. However, union density has also fallen among men and blue collar workers, and econometric analyses for western and eastern Germany indicate that some traditional explanatory variables for individual union membership (including sex) may have lost their significance in recent years (see Schnabel/Wagner 2003, 2005).

This suggests that an investigation of the structural explanation of declining unionization should distinguish two groups of factors: These are changes in the composition of the workforce (like the decline in the employment share of men)

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<sup>1</sup> For a comprehensive discussion of the evidence and its implications see Addison et al. (2006).

<sup>2</sup> For detailed discussions of variations in membership and density, see Fichter (1997), Ebbinghaus (2003), and Schnabel (2005).

and changes in the strength that links certain characteristics of employees (such as sex) to the individual probability of being a union member. It should be interesting to see whether and to which degree these two groups of factors contribute to the decline of union membership and what the relative importance of both groups of factors is. Therefore this paper estimates an empirical model for union membership and attempts to decompose the difference in the percentage of union members among employees over time (and between western and eastern Germany) into the share that is due to differences in characteristics and attitudes of the workers and the residual share that reflects the different coefficients linking these characteristics and attitudes to the probability of being a union member as well as unobserved and unmeasurable factors.

The structure of the paper is as follows: Section 2 discusses the data used and provides some descriptive evidence on union density in western and eastern Germany over various years. The results of econometrically investigating the factors associated with the individual probability of union membership are presented in section 3. Section 4 is devoted to the decomposition of the difference in unionization over the years and between western and eastern Germany. Section 5 interprets our findings and provides some conclusions.

## **2. Data and descriptive analysis**

The data used in this study are taken from various waves of the ALLBUS, the German general social survey. This survey has been conducted every second year since 1980, and for a nominal fee the data are available for scientific research. Note that the ALLBUS data sets are not part of a panel study; for each wave an independent random sample is drawn covering people aged 18 years or more. An additional baseline survey was conducted in 1991 shortly after German unification, and since then the samples include residents in the new federal states in eastern Germany and (German-speaking) foreigners.<sup>3</sup>

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<sup>3</sup> For additional information on the ALLBUS, see Terwey (2000). Data on union membership can also be found in several waves of the German Socio-Economic Panel (GSOEP) since 1985 and have been employed in the econometric studies conducted by Lorenz/Wagner (1991), Fitzenberger et al. (1999) and Goerke/Pannenberg (2004), to name but a few. We use the ALLBUS data instead of the GSOEP for three reasons: First, we can cover a longer period of observation. Second, we

Foreigners are excluded here because they were not covered in the years before 1991 and because they form a small and rather heterogeneous proportion of the samples. We look at individuals who were 18 to 64 years old and who were working full time or part time, either as blue collar workers, white collar workers (except top managers) or civil servants (*Beamte*).

[Table 1 near here]

Table 1 reports information on the percentage of union members among different groups of German employees between 1980 and 2004.<sup>4</sup> Although the 95 percent confidence intervals are quite large, it can be seen that union density has fallen substantially in both western and eastern Germany. Such a negative trend is observed for men and women, and for blue collar workers, white collar workers, and civil servants. Furthermore, while in 1992 overall union density was much higher in eastern than in western Germany, this order is reversed in 2004. In western Germany union density is particularly low for women and white collar workers (with blue collar workers still being union strongholds), whereas similar differences do not show up in eastern Germany.

### **3. Factors associated with the probability of union membership in western and eastern Germany**

In order to find out which factors can explain the patterns of unionization documented in Table 1, we perform a probit analysis (estimating the probability of

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can make use of information on the political orientation of employees on a ten-point left-right scale and on the profession of the father which is not available in the GSOEP but is important for assessing the empirical relevance of theoretical considerations discussed in the literature. Third, while a panel design would allow us to look at the entry into and the exit out of unions, union status switchers tend to be rare in the samples, and the use of panel econometric methods to control for unobserved heterogeneity has to rely heavily on information from this small subgroup. However, we see our study as a complement and not as a substitute for investigations of union membership in Germany based on the GSOEP data.

<sup>4</sup> While official union member statistics are inflated by a large (but not precisely known) number of retired members, the ALLBUS survey data give more precise information on the proportion of active employees that are unionized.

union membership) and use a 1/0-dummy indicating whether an employee is a union member or not as the dependent variable.<sup>5</sup>

The ALLBUS data used include information on a number of potential covariates such as personal and occupational characteristics, attitudes and family background. The first group of variables contains a number of personal characteristics such as sex, age and education which have been found to be systematically related to union membership in cross-sectional studies in many countries (see the surveys by Riley 1997 and by Schnabel 2003). Table 1 shows that in western Germany (as in many other countries) men exhibit a higher union density than women. This stylised fact is usually interpreted as a reflection of men's greater degree of attachment to the labour force which would increase the benefits of unionization both from the point of view of workers and of unions. A similar cost-benefit reasoning applies to full time workers, and dummy variables for sex and full time working are therefore included in the analysis. This argumentation may not carry over to eastern Germany, however, where in the communist regime and even now the labour force participation of women has been substantially higher than in the west.

An age variable is included in the analysis in order to test the hypothesis that younger workers are less likely to be union members due to their different socialization resulting in lower identification with unions and due to a related change of values. In addition to this explanation from social psychology, cost-benefit considerations could explain a higher unionization rate of older employees since in some industries there exist collective agreements that provide job security for union members above a certain age. This argument is not very strong, however, since in practice (i.e. by law and labour court practice) older non-union employees enjoy almost the same employment security.

Concerning the educational and qualificational background of union members, we are able to include dummy variables in our analysis that take on the value of 1 if employees have finished an apprenticeship or are master craftsmen and if they have a polytech or university degree. For the former variable we would

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<sup>5</sup> The empirical approaches used and the evidence provided in previous studies of the determinants of union membership in Germany are surveyed by Schnabel/Wagner (2005). For a discussion of various theories from economics and other social sciences that motivate the selection of variables included in the empirical model, see Schnabel (2003) or Schnabel/Wagner (2005).

expect a positive influence on unionization for two reasons: First, unions have developed and have traditionally served as representatives of skilled craftsmen, and recruitment costs should be relatively low for this rather homogeneous group (with high employment security) that forms the backbone of the German industrial workforce. Second, vocational education can be regarded as a surrogate for current group identity which plays an important role in the interactionist approach of social psychology (see Guest/Dewe 1988). In contrast, a polytech or university degree is assumed to be negatively associated with unionism because more educated employees have greater individual bargaining power and thus a lesser need for collective voice. Furthermore, they are said to sometimes identify more with management than with the labour movement, so that they should be less likely to become union members.

The occupational status of employees is included in the analysis by dummy variables for blue collar workers and civil servants which again enable us to test whether the relationships showing up in Table 1 also hold in a multivariate analysis. Economic and rational choice considerations predict that since blue collar workers and civil servants have rather homogeneous preferences and working conditions which make them easier to organize they should have a higher probability of being union members.

Workplace characteristics are reflected in a dummy variable for employees working in the public sector. Since union recruitment tends to be easier and less costly in large, homogeneous organizations with a bureaucratic nature and a low turnover rate, unionization is expected to be higher in the public sector than in the market sector. In addition, in the public sector substantially more works councils exists than elsewhere (cf. Addison et al. 2003), and since works councils usually are prime actors of union recruitment (Streeck 1981: 209ff.), the propensity to join a union should be higher there.<sup>6</sup>

Political attitudes of individual employees have been found to be significant determinants of union membership in many studies (see the surveys by Riley 1997

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<sup>6</sup> Similar arguments apply to firm size, but since in our data set this variable is only available for the years 1980 and 1984 we decided not to include it in the empirical analysis. Using the same data set, Schnabel/Wagner (2005) found firm size to be a highly significant determinant of unionization in both years. Similar results are obtained for more recent years in the studies by Goerke/Pannenberg (2004) and Fitzenberger et al. (2006) using GSOEP data.



and by Schnabel 2003). For Germany, Windolf/Haas (1989), Lorenz/Wagner (1991), Fitzenberger et al. (1999) and Beck/Fitzenberger (2004) all found that Social-Democrat (SPD) voters have a higher probability of being union members which is not surprising given the historically close relationship between the SPD and the labour movement. In the ALLBUS data set there is information on the political orientation of respondents measured on a ten-point scale ranging from 1 for extreme left to 10 for extreme right. Since left-wing views should be associated with a higher probability of union membership we expect a negative coefficient of this variable in our estimations.

Several theories of social psychology as well as social custom models (in the spirit of Booth 1985) suggest including social variables into individual-level cross-sectional studies of unionization. In Germany, the influence of reference groups and key individuals such as parents and spouses on the decision maker has been investigated with mixed success by Windolf/Haas (1989) and Goerke/Pannenberg (2004). Our data set contains information on whether an employee's father was a blue collar worker. While this dummy variable should play no role in a purely economic reasoning, according to social custom theory it can be expected to have a positive influence on the probability of union membership due to a union-friendly socialization process in the family.

The results of estimating identical models for the probability of being a union member with the explanatory variables described above for western and eastern Germany are presented in Table 2. It can be seen that the empirical model works much better in western Germany and that the explanatory power of the variables used is mixed: On the one hand, most of the explanatory variables are statistically significantly related to the probability of being a union member in at least one of the years covered (the exception being the variable indicating whether or not an employee holds a polytech or university degree). On the other hand, statistical significance often varies over time, and none of the variables included in the empirical model is significant in every year and each part of Germany investigated.

[Table 2 near here]

Furthermore, the marginal effects (that is, the estimated change in the probability of being a union member for an infinitesimal change in a continuous

independent variable evaluated at the sample mean of this variable, or for a change of the value of a dummy variable from zero to one) reported in Table 2 reveal that there are substantial differences in the size of effects. To look at two cases in point, according to our estimates being a civil servant *ceteris paribus* increased the probability of being a union member in western Germany by 15.4 percent in 1992, while this effect was about twice as high (29.9 percent) in 2004; and working in the public sector in 2004 had a marginal effect of 0.092 in western Germany, but an effect more than twice as high (0.209) in eastern Germany.

Despite these qualifications, many of the empirical results are in accordance with expectations. Men are found to have a higher propensity to unionize in western Germany only, what confirms the descriptive evidence in Table 1. Further significant relationships restricted to western Germany are found for blue collar workers and civil servants and for an employee's father being a blue collar worker. In contrast, public sector employees are more and younger employees are less likely to be union members in both western and eastern Germany (although the latter effect is only marginally significant in the west in 2004). Interestingly, however, some traditional predictors of union membership in western Germany in 1980 such as being a full time worker, having completed an apprenticeship and expressing left-wing views do not seem to play a significant role anymore in both parts of Germany in 2004.<sup>7</sup>

#### **4. A decomposition of the difference in union membership over time and between western and eastern Germany**

The results of the empirical models reported in Table 2 reveal a number of time period and/or region specific differences regarding the statistical significance of the relationship between some of the explanatory variables and the probability of membership, and regarding the size of these effects. However, not only the estimated coefficients linking characteristics and attitudes of the employees to the probability of unionization do differ over time and between western and eastern Germany – the composition of the samples with regard to these characteristics

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<sup>7</sup> Looking at recent analyses with GSOEP data, the insignificance of political orientation is also found by Goerke/Pannenberg (2004) but not by Fitzenberger et al. (2006). The latter, however, confirm the irrelevance of having completed an apprenticeship and of working part or full time.

and attitudes differs, too. This is reflected in the means of the variables included in the empirical models that are reported in Table 3. From these we see, for example, that the share of males in all employees declined by eight percentage points in western Germany between 1980 and 2004, and that the share of full time workers was 10 percentage points higher in eastern than in western Germany in 2004.

[Table 3 near here]

Given these differences between the employees in the samples and between the regression coefficients, the question arises to what extent the differences of union density across time and space documented in Table 1 can be explained by differences in characteristics and attitudes of the workers on the one hand and by differences in the coefficients on the other. This type of question is familiar from other fields of economics. A case in point is the decomposition of the earnings differential between groups of workers (for example, males and females) into a share that can be explained by differences in characteristics that are related to productivity (years of schooling, years of experience etc.) and the rest that is due to differences in the rates of return to these characteristics (often labelled discrimination). This kind of decomposition is based on earnings functions (linking earnings to its determinants) that are estimated separately for samples of employees from both groups. It was introduced by Blinder (1973) and Oaxaca (1973), has been used in hundreds of empirical studies ever since, and is covered in standard textbooks of labour economics (e.g., Cahuc/Zylberberg 2004: 280ff.).

While the Blinder-Oaxaca decomposition technique is easy to apply if the outcome variable is continuous like earnings, a problem arises if the outcome is binary (like union membership) and the coefficients are from a (non-linear) probit model because these coefficients cannot be used directly in the standard Blinder-Oaxaca decomposition equations (Fairlie 2006: 1). Therefore Fairlie (1999, 2006) introduced a decomposition method that uses estimates from a probit model. This method has recently been implemented in Stata by Jann (2006), and it is used here to decompose the differences in union membership over time and between western and eastern Germany. While a discussion of the details of this method is beyond the scope of this paper, two important aspects and limitations (that also

show up in the standard Blinder-Oaxaca decomposition) should be mentioned: First, while the characteristics effect identified in the decomposition represents the part of the difference in union density that is due to observed differences over time and region in the characteristics and attitudes of employees that form the explanatory variables, the residual effect not only represents the part due to different regression coefficients but captures also the proportion of the difference in density due to group differences in unmeasurable or unobserved factors. This second, “unexplained” portion of the difference in density (which is calculated as a residual) thus should not be overinterpreted. Second, each subsample can be used as the reference group, and the results usually will differ according to the choice of the reference group. Given that there is no sound reason to use one subsample or the other as the reference group, both variants are computed, and the results are compared.

Using (one at a time) each part of Germany and each year as the reference group, the contribution of differences in the entire set of variables entering the union membership function to the difference in union density between two subsamples investigated is estimated and reported in Table 4. For a reference group and a comparison group two sets of predicted probabilities of union membership are calculated based on the estimated coefficients from the membership functions for the reference group (reported in Table 2) and the employees in the subsamples, and the difference between the average values of the two sets of predictions is computed. The type of question answered here is “How high would union density in eastern Germany have been in 1992 if the employees from the western German sample worked in eastern Germany, and if the characteristics and attitudes of these western German employees were linked to the probability of being a union member according to the coefficients estimated using the eastern German sample from 1992?”<sup>8</sup>

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<sup>8</sup> To illustrate, consider the following hypothetical example: The observed union density in Axistan is 25 percent, and 5 percent in Uxistan, leading to a union density gap of 20 percentage points in favour of Axistan. If the estimated union density for the employees from the Uxistan sample, using the coefficients calculated for Axistan, is 15 percent, this means that 10 percentage points (or 50 percent) of the difference in the union density between the two countries can be explained by differences in the characteristics and attitudes of employees and workplaces between Axistan and Uxistan, while the other 10 percentage points are due to cross-country differences in the coefficients linking these characteristics and attitudes to the probability of union membership and

[Table 4 near here]

The results of the decomposition analyses of differences in union density are reported in Table 4. Starting with the decline in union density in western Germany over time, the estimates demonstrate that changes in the composition of the sample of employees between 1980 and 1992, between 1992 and 2004, and between 1980 and 2004 can explain only a small fraction of the changes in the share of employees that were union members. This becomes particularly clear when we compare the years 1980 and 2004 (in rows 3 and 4) when unionization declined by 11.49 percentage points from 33.01 percent to 21.52 percent. Using the results for 1980 as the reference group and 2004 as the comparison group, according to the decomposition performed here only 0.16 percentage points (or 1.4 percent) of this decline are due to changes in the composition of the sample with regard to the explanatory variables included in the membership function. The other 11.33 percentage points (or 98.6 percent) are due to differences in the coefficients linking the characteristics of the employees and the probability of being a union member or due to unobserved factors. If the results for 2004 are considered as the reference group instead, and 1980 is used as the comparison group, the share of the difference in union density which is explained by changes in the composition of the sample is somewhat higher (11.3 percent), but still relatively small.

The minor role of the characteristics effect is even more pronounced if we look at the results for eastern Germany over time. Irrespective of the choice of the reference group and the comparison group (1992 and 2004 or the reverse), the characteristics effects has the “wrong” sign – differences in the characteristics of the workforce do not contribute at all to understanding the decline in union density.

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due to unobserved or unmeasurable factors. In this case, both the characteristics effect and the residual effect are 10 percentage points. If, however, the estimated union density for the employees from the Axistan sample, using the coefficients calculated for Uxistan, is 10 percent, this means that 25 percent of the difference in the union density between the two countries can be explained by differences in the characteristics and attitudes of employees and workplaces between Axistan and Uxistan. Given that the choice of the reference group (Axistan or Uxistan) is arbitrary, we would conclude that between 25 and 50 percent of the cross-country difference in union density is due to observed differences between the two groups of employees and their workplaces.

Comparing western and eastern Germany, results differ for 1992 and 2004. In 1992, two years after unification, differences in the composition of employment can explain between 12 percent and one third of the difference in union density (depending on the choice of the reference group). More precisely, had the employees in western Germany (given their specific employment structure) shown the same propensity to unionize (as reflected in the regression coefficients of explanatory variables) as their eastern German colleagues, aggregate union density in western Germany would have been 3.17 percentage points higher in 1992. In 2004, however, irrespective of the choice of the reference group the characteristics effects has the “wrong” sign – differences in characteristics and attitudes of workers do not contribute to understanding the east/west difference in union density.

These empirical results can be put into perspective by relating them to the findings of a contemporaneous study by Fitzenberger et al. (2006). Using micro data of the German Socio-Economic Panel (GSOEP) survey (from six waves during the period 1985 to 2003 for western Germany and four waves between 1993 and 2003 for eastern Germany) the authors investigate the same topic as we do here. They apply a different approach to estimate the membership functions (making use of the panel character of the data by estimating a correlated random effects probit model) and a similar decomposition technique. Looking at changes in union density over time, Fitzenberger et al. (2006) find that changes in the composition of the workforce have only played a minor role for the deunionization trends in eastern and western Germany. They argue that the small impact of the characteristics effect in eastern Germany is quite remarkable in light of the structural change during the 1990s.

Details aside, the findings from these two studies which use different data sets and different microeconomic methods are remarkably similar as regards the role of changes in the composition of employment in shaping the decline in union density in western and eastern Germany. This is reassuring because “the credibility of a new finding that is based on carefully analyzing two data sets is far more than twice that of a result based only on one.” (Hamermesh 2000: 376).

## **5. Discussion**

The ALLBUS survey data analyzed here show that union density fell drastically in western Germany from 1980 to 2004 and in eastern Germany from 1992 to 2004. Such a negative trend can be observed for men and women and for different groups of the workforce. Furthermore, while in 1992 overall union density was much higher in eastern than in western Germany, this order is reversed in 2004. The regressions estimated in this paper indicate that the probability of union membership is related to a number of personal and occupational variables such as age, occupational status, and public sector employment. A decomposition applied showed that – contrary to expectations and wide-spread perceptions – differences in union density over time and between eastern and western Germany to a large degree cannot be explained by differences in the characteristics of employees. In other words, changes in the composition of the workforce seem to have played a minor role in the substantial fall in union density in western and eastern Germany.

Two limitations of the Fairlie decomposition technique applied are that the characteristics effect of different compositions of the employees in the samples is simulated using statistically significant and insignificant regression coefficients alike and that the residual effect reflects not only differences in regression coefficients but also differences in unobserved or unobservable factors (and thus in some sense our ignorance). Against this background it is important to note that in our empirical analysis quite a few regression coefficients of explanatory variables have become insignificant over time and that the size of effects has changed over time.

What this means for explaining the decline in union membership can be demonstrated using the example of full time workers. In western Germany not only the proportion of full time workers falls between 1980 und 2004 (from 88 to 81 percent in our sample according to Table 3). What is more, being a full time worker is no longer linked positively (and with a large effect) to the probability of being a union member. As reported in Table 2, the marginal effect of the full time worker dummy declines from 0.152 (statistically highly significant) in 1980 to -0.016 (statistically insignificant) in 2004. This implies a reduction in the statistical importance of this explanatory variable for the probability of union membership. Similarly, the marginal effects of having completed an apprenticeship or being a master craftsman and of the political orientation variable go down by half between the two years and become statistically insignificant. Thus traditional predictors of

unionization such as being a full time worker, having completed an apprenticeship and expressing left-wing views do not play a significant role anymore in 2004, and this applies for western and eastern Germany alike.<sup>9</sup>

This said, we must acknowledge that it has proved difficult to explain the level and the fall in union density in western and eastern Germany. Although due to lack of data we could not include potential explanatory variables like service sector employment and firm size in our econometric analyses, it seems save to conclude that the changing composition of the workforce is of lesser importance than widely believed. This insight and the low explanatory power of many potential determinants of unionization in 2004 (in particular in eastern Germany) indicate that there seem to exist other relevant factors which are difficult to measure and identify, such as union policies, workers' experiences and individual attitudes.

For the unions this means that recruiting (and keeping) members has become a tough challenge. Although the public sector is still a union stronghold, "born unionists" seem to be a vanishing species, and identifying union-friendly groups in the workforce that are easy to recruit is more and more difficult in light of growing individualism. Up to now, most unions have failed to come up with promising and successful strategies for attracting increasingly heterogeneous groups of employees. One starting point (whose empirical relevance has been shown by Schnabel/Wagner 2006) could be increasing unions' presence at the workplace, which would also mean reversing the organizational withdrawal from low membership areas performed in the last decade. It is also high time for the German unions to discuss and define what they stand for in the twenty-first century and so try to attract members by a convincing "corporate identity".

The experience of other European and non-European countries (documented by Visser 2003) shows that there is no "iron law" of falling union density. Learning from best recruitment practices in other countries may help German unions to stop the erosion of membership and density that in the long term could threaten their existence. It is an open question what might happen to the German system of industrial relations, and to the labour market in general, if union membership and

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<sup>9</sup> While the marginal effect of the sex variable has remained rather stable over time, the share of men in the workforce has fallen from 64 to 56 percent, which should have contributed to the observed decline in union density in western Germany from 1980 to 2004.



density erodes further. A discussion of this topic, however, is beyond the scope of this study.

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**Table 1: Percentage of union members among German employees**

Year	1980	1992		2004	
Sample	Western Germany	Western Germany	Eastern Germany	Western Germany	Eastern Germany
All	32.7 (30.0/35.5)	28.7 (25.8/31.7)	39.7 (35.3/44.1)	21.7 (18.7/24.9)	18.3 (14.3/22.7)
Male	39.6 (36.1/43.2)	36.0 (32.1/40.2)	35.8 (29.8/42.1)	26.3 (22.1/30.9)	16.8 (11.7/22.9)
Female	20.3 (16.6/24.5)	18.5 (14.8/22.7)	43.5 (37.3/50.0)	15.8 (11.9/20.4)	20.0 (14.1/27.0)
Blue collar	36.3 (31.9/41.0)	37.6 (32.1/43.3)	37.8 (30.8/45.1)	29.6 (23.8/36.0)	19.6 (13.4/27.0)
White collar	26.3 (22.6/30.1)	20.2 (16.8/23.9)	40.7 (35.1/46.5)	13.8 (10.6/17.5)	17.7 (12.5/23.9)
Civil servants	45.2 (37.3/53.4)	43.5 (34.3/53.0)	50.0 (11.8/88.2)	42.0 (30.2/54.5)	n.a.

Notes: own calculations based on ALLBUS data for 1980, 1992, 2004; numbers in brackets are the lower/upper bounds of the binominal exact 95% confidence interval.

**Table 2: Results from estimations of union membership functions for Germany**

Dependent variable: union member (1=yes); method: probit; marginal effects

Year	1980	1992		2004	
Explanatory variables	Western Germany	Western Germany	Eastern Germany	Western Germany	Eastern Germany
Age (years)	0.005** (3.31)	0.005** (3.26)	0.007* (2.47)	0.003 (1.73)	0.005* (2.22)
Sex (dummy, 1 = male)	0.088* (2.27)	0.080 (1.92)	-0.089 (-1.38)	0.115** (2.68)	0.011 (0.22)
Full time worker (dummy, 1 = yes)	0.152** (2.69)	0.190** (3.54)	-0.018 (-0.15)	-0.016 (-0.29)	-0.153 (-1.77)
Completed apprenticeship or master craftsman (dummy, 1 = yes)	0.113* (2.37)	0.015 (0.33)	0.131 (1.60)	0.063 (1.29)	-0.176 (-1.82)
Polytech or university degree (dummy, 1 = yes)	0.093 (1.20)	-0.050 (-0.90)	0.002 (0.02)	-0.013 (-0.20)	-0.107 (-1.36)
Blue collar worker (dummy, 1 = yes)	0.054 (1.43)	0.151** (3.57)	0.070 (1.01)	0.123** (2.69)	0.063 (1.10)
Civil servant (dummy, 1 = yes)	0.161* (2.50)	0.154* (2.38)	0.107 (0.49)	0.299** (3.93)	-0.128 (-1.57)
Public sector employee (dummy, 1 = yes)	0.048 (1.04)	0.124** (2.63)	0.063 (1.10)	0.092* (2.01)	0.209** (3.40)
Political orientation (index from 1= extreme left to 10 = extreme right)	-0.031** (-3.49)	-0.024** (2.59)	-0.065** (-3.97)	-0.015 (-1.46)	-0.025 (-1.65)
Father: blue collar worker (dummy, 1 = yes)	0.073* (2.18)	0.105** (2.94)	0.053 (0.99)	0.081* (2.18)	0.092 (1.93)
Number of observations	939	746	377	567	286

Notes: z-values in brackets; \*(\*\*) denote statistical significance at the 5 percent (1 percent) level

**Table 3: Sample means of variables used in estimations of union membership functions for Germany**

Year	1980	1992		2004	
Explanatory variables	Western Germany	Western Germany	Eastern Germany	Western Germany	Eastern Germany
Age (years)	39.05 (11.38)	38.12 (10.74)	37.34 (10.01)	40.43 (9.78)	41.57 (10.16)
Sex (dummy, 1 = male)	0.640 (0.48)	0.583 (0.49)	0.504 (0.50)	0.561 (0.50)	0.552 (0.50)
Full time worker (dummy, 1 = yes)	0.880 (0.33)	0.836 (0.37)	0.947 (0.22)	0.811 (0.39)	0.913 (0.28)
Completed apprenticeship or master craftsman (dummy, 1 = yes)	0.748 (0.44)	0.696 (0.46)	0.793 (0.41)	0.723 (0.45)	0.783 (0.41)
Polytech or university degree (dummy, 1 = yes)	0.105 (0.31)	0.173 (0.38)	0.204 (0.40)	0.196 (0.40)	0.210 (0.41)
Blue collar worker (dummy, 1 = yes)	0.373 (0.48)	0.308 (0.46)	0.366 (0.48)	0.314 (0.46)	0.420 (0.49)
Civil servant (dummy, 1 = yes)	0.135 (0.34)	0.137 (0.34)	0.016 (0.13)	0.106 (0.31)	0.045 (0.21)
Public sector employee (dummy, 1 = yes)	0.257 (0.44)	0.328 (0.47)	0.366 (0.48)	0.309 (0.46)	0.276 (0.48)
Political orientation (index from 1= extreme left to 10 = extreme right)	5.763 (1.81)	5.241 (1.85)	4.836 (1.66)	5.351 (1.61)	4.818 (1.57)
Father: blue collar worker (dummy, 1 = yes)	0.496 (0.50)	0.489 (0.50)	0.501 (0.50)	0.487 (0.50)	0.573 (0.50)
Number of observations	939	746	377	567	286

Note: standard deviations in brackets

**Table 4: Decomposition analyses of differences in union membership**

Reference group (percentage of union members in sample)	Comparison group (percentage of union members in sample)	Difference in density (percentage points)	Characteristics effect (percentage points)	Residual effect (percentage points)
western Germany 1980: 33.01	western Germany 1992: 29.76	3.25	0.08	3.17
western Germany 1992: 29.76	western Germany 1980: 33.01	-3.25	-1.03	-2.22
western Germany 1980: 33.01	western Germany 2004: 21.52	11.49	0.16	11.33
western Germany 2004: 21.52	western Germany 1980: 33.01	-11.49	-1.30	-10.19
western Germany 1992: 29.76	western Germany 2004: 21.52	8.24	0.49	7.75
western Germany 2004: 21.52	western Germany 1992: 29.76	-8.24	-0.60	-7.64
eastern Germany 1992: 39.26	eastern Germany 2004: 17.83	21.43	-2.80	24.23
eastern Germany 2004: 17.83	eastern Germany 1992: 39.26	-21.43	1.23	-22.66
western Germany 1992: 29.76	eastern Germany 1992: 39.26	-9.50	-1.13	-8.37
eastern Germany 1992: 39.26	western Germany 1992: 29.76	9.50	3.17	6.33
western Germany 2004: 21.52	eastern Germany 2004: 17.83	3.69	-1.26	4.95
eastern Germany 2004: 17.83	western Germany 2004: 21.52	-3.69	0.73	-4.42

Note: Own calculations based on union membership functions reported in Table 2. The percentage of union members in the sample differs (slightly) from the values reported in Table 1 due to different samples used in the membership function estimations (caused by missing values). For details regarding the decomposition method used see text.