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Nontechnical Summary

Trade union membership in Germany has declined remarkably in recent decades. By the year 2004, gross union density, i. e., the ratio of the number of union members and the number of employees in the German labor market, was down to a historically low level of 27%. Some unions have responded to the decline in size by merging, but to date unions have not been able to reverse the trend. Moreover, the results of union activity apply to most of the workers irrespective of membership. Why then do people join a union at all?

This study uses panel data from the German Socio-Economic Panel to provide insights into the determinants of individual union membership and corresponding changes over time. Our findings based on correlated random effects probit models for West (1985–2003) and for East Germany (1993–2003) quantify the influence of socio-demographic personal characteristics, such as age or marital status; the influence of workplace characteristics, i. e., match, firm, or industry-specific effects; and the influence of attitudinal factors for the individual choice to be or not to be a union member.

We then use our estimates to project net union density (NUD)—defined as the share of employed union members in the number of employees—as a measure for union strength in East and West Germany. The projections consistently trace the trends towards de-unionization in both parts of the country. Compared to the West, membership in East Germany started out from a higher level at the beginning of the 1990's, but exhibited a stronger decline afterwards. By the year 2003, NUD was even lower in East Germany than in the West.

The projections are analyzed by means of decomposition techniques in order to shed light on (1) the changes in unionization over time and (2) the differences in NUD between East and West Germany. We find that changes in the composition of the work force only played a minor role for the deunionization trends in both East and West Germany. In East-West comparison, the West German work force exhibits more attributes supporting union membership. The higher union density in East Germany in the year 1993 and the stronger subsequent decline thus reflect a lower quality of membership matches resulting from the widespread, arbitrary membership recruitment after unification.

The erosion of union membership is likely to weaken the bargaining power of unions and therefore the unions' impact on the labor market. Despite the still high coverage of collective agreements, the results of wage bargaining are likely to deteriorate from the perspective of union members—but possibly result in higher employment. Based on the results of this study, the link between union membership, wages, and employment can be explored in future research.

The Erosion of Union Membership in Germany: Determinants, Densities, Decompositions

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Abstract: Union density in Germany has declined remarkably during the last two decades. We estimate socio-economic and workplace-related determinants of union membership in East and West Germany using data from the German Socio-Economic Panel by means of Chamberlain-Mundlack correlated random effects probit models. Drawing on the estimates, we project net union densities (NUD) and analyze the differences between East and West Germany as well as the corresponding changes in NUD over time. Blinder-Oaxaca decompositions show that changes in the composition of the work force have only played a minor role for the deunionization trends in East and West Germany. In East-West comparison, differences in the characteristics of the work force reflect a lower quality of membership matches in East Germany right after German unification.

Keywords: Union membership, union density, correlated random effects probit model, decomposition analysis, East Germany, West Germany.

JEL-Classification: J51.

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1 Introduction

Trade unions bargain for higher wages, equal pay, reduced working hours, fair working conditions, or employment protection (Freeman and Medoff, 1984). However, in Germany—and in a number of other countries—the results of union activity apply to most of the workers irrespective of membership. Membership is not compulsory and closed shop regulations are illegal. The public good character of core services offered by trade unions may give rise to free-rider behavior.

Thence, why do people join a union? Given the economic importance of union activity (Addison and Schnabel, 2003), interest in the determinants of union membership is of its own right. It is essential to disentangle and quantify the determinants of union membership in order to understand the recent decline in union membership in developed countries; see OECD (2004) and Ebbinghaus (2003) for Germany. Moreover, facing the lack of information on union membership in various data sets, microeconometric membership estimations can be used to predict union density for homogeneously defined labor market segments, such as industries and/or regions. These predictions can then be employed to study the impact of unionization on economic performance, and on employment and the structure of wages in particular; see Fitzenberger and Kohn (2005). This is of importance since in contrast to the Anglo-Saxon literature (see the survey by Card, Lemieux, and Riddell, 2003), it is not meaningful to estimate a wage effect of individual union membership in Germany, where the public good nature of union activity results in union coverage being much higher than union density.

For Germany, a couple of microeconometric analyses of union membership using survey data are available. For example, Windolf and Haas (1989), Lorenz and Wagner (1991), and Schnabel and Wagner (2005) use different sets of cross sectional survey data to estimate binary choice models of union membership in West Germany. Schnabel and Wagner (2003) also estimate determinants of union membership in East Germany. However, none of the above studies employs panel data methods to control for unobserved heterogeneity. This was first established by Fitzenberger, Haggeney, and Ernst (1999) and Beck and Fitzenberger (2004), whose analyses for West Germany are based on three and four waves of the German Socio-Economic Panel (GSOEP), respectively.

Our study extends upon this literature in two main directions. First, we estimate determinants of union membership in East as well as in West Germany, using the panel structure of the GSOEP and applying a Chamberlain (1980)-Mundlack (1978)-type correlated random effects probit model. Our estimations are based on six waves during the period 1985–2003 providing union membership status for individuals in West Germany,

and on four waves between 1993 and 2003 for East Germany. In fact, it proves important to control for individual-specific effects in the membership decision. Our findings show the influence of socio-demographic personal characteristics, such as age or marital status; the influence of workplace characteristics, i. e., match, firm, or industry specific effects; as well as the influence of attitudinal factors for the individual choice to be or not to be a union member, and we analyze differences of these factors between East and West Germany and across time.

Second, we use our estimates to predict net union density (NUD) as a measure for union strength in East and West Germany. The predictions, which consistently trace the trends towards deunionization in both parts of the country, are then analyzed by means of decomposition techniques in order to shed light on (1) the changes in unionization over time and (2) the differences in NUD between East and West Germany. We find that changes in the composition of the work force only played a minor role for the deunionization trends in both East and West Germany. In East-West comparison, differences in the characteristics of the work force are in favor of higher NUD in the West. The stronger decline in union membership in East Germany reflects a stronger change in the impact of these characteristics.

The remainder of the paper is organized as follows: Section 2 reviews the literature on union membership. Section 3 discusses potential determinants of membership decisions. Our econometric investigation is presented in section 4. Corresponding projections of net union densities and the decomposition analyses are discussed in section 5. Section 6 concludes. The appendix includes further information on the data and empirical results.

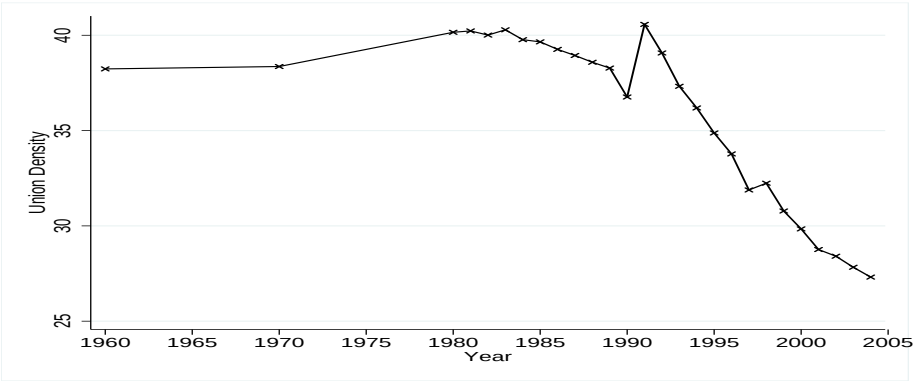
2 Literature Review

Studies of union membership in Germany face three challenges. First, collective bargaining is an open shop system. Negotiation outcomes apply not only to union members, but to the vast majority of all employees; see, e. g., Bosch (2004). Membership is not compulsory and closed shop regulations are forbidden by constitutional law. By nature, the core services trade unions offer have public good character, which gives rise to the possibility of free-riding behavior. Thus, why would people want to join a union at all? Who joins the union? And how much do different determinants such as personal or workplace characteristics contribute to people's membership decision?

Second, union membership rates have been steadily declining in recent decades. Figure 1 depicts gross union density (GUD), defined as the ratio of the number of union members and the number of employees in the German labor market. After a period of

slight increases in the 1970's, the early 1980's mark the beginning of a pronounced trend towards deunionization, which started out at a level of about 40%. By 2004, GUD was down to a historically low level of 27%. Deunionization was merely interrupted by a unification effect in 1990, when West German institutions were transferred to the East, and unions were initially very successful in recruiting members in the East. However, the upsurge in aggregate GUD of about five percentage points (pp)—which was built on the grounds of the GDR labor organization *Freier Deutscher Gewerkschaftsbund*, whose members had comprised the largest part of the GDR work force—was not sustainable, and deunionization went on even more rapidly in the 1990's and 2000's. Some trade unions have responded to the decline in size by merging; see, e. g., Keller (2005). To date, however, unions have not been able to reverse the trend; see also Ebbinghaus (2003) and Fichter (1997). Against this background, micro-level studies which unveil how individual membership decisions have been changing over time, can give insight into the nature of observed trends.

Figure 1: Evolution of Gross Union Density



Gross union density in percent; 1960–1990: West Germany; 1991–2004: Unified Germany.
Union membership in CGB (*Christlicher Gewerkschaftsbund*, data until 1999: German Statistical Office (*Statistisches Bundesamt, Statistische Jahrbücher*), union information thenceforward), DAG (*Deutsche Angestelltengewerkschaft*, until 2000; data: German Statistical Office), DGB (*Deutscher Gewerkschaftsbund*, data: www.dgb.de), DBB (*Deutscher Beamtenbund*, data: www.dgb.de), and DPolG (*Deutsche Polizeigewerkschaft*, until 1970, data: German Statistical Office).
Employment (*abhängig Beschäftigte ohne mithelfende Familienangehörige*) from German Microcensus: www.destatis.de.

Third of all, the availability of adequate data from union records is limited. From 1991 onwards, only aggregate numbers for unified Germany are available, and unions' publications do not distinguish between employed members on the one hand and unemployed, retired, or student members on the other. Yet this distinction is important from an economic point of view. Net union density (NUD), defined as the share of employed union members in the number of employees, is a better measure of union power than GUD

because it is more closely related to the union's financial resources and to the potential to mobilize workers within firms. Net union density is lower than gross union density by definition. Estimates of aggregate NUD usually fall short of GUD by about 10 pp and this difference also varies with the business cycle; see Ebbinghaus (2003). Union power further differs significantly between different labor market segments. For example, unions are traditionally strong in manufacturing industries, but they are of minor importance in personal service sectors. Official membership information does not distinguish between sufficiently homogenous segments. Detailed NUD estimates obtained from survey data should thus help providing meaningful measures of union strength.

The following paragraphs review contributions from the theoretical literature and existing empirical studies on these issues. The purpose is to motivate the determinants under study and the adequacy of the econometric approach pursued later on; see Naylor (2003), Riley (1997), and Schnabel (2003) for more extensive surveys.

2.1 Theoretical Analyses

In a traditional cost-benefit framework, potential union members balance the utility derived from being member with the costs associated to it. Membership is costly due to membership fees, and in an open shop system the key benefits arising from union bargaining—like higher wages and equal pay, reduced working hours, fair working conditions, or employment protection—are basically public goods. Therefore, a rational individual would not join a union, but rather free ride in this setting.

Several ways to accommodate the free-rider problem have been considered. First, membership could be compulsory. Second, membership would be voluntary in a dichotomous labor market with union and non-union sectors (Grossman, 1983), but all employees in unionized firms choose to be member. Both of these arrangements are essentially closed shop solutions, where only members are eligible for benefits. However, the German as well as most European empirical evidence dismisses closed shop solutions.

Third, unions offer selective incentives (Olson, 1965) in addition to the collective goods. On the one hand, these can be actual private goods (Booth and Chatterji, 1995), such as legal aid and grievance procedures, accident insurances, or even education and further training. Moreton (1998), for instance, considers greater job security for union members. On the other hand, members may comply with a social custom to support the union. The notion of social custom, as introduced to labor economics by Akerlof (1980), captures the idea that individuals abide by internal rules or norms set within society because non-conformance would result in a loss of reputation, which would be costly for the individual (Booth, 1985). Naylor (1989) considers the case where individuals'

believes about a social custom are heterogeneous, thereby explaining stable equilibria at intermediate union densities. Alternatively, the incorporation of management opposition in Corneo (1995) uses the union's interaction with other institutional agents to explain stable intermediate levels of unionization. All of the economic models above rationalize a minimum level of unionization below which a union loses its ability to effectively provide services. Reduced services would in turn induce more and more members to quit and, at the end of the day, the union would cease to exist.

Complementary approaches in social and political sciences (Wallerstein and Western, 2000, for example) discuss internal rules, class consciousness, social values, political attitudes, etc. Though difficult to measure, these are considered to be highly relevant for union membership. Most of these factors are likely to induce unobserved heterogeneity in the empirical analysis.

2.2 Empirical Studies

There are three important strands of the literature; see Riley (1997) and Schnabel (2003) for overviews. A first class of studies uses aggregate time series data. In the tradition of Ashenfelter and Pencavel (1969) the analyses focus on long-run trends and business cycle effects. For Germany, Armingeon (1989) analyzes changes in union density in the period 1950–1985. He finds that the stability of gross union density was caused by membership gains in shrinking segments of the labor market on the one hand and stagnation in growing industries on the other. Similarly, Schnabel (1989) studies trade union growth in the period 1955–1986 and links it to changes in price levels and wages, employment, and unemployment. The aggregate evidence stresses the importance of environmental factors.

The second strand of the literature analyzes the impact of institutional regulations and interactions in social environments. Centralization and coordination of collective bargaining, coverage rates, and codetermination are the pillars of an industrial relation system (Hassel, 1999). Interaction between these constituents is closely related to union membership. For example, union membership of a works council increases union density at the firm level since it facilitates union access to the work force (Windolf and Haas, 1989). Similar effects can be expected from a Ghent system of union-managed unemployment insurance. The contact of union officials to insured employees supports recruitment efforts. Frege (1996) emphasizes that the membership decision and the question whether people actually participate in collective action are two separate issues. She finds that there is no difference in actual behavior of union members between East and West Germany.

The third class of studies uses micro data to model individual membership decisions. At this level, determinants can be grouped into three categories.

- Personal characteristics: Observed socio-demographic variables such as age or marital status, but also attitudes determine an individual's decision to be union member.
- Workplace characteristics: Match-specific, firm-specific, as well as industry-specific effects can facilitate or impede unionization.
- Social environment: The influence of reference groups frames the individual decision.

Studies based on micro-level data for Germany analyze membership determinants along these lines. Windolf and Haas (1989) provide logit estimates based on cross-sectional survey data for the period 1976–1984 and Lorenz and Wagner (1991) use the 1985 wave of the German Socio-Economic Panel (GSOEP). Fitzenberger, Haggeney, and Ernst (1999) and Beck and Fitzenberger (2004) use various GSOEP waves with union membership information in 1985, 1989, 1993, and 1998 (only Beck and Fitzenberger) to estimate West German union membership. Both studies use panel probit estimators and conclude that the propensity for union membership has not changed considerably over time. Hence, the observed aggregate decline in union membership was mainly driven by composition effects.

Goerke and Pannenberg (2004) also use GSOEP data. They employ fixed effects estimations to back up a theoretical social custom model. Schnabel and Wagner (2005) conduct an analysis based on West German data from the general social survey (ALLBUS), a collection of independent biannual cross sections. Their probit estimates for years between 1980 and 2000 yield no consistent picture of the influence of most variables over time. Applying the same method, Schnabel and Wagner (2003) use the years 1992, 1996, and 2000 of the ALLBUS data to compare determinants in East and West Germany. They conclude that the factors influencing an individual's propensity to be union member have converged between East and West Germany between 1992 and 2000.

3 Determinants of Union Membership

Our empirical analysis investigates the following theoretical hypotheses about determinants of union membership; see Schnabel (1993) or Beck and Fitzenberger (2004) for more detailed discussions.

- Age: Mobility tends to decrease with the age of a worker. Family ties and specific human capital increase with age. Thus, older workers are more interested in job security and therefore in union membership as an implicit insurance. Yet the interest in union representation may fade out once people know that they are successful in

the labor market. The link between age and union membership may also mirror cohort effects. Differences between generations in value orientation or social custom may result in different attitudes towards unions; see Blanchflower (2006) for an extensive discussion.

- Gender: Compared to males, women are less attached to the labor market and tend to accumulate less specific human capital. Besides, trade union services have traditionally been directed to the needs of male members. Therefore, women are less likely to be union members. The higher rate of female labor force participation in East Germany and its increase in the West should reduce the gender differential.

- Education: Higher education generally implies a higher participation and workplace-related involvement, hence increasing the propensity for unionization. However, higher education is usually associated with higher professional status involving a closer relationship to management, which reduces the desire for a union voice. The latter effect may outweigh the former in particular for employees with a university degree, whereas the former may dominate among workers with vocational training in comparison to less educated workers.

- Marital Status: If both partners of a couple are working, the risk of a job loss is diversified to some extent, which reduces the need for job protection. However, married workers are responsible not only for themselves but also for their family. This would increase the propensity to be a union member, especially with children or when being the only earner.

- Citizenship: Foreigners can be expected to have a weaker attachment to the German labor market and cultural differences might be an obstacle to unionization. Thus, a lower unionization rate among foreigners is likely.

- Political Preference: The historically close relationship between the Social Democratic Party (SPD) and unions suggests that individuals who share values of the Social Democrats are more likely to be union members. There also exists a strong workers' wing within the Christian Democratic Party (CDU), suggesting a somewhat smaller positive effect for the CDU (relative to the omitted category).

- Wage: Membership fees increase with wages and a higher wage tends to be associated with a higher professional status, both of which reduce the propensity to join a union. However, higher wages may indicate higher firm-specific human capital,

thus increasing the demand for stability. Similar to education, a hump-shaped relationship may arise with a positive influence for low wage levels and a negative one for higher wages.

In closed shop systems as, e. g., in the United States, union membership itself may result in higher wages; see the broad literature on union wage gaps surveyed in Card, Lemieux, and Riddell (2003). In Germany, however, there are no wage effects of union membership per se at the individual level; compare the discussion in Goerke and Pannenberg (2004).

- Employee Status: Trade unions historically evolved as organizations of blue-collar workers, whose relatively homogenous preferences accommodate unionization efforts. A similar argument applies to civil servants, who share a preference for a stable work environment. Both of these groups are thus more likely to be union members compared to white-collar workers. The latter have moved into the focus of union action only recently with the relative decline of blue-collar employment. With respect to working time, the weaker labor market adherence of part-time workers renders them less likely to be union members than full-time workers.

- Unemployment History: Employees who experienced unemployment in the past might join a union to increase job protection. However, unemployment spells might be associated with a lower attachment to the labor market, thus reducing membership. The overall effect is ambiguous.

- Job Satisfaction: In cooperation with works councils, unions provide a platform of voice and support for dissatisfied workers. They can offer legal advice and financial support in case of a lawsuit between employer and employee. Therefore, membership may be more attractive for dissatisfied workers. However, union intermediation also facilitates communication and understanding between employer and employees which will result in a higher degree of job satisfaction. The overall effect is ambiguous.

- Tenure: With increasing tenure, the worker accumulates more firm specific human capital, which would call for protection. At the same time, an increasing job duration builds up identification with the job, trust, and loyalty towards the employer, thereby decreasing the propensity to unionize. The overall effect is ambiguous.

- Firm Size: The existence of fixed set-up and organizational costs favors union recruitment in larger firms. Larger firms also provide larger subsets of homogeneous

workers which accommodate recruitment efforts. Works councils and supervisory boards in large firms support union access to the firm. Large firms show more scope for rent sharing and, therefore, the higher is the relevance of wage bargaining. All of these arguments imply a positive effect.

- Industry: Unions are traditionally pervasive in manufacturing and they are also strong in the public sector, where competition is generally low and high rents exist which can be shared between employees and employers. Private services, however, have less of a union tradition, feature more heterogenous work forces, and face fierce competition in goods and factor markets as well as rapid structural changes. All of these factors make union recruitment efforts more difficult in private services.

Each of the above factors may influence union membership differently in East and West Germany, and its impact may change over time. In addition, further unobserved individual factors (e. g., social customs) are likely to be of importance.

4 Empirical Analysis

4.1 Correlated Random Effects Probit Model

We employ a Chamberlain (1980)-Mundlack (1978)-type correlated random effects probit model, which allows us to control for unobserved heterogeneity and to take account of possible correlation of individual- specific effects with observed characteristics. This is central because it is likely that people's attitudes towards unions differ considerably and these attitudes are correlated with observed characteristics.

Let union membership y_{it} of individuals $i = 1, 2, ..., N$ in periods $t = 1, 2, ..., T$ be captured by a binary choice model

$$y_{it} = \begin{cases} 1 & \text{if} \quad y_{it}^* \geq 0 \\ 0 & \text{else} \end{cases}, \tag{1}$$

where the latent variable y_{it}^* driving the membership decision of individual i in period t is a linear function of observable characteristics x_{it} and an unobservable individual-specific, time-invariant effect c_i:

$$y_{it}^* = x_{it}\beta + c_i + u_{it}. \tag{2}$$

The error term u_{it} is assumed to be normally distributed with unit variance in all periods. The individual-specific effect c_i controls for unobserved heterogeneity in the membership decision. What is more, we consider c_i as a random effect which can be correlated to

some variables in x_{it}. In the tradition of Chamberlain (1980) and Mundlack (1978) we assume that c_i is related to the time averages $\bar{x}_{ji}$ of some variables x_{jit}, and that it follows a conditional normal distribution

$$c_i|x_{i1}, ..., x_{iT} \sim N(\mu + \bar{x}_i\xi, \sigma_\epsilon^2), \tag{3}$$

where σ_ϵ^2 is the variance of ϵ_i in the regression $c_i = \mu + \bar{x}_i\xi + \epsilon_i$, therefore constituting the conditional variance of c_i. A detailed discussion of this model can be found in Wooldridge (2002).

Given this specification, the model can be written as

$$P(y_{it} = 1|x_{i1}, ..., x_{iT}, c_i) = \Phi\left(\theta(x_{it}\beta + \mu + \bar{x}_i\xi)\right), \tag{4}$$

where $\theta = (1 + \sigma_\epsilon^2)^{-1/2}$. As in a standard random effects probit model, the estimation of (4) is straightforward. Adding $\bar{x}_i$ is quite intuitive: β estimates the effect of x_{it} on the union participation decision at time t, holding the time average $\bar{x}_i$ fixed. $\bar{x}_i$ contributes to the decision through its effect on the time-invariant individual- specific effect. Note that c_i can only be correlated to averages of time-varying variables, because the effect of the average $\bar{x}_{ji}$ of a time-invariant characteristic x_{jit} could not be discriminated from the direct effect of x_{jit} itself. Furthermore, a constant in x_{it} cannot be distinguished from μ. Details on the empirical model selection are presented in the next section.

4.2 Data and Model Selection

We use data of the German Socio-Economic Panel (GSOEP), a longitudinal survey of individuals in private households in the Federal Republic of Germany. The GSOEP started in (West) Germany in the year 1984, and it was extended to East Germany in 1990; see Haisken-DeNew and Frick (2003) for detailed information on the GSOEP. Among others, questions related to the labor market are at the heart of the yearly survey. The question of membership in a trade union, however, is not included in every wave. Up to date, six waves contain accordant information for West Germany: 1985, 1989, 1993, 1998, 2001, and 2003. For East Germany, we can use four waves: 1993, 1998, 2001, and 2003. To analyze the determinants of employees' union membership decisions, we focus on individuals in gainful dependent employment who are aged between 16 and 65 years and who earn not more than DM 15,000 per month.[1] Definitions of variables considered

[1]We consider the earnings threshold in order to measure the impact of EARNINGS in the main part of the distribution, which is skewed to the right. Median earnings lie between DM 2,000 (East, 1993) and DM 3,000 (West, 2003) per month, and the 99% quantile varies between DM 5,100 (East, 1993) and DM 10,00 (West, 2003). However, there are outliers with earnings as high as DM 31,400. Applying the earnings threshold, we lose only 22 observations in West Germany and none in East Germany.

in the analysis can be found in tables 2 and 3 in the appendix. Tables 4 and 5 report summary statistics for our subsamples of West and East Germany, respectively.

In order to avoid the loss of a large number of observations due to missing values, we add dummy variables for missings in single regressors into the regression equations. In particular, we include dummy variables for missing values in ABITUR, FIRM-SIZE, and SECTOR since these variables contribute most to the problem of missing values. At the same time, some individuals appear in several, but not in all sample periods—due to unemployment spells, for example. We control for this by introducing missing-period dummies. For instance, a vector (1, 1, 0, 1, 0, 1) is assigned to West German individuals observed only in 1993 and 2001—that is, the third and the fifth of the six waves. Furthermore, time dummies and interactions of these with other regressors are included to allow each of the effects to vary between different years.

We estimate several specifications of model (4), separately for both West and East Germany. These specifications are as follows:

(A) Selected Model: The estimation of a random effects probit model is computationally involved due to the numerical integration needed. Therefore, we start by applying pooled probit estimations, which are consistent and need significantly less computation time, to select variables for a preferred specification. The resulting specification is then estimated and tested by means of a random effects probit.

More specifically, we first apply a backward selection procedure to select those time-average regressors in $\bar{x}_i$ which are correlated to the individual- specific effect. Starting from a model which includes all x_{jit} as well as averages of all time-varying regressors, we stepwise drop the $\bar{x}_{ji}$ which is least significant, until all remaining averages are significant at the 5% level. At the end of this stage, the list of variables related to the individual- specific effect comprises for West Germany: CHRISTIAN-DEMOCRAT, SOCIAL-DEMOCRAT, WHITE-COLLAR, TRAINEE, UNEMPLOYMENT HISTORY, EARNINGS, FIRM-SIZE, and SECTOR. For East Germany, EARNINGS, TENURE, FIRM-SIZE, and SECTOR turn out to be correlated to the individual- specific effect.

Given the above choice of $\bar{x}_i$, we estimate specifications which include interactions of the regressors x_{it} with year dummies in order to allow for the possibility of time-varying coefficients. Again, effects significant at the 5% level are kept as time-varying. At this stage, the variations of AGE and AGE SQUARED are tested jointly, and so are the variations of EARNINGS and EARNINGS SQUARED as well as those of the SECTOR and the FIRM-SIZE categories.

At the end, we estimate a correlated random effects probit model using the selected variables and test it against a model which again includes averages of all time-varying regressors. Joint significance of the excluded variables is rejected for both West and East Germany.

(B) Reduced Selected Model: Some regressors x_{jit} which are generally time-varying show only limited variation within individuals. For example, an individual's educational attainment rarely changes during his or her working life, and civil servants seldom change back to a private employer. Nevertheless, the averages of these variables might turn out significant in the selected model (A). This could be due to problems of multicollinearity, with the direct effects of x_{jit} becoming insignificant. For this reason, we also estimate a model without averages of educational attainment and vocational status variables.

(C) Benchmark Model: We further estimate a standard random effects probit as a benchmark model. Here we use the same procedure as described above to consider time-varying coefficients, but we do not include any averages $\bar{x}_i$.

(D) IABS Model: Estimates of individual union membership status can be used to predict union densities; compare section 5. Accordant predictions can be based on different data sets with larger sample sizes in order to achieve more detailed and more precise predictions.[2] In order to facilitate predictions for individuals in the IAB employment sample (*IAB Beschäftigtenstichprobe*, IABS) 1975–2001, we estimate an additional specification, using only those explanatory variables which are available in the IABS. This specification excludes the variables CHRISTIAN-DEMOCRAT, SOCIAL-DEMOCRAT, SATISFACTION, TENURE, and MARRIED. The estimation for East Germany further excludes UNEMPLOYMENT HISTORY because the IABS offers accounts for individuals in East Germany from 1992 onward only. We also incorporate the fact that the IABS distinguishes between different vocational statuses only among full-timers. In all other respects the selection process is the same as in (A).

(E) GSES Model: For the same purpose as in (D), we also estimate a specification which includes only variables available in the German Structure of Earnings Survey

[2]Most large micro-level data sets for Germany—such as the administrative IAB employment sample or the Structure of Earnings Survey carried out by the German Statistical Office—provide no information on union membership. In order to take advantage of the big sample sizes of these data sets membership propensities thus have to be imputed.

(GSES, *Gehalts- und Lohnstrukturerhebung*) 2001. We thus exclude CHRISTIAN-DEMOCRAT, SOCIAL-DEMOCRAT, SATISFACTION, UNEMPLOYMENT HISTORY, FOREIGNER, and MARRIED. Since the GSES is a cross-sectional data set, this specification is estimated without averages $\bar{x}_i$.

4.3 Estimation Results

Estimated coefficients for West and East Germany are reported in tables 6 and 7 in the appendix. Note that there are only four specifications for East Germany because the selected and the reduced selected specification coincide for the East. In the following, we compare the different models and then turn to our preferred models in more detail.

Comparing first the correlated random effects models (A) and (B) to the benchmark models (C), we find significance of several elements of ξ for both parts of the country. Individual-specific effects are in fact correlated to averages $\bar{x}_i$ of some observed characteristics, for which the effects in the benchmark model are quite similar to the joint impact of the direct effect and the indirect effect through c_i in the models (A) and (B). Yet the economic reasoning behind the estimated determinants is more subtle in the correlated models. The latter do not only take account of direct impacts on the membership decision, but also allow for the possibility that some determinants are correlated with unobserved individual-specific attitudes towards unions, which again drive the membership decision. Given this richer interpretation and the statistical significance of ξ, we prefer the models (A) and (B) to the benchmark ones (C). There are only small differences of coefficients β_j for those variables x_{jit} whose time-averages are not included.

When comparing the selected specification (A) to the reduced selected model (B), we also find very similar effects. In fact, the direct effect of being a TRAINEE is even insignificant if the corresponding average is included. This finding suggests multicollinearity between the regressor and its average. Predictions based on either specification should not differ fundamentally, though. Both specifications yield very similar percentages of correct predictions. Since, above all, the true channel through which the determinants work is not clear a priori, we prefer the statistically validated specification (A).

The IABS models (D) and the GSES models (E) include only regressors that are also available in the respective target data sets. Estimated coefficients for the included variables are generally very similar to the results obtained from the full models, and predictive power is also comparable. More specifically, recalling that the GSES is a cross-sectional data set, the coefficients of specifications (E) match those from the benchmark models (C). The coefficients of the IABS models (D) match the results of specifications (A).

We now describe the preferred specifications (A) in more detail. Results for East and for West Germany are remarkably similar despite some notable exceptions. First, the baseline (TIME dummies) and the impacts of EARNINGS and UNEMPLOYMENT HISTORY are the only effects which vary significantly across time in the East, whereas some more effects vary in the West. On the one hand this is to be expected given the longer sample period for West Germany. On the other hand, East-West convergence (Schnabel and Wagner, 2003) is likely to be driven by changes in the East. Second, while MARRIED individuals ceteris paribus have a lower propensity to be a union member in the West, the respective effect is significantly positive in the East. This finding likely reflects East-West differences in labor force participation. Third, working PART-TIME has the expected negative sign in West Germany, but it has a positive but insignificant effect in East Germany. Fourth, differences between sectors are stronger in East Germany, and most direct SECTOR effects are insignificant, possibly due to the relatively small number of observations in some sectors (compare table 5) and to less within-individual variation.

The coefficients are generally allowed to vary over time. However, most of the effects do not change significantly. Those which do change mainly show a consistent, monotonic pattern. For instance, both the linear effect of AGE and the curvature effect of AGE SQUARED decrease in West Germany over some time, rendering the total impact less concave. In East Germany, the impact of EARNINGS becomes also less concave. Thus, in contrast to Beck and Fitzenberger (2004) and Schnabel and Wagner (2005), we find some clear patterns of changes. For East Germany, we find a significant positive time effect only for 1993, whereas for West Germany there is a negative time trend throughout the entire sample period. Therefore, the estimated time trend contributes to the continuous deunionization in West Germany but not in East Germany.

Turning to the effects of the covariates, we can confirm most of the hypotheses in section 3. Women are less likely to be union members. The effect of FOREIGNER is positive but not significant in East Germany. We further find that a positive, concave impact of AGE. As expected, supporters of the Social Democrats (but not those of the Christian Democrats) have a higher propensity to join a union. Regarding education, ABITUR and UNIVERSITY have a sizeable negative impact, but the influence of APPRENTICESHIP is not as clear. In contrast to SEMISKILLED and—even more substantially—SKILLED BLUE-COLLAR workers, CIVIL SERVANTS and WHITE-COLLAR workers show a significantly lower propensity. The effect for individuals working PART-TIME has the expected negative sign in West Germany, but it is positive and insignificant in the East. The effect of UNEMPLOYMENT HISTORY is negative. However, the effect of average UNEMPLOYMENT HISTORY is strongly positive. Employees who have recently been

unemployed are less likely to be union member due to their lower labor market attachment, whereas employees who are generally at a higher risk of unemployment have a higher need for protection. Job SATISFACTION shows virtually no effect in the West and only a limited one in the East.

The concave effect of EARNINGS generally meets our expectations. As discussed above, the impact becomes flatter over time in East Germany. The EARNINGS effect is more sizeable in East Germany, being attenuated by converse effects through average EARNINGS and average EARNINGS SQUARED. The positive but small TENURE coefficient supports the human capital argument. In contrast, FIRM-SIZE shows a substantial positive impact. However, the differences between firms with more than 200 employees and ones with more than 2000 are negligible. Finally, considerable differences in unionization exist between industries. Compared to our reference SECTOR "Miscellaneous Manufacturing (7)", the large positive effects of "Chemical Products (5)" and the formerly public industries "Transport and Communication (11)" are most striking. In contrast, "Hotels and Restaurants (10)", "Financial Intermediation (12)", or "Other Services (16)" show significantly lower union membership.

5 Prediction and Decomposition Analysis

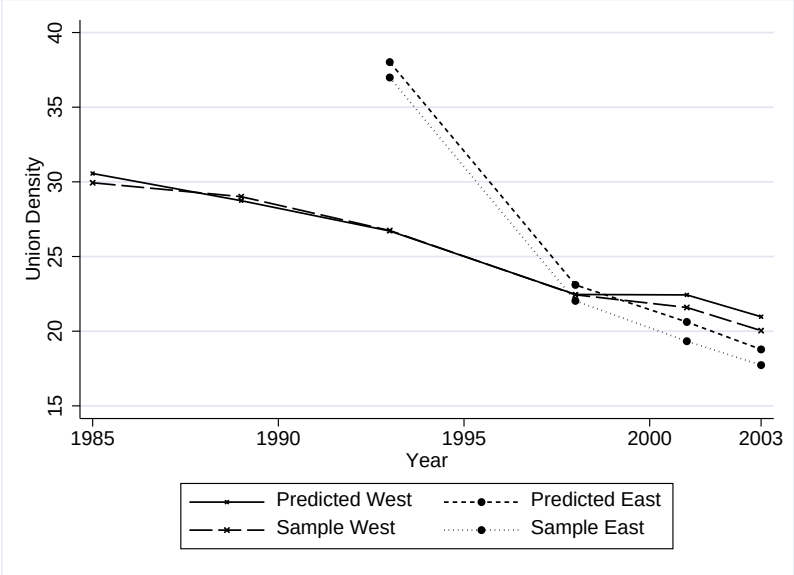
Based on our preferred models, we predict propensities to be a union member for each of the individuals in our samples. These propensities can be averaged to an estimator for net union density. More specifically, we estimate net union density NUD_{rt} separately for regions $r \in \{\text{East, West}\}$ in each year t by

$$\widehat{NUD}_{rt} = N_{rt}^{-1} \sum_{i=1}^{N_{rt}} \Phi \left(\hat{\theta}^{rt} (x_{irt} \hat{\beta}^{rt} + \hat{\mu}^{rt} + \bar{x}_{ir} \hat{\xi}^{rt}) \right). \tag{5}$$

The observed as well as the predicted net union densities are depicted in figure 2. In general, the predicted densities match the observed frequencies fairly well. Compared to the West, membership in East Germany started out at a higher level in the year 1993, but exhibited a stronger decline afterwards. NUD for 1993 and 2003 were 38% and 19% in East and 27% and 21% in West Germany.[3] Aggregate NUD is about 10 percentage points (pp) lower than gross union density (compare section 2).

[3]Estimates of individual union membership can generally be used to predict densities for more narrowly defined labor market segments. Lorenz and Wagner (1991), Fitzenberger, Haggeney, and Ernst (1999), and Beck and Fitzenberger (2004), for instance, predict union densities for two-digit industries. In particular, the latter studies impute membership propensities for individuals in the IAB employment sample, taking advantage of the bigger sample size of this data set to achieve more detailed and more precise NUD predictions.

Figure 2: Net Union Density in East and West Germany



Sample frequencies and predicted densities in percent. Data source: GSOEP.

We now investigate (1) the changes of NUD over time and (2) the differences in NUD between East and West Germany by means of Blinder (1973) and Oaxaca (1973) decomposition techniques, which we adapt to the nonlinear probit framework. To decompose the changes of NUD within the two regions between 1993 and 2003,[4] we write

$$\widehat{NUD}_{2003} - \widehat{NUD}_{1993} = \underbrace{(\widehat{NUD}_{2003} - \widehat{NUD}^{1993}_{2003})}_{\text{coefficients effect}} + \underbrace{(\widehat{NUD}^{1993}_{2003} - \widehat{NUD}_{1993})}_{\text{characteristics effect}} \quad (6)$$

$$= \underbrace{(\widehat{NUD}_{2003} - \widehat{NUD}^{2003}_{1993})}_{\text{characteristics effect}} + \underbrace{(\widehat{NUD}^{2003}_{1993} - \widehat{NUD}_{1993})}_{\text{coefficients effect}}, \quad (7)$$

where $\widehat{NUD}_t$ are estimated as described in equation (5). The decompositions (6) and (7) differ with respect to the chosen counterfactual densities $\widehat{NUD}^{\tilde{t}}_t$. In equation (6), $\widehat{NUD}^{1993}_{2003}$ denotes the prediction for individuals in the year 2003, assuming that the coefficients stayed as in 1993. In equation (7), $\widehat{NUD}^{2003}_{1993}$ uses predictions for individuals in 1993 based on the coefficients of 2003. To investigate the sensitivity of the decomposition result, we compute both versions (6) and (7).[5] The characteristics effect involves the part of the

[4]It would also have been possible to analyze the change for West Germany over the even longer period 1985–2003. However, we opt for 1993–2003 in order to facilitate East-West comparisons in table 1.

[5]It is well-known that the decompositions resulting from the different counterfactuals do not necessarily yield identical results. Different approaches to the issue of non-uniqueness have been proposed in the literature; see Oaxaca and Ransom (1994) and Silber and Weber (1999) for surveys. Yet each of the approaches relies on ad-hoc assumptions of some type, so we choose to report the two most prominent

overall change between 1993 and 2003 which can be attributed to changes in personal, workplace, and social characteristics of the individuals in the sample at given coefficients. The coefficients effect captures the part which is due to changes in the coefficients at given characteristics. The necessary counterfactuals can be estimated as averages analogous to equation (5).

For the differences between East (E) and West (W) Germany in any given year, we use

$$\widehat{NUD}_W - \widehat{NUD}_E = \underbrace{(\widehat{NUD}_W - \widehat{NUD}_W^E)}_{\text{coefficients effect}} + \underbrace{(\widehat{NUD}_W^E - \widehat{NUD}_E)}_{\text{characteristics effect}} \quad (8)$$

$$= \underbrace{(\widehat{NUD}_W - \widehat{NUD}_E^W)}_{\text{characteristics effect}} + \underbrace{(\widehat{NUD}_E^W - \widehat{NUD}_E)}_{\text{coefficients effect}}, \quad (9)$$

where the involved counterfactual densities $\widehat{NUD}_r^{\tilde{r}}$ are defined as above.

The results of the different decompositions are reported in table 1. Standard errors to assess the accuracy of the decompositions are obtained by means of a parametric bootstrap by resampling from the estimated distribution of the parameters $(\beta^{rt\,\prime}, \mu^{rt}, \xi^{rt\,\prime}, \sigma_\epsilon^{rt})'$.

Table 1: Differences in Net Union Density: Decomposition Analyses

	Net Union Density [%] 1993	2003	Change	Char. Effect[a]		Coeff. Effect[a]	
West Germany	26.71 (0.57)	20.97 (0.61)	-5.74 (0.71)	-1.81 *-0.4*	(0.58) *(0.55)*	-3.93 *-5.34*	(0.80) *(0.82)*
East Germany	38.03 (1.67)	18.78 (1.22)	-19.25 (1.12)	-3.56 *-0.11*	(1.84) *(1.64)*	-15.69 *-19.14*	(1.70) *(2.18)*
Difference	-11.32 (1.75)	2.19 (1.35)					
Char. Effect[b]	4.7 (4.27)	*7.94* *(0.66)*	6.03 (2.77)	*6.37* *(0.56)*			
Coeff. Effect[b]	-16.02 (4.13)	*-19.26* *(1.80)*	-3.84 (2.80)	*-4.18* *(1.44)*			

[a] Counterfactual with characteristics of 2003/*1993* in normal/*italic* font.
[b] Counterfactual with West/*East* characteristics in normal/*italic* font.
Standard errors in parentheses estimated by 1000 bootstrap resamples. Data source: GSOEP.

The results are not very sensitive to the choice of counterfactuals in (6) and (7), nor in (8) and (9). Interpreting first the (horizontal) decompositions of the changes in NUD

cases.

over time, both characteristics and coefficients effects contribute to the observed deunionization. However, the coefficients effect dominates in almost all cases. The characteristics effect does not explain more than a third of the 6 pp decline in West Germany and does not even account for a fifth of the 19 pp decline in the East. This result is in contrast to the finding in Beck and Fitzenberger (2004) that the decline in union density in West Germany between the 1980's and 1990's was mainly driven by changes in the composition of the work force.[6] The small impact of the characteristics effect in East Germany is quite remarkable in light of the structural change during the 1990's; compare the summary statistics in tables 4 and 5. The strong coefficients effect involves the negative time trend as well as changing impacts of particular characteristics.

Regarding the (vertical) East-West comparison, the characteristics effects and the coefficients effects generally work in opposite directions. The characteristics effect is in favor of a higher density in West Germany by 5 to 7 pp: The composition of the West German work force exhibits more attributes supporting union membership. Thus, the higher NUD in East Germany in 1993 resulted from differences in the coefficients in the order of 16 to 19 pp: For given characteristics, East Germans were more strongly unionized than West Germans. This finding suggests a lower quality of union membership matches in East Germany resulting from the widespread, arbitrary recruitment after unification. A stronger decline in union membership thus comes as no surprise. Ten years later, in 2003, union density in East Germany is already 2 pp smaller than in West Germany. The composition of the work force still being more in favor of union membership in the West, the coefficients in the two parts of the country have become more similar such that the—still negative—coefficients effect has lost its bite.

6 Conclusions

The importance of unions in the German labor market is undisputed. However, the question why people join a union is anything but beyond dispute. This study uses detailed micro-panel data to provide insights into the determinants of individual union membership. We use the German Socio-Economic Panel (GSOEP) to estimate membership equations for West (1985–2003) and for East Germany (1993–2003). The application of a Chamberlain (1980)-Mundlack (1978)-type correlated random effects probit model controls for unobserved heterogeneity and allows for a correlation between individual- specific effects and observed characteristics.

Our findings quantify the influence of socio-demographic personal characteristics, such

[6]Note that Beck and Fitzenberger (2004) do not apply decomposition techniques.

as age or marital status; the influence of workplace characteristics, i. e., match, firm, or industry specific effects; and the influence of attitudinal factors for the individual choice to be or not to be a union member. The membership equations are allowed to differ between East and West Germany and over time.

Projections of net union densities (NUD) based on our estimates consistently trace the trends towards deunionization in both parts of the country. Compared to the West, membership in East Germany started out from a higher level at the beginning of the 1990's, but exhibited a stronger decline afterwards. By the year 2003, NUD was even lower in East Germany than in the West.

Decomposition analyses shed light on (1) the changes in unionization over time and (2) on the differences in NUD between the two regions. Changes in the composition of the work force do in no case explain more than one third of the observed decline in NUD over time. In East-West comparison, the West German work force exhibits more attributes supporting union membership. The higher union density in East Germany in the year 1993 and the stronger subsequent decline reflect a lower quality of membership matches resulting from the widespread, arbitrary membership recruitment after unification.

The erosion of union membership in Germany is likely to weaken the bargaining power of unions and therefore the unions' impact on the labor market (Fitzenberger and Kohn, 2005). Despite the still high coverage of collective agreements (especially in West Germany), the results of wage bargaining are likely to deteriorate from the perspective of union members—but possibly result in higher employment. We plan to explore the link between union membership, wages, and employment in future research, for which the results of this study provide a necessary input.

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Appendix

Table 2: Description of Variables

Dummy Variables	= 1 if true
MEMBER	being a union member
FEMALE	being female
MARRIED	being married
FOREIGNER	being a foreigner
Education:	
ABITUR	"Abitur" is the highest educational attainment
APPRENTICESHIP	apprenticeship or a similar vocational training is the highest professional degree
UNIVERSITY	person has obtained a technical college or a university degree
Political Orientation:	
CHRISTIAN-DEMOCRAT	person feels close to the Christian Democratic Party
SOCIAL-DEMOCRAT	person feels close to the Social Democratic Party
Vocational Status:	
PART-TIME	working part-time
SEMISKILL-BLUE	being an unskilled or a semi-skilled blue-collar worker
SKILL-BLUE	being a skilled blue-collar worker
WHITE-COLLAR	being a white-collar worker
CIVIL SERVICE	being employed in the civil service
TRAINEE	being currently in professional training
UNEMPLOYMENT HISTORY	person has been unemployed at least once during past 5 years (10 years for 1985 wave)
Firm Size:	
FIRM-SIZE19	firm has less than 20 employees
FIRM-SIZE199	firm has 20–199 employees
FIRM-SIZE1999	firm has 200–1999 employees
FIRM-SIZE_MORE	firm has more than 1999 employees
SECTORj:	working in sector j[a]
MISSINGt:	person is not observed in year t
TIMEt:	observation is in year t
Other Variables	
AGE	age of person divided by 10
EARNINGS	total earnings last month in thousands of DM, at constant prices (1985 = 100)
TENURE	duration of employment in the current firm, in years
SATISFACTION	satisfaction of the worker with her/his job, scaled from 0 (not satisfied) to 10 (very satisfied)

[a] See table 3 for the industry classification and grouping of sectors.

Table 3: NACE Industry Classification in the GSOEP and Grouping Used in our Empirical Analysis

No.[a]	Industry	NACE[b]
01	Agriculture, Forestry, and Fishing; Mining; Energy and Water Supply	01–14, 40–41
02	Manufacture of Food, Beverages, and Tobacco	15–16
03	Textiles	17–19
04	Woodwork, Paper, Printing, Publishing	20–22
05	Chemical Products	23–26
06	Manufacture of Iron, Steel, Metal; Machinery; Vehicles	27–29, 34–35
07	Other Manufacturing; Recycling	30–33, 36–37, 96–97, 100
08	Construction	45
09	Trade	50–52
10	Hotels and Restaurants	55
11	Transport and Communication	60–64
12	Financial Intermediation	65–67
13	Education; Research	73, 80
14	Health Care System and Social Work	85
15	Public Administration and Defence, Social Security	75
16	Other Services	70–74, 90–95, 98–99

[a] Sector classification used in the empirical analysis.

[b] GSOEP industry classification based on 2-digit NACE.

Table 4: Summary Statistics, West Germany

Variable	1985	1989	1993	1998	2001	2003
MEMBER	29.94	29.01	26.74	22.44	21.59	20.04
FEMALE	38.04	38.86	41.67	42.52	44.27	45.32
MARRIED	66.88	63.62	63.36	61.12	62.04	61.19
FOREIGNER	29.45	28.84	28.03	21.25	19.36	17.62
APPRENTICESHIP	59.09	60.42	59.51	64.57	63.51	64.15
ABITUR	8.90	9.73	11.45	15.48	17.36	18.29
MISSING_ABITUR	0.20	0.32	0.70	0.93	1.74	2.45
UNIVERSITY	8.80	8.84	9.73	13.23	15.39	15.88
CHR-DEM	11.50	8.62	10.06	9.54	10.01	12.83
SOC-DEM	30.15	29.75	21.09	24.20	24.10	21.18
PART-TIME	11.05	10.85	13.40	14.93	16.52	17.53
SEMISKILL-BLUE	29.52	30.03	26.60	21.57	20.46	18.51
SKILL-BLUE	20.68	18.29	18.10	16.20	16.41	15.24
WHITE-COLLAR	34.94	37.64	41.48	48.87	50.78	53.89
CIVIL SERVICE	8.26	7.67	7.67	7.86	7.29	7.59
TRAINEE	6.59	6.38	6.15	5.50	5.03	4.76
UNEMPL_HIST	18.47	9.71	7.84	9.91	9.84	7.24
FIRM-SIZE19	18.55	20.11	21.05	23.05	21.85	21.63
FIRM-SIZE199	26.96	26.95	26.01	26.03	27.11	25.63
FIRM-SIZE1999	22.30	25.20	25.46	25.76	23.32	22.99
FIRM-SIZE_MORE	27.88	27.48	27.17	24.99	23.55	24.04
MISSING_FIRM-SIZE	4.30	0.25	0.31	0.16	4.17	5.72
SECTOR01	2.11	2.25	2.46	2.34	2.00	1.97
SECTOR02	3.01	3.12	2.44	2.31	2.08	1.87
SECTOR03	3.05	3.09	2.31	1.22	0.95	0.83
SECTOR04	2.64	2.78	2.79	2.66	2.52	2.41
SECTOR05	5.44	6.25	6.61	6.14	5.15	4.92
SECTOR06	16.90	19.22	16.56	13.86	14.38	12.73
SECTOR07	6.16	7.46	7.03	8.79	6.68	6.38
SECTOR08	8.28	7.65	7.64	5.50	5.87	5.34
SECTOR09	7.75	9.15	11.18	12.88	12.67	11.34
SECTOR10	1.68	1.82	2.13	1.54	2.05	1.84
SECTOR11	4.81	4.53	5.03	4.62	4.75	4.48
SECTOR12	2.76	3.58	3.98	4.67	4.22	4.73
SECTOR13	4.05	4.05	3.93	4.38	4.57	4.99
SECTOR14	5.67	6.55	8.15	10.12	9.40	10.00
SECTOR15	8.16	8.39	8.24	8.02	8.04	8.45
SECTOR16	6.40	7.63	7.67	9.91	11.20	11.34
MISSING_SECTOR	11.11	2.48	1.85	1.04	3.44	6.38
AGE	3.76	3.74	3.78	3.84	3.92	3.98
EARNINGS	2.58	2.82	2.95	3.11	3.12	3.25
SATISFACTION	7.40	7.23	7.26	7.24	7.25	7.07
TENURE	9.76	10.16	9.84	10.17	10.15	10.65
N. of Obs.	5111	4719	4552	3765	3456	3149

Mean values of variables.
See text for details on the selected sample.
Data source: GSOEP.

Table 5: Summary Statistics, East Germany

Variable	1993	1998	2001	2003
MEMBER	36.99	22.03	19.33	17.73
FEMALE	47.03	47.13	49.19	49.56
MARRIED	70.47	63.13	60.36	57.56
FOREIGNER	0.20	0.17	0.17	0.19
APPRENTICESHIP	75.37	74.79	71.40	72.11
ABITUR	16.17	17.96	21.35	23.00
MISSING_ABITUR	0.30	1.06	1.32	1.78
UNIVERSITY	28.14	27.22	27.79	27.89
CHR-DEM	7.91	7.75	10.64	14.74
SOC-DEM	10.48	9.98	11.05	9.97
PART-TIME	7.22	9.48	12.14	14.55
SEMISKILL-BLUE	12.76	12.10	12.43	11.25
SKILL-BLUE	30.02	26.77	25.43	24.78
WHITE-COLLAR	48.22	49.25	49.71	52.16
CIVIL SERVICE	1.68	3.51	4.32	4.45
TRAINEE	7.32	8.31	8.06	7.37
UNEMPL_HIST	12.17	19.91	19.85	15.44
FIRM-SIZE19	24.48	29.50	27.10	24.71
FIRM-SIZE199	33.68	34.30	33.03	31.39
FIRM-SIZE1999	22.45	19.07	18.12	19.63
FIRM-SIZE_MORE	18.74	16.68	16.46	16.96
MISSING_FIRM-SIZE	0.64	0.45	5.29	7.31
SECTOR01	7.42	4.91	4.09	3.56
SECTOR02	1.53	1.56	1.61	1.65
SECTOR03	0.89	0.89	1.09	1.21
SECTOR04	1.73	1.73	1.61	1.72
SECTOR05	3.51	3.07	2.47	2.67
SECTOR06	8.51	7.53	8.29	7.56
SECTOR07	3.96	6.41	4.55	4.76
SECTOR08	12.41	10.93	9.72	7.12
SECTOR09	11.67	12.16	13.23	11.94
SECTOR10	1.68	1.84	2.59	2.48
SECTOR11	7.67	5.41	5.06	4.83
SECTOR12	2.52	2.96	2.99	3.30
SECTOR13	7.17	5.19	6.67	6.16
SECTOR14	8.85	11.82	11.45	10.67
SECTOR15	11.18	10.82	9.32	9.97
SECTOR16	7.52	11.43	10.99	10.86
MISSING_SECTOR	1.78	1.34	4.26	9.53
AGE	3.72	3.83	3.89	3.94
EARNINGS	2.07	2.44	2.45	2.59
SATISFACTION	6.42	6.72	6.76	6.55
TENURE	6.91	7.27	7.54	8.30
N. of Obs.	2022	1793	1738	1574

Mean values of variables.
See text for details on the selected sample.
Data source: GSOEP.

Table 6: Determinants of Union Membership, West Germany

	Specification (A)		(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
FEMALE	-0.263 ***	(0.077)	-0.405 ***	(0.074)	-0.435 ***	(0.064)	-0.248 ***	(0.076)	-0.443 ***	(0.064)
FOREIGNER	-0.007	(0.070)	0.051	(0.068)	0.063	(0.064)	-0.028	(0.071)		
AGE_1985	-0.032	(0.249)	-0.095	(0.246)			0.219	(0.243)		
AGE_1989	0.380	(0.262)	0.301	(0.259)			0.482 *	(0.259)		
AGE_1993	0.725 ***	(0.278)	0.573 **	(0.274)	0.501 ***	(0.134)	0.964 ***	(0.279)	0.591 ***	(0.136)
AGE_1998	1.039 ***	(0.325)	0.790 **	(0.320)			1.254 ***	(0.330)		
AGE_2001	1.187 ***	(0.342)	0.893 ***	(0.335)			1.359 ***	(0.349)		
AGE_2003	1.368 ***	(0.386)	1.032 ***	(0.379)			1.521 ***	(0.391)		
AGE_SQU_1985	0.013	(0.032)	0.021	(0.032)			-0.004	(0.031)		
AGE_SQU_1989	-0.034	(0.033)	-0.025	(0.033)			-0.029	(0.033)		
AGE_SQU_1993	-0.085 **	(0.034)	-0.069 **	(0.034)	-0.054 ***	(0.016)	-0.095 ***	(0.034)	-0.065 ***	(0.016)
AGE_SQU_1998	-0.118 ***	(0.039)	-0.091 **	(0.038)			-0.125 ***	(0.039)		
AGE_SQU_2001	-0.125 ***	(0.040)	-0.095 **	(0.039)			-0.126 ***	(0.040)		
AGE_SQU_2003	-0.138 ***	(0.044)	-0.105 **	(0.044)			-0.137 ***	(0.045)		
MARRIED	-0.060	(0.052)	-0.051	(0.051)	-0.095 *	(0.049)				
CHR-DEM	-0.048	(0.092)	-0.045	(0.092)	-0.260 ***	(0.073)				
SOC-DEM	0.110 **	(0.055)	0.114 **	(0.055)	0.392 ***	(0.044)				
ABITUR	-0.387 ***	(0.119)	-0.399 ***	(0.114)	-0.432 ***	(0.102)	-0.409 ***	(0.112)	-0.417 ***	(0.104)
APPRENTICESHIP	0.041	(0.057)	0.030	(0.057)	0.038	(0.054)	0.041	(0.057)	0.025	(0.052)
UNIVERSITY	-0.265 **	(0.110)	-0.261 **	(0.108)	-0.311 ***	(0.103)	-0.348 ***	(0.104)	-0.307 ***	(0.103)
SKILL-BLUE	0.100	(0.063)	0.102	(0.063)	0.094	(0.061)	0.098	(0.064)	0.102 *	(0.060)
WHITE-COLLAR	-0.178 **	(0.086)	-0.490 ***	(0.070)	-0.526 ***	(0.066)	-0.249 ***	(0.083)	-0.538 ***	(0.064)
CIVIL SERVICE	-0.276 **	(0.139)	-0.142	(0.134)	0.015	(0.122)	-0.344 ***	(0.129)	-0.006	(0.122)
TRAINEE	-0.083	(0.138)	0.058	(0.120)	0.234 **	(0.115)	-0.105	(0.139)	0.227 **	(0.113)
PART-TIME_1985						(0.080)	-0.593 ***	(0.162)		
PART-TIME_1989						(0.080)	-0.118	(0.156)		
PART-TIME_1993	-0.042	(0.084)	-0.070	(0.083)	-0.101	(0.080)	-0.576 ***	(0.159)	-0.115	(0.080)
PART-TIME_1998						(0.080)	-0.078	(0.158)		
PART-TIME_2001						(0.080)	0.031	(0.156)		

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... table 6 continued

	Specification (A)		(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
PART-TIME_2003						(0.080)	0.133	(0.158)		
UNEMPL_HIST_1985							-0.328 ***	(0.097)		
UNEMPL_HIST_1989							0.108	(0.126)		
UNEMPL_HIST_1993	-0.116 *	(0.062)	-0.107 *	(0.062)	-0.025	(0.057)	0.054	(0.139)		
UNEMPL_HIST_1998							-0.330 **	(0.156)		
UNEMPL_HIST_2001							-0.241	(0.165)		
UNEMPL_HIST_2003							-0.300	(0.211)		
SATISFACTION	-0.007	(0.011)	-0.007	(0.011)	-0.019 *	(0.010)				
EARNINGS_1985					0.741 ***	(0.101)			0.767 ***	(0.102)
EARNINGS_1989					0.621 ***	(0.100)			0.622 ***	(0.102)
EARNINGS_1993	0.320 ***	(0.068)	0.387 ***	(0.067)	0.562 ***	(0.095)	0.327 ***	(0.067)	0.578 ***	(0.096)
EARNINGS_1998					0.482 ***	(0.099)			0.486 ***	(0.100)
EARNINGS_2001					0.469 ***	(0.094)			0.432 ***	(0.094)
EARNINGS_2003					0.464 ***	(0.097)			0.415 ***	(0.099)
EARNINGS_SQU_1985					-0.102 ***	(0.014)			-0.107 ***	(0.014)
EARNINGS_SQU_1989					-0.085 ***	(0.014)			-0.086 ***	(0.014)
EARNINGS_SQU_1993	-0.039 ***	(0.008)	-0.044 ***	(0.007)	-0.067 ***	(0.012)	-0.037 ***	(0.007)	-0.068 ***	(0.011)
EARNINGS_SQU_1998					-0.055 ***	(0.012)			-0.055 ***	(0.012)
EARNINGS_SQU_2001					-0.058 ***	(0.011)			-0.054 ***	(0.011)
EARNINGS_SQU_2003					-0.056 ***	(0.011)			-0.052 ***	(0.011)
TENURE_1985									0.023 ***	(0.005)
TENURE_1989									0.022 ***	(0.005)
TENURE_1993	0.025 ***	(0.003)	0.025 ***	(0.003)	0.028 ***	(0.003)			0.018 ***	(0.005)
TENURE_1998									0.026 ***	(0.005)
TENURE_2001									0.035 ***	(0.005)
TENURE_2003									0.038 ***	(0.005)
FIRM-SIZE199_1985	0.716 ***	(0.133)	0.695 ***	(0.132)	0.846 ***	(0.124)	0.659 ***	(0.134)	0.814 ***	(0.123)
FIRM-SIZE199_1989	0.705 ***	(0.140)	0.692 ***	(0.139)	0.903 ***	(0.130)	0.716 ***	(0.140)	0.937 ***	(0.130)
FIRM-SIZE199_1993	0.618 ***	(0.142)	0.602 ***	(0.142)	0.801 ***	(0.132)	0.630 ***	(0.143)	0.813 ***	(0.132)
FIRM-SIZE199_1998	0.731 ***	(0.157)	0.718 ***	(0.156)	0.956 ***	(0.146)	0.762 ***	(0.157)	0.940 ***	(0.146)

Continued on next page...

... table 6 continued

	Specification (A)		(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
FIRM-SIZE199_2001	0.469 ***	(0.157)	0.473 ***	(0.156)	0.734 ***	(0.148)	0.530 ***	(0.158)	0.725 ***	(0.148)
FIRM-SIZE199_2003	0.302 *	(0.169)	0.303 *	(0.169)	0.599 ***	(0.158)	0.347 **	(0.171)	0.587 ***	(0.159)
FIRM-SIZE1999_1985	1.374 ***	(0.137)	1.347 ***	(0.136)	1.595 ***	(0.127)	1.334 ***	(0.138)	1.584 ***	(0.126)
FIRM-SIZE1999_1989	0.978 ***	(0.141)	0.963 ***	(0.140)	1.291 ***	(0.130)	1.016 ***	(0.141)	1.330 ***	(0.130)
FIRM-SIZE1999_1993	0.903 ***	(0.142)	0.891 ***	(0.141)	1.249 ***	(0.131)	0.947 ***	(0.142)	1.287 ***	(0.130)
FIRM-SIZE1999_1998	0.800 ***	(0.160)	0.792 ***	(0.158)	1.192 ***	(0.148)	0.873 ***	(0.160)	1.182 ***	(0.149)
FIRM-SIZE1999_2001	0.710 ***	(0.160)	0.702 ***	(0.159)	1.170 ***	(0.151)	0.827 ***	(0.161)	1.136 ***	(0.152)
FIRM-SIZE1999_2003	0.735 ***	(0.170)	0.712 ***	(0.170)	1.221 ***	(0.161)	0.857 ***	(0.173)	1.185 ***	(0.162)
FIRM-SIZE_MORE_1985	1.378 ***	(0.135)	1.356 ***	(0.134)	1.729 ***	(0.125)	1.332 ***	(0.136)	1.724 ***	(0.125)
FIRM-SIZE_MORE_1989	1.138 ***	(0.142)	1.125 ***	(0.141)	1.616 ***	(0.131)	1.172 ***	(0.142)	1.646 ***	(0.132)
FIRM-SIZE_MORE_1993	0.937 ***	(0.143)	0.925 ***	(0.143)	1.423 ***	(0.133)	1.003 ***	(0.144)	1.472 ***	(0.133)
FIRM-SIZE_MORE_1998	0.873 ***	(0.160)	0.847 ***	(0.159)	1.383 ***	(0.150)	0.962 ***	(0.161)	1.395 ***	(0.151)
FIRM-SIZE_MORE_2001	0.819 ***	(0.162)	0.807 ***	(0.161)	1.404 ***	(0.154)	0.942 ***	(0.164)	1.391 ***	(0.155)
FIRM-SIZE_MORE_2003	0.705 ***	(0.172)	0.691 ***	(0.171)	1.327 ***	(0.162)	0.855 ***	(0.174)	1.313 ***	(0.164)
SECTOR1	0.215	(0.191)	0.216	(0.191)	0.497 ***	(0.143)	0.257	(0.189)	0.484 ***	(0.145)
SECTOR2	0.110	(0.176)	0.108	(0.177)	0.032	(0.139)	0.077	(0.180)	0.027	(0.139)
SECTOR3	0.212	(0.188)	0.202	(0.188)	0.315 **	(0.151)	0.247	(0.191)	0.281 *	(0.159)
SECTOR4	-0.189	(0.174)	-0.186	(0.174)	0.061	(0.142)	-0.175	(0.174)	0.025	(0.142)
SECTOR5	0.302 **	(0.129)	0.289 **	(0.129)	0.331 ***	(0.102)	0.303 **	(0.129)	0.330 ***	(0.100)
SECTOR6	0.223 **	(0.095)	0.227 **	(0.095)	0.476 ***	(0.080)	0.209 **	(0.095)	0.469 ***	(0.079)
SECTOR8	-0.342 **	(0.134)	-0.354 ***	(0.133)	-0.426 ***	(0.106)	-0.346 **	(0.137)	-0.419 ***	(0.105)
SECTOR9	-0.246 **	(0.120)	-0.225 *	(0.120)	-0.200 **	(0.100)	-0.211 *	(0.120)	-0.210 **	(0.099)
SECTOR10	-0.527 **	(0.263)	-0.487 *	(0.263)	-0.684 ***	(0.220)	-0.489 *	(0.260)	-0.718 ***	(0.222)
SECTOR11	0.553 ***	(0.153)	0.538 ***	(0.152)	0.693 ***	(0.117)	0.627 ***	(0.152)	0.715 ***	(0.117)
SECTOR12	-0.540 ***	(0.208)	-0.514 **	(0.211)	-0.598 ***	(0.157)	-0.606 ***	(0.208)	-0.657 ***	(0.154)
SECTOR13	-0.191	(0.191)	-0.211	(0.189)	-0.068	(0.147)	-0.217	(0.188)	-0.089	(0.149)
SECTOR14	0.014	(0.154)	0.018	(0.151)	-0.083	(0.115)	0.052	(0.152)	-0.091	(0.116)
SECTOR15	-0.165	(0.142)	-0.175	(0.141)	-0.037	(0.112)	-0.136	(0.142)	-0.081	(0.112)
SECTOR16	-0.437 ***	(0.130)	-0.414 ***	(0.130)	-0.390 ***	(0.107)	-0.438 ***	(0.130)	-0.417 ***	(0.107)
MISSING_SECTOR	-0.097	(0.143)	-0.098	(0.143)	-0.072	(0.122)	-0.103	(0.142)	-0.080	(0.121)

Continued on next page...

... table 6 continued

	Specification (A)		(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
MISSING_FIRMSIZE	0.393 **	(0.181)	0.352 *	(0.180)	0.702 ***	(0.164)	0.420 **	(0.184)	0.669 ***	(0.164)
MISSING_ABITUR	0.110	(0.214)	0.110	(0.213)	0.063	(0.206)	0.131	(0.217)	0.033	(0.207)
CHR-DEM_av	-0.340 **	(0.156)	-0.384 **	(0.155)						
SOC-DEM_av	0.793 ***	(0.098)	0.767 ***	(0.097)						
WHITE-COLLAR_av	-0.794 ***	(0.125)					-0.816 ***	(0.115)	(0.125)	
TRAINEE_av	0.779 ***	(0.249)					0.871 ***	(0.251)	(0.250)	
UNEMPL-HIST_av	0.752 ***	(0.198)	0.676 ***	(0.187)			0.789 ***	(0.185)		
EARNINGS_av	0.626 ***	(0.104)	0.420 ***	(0.097)			0.676 ***	(0.105)		
EARNINGS_SQU_av	-0.087 ***	(0.013)	-0.073 ***	(0.013)			-0.091 ***	(0.013)		
FIRM-SIZE199_av	1.254 ***	(0.256)	1.296 ***	(0.248)			1.202 ***	(0.265)		
FIRM-SIZE1999_av	1.788 ***	(0.246)	1.822 ***	(0.245)			1.664 ***	(0.235)		
FIRM-SIZE_MORE_av	2.714 ***	(0.255)	2.710 ***	(0.246)			2.853 ***	(0.246)		
SECTOR1_av	1.968 ***	(0.480)	1.831 ***	(0.503)			1.664 ***	(0.500)		
SECTOR2_av	0.455	(0.450)	0.443	(0.505)			0.681	(0.600)		
SECTOR3_av	1.212 ***	(0.444)	1.171 **	(0.477)			1.132 **	(0.557)		
SECTOR4_av	2.073 ***	(0.445)	2.058 ***	(0.458)			2.001 ***	(0.457)		
SECTOR5_av	0.984 ***	(0.325)	0.993 ***	(0.342)			0.809 **	(0.375)		
SECTOR6_av	1.731 ***	(0.288)	1.720 ***	(0.303)			1.708 ***	(0.363)		
SECTOR8_av	0.177	(0.328)	0.283	(0.342)			0.128	(0.487)		
SECTOR9_av	1.034 ***	(0.335)	0.701 **	(0.352)			0.709 *	(0.384)		
SECTOR10_av	-0.199	(0.870)	-0.662	(0.880)			-0.584	(0.768)		
SECTOR11_av	1.348 ***	(0.447)	1.244 ***	(0.455)			1.129 **	(0.447)		
SECTOR12_av	0.949 **	(0.424)	0.539	(0.480)			0.947 **	(0.462)		
SECTOR13_av	1.379 ***	(0.482)	1.373 ***	(0.424)			1.432 ***	(0.488)		
SECTOR14_av	0.595	(0.396)	0.450	(0.372)			0.220	(0.409)		
SECTOR15_av	1.206 ***	(0.316)	1.080 ***	(0.331)			0.954 **	(0.413)		
SECTOR16_av	0.888 **	(0.404)	0.577	(0.409)			0.670	(0.422)		
MISSING_SECTOR_av	0.553	(0.562)	0.381	(0.570)			0.834	(0.568)		
MISSING_FIRM-SIZE_av	1.431 **	(0.587)	1.830 ***	(0.580)			0.865	(0.531)		
MISSING1985	0.308 ***	(0.096)	0.251 ***	(0.097)	0.055	(0.081)	0.331 ***	(0.098)	0.054	(0.084)

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... table 6 continued

	Specification (A)		(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
MISSING1989	0.062	(0.091)	-0.005	(0.091)	-0.099	(0.082)	0.070	(0.090)	-0.107	(0.083)
MISSING1993	0.142	(0.093)	0.073	(0.091)	-0.022	(0.083)	0.196 **	(0.094)	0.003	(0.084)
MISSING1998	0.278 ***	(0.104)	0.239 **	(0.101)	0.127	(0.091)	0.229 **	(0.102)	0.130	(0.092)
MISSING2001	-0.169	(0.119)	-0.174	(0.118)	-0.203 *	(0.113)	-0.064	(0.119)	-0.196 *	(0.114)
MISSING2003	0.114	(0.099)	0.077	(0.100)	0.076	(0.099)	0.079	(0.105)	0.056	(0.099)
TIME1989	-0.817	(0.537)	-0.774	(0.535)	0.122	(0.226)	-0.749	(0.539)	0.146	(0.226)
TIME1993	-1.281 **	(0.610)	-1.071 *	(0.606)	0.179	(0.234)	-1.505 **	(0.612)	0.162	(0.234)
TIME1998	-2.206 ***	(0.739)	-1.749 **	(0.731)	0.045	(0.257)	-2.428 ***	(0.747)	0.021	(0.257)
TIME2001	-2.609 ***	(0.800)	-2.009 **	(0.789)	0.191	(0.246)	-2.816 ***	(0.813)	0.146	(0.247)
TIME2003	-3.167 ***	(0.902)	-2.442 ***	(0.889)	0.151	(0.258)	-3.378 ***	(0.911)	0.076	(0.261)
Intercept	-6.221 ***	(0.572)	-5.830 ***	(0.568)	-4.296 ***	(0.319)	-6.388 ***	(0.572)	-4.529 ***	(0.315)
N. of Obs.	24752		24752		24752		24910		24910	
Log-likelihood	-9035.035		-9064.15		-9535.12		-9185.97		-9371.74	
sigma	1.88	(0.05)	1.86	(0.05)	1.93	(0.05)	1.94	(0.05)	1.77	(0.04)
rho	0.78	(0.009)	0.78	(0.009)	0.79	(0.009)	0.79	(0.009)	0.76	(0.008)
Correct Predictions [%]:										
$y = 0$	81.99		81.03		79.23		80.63		78.79	
$y = 1$	65.46		65.71		68.78		64.81		67.58	

(Correlated) random effects probit models of union membership.
See section 4.2 for a description of the model specifications.
* / ** / *** indicate significance at 10% / 5% / 1% level.
Data source: GSOEP.

Table 7: Determinants of Union Membership, East Germany

	Specification							
	(A)/(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
FEMALE	-0.273 **	(0.132)	-0.217 *	(0.126)	-0.330 **	(0.131)	-0.203	(0.124)
FOREIGNER	0.791	(1.072)	0.672	(1.017)	0.995	(1.081)		
AGE	0.812 **	(0.341)	0.741 **	(0.325)	1.270 ***	(0.323)	1.038 ***	(0.313)
AGE_SQU	-0.061	(0.041)	-0.049	(0.039)	-0.091 **	(0.038)	-0.078 **	(0.038)
MARRIED	0.387 ***	(0.122)	0.343 ***	(0.116)				
CHR-DEM	-0.249 *	(0.144)	-0.182	(0.141)				
SOC-DEM	0.392 ***	(0.134)	0.415 ***	(0.126)				
ABITUR	-0.741 ***	(0.196)	-0.655 ***	(0.169)	-0.818 ***	(0.177)	-0.678 ***	(0.164)
APPRENTICESHIP	-0.083	(0.120)	-0.072	(0.116)	-0.116	(0.117)	-0.074	(0.114)
UNIVERSITY	-0.096	(0.179)	-0.213	(0.166)	-0.171	(0.169)	-0.205	(0.164)
SKILL-BLUE	0.110	(0.153)	0.062	(0.147)	0.252	(0.154)	0.107	(0.144)
WHITE-COLLAR	-0.082	(0.159)	-0.118	(0.154)	0.155	(0.161)	-0.083	(0.150)
CIVIL SERVICE	-0.131	(0.360)	-0.104	(0.312)	0.215	(0.341)	-0.116	(0.312)
TRAINEE	0.238	(0.268)	0.164	(0.259)	0.428	(0.264)	0.228	(0.255)
PART-TIME	0.106	(0.185)	0.147	(0.173)	0.210	(0.197)	0.163	(0.172)
UNEMPL_HIST_1993	-0.441 **	(0.204)	-0.468 **	(0.200)				
UNEMPL_HIST_1998	0.013	(0.193)	-0.022	(0.185)				
UNEMPL_HIST_2001	-0.114	(0.208)	-0.139	(0.200)				
UNEMPL_HIST_2003	-0.234	(0.251)	-0.244	(0.247)				
SATISFACTION	-0.055 **	(0.027)	-0.049 *	(0.025)				
EARNINGS_1993	1.427 ***	(0.335)	1.205 ***	(0.296)	1.578 ***	(0.332)	1.276 ***	(0.292)
EARNINGS_1998	1.004 ***	(0.266)	0.826 ***	(0.229)	1.073 ***	(0.255)	0.841 ***	(0.224)
EARNINGS_2001	0.905 ***	(0.262)	0.657 ***	(0.219)	0.923 ***	(0.253)	0.701 ***	(0.218)
EARNINGS_2003	0.450 **	(0.205)	0.231	(0.178)	0.554 ***	(0.213)	0.279	(0.177)
EARN_SQU_1993	-0.268 ***	(0.063)	-0.251 ***	(0.056)	-0.295 ***	(0.064)	-0.260 ***	(0.055)
EARN_SQU_1998	-0.137 ***	(0.040)	-0.128 ***	(0.034)	-0.143 ***	(0.039)	-0.129 ***	(0.034)
EARN_SQU_2001	-0.123 ***	(0.039)	-0.103 ***	(0.033)	-0.123 ***	(0.038)	-0.107 ***	(0.033)
EARN_SQU_2003	-0.047 *	(0.024)	-0.033	(0.021)	-0.060 **	(0.027)	-0.039 *	(0.022)
TENURE	0.019 **	(0.009)	0.041 ***	(0.006)			0.043 ***	(0.006)

Continued on next page...

... table 7 continued

	Specification							
	(A)/(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
FIRM-SIZE199	0.349 **	(0.142)	0.384 ***	(0.112)	0.359 ***	(0.137)	0.381 ***	(0.111)
FIRM-SIZE1999	0.715 ***	(0.169)	0.970 ***	(0.138)	0.700 ***	(0.162)	0.945 ***	(0.136)
FIRM-SIZE_MORE	1.023 ***	(0.187)	1.296 ***	(0.146)	1.069 ***	(0.181)	1.302 ***	(0.145)
SECTOR1	-0.181	(0.342)	0.009	(0.284)	-0.092	(0.339)	-0.055	(0.284)
SECTOR2	0.397	(0.459)	0.354	(0.385)	0.369	(0.452)	0.329	(0.379)
SECTOR3	0.054	(0.627)	0.556	(0.407)	0.208	(0.609)	0.561	(0.416)
SECTOR4	-0.256	(0.428)	0.490	(0.333)	-0.317	(0.419)	0.477	(0.331)
SECTOR5	0.448	(0.392)	0.631 **	(0.308)	0.393	(0.382)	0.600 **	(0.302)
SECTOR6	-0.308	(0.294)	0.291	(0.251)	-0.242	(0.289)	0.273	(0.249)
SECTOR8	-0.369	(0.287)	-0.220	(0.240)	-0.410	(0.283)	-0.242	(0.239)
SECTOR9	-0.389	(0.299)	-0.079	(0.245)	-0.463	(0.292)	-0.085	(0.244)
SECTOR10	-0.774	(0.530)	-0.597	(0.424)	-0.781	(0.515)	-0.603	(0.415)
SECTOR11	0.105	(0.348)	0.751 ***	(0.265)	0.017	(0.339)	0.719 ***	(0.260)
SECTOR12	-1.082 *	(0.617)	-1.022 **	(0.442)	-1.085 *	(0.612)	-1.034 **	(0.416)
SECTOR13	-0.149	(0.367)	0.426	(0.281)	-0.291	(0.356)	0.399	(0.279)
SECTOR14	-0.598 *	(0.341)	-0.108	(0.262)	-0.671 **	(0.335)	-0.136	(0.260)
SECTOR15	-0.207	(0.328)	0.159	(0.260)	-0.296	(0.322)	0.171	(0.260)
SECTOR16	-0.637 **	(0.297)	-0.200	(0.244)	-0.708 **	(0.293)	-0.251	(0.244)
MISSING_SECTOR	-0.439	(0.401)	-0.140	(0.356)	-0.530	(0.393)	-0.197	(0.348)
MISSING_FIRM-SIZE	0.551	(0.365)	0.774 **	(0.321)	0.523	(0.359)	0.725 **	(0.316)
MISSING_ABITUR	0.048	(0.504)	0.200	(0.487)	0.070	(0.471)	0.233	(0.488)
EARNINGS_av	-0.538 **	(0.241)			-0.431 *	(0.236)		
EARNINGS_SQU_av	0.038	(0.036)			0.024	(0.035)		
TENURE_av	0.045 ***	(0.012)						
FIRM-SIZE199_av	0.161	(0.338)			0.429	(0.309)		
FIRM-SIZE1999_av	1.158 ***	(0.385)			1.755 ***	(0.391)		
FIRM-SIZE_MORE_av	1.053 ***	(0.387)			1.415 ***	(0.379)		
SECTOR1_av	1.719 **	(0.718)			0.944	(0.741)		
SECTOR2_av	0.343	(0.997)			0.618	(0.982)		
SECTOR3_av	2.586 **	(1.100)			2.114 *	(1.138)		

Continued on next page...

... table 7 continued

	Specification							
	(A)/(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
SECTOR4_av	5.235 ***	(0.932)			5.084 ***	(0.870)		
SECTOR5_av	1.260	(0.900)			1.201	(0.834)		
SECTOR6_av	3.182 ***	(0.643)			2.715 ***	(0.654)		
SECTOR8_av	1.596 **	(0.671)			1.228 *	(0.656)		
SECTOR9_av	1.886 ***	(0.672)			1.567 **	(0.617)		
SECTOR10_av	1.688	(1.124)			1.251	(1.139)		
SECTOR11_av	2.571 ***	(0.680)			2.844 ***	(0.744)		
SECTOR12_av	0.897	(1.250)			0.251	(1.094)		
SECTOR13_av	2.515 ***	(0.683)			2.491 ***	(0.663)		
SECTOR14_av	2.357 ***	(0.695)			2.052 ***	(0.671)		
SECTOR15_av	1.976 ***	(0.652)			1.592 **	(0.664)		
SECTOR16_av	2.129 ***	(0.648)			1.650 **	(0.646)		
MISSING_SECTOR_av	1.815	(1.177)			1.182	(1.131)		
MISSING_FIRM-SIZE_av	0.932	(1.064)			1.163	(1.032)		
MISSING1993	-0.574 **	(0.242)	-0.410 **	(0.160)	-0.438 **	(0.214)	-0.396 **	(0.161)
MISSING1998	-0.191	(0.195)	-0.075	(0.135)	-0.123	(0.191)	-0.050	(0.132)
MISSING2001	-0.169	(0.196)	-0.093	(0.147)	0.013	(0.220)	-0.110	(0.144)
MISSING2003	-0.410 **	(0.197)	-0.356 **	(0.140)	-0.363 *	(0.189)	-0.362 ***	(0.138)
TIME1998	-1.025 **	(0.440)	-1.029 **	(0.426)	-0.996 **	(0.419)	-0.951 **	(0.411)
TIME2001	-1.127 **	(0.446)	-1.056 **	(0.428)	-1.062 **	(0.432)	-1.063 **	(0.418)
TIME2003	-0.839 *	(0.442)	-0.826 *	(0.427)	-0.915 **	(0.433)	-0.851 **	(0.415)
Intercept	-6.054 ***	(0.940)	-4.316 ***	(0.772)	-7.337 ***	(0.907)	-5.212 ***	(0.736)
N. of Obs.	7127		7127		7152		7152	
Log likelihood	-2641.50		-2739.62		-2702.79		-2767.36	
sigma	2.42	(0.14)	2.24	(0.12)	2.33	(0.12)	2.22	(0.11)
rho	0.85	(0.014)	0.83	(0.014)	0.84	(0.014)	0.83	(0.014)
Correct Predictions [%]:								
$y = 0$	80.48		79.32		79.35		79.18	

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... table 7 continued

	Specification							
	(A)/(B)		(C)		(D)		(E)	
	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)	Coeff.	(Std.Err.)
$y = 1$	62.15		63.52		61.54		63.02	

(Correlated) random effects probit models of union membership.
See section 4.2 for a description of the model specifications.
* / ** / *** indicate significance at 10% / 5% / 1% level.
Data source: GSOEP.