Wage Mobility in East and West Germany[*]

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This article studies long run patterns and explanations of wage mobility as a characteristic of regional labor markets. Using German administrative data we describe wage mobility since 1975 in West and since 1992 in East Germany. Wage mobility declined substantially in East Germany in the 1990s and moderately in East and West Germany since the late 1990s. We apply RIF regression based decompositions to measure the role of factors associated with these mobility changes. Job and employment characteristics contribute to the decline in wage mobility, however, shifts in labor market structures are central in the determination of overall wage mobility.

Keywords: wage mobility, earnings mobility, income mobility, Germany, East Germany, inequality, transition matrix, Shorrocks index, administrative data

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1. Introduction

The German labor market has changed. This change gathered international attention as the "German Labor Market Miracle" (Burda and Hunt 2011): unemployment did not rise in the wake of the recent big recession. Card et al. (2012) and Dustmann et al. (2009) study the repercussions of these labor market changes for wage inequality. In this paper, we complete the picture by a study of the development of German wage mobility.

To understand labor markets, shifts in labor demand, labor supply, and the institutional framework must be considered jointly. Dustmann et al. (2009) stress de-unionization, the polarization of work, and a changing workforce composition as key developments of the German labor market. Burda and Hunt (2011) emphasize the role of wage moderation and employers' hiring restraints, and Card et al. (2012) discuss increasing labor market flexibility. It is plausible, that de-unionization, reductions of wage compression, and changes in the workforce composition not only affect wage inequality but also wage mobility.

We provide evidence and first describe wage inequality and mobility over the last 35 years in West Germany and the trends in former communist East Germany since unification. Then, we test hypotheses regarding the potential mechanisms behind aggregate mobility shifts using linked employee-employer data. Our novel approach to the study of wage mobility generates insights on structural shifts in the East German transition economy and in the German labor market over time.

Even though high mobility can, both, increase or reduce individual welfare, the economic literature tends to stress its beneficial aspects. High income mobility promises the disadvantaged of today a better position in the future and balances the distribution of lifetime incomes. Friedman (1962) introduced the notion that income mobility can equalize long-term personal incomes; Shorrocks index measures to what extent income mobility reduces income inequality. A broad and often methodological literature studies wage and earnings mobility, its development over time and in international comparison.

So far, the international evidence on the development of wage mobility over time does not yield unambiguous conclusions or general trends. Kopczuk et al. (2010) investigate U.S. earnings inequality and mobility between 1937 and 2004 and find that short-run mobility was rather stable since the 1950s.[1] Dickens (2000) evaluates British evidence on wage mobility from 1975 to 1994 and concludes that mobility has been declining since the 1970s. Jenkins (2011) considers the period 1991 to 2006 based on the British Household Panel Survey and finds hardly any mobility change over time. Buchinsky et al. (2003) find falling mobility in French earnings between 1967 and 1999.[2]

Most prior contributions on German wage mobility used the German Socio-Economic Panel (SOEP), which covers West Germany since 1984 and East Germany since 1990. This literature is dominated by comparisons of West German and U.S. wage mobility.[3] The results vary, as different survey years, income measures, and mobility indicators are applied. Only few studies evaluate mobility over time. In their comparison of East and West German income mobility early after unification Hauser and Fabig (1999) find that mobility was initially much higher in East Germany but declined already by 1995. Gernandt (2009) and Bayaz-Ozturk et al. (2011) apply SOEP data (1984-2007) for West Germany and find declining mobility, while Bartels and Bönke (2010) find rising earnings volatility among West German males.[4]

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[1] Buchinsky and Hunt (1999) find falling wage mobility over the time period 1979-1991. Recently, Dahl et al. (2011) show that based on administrative data U.S. year-to-year earnings volatility has been about constant between 1985 and 2005. This is confirmed by Celik et al. (2012).

[2] For additional recent contributions on the U.S. see Shin and Solon (2011), on the U.K. see Jarvis and Jenkins (1998), two studies on Austria are Hofer and Weber (2002) and Raferzeder and Winter-Ebmer (2007). For comparative studies see Aaberge et al. (2002), Chen (2009), van Kerm (2004), Maasoumi and Trede (2001), Gottschalk and Spolaore (2002), OECD (1997) and for methodological contributions Fields and Ok (1999a, 1999b, 1996) among others.

[3] See, e.g., Burkhauser and Poupore (1997), Maasoumi and Trede (2001), Gottschalk and Spolaore (2002), van Kerm (2004), and Chen (2009).

[4] Aretz and Gürtzgen (2012) study the persistence in low wage employment in West Germany between 1984 and 2004. They find that compositional and structural changes jointly explain the increasing persistence in low wage employment.

Most studies in the international literature on wage and income mobility focus on the measurement and description of mobility without explicit attention to its determinants. Among the contributions addressing mobility developments, three approaches dominate. The first approach was initiated by Lillard and Willis (1978), Lillard and Weiss (1979), MaCurdy (1982), and Abowd and Card (1989). These studies follow individual wages and earnings over time and focus on the covariance structure of earnings. This literature differs from our approach in that it studies the stochastic nature of the individual earnings process over time and does not consider mobility as an aggregate labor market characteristic.[5]

The second approach in the study of mobility consists of decompositions of mobility indicators and comprises numerous procedures: (a) some authors compare the mobility patterns for different types of household incomes (e.g., Chen 2009), (b) some split the sample in subsamples (e.g., Maasoumi and Trede 2001, van Kerm 2004, Ayala and Sastre 2008), or (c) differentiate between and within group mobility (Buchinsky and Hunt 1999); (d) some studies consider the contribution of different quantiles of the initial distribution to overall mobility (van Kerm 2003), and, finally, (e) based on Fields and Ok (1999b) some authors decompose mobility into mobility due to overall growth and mobility due to the transfer of income within a given distribution (e.g., Chen 2009, van Kerm 2004, Ayala and Sastre 2008).

A final third approach studies individual-level determinants of wage changes: Hunt (2001) investigates the determinants of year-to-year changes in East German wages immediately after unification. Finnie and Gray (2002), Raferzeder and Winter-Ebmer (2007), and Gernandt (2009) investigate correlation patterns of changes in individual income positions. Generally, these authors find that wage mobility is concentrated among the young and that mobility varies with the initial position in the income distribution.

This study contributes to this literature in several ways. We add to the second approach to the study of wage mobility by combining a decomposition analysis with tests of

[5] For more recent contributions see Meghir and Pistaferri (2011) and studies cited there.

specific contributors to aggregate mobility. Further, we study German wage mobility based on new administrative data that provide large samples, go back further in time than prior contributions, and cover recent developments. Compared to survey data, administrative data promise higher precision, less measurement error, and less attrition (see Gottschalk and Huynh 2010). The data allow us to compare the developments in the transition economy of East Germany and the established market economy of West Germany in the period after unification. This specific perspective is missing in the extant literature. We apply a broad set of mobility indicators to establish reliable stylized facts. However, we go beyond the mere description of wage mobility and investigate alternative explanations of the observed changes in wage mobility. We apply decompositions based on recentered influence function (RIF) regressions as introduced by Firpo, Fortin, and Lemieux (2009) to quantify the contribution of potential determinants of aggregate mobility.

Our main results are as follows: West German wage mobility stayed roughly constant between 1975 and 1997; we observe substantial declines in East German wage mobility in the 1990s and moderate mobility reductions in East and West Germany since the late 1990s. We confirm the evidence on rising wage inequality. Jointly, both stylized facts suggest that mobility is less and less effective as an "equalizer" of inequality as suggested by Friedman (1962). A substantial part of the mobility decline in East Germany is associated with changes in observable worker characteristics, particularly those describing job stability and employment characteristics. In addition, structural shifts contribute to the decline in wage mobility in both parts of Germany. Their patterns appear plausible based on recent institutional and macro-economic developments.

The paper proceeds as follows: in section two we describe our data, sample, and measurement issues. Section three describes the developments of inequality and mobility in West and East Germany. In section four we derive our hypotheses on the potential

determinants of mobility from the literature and outline our empirical approach to test them. We present and discuss the empirical results in section five before we conclude in section six.

2. Data and Measurement Issues

We use the newly available SIAB (Sample of Integrated Labour Market Biographies, 1975-2008) data, a two percent random sample of administrative records (for additional information see the appendix). The data contain the employment history of 1.6 million individuals who are covered by the statutory retirement insurance; they represent 80 percent of the German labor force.[6] We match individual records with establishment characteristics.

The SIAB data have two weaknesses. First, they provide only a limited number of covariates, e.g., we only know about workers' full-time vs. part-time employment status rather than the actual number of hours worked. Second, the information on daily wages is censored: since retirement insurance contributions are paid as a fixed earnings share only up to a threshold, earnings beyond the threshold are not registered. This threshold is fixed nominally every year, separately for East and West Germany. We apply 'consistent top-coding' to avoid time inconsistencies in the share of censored observations (see Burkhauser et al. 2009) and censor the top 15 and 10 percent of each annual wage distribution for West and East Germany, respectively (for details see the data appendix).

Our sample covers all full-time employed individuals in East and West Germany, between 25 and 60 years of age. We consider every individual who is employed full-time at some point in the calendar year. East and West German subsamples are distinguished based on the individuals' place of work. Observations from Berlin are considered East German starting in 1992 and are excluded before 1992. In robustness tests we study the relevance of East-West migration and the treatment of observations from Berlin. In the analysis of wage mobility between periods t and $t + k$ we use observations who were full-time employed in the

[6] Excluded are civil servants, self employed workers, and those in the military.

base (t) and the final (t + k) reporting year, who worked in the same region of the country at both points in time, and who met the age restrictions in both periods. Table A.1 in the appendix provides the number of observations used in the mobility analysis for the two regional samples by year. Our key variable of interest describes real daily wages in 2008 Euro. Similar to Dustmann et al. (2009), we disregard employment relationships with daily wages below 12 Euro (for details see the appendix).

3. Inequality and Mobility Patterns in East and West Germany

3.1 Inequality Patterns

In this first subsection we briefly replicate the evidence on wage inequality in Germany as presented, e.g., by Dustmann et al. (2009). Based on the SIAB data, we extend their observation window to include both more recent years and the East German subsample.

Figure 1 presents the development of aggregate inequality developments using the spread between the 80th and 20th percentile of the annual wage distribution, separately for East and West Germany.[7] The results confirm prior findings: wage inequality has been rising steadily in West Germany, in particular since the late 1990s. In East Germany, wage inequality has been rising since 1992. Increasing cross-sectional wage inequality does not have to enhance permanent and lifetime inequality if it is balanced by increasing intertemporal wage mobility. Next, we study the development of wage mobility over time.

3.2 Mobility Patterns

The literature uses a number of different indicators of wage mobility. To ensure that our findings are reliable and independent of any particular measure, we apply different indicators. We first study indicators that are based on individual rank positions in the wage distribution. In particular, we look at (a) the probability of shifting to a different quintile of

[7] We also studied Gini coefficients. The developments are very similar to those depicted.

the wage distribution, (b) the probability of jumping by more than 10 rank positions, (c) rank correlations over different interval durations, (d) the distribution of changes in rank positions, and (e) the variance of the distribution of changes in rank positions. As our second indicator, we present evidence based on Shorrocks index. Finally, we describe the development of mean absolute and relative wage changes.

Figure 2 summarizes annual transition matrices based on the full sample of censored and uncensored observations. It shows the share of wage earners who stay in the same quintile of the wage distribution between periods t and $t+4$ and those who move by one, two, three, or four quintiles. For the West (East) German sample we present the developments since 1975 (1992). Since the last year of our data is 2008, the last depicted transition refers to the starting year 2004 and represents the mobility between 2004 and 2008. Among West Germans, mobility appears to be rather stable. Only recently, the share of immobile workers, who remain in their wage quintile increased. The shifts in East German mobility are more pronounced. Here the share of 'stayers' increased since 1992 from around 50 to 70 percent in 2004 thus converging to West German levels. Overall, we observe a trend to lower mobility, particularly in East Germany.[8] This matches the evidence provided by Gernandt (2009) using SOEP data and the picture drawn for U.S. males by Kopczuk et al. (2010).

As a second and somewhat more detailed indicator based on rank positions, we study the development of the probability of changing the individual rank position by more than 10 percentage points up or down within a window of four years.[9] Figure 3 presents the development for the two regional subsamples. A high probability of a ten percentage point shift reflects high mobility. Mobility in West Germany slightly declined between 1975 and 1985; it increased through 1989, and subsequently fell substantially from about 40 to 30

[8] To test the robustness of our indicators to censoring we additionally calculated the share of stayers in a sample that consisted exclusively of uncensored observations, again grouped in quintiles. The share of stayers developed in parallel for the full and for the uncensored samples (not presented). This suggests that censoring does not affect the mobility measure.

[9] Unless stated otherwise, we derive individual wage ranks by dividing the uncensored part of the regional wage distribution (separately for East and West Germany) into 100 ranks.

percent. The East German development is striking: mobility declined from initially 55 to about 25 percent, i.e., to levels below West German values.

One shortcoming of quintile or 10 percentage point transitions is that they do not describe developments within the considered ranges.[10] Figure 4 addresses this problem and presents the development of individuals' rank correlation coefficients over time for time intervals of different lengths. The shorter the interval, the higher are the measured correlations. Overall, rank correlation coefficients and thus immobility increase over time. In East Germany, immobility increases strongly and eventually surpasses West German levels.

Figure 5 presents the distribution of changes in relative rank positions separately for three periods in West and for two periods in East Germany. The dispersion in rank adjustments over time is roughly constant in West Germany (see top row). In East Germany (see bottom row) the variance of the rank change distribution visibly declines between the first and the second observation period (1992-1996 vs. 2004-2008).

Figure 6 shows the variance of the distribution of individual rank changes (depicted in Figure 5) between periods t and $t+4$ along with 95 percent confidence intervals. The patterns strongly resemble those in Figure 3: in the early 1990s wage mobility was higher in East than in West Germany. Mobility declined in East Germany since 1993 and in West Germany since 1997. Nevertheless, since 1997 East German wage mobility is below the West German level. In the appendix Figures A.1-A.3 we depict the development of wage mobility by tenure, age and quintile position in the base period t. Wage mobility declines at all levels of tenure, over the life-cycle in both regions and all years, and it varies by starting position: generally, mobility is small in the highest wage quintile and high in the lowest quintile.

The correlation patterns over alternative time horizons (see Figure 4) indicate that mobility developments can vary in the short and the long run. Our second type of indicator, the Shorrocks index, describes the extent to which wage mobility balances short-run

[10] Also, these indicators cannot differentiate between more or less dispersed distributions.

inequality (Shorrocks 1978). It compares the average of T period-specific inequality measures with inequality averaged over these T periods. If the latter is smaller than the former, intertemporal mobility reduces short-run inequality. If there is no mobility, the inequality of the average and the average of the inequality measures are identical and the Shorrocks index is close to zero. Figure 7 presents the development of the Shorrocks index when we apply two alternative inequality indicators, mean log deviation and the Gini coefficient.[11] The developments over time resemble those observed with prior measures. Overall, mobility in West Germany is lower in the early 2000s than in the 1970s. In East Germany, mobility has been declining continuously since unification and it soon fell below West German levels.

In our third group of mobility measures we calculated the development of absolute and relative changes in real wages over time. Both trend downwards, in East Germany since the first measurements and in West Germany since the mid 1980s, which confirms the decline in wage mobility that we found before (results available upon request).

It is important to know, whether the use of censored data yields biased results. A bias can result if important developments occur in the censored part of the distribution (see Burkhauser et al. 2011). Above, we presented mobility indicators based on the full sample (see Figure 2) as well as only for the uncensored part of the sample (see Figures 3-7). In order to find out whether censoring is likely to affect our conclusions we repeat our analyses using uncensored survey data taken from the German Socio-Economic Panel (SOEP) for the years observed in our administrative data (Wagner et al. 2007). In Figure A.4 we present the developments of the variance of the rank change distribution for East and West Germany (cf. Figure 6) using both an uncensored and censored sample. For the censored data we use only that part of the wage distribution that is also available in our administrative data after

[11] The literature applies different inequality measures to calculate Shorrocks index (e.g., the Gini coefficient, mean log deviation, Theil I1, or Theil I2), which vary in their sensitivity to changes in different parts of the income distribution (e.g., Hofer and Weber 2002). We use the Gini coefficient, which is particularly sensitive to changes in the middle of the distribution and the mean log deviation which is particularly sensitive to changes in the lower part of the distribution.

consistent top-coding. We observe higher mobility for the censored than for the complete distribution. This is plausible if, e.g., the ranks at the tails of the distribution are less tightly distributed. Figure A.3 showed for censored data that mobility was lowest in the highest wage quintile. This matches the patterns in censored vs. uncensored survey data. The mobility indicators for the censored and uncensored samples show the same time trends. This suggests that the observed mobility trends are not the result of a bias generated by censoring.

Overall, the evidence supports two stylized facts: (i) wage mobility declined over time and (ii) it declined faster in East than West Germany. Next, we study potential mechanisms behind this robust decline in German wage mobility.

4. Explaining the Mobility Decline: Hypotheses and Empirical Approach

4.1 Hypotheses

The literature offers a range of hypotheses that may explain changes in aggregate wage mobility. These hypotheses fall in four groups: a first group of factors considers individual characteristics (Z), which are connected to labor supply; closer to labor demand, a second group of potential mobility determinants focuses on job stability (J) and a third group on employment characteristics (E). A last group considers regional and aggregate developments (R) as potential determinants of wage mobility. Next, we discuss each of the four groups of hypotheses which we later evaluate empirically.

Wage mobility is affected by individual characteristics including changes over the life-cycle (Drewianka 2010, Raferzeder and Winter-Ebmer 2007, Gernandt 2009, Aaberge et al. 2002, Sabelhaus and Song 2010, Kohn and Antonczyk 2011, Bönke et al. 2011). Mobility dropped the most for the East German labor force and, clearly, the composition of the East German labor force with respect to age, sex, and education has changed substantially since unification: East Germany experienced demographic aging and fertility declines (Lechner 2001), selective out-migration (Hunt 2006, Fuchs-Schündeln and Schündeln 2009),

modifications of the education system (Riphahn and Trübswetter 2013), and shifts in female labor force participation (Hanel and Riphahn 2012). In order to gauge the joint effects of changes in workforce characteristics we consider as individual characteristics (Z) age, sex, education, citizenship, an indicator for whether an individual will leave East German for the West in the future, and the rank position in the income distribution in the base period.

Wage mobility is typically associated with job changes. Therefore, aggregate changes in job stability are likely to be connected to shifts in wage mobility (Stevens 2001, Farber 2008, Shin and Solon 2011, Gottschalk and Moffitt 1994 and 2009). In the U.S., job stability declined recently suggesting an increase in wage mobility. In East Germany job stability almost mechanically increased since unification, which should reduce wage mobility. To quantify such mechanisms, we consider three indicators of job stability (J): individual employer change, unemployment experience between t and $t+4$, and current tenure.

A third group of factors relevant to wage mobility relates to employer and employment characteristics. In this group we distinguish four different mechanisms. First, the recent decline in unionization and wage compression may contribute to the rise in wage inequality (e.g., Dustmann et al. 2009, Antonczyk et al. 2010, Kohn and Antonczyk 2011) and may affect wage mobility (Gottschalk and Moffitt 1994). Particularly in East Germany, employers left collective bargaining arrangements as a result of overly generous wage agreements (Stephen and Schroeder 2007). Second, Gottschalk and Moffitt (1994) argue that employment shifts between industries affect aggregate wage mobility if workers move from more stable (e.g., manufacturing) to more instable (e.g., services) industries. This is particularly relevant for the East German industrial structure which adjusted after unification with shifting industry and employer size composition (see Kohn and Antonczyk 2011). As a third mechanism, Comin et al. (2009) and Gottschalk and Moffitt (2009) show the connection between the volatility of firm performance and wage mobility. Fourth and finally, given the relevance of occupation-specific human capital (Schmillen and Möller 2012, Firpo et al.

2011), of skill biased technical change, and increasing specialization it may have become more difficult to transfer human capital between employments over time (Gottschalk and Moffitt 2009). This again may affect wage mobility. To control for the impact of these mechanisms on wage mobility we consider (E) employer size, and its change between t and $t + 4$ as indicators of employer stability and control for employees' industry and occupation as of period t and for their changes over time.

Our final set of factors considers regional developments that might affect wage mobility such as unemployment, GDP growth, and regional employment structures, e.g., the share of the self-employed (Gottschalk and Moffitt 1994 and 2009, and Anger 2011). As summary measures for these macroeconomic mechanisms we consider state fixed effects.

In order to determine which of the four factor groups contributes most strongly to the decline in German wage mobility, we pursue a decomposition approach. The decomposition framework suggests that the observed mobility decline must be connected either to composition effects, i.e., to shifts in the observable explanatory factors behind wage changes, or to structure effects, i.e., to shifts in unobservables or in correlation patterns as reflected in regression coefficients. We first evaluate the magnitude of overall composition and structure effects and then study the relevance of the four factor groups, separately.

4.2 Empirical Approach

To quantify the contribution of the four factor groups to the change in wage mobility over time we apply the recentered influence function (RIF) method as introduced by Firpo et al. (FFL 2009) and discussed in Firpo et al. (FFL 2007) and Fortin et al. (FLF 2011). Similar to the Oaxaca Blinder decomposition which focuses on differences in the means of distributions, the RIF method permits decompositions of differences in functionals of distributions such as the variance. The aggregate decomposition separates the effect of

changes in characteristics and coefficients, while the detailed decomposition assigns (groups of) covariates their specific contribution to the difference in the distributional measure.

As our indicator of wage mobility we use the variance of the distribution of individual changes in rank positions in annual wage distributions between periods t and $t+4$ (see Figure 6). Let y_i represent the change in the relative rank position of individual i between period t and $t+4$. y_i takes on values in the interval $[-99, 99]$. In a balanced panel of individual wage observations the mean of y is zero and independent of wage mobility. Wage mobility is reflected in the variance of y: labor markets with high wage mobility are characterized by a high dispersion of rank changes while labor markets with low wage mobility feature mostly small changes in rank positions and thus a small variance of y.

We decompose the change in mobility, i.e. in the variance of y, to measure the impact of the distribution of covariates. The influence function of the variance, $IF(y_i;\ \sigma^2)$, describes the influence of an individual observation y_i on the aggregate variance, σ^2:

$$\text{(3)} \qquad \mathrm{IF}\left(y_i;\sigma^2\right) = \left(y_i - \int z \cdot \mathrm{d}F_y(z)\right)^2 - \sigma^2.$$

The recentered influence function (RIF) adds this influence function back to the observed variance (see equation 4), which after substituting the expected value of the influence function yields the original variance (see equation 5):

$$\text{(4)} \qquad \mathrm{RIF}\left(y_i;\sigma^2\right) = \mathrm{IF}\left(y_i;\sigma^2\right) + \sigma^2$$

$$\text{(5)} \qquad \mathrm{RIF}\left(y_i;\sigma^2\right) = \left(y_i - \int z \cdot \mathrm{d}F_y(z)\right)^2 = \left(y_i - \mu\right)^2.$$

FFL (2007) show that the conditional expectation of $RIF(y_i;\ \sigma^2)$ can be modeled as a linear function of explanatory variables X:

$$\text{(6)} \qquad \mathrm{E}\left(\mathrm{RIF}\left(y_i;\sigma^2\right) \mid X\right) = X_i \cdot \gamma.$$

The RIF regression coefficients (γ) provide partial effects of changes in the distribution of the covariates X on the variance of the conditional distribution of y. In this

framework we can separate the contribution of covariate (X) and structure effects to the explanation of overall changes in wage mobility over time.[12] The overall change in wage mobility between a late ($t = 0$) and an early ($t = 1$) period is defined as

$$(7) \qquad \Delta_O^{\sigma^2} = \sigma_0^2 - \sigma_1^2,$$

and can be decomposed into two parts

$$(8) \qquad \Delta_O^{\sigma^2} = \Delta_S^{\sigma^2} + \Delta_X^{\sigma^2},$$

where $\Delta_X^{\sigma^2}$ represents the composition and $\Delta_S^{\sigma^2}$ the structure effect. FFL (2007) show that this decomposition can be obtained as the Oaxaca Blinder decomposition of equation (6).

However, the authors recommend a two step procedure: the first step consists of reweighting the data following DiNardo et al. (1996) to account for potential non-linearities in the true conditional expectation of equation (6). Without reweighting, the decomposition yields consistent results only if the true conditional expectation of equation (6) is linear. The reweighting procedure generates counterfactual observations ($t = 2$) that result if individuals of the late period ($t = 0$) had the same distribution of observable characteristics as individuals observed in the early period ($t = 1$).[13]

In the second step the decomposition analysis is performed on the reweighted data. The composition and structure effects are calculated as follows:

$$(9) \qquad \begin{aligned} \Delta_X^{\sigma^2} &= \left(\bar{X}_2 - \bar{X}_0\right)\hat{\gamma}_0 + \bar{X}_2\left(\hat{\gamma}_2 - \hat{\gamma}_0\right) \\ &= \left(\bar{X}_2 - \bar{X}_0\right)\hat{\gamma}_0 + \hat{R}_X^{\sigma^2} \end{aligned}$$

$$(10) \qquad \begin{aligned} \Delta_S^{\sigma^2} &= \bar{X}_1\left(\hat{\gamma}_1 - \hat{\gamma}_2\right) + \left(\bar{X}_1 - \bar{X}_2\right)\hat{\gamma}_2 \\ &= \bar{X}_1\left(\hat{\gamma}_1 - \hat{\gamma}_2\right) + \hat{R}_S^{\sigma^2} \end{aligned}$$

[12] The literature frequently uses the terminology of explained vs. unexplained effects. We follow FLF (2011) and label explained effects *composition effects* and unexplained effects *structure effects*.

[13] The reweighting procedure is based on estimating a probit model on the probability of being observed in the early period Our probit specification considers the explanatory variables of the decomposition analysis and their interactions. The results of the reweighting are presented in the electronic appendix, including the difference of the mean characteristics in the reweighted and original period. These differences are small or equal to zero in almost all cases.

$\hat{R}_X^{\sigma^2}$ represents the approximation error, which reflects the imprecision of the approximation of $\Delta_X^{\sigma^2}$ through RIF regressions. The approximation error is large if the linearity of the RIF regression is inappropriate and disappears if the conditional expectation of the variance is indeed linear in *X* (see FFL 2007). $\hat{R}_S^{\sigma^2}$ represents the reweighting error that disappears if the reweighting matrix is consistently estimated and $plim\ \bar{X}_2 = plim\ \bar{X}_1$.

The results identify $\Delta_X^{\sigma^2}$ and $\Delta_S^{\sigma^2}$ under two assumptions. (i) The ignorability assumption requires that conditional on *X* the unobservable determinants of the dependent variable, i.e. the individual contribution to wage mobility, are independent of the assignment to treatment group t, i.e., to the early vs. late period. As it is difficult to imagine systematic unobservables that might determine the individual assignment to the early vs. late period in a sample of individuals who are observed in both periods in a given region, and conditional on X, we consider the assumption to be innocuous. As, in addition, our specification considers a rich set of indicators that reflect time varying processes (e.g., age, unemployment experience, or tenure) it seems unlikely that unobservables of the mobility equation could be correlated with the assignment to the treatment group. (ii) The assumption of overlapping support requires that no value of covariates *X* is exclusively observed among members of group 0 or group 1. In our case this, again, is innocuous.

To test our hypotheses and to determine the contribution of different groups of covariates to the decline in wage mobility over time we use linear regressions of the individual contribution to aggregate wage mobility considering the four factor groups (Z, J, E, and R) defined above and ε as a random error term:

(11) $$\mathrm{RIF}\left(y;\sigma^2\right) = \gamma_0 + Z\gamma_1 + J\gamma_2 + E\gamma_3 + R\gamma_4 + \varepsilon.$$

Now, we can calculate composition (12) and structure (13) effects for each covariate group *k*:

(12) $$\sum_{k=1}^{K} \left(E\left[X^k \mid t=1\right] - E\left[X^k \mid t=0\right]\right)' \cdot \hat{\gamma}_{0,k}^{\sigma^2}$$

(13) $$\sum_{k=1}^{K} E\left[X^k, t=1\right]' \cdot \left(\hat{\gamma}_{1,k}^{\sigma^2} - \hat{\gamma}_{2,k}^{\sigma^2}\right).$$

Under the stated assumptions this procedure can be applied to evaluate the contribution of the four factor groups to the observed change in wage mobility. We follow FFL (2007) and estimate the standard errors of all indicators by bootstrap procedures.

There are several advantages connected to the RIF procedure: first, it allows us to decompose the patterns behind changes in variances; second, in contrast to other decomposition procedures it permits both aggregate and detailed decompositions; third, the results of the detailed decomposition for each group of covariates are not path dependent. However, the RIF procedure also suffers the disadvantages of the Oaxaca Blinder decomposition: the measured contribution of covariates to the structure effect depends on the specific characteristics of the reference person and results depend on whether period 1 is compared to 0 or vice versa. In response to the first disadvantage we do not present detailed structure effects. In response to the second point we test the robustness of our results.

5. Results and Discussion

5.1 Empirical Results

The empirical analysis evaluates the contribution of the four factor groups to the decline in wage mobility. First, we regress the individual contribution to the aggregate variance on the four factor groups (see equation 11). The estimates are available in appendix Table A.2. The coefficient estimates for factor groups are all jointly statistically significant.

We present the results of the decomposition analysis in Table 1, where we compare wage mobility observed in the early years after unification (base year $t = 1993$)[14] to that observed most recently (base year $t = 2004$). Panel A of Table 1 describes that the observed variance of the rank change distribution dropped by half in East and by 15 percent in West Germany over the observed period. Panel B of Table 1 presents the results of the aggregate decomposition, where we distinguish the contribution of composition ($\Delta_X^{\sigma^2}$) and structure effects ($\Delta_S^{\sigma^2}$) to the overall change in wage mobility over time. In East and West Germany most of the change in wage mobility is associated with structural shifts, i.e., with changes in correlation patterns and the relevance of unobservables. However, in East Germany a statistically significant share of about 40 percent of the total decline in wage mobility is associated with composition effects, i.e., with changes in observable characteristics. Panel C of Table 1 presents the contribution of changes in observable characteristics by factor group. In both regions changes in job stability (J) and employment characteristics (E) contributed the most to the composition effect. While in East Germany changes in all factor groups contribute to a decline in wage mobility, the shifts in job stability (J) and employment (E) characteristics in West Germany would have increased wage mobility. Surprisingly, the contribution of individual level characteristics (Z) in East Germany is relatively small: if the mobility decline were driven by migration and ensuing changes in population characteristics this should have generated a more substantial contribution of factor group Z to the total composition effect.

The bottom rows of Table 1 describe the magnitude of the approximation and the reweighting errors. For East Germany the approximation error to the true functional form of the composition effect is negligible, for West Germany it takes on a value of -5. The

[14] In contrast to our descriptive results on East Germany which start in 1992, we use 1993 as the base year for our multivariate analyses to avoid measurement problems. East German data collection commenced in 1991 and some commentators consider the early evidence as unreliable.

statistically significant reweighting error for East Germany indicates that there remains a difference between the characteristics of the compared groups even after reweighting.

Overall, the substantial decline in East German wage mobility is connected to both composition and structure effects whereas the small change in West Germany is accounted for by structure effects. In principle, it is possible to decompose structure effects and to evaluate the contribution of each factor group. However, because the results vary substantially depending on the chosen reference group, we prefer not to present a—necessarily arbitrary—decomposition of the structure effect.[15]

Instead, we refine our decomposition analysis and break the observation window in two periods. In Table 2 we separately present the results of a decomposition comparing first the base years 1993 and 1998 and then the base years 1998 and 2004. This splits the periods of constant and declining mobility in West Germany (see Figure 6). Panel A confirms that the East German mobility decline slowed down substantially after the first period, whereas the West German mobility decline only started after 1998 (see row labeled change). The mobility decline in the second period was of about equal size in East and West Germany.

Panel B shows that both structure and composition effects contribute significantly to all observed changes. In East Germany, the patterns differ in the first and the second period: whereas in the early period about one quarter of the overall mobility change is associated with shifts in characteristics that share increases to 70 percent in the second period. In West Germany, the variance changed little in the first period and the decline in the second period is connected to both, composition and structure changes. Across both regions and periods the detailed decomposition of the characteristics effect in Panel C confirms a dominance of job stability and employment characteristics. The approximation and reweighting errors are

[15] We present the results of the aggregate decomposition with swapped period assignments (1 vs. 0) in the electronic appendix. The results are robust to the direction of the decomposition.

generally small and mostly insignificant. Overall, the mobility shifts in East and West are associated with both, changes in composition and structure.

While a detailed decomposition of structure effects is not possible without an arbitrary reference group we can test whether the RIF regression coefficients (cf. equation 11) changed over time. The tests (see the electronic appendix) yield that except for the regional indicators (R) the coefficients of all factor groups changed significantly.

While structure effects dominate in the first period, observables drive a substantial share of the decline in East German wage mobility particularly in the second half of the observation window. Job stability and employment characteristics seem to be key factors associated with wage mobility in East and West Germany, while labor force characteristics (Z) matter less. Before we discuss this evidence in greater detail we test its robustness.

5.2 Two Robustness Tests

We address two issues in our robustness tests, the impact of Berlin and of East-West migration. More than one fifth of the East German population resides in Berlin. Since the labor market in this metropolis may differ from the labor markets in the other, at times sparsely populated regions of East Germany we investigate whether our findings for East Germany are robust to omitting observations from Berlin. The results (see the electronic appendix) confirm the patterns observed before: a substantial share of the mobility decline is associated with the composition of the sample, particularly in the second sub-period. Job stability and employment characteristics contribute most to the composition effect. Overall, our results are robust to omitting Berlin.

The second test addresses a sample selection criterion that we imposed on the analysis. To ensure that we truly describe the East and West German labor markets we required that individuals are observed in the same region of the country when we measure their wages in periods t and $t + 4$. Here, migration can generate a selectivity problem (see, e.g., Brücker and

Trübswetter 2007 or Hunt 2006): it is possible that East German wage mobility declined because workers who are mobile in their wage rank left the region. In that case the East German labor market *per se* may not have changed and our previous results would be biased.

To test this scenario, we generated an alternative sample. First, we pooled the East and West German observations. Then, we accounted for the east-west difference in nominal wage censoring thresholds and applied the 90th percentile of the East German wage distribution for consistent top coding in the full sample.[16] We then ranked the uncensored wage observations in the national sample. For the robustness test, we consider all individuals who work in East Germany in base year (t) of the mobility measurement and describe their mobility in the national wage distribution by period $t + 4$ independent of whether they are observed in East or West Germany in $t + 4$. This describes the wage mobility of East German employees rather than the wage mobility in the East German labor market.[17] The development of wage mobility based on the now nationally calculated ranks is presented in appendix Figure A.5: changing from regional to national assignments of wage ranks for the original sample increases wage mobility observed in West Germany, however, with a similar decline over time. The results are not affected by allowing West German emigrants back into the sample. In East Germany, the change from regional to national wage ranks reduces the observed wage mobility. When we then add East German emigrants to the sample mobility jumps back to the originally measured values. Thus, the mobility decline is robust to definitional changes.

Table 3 shows the results of the decomposition exercise for East Germany based on the newly defined sample.[18] The observed variances of the rank change distributions in Panel A do not differ substantially from those in Tables 1 and 2. The overall decline in mobility is

[16] A number of alternative procedures could be used, each with its own strengths and weaknesses. Since the East and West German wage distributions differ any nominal cutoff censors different shares of the two regional wage distributions.

[17] Eventually, at least 94.1 percent of the initial East German employees are employed in the East German labor market 4 years later. The share of East-West migrants by period $t + 4$ ranged from 3.08 percent in period 1993-1997, to 5.9 percent in period 1998-2002, and 4.25 percent in 2004-2008.

[18] We present the decomposition results obtained for the original sample after only changing to national wage ranks in the electronic appendix. Prior results are confirmed.

reduced from 199.1 in Table 1 to 145.11 (see column 3, Panel A, Table 3). This decline occurs only in the early observation period; adding individuals who left East Germany to the sample does not affect the development in the second observation period. The aggregate decomposition in Panel B is fairly similar to that presented before: structure effects dominate in the first period and composition effects in the second period. Overall, observable characteristics account for 40 percent of the mobility decline in Table 1 and for 47 percent in Table 3. These results are robust to changes in the sample composition.

However, the results of the detailed decomposition presented in Panel C of Table 3 differ from those in Tables 1 and 2. When we consider the wage mobility of East German employees in Table 3 rather than of those staying in the East German labor market (see Tables 1 and 2) individual characteristics account for a larger share of the composition effect. Given the small addition to the overall East German sample size the magnitude of this shift is surprising, while its pattern meets expectations: we have now added East-West migrants who are known to be a selective group in terms of their individual characteristics (Z) (for references see section 4.1). As they changed employers between t and t+4 their initial employment characteristics are less informative for subsequent wage changes than the initial employment characteristics of those, who not only stayed in East Germany but potentially also with their employers. Overall, however, the results in Table 3 confirm the robustness of prior findings to changes in the sample composition.

5.3 Discussion

We have learnt that East German wage mobility was high initially after German unification and rapidly fell below the West German mobility level, which also declined over time. More than 60 percent of the overall East German mobility decline are connected to correlation patterns and unobservables (structure effect) and about 40 percent are associated with shifts in observables (composition effect). The structure effect drives the fast drop in

wage mobility in the first half of the observed period (1993-1998), when matching and remuneration mechanisms were newly established in the East German labor market. In the second half of the observation period (1998-2004) predominantly composition effects contribute to the East German mobility decline.

Neither migration nor shifting workforce characteristics drive this mobility decline. Instead, changes in job stability and employment characteristics are behind most of the composition effect in both periods and regions of the country. Appendix Table A.3 shows the development of job stability (J) and employment indicators (E) and documents the stabilization of the East German labor market: the share of individuals changing firms declines to West Germans levels; unemployment experience still differs between the regions, but declined in East Germany; the accumulation of job tenure in East Germany took time, however, by 2004 the share of employees with at least two years of tenure has about reached the West German level. Similarly, the incidence of changes in occupation and industry converged between the regions. So, observable characteristics reflect adjustments in the East German labor market and its rising job stability.[19]

In order to better understand the patterns behind the relevance of structure effects we return to Table A.2 and the joint significance tests (see the electronic appendix) as discussed in section 5.1: just about all coefficients of the RIF regressions changed significantly over time:[20] between 1993 and 2004 the coefficients of foreign citizenship, unemployment experience, and industry changed significantly both in East and West Germany. The estimates show that foreign citizenship lost its significant association with wage mobility over time (see Table A.3). Prior unemployment experience continues to be positively correlated with wage mobility, however, the magnitude of the coefficients declined between 1993 and 2004. We

[19] The observed differences are still statistically significant due to the large number of observations.

[20] Additional evidence on pooled RIF regressions with time and region interaction terms is presented in the electronic appendix.

observe a substantial increase in service industry employment over time (see Table A.2); the coefficient estimates suggest that almost all other industries are associated with less wage mobility than the services sector, however, the magnitudes of these parameters tend to fall in East Germany.

While these patterns are interesting they do not explain why East German wage mobility has fallen below West German levels. In a final step, we repeated our decomposition analysis, this time comparing contemporaneous wage mobility between East and West Germany in three different periods (see Table A.4). As expected, East German wage mobility is higher only in the earliest period. The aggregate decomposition yields interesting results. We find that early after unification (1993-1997) almost 80 percent of the East German mobility advantage was associated with the composition effect. This difference in observables did not disappear over time. The composition effect remains negative even when overall East German mobility had fallen below West German levels. Among the factor groups, again the job stability indicators dominate the composition effect.

The decline in East German wage mobility over time apparently relates to the strong adjustments in labor market structures, which confirms the findings in Table 2: already by 1998, structure effects more than compensated the composition effects and explain the lower wage mobility in East compared to West Germany. Thus, the difference between East and West German wage mobility is not related to the characteristics of the East German workforce nor to its employment relationships, firm size distribution, occupational or industry structures. Instead, it is driven by East-West differences in the correlation between observables and wage mobility: given characteristics yield lower wage volatility in East than in West Germany; it takes larger changes in characteristics in East than in West Germany to achieve a given "jump" in the regional wage rank distribution.

What may explain this relative sluggishness in East German wage adjustments? Relevant structural differences behind the sluggishness in wage adjustments may be

connected to the age and education profiles of East German wage levels: the flatter these profiles, the smaller are wage changes and, implicitly, wage mobility. Flatter profiles in East than in West Germany have been found in the literature before (e.g., Orlowski and Riphahn, 2009). They are reflected in the coefficients in appendix Table A.2 and in the interacted RIF regression results in the electronic appendix: "mobility returns" to education are lower in East than in West Germany, and the marginal effects of changes in employer, occupation, and industry on mobility are lower in East than in West Germany.

In addition, the overall changes of the German labor market mentioned in the introduction may affect East Germany in a way that is conducive to reduced wage volatility. The literature discusses de-unionization, wage moderation, increasing labor market flexibility, and the reduction of wage compression (see Eichhorst and Marx 2011, or Ellguth and Kohaut 2012). Within this scenario, it seems plausible that workers in the East German labor market that was characterized by massive unemployment were less able to achieve appropriate rents and that their wage mobility was weaker than that of their colleagues in West Germany.

6. Conclusions

This is one of the first studies using long-running administrative data to study the development of wage mobility over time. We describe the case of Germany since the mid 1970s: wage mobility in West Germany was initially stable and declined since the late 1990s, wage mobility in East Germany declined continuously since the early 1990s. We discuss explanations of the observed mobility decline and quantify their contributions. We apply a decomposition procedure that is based on recentered influence functions (RIF) and permits a flexible, path independent, aggregate and detailed decomposition of wage mobility changes. The results yield that structural shifts and unexplained factors contributed substantially to the decline in wage mobility in both parts of Germany. In addition, a share of about 40 percent of the mobility decline in East Germany is associated with changes in observable characteristics,

particularly those describing job stability and employment characteristics. Fifteen years of transition have not equalized mobility patterns in East and West Germany.

The overall mobility decline appears plausible, given recent changes in observable characteristics and institutions in German labor markets. While the latter may have generated the recent "German labor market miracle" (Burda and Hunt 2011) they are likely to also contribute to rising wage inequality and reduced wage mobility. These developments are particularly powerful in East Germany where wages are lower, inequality is higher, and mobility is lower than in West Germany. The shifts in West German wage structures suggest that the transition process in the East German labor market cannot be interpreted as a convergence to a static German wage structure. Instead, wage mobility appears to develop over time and thus is a dynamic feature of modern labor markets.

An important conclusion of our analysis is that the welfare effects of the observed rise in wage inequality are not balanced by higher life-time wage mobility, as was suggested by Friedman (1962); he interpreted mobility as an equalizer of long-term incomes. Instead, inequality continues to rise at the same time as its potential balancing mechanism—wage mobility—loses effectiveness.

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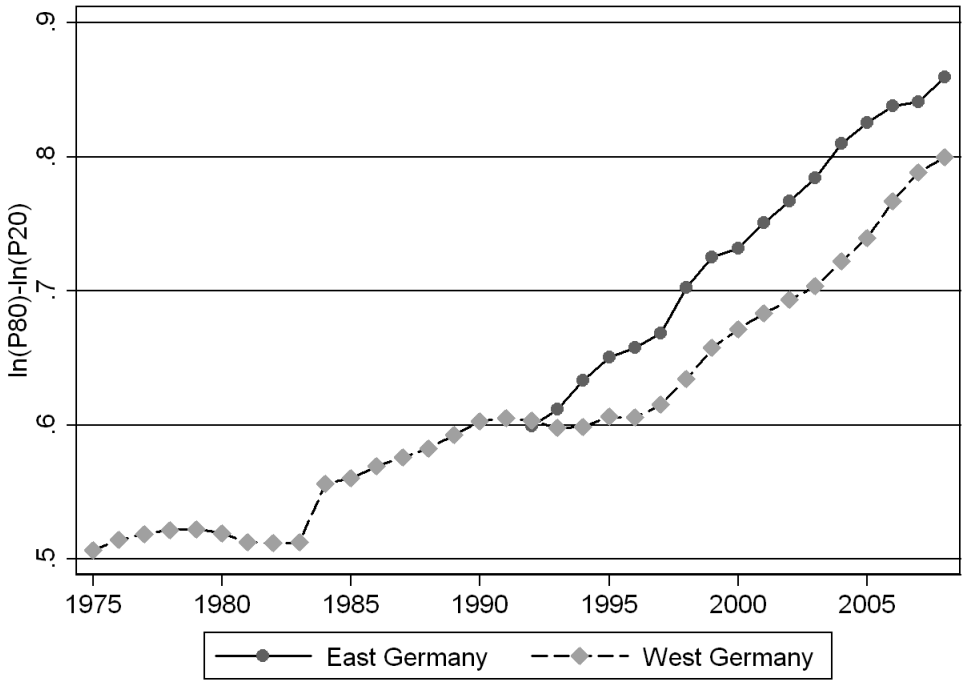
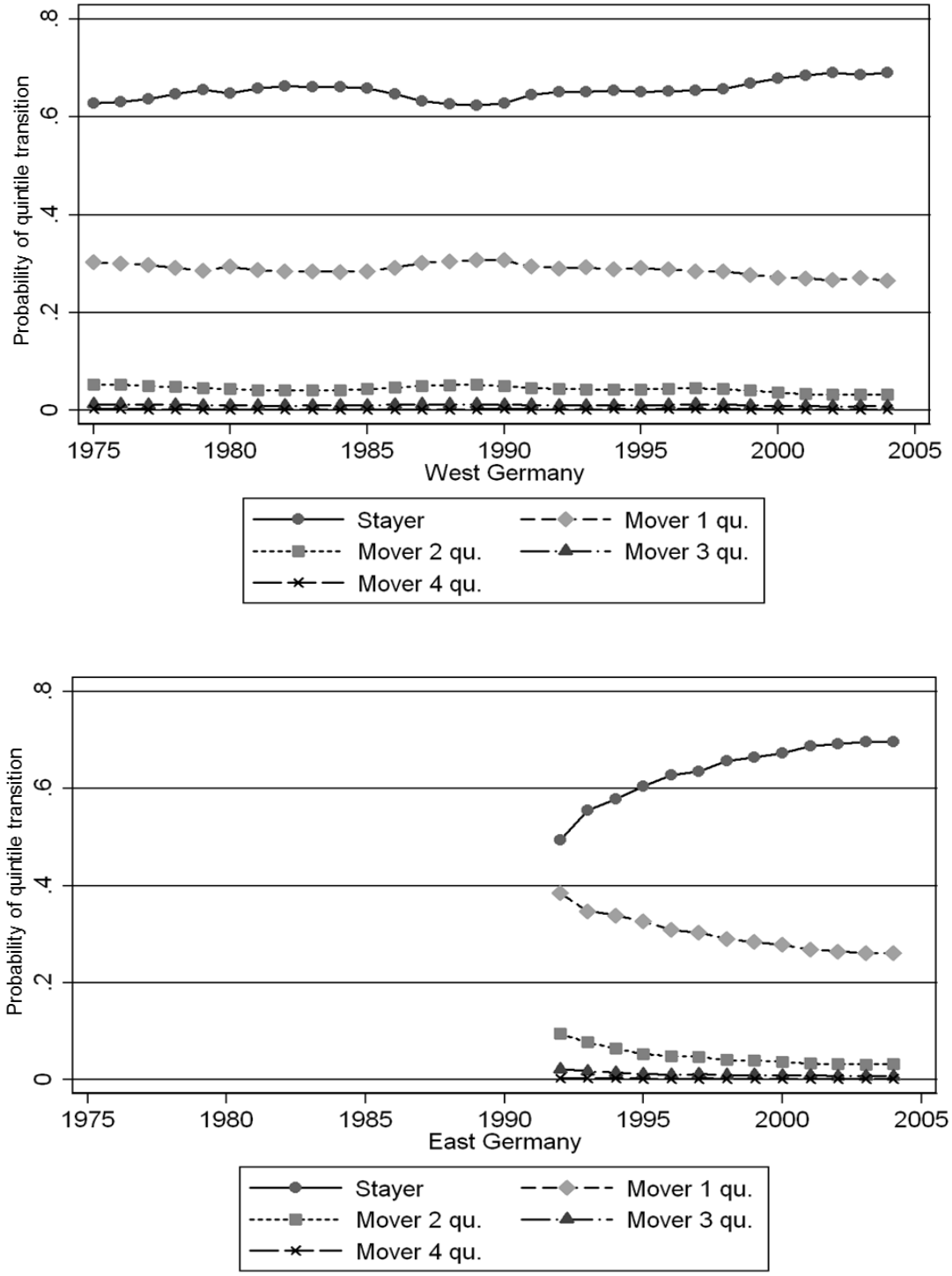
Figure 1 Development of the Spread between 80th and 20th Percentile of the Real Wage Distribution



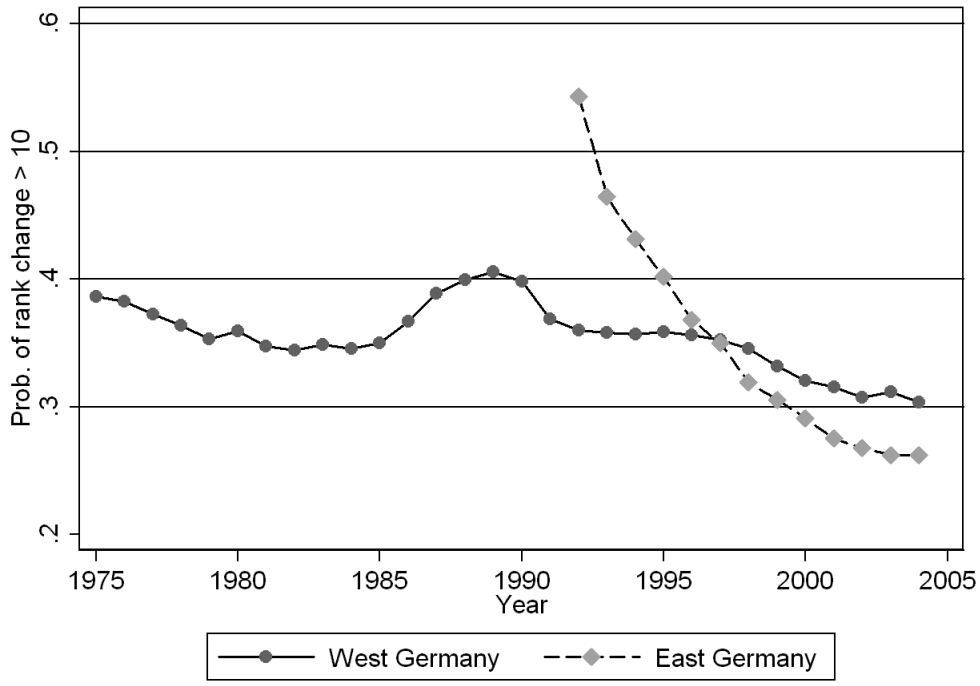
Note: Presented is the spread between the 80th and the 20th percentile of the regional uncensored real wage distributions. The steep rise in 1984 is due to a change in reporting rules to the pension system. For further details see the data appendix.
Source: SIAB (1975-2008).

Figure 2 Development of Quintile Transitions by Region



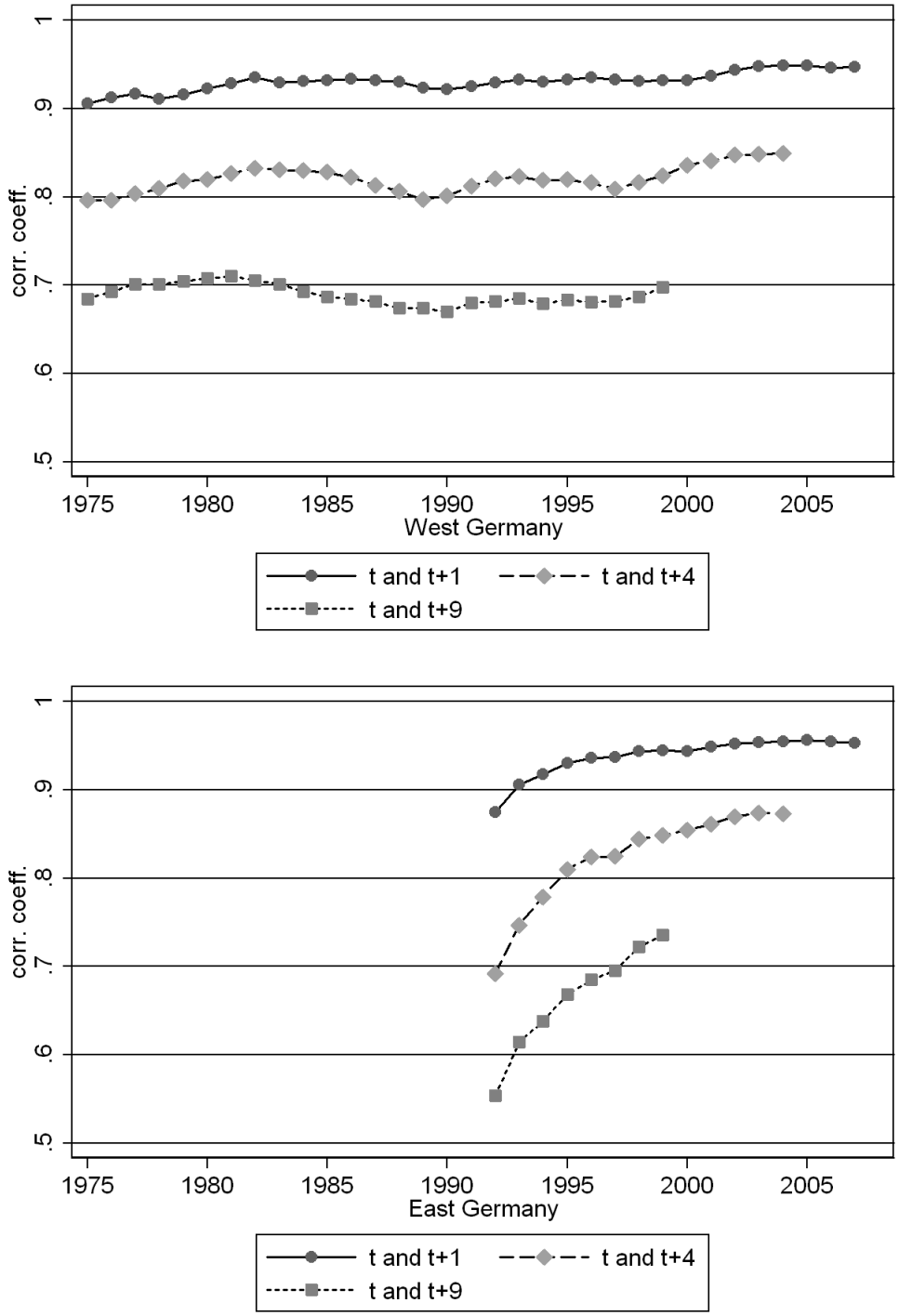
Notes: All figures present the share of transitions from a quintile in the quintile transition matrix of year t (x-axis) to year $t + 4$. Rank positions and transition matrices are calculated based on separate East and West German wage distributions in each year (t and $t + 4$). The graphs indicate the share of those staying in a quintile as well as the shares of those jumping by one, two, three, or four quintiles. Upward and downward mobility are not distinguished. All observations - including censored observations - are considered.
Source: SIAB (1975-2008).

Figure 3 Development of the Probability of a Change in Rank Position by More Than 10 Points Between t and $t + 4$



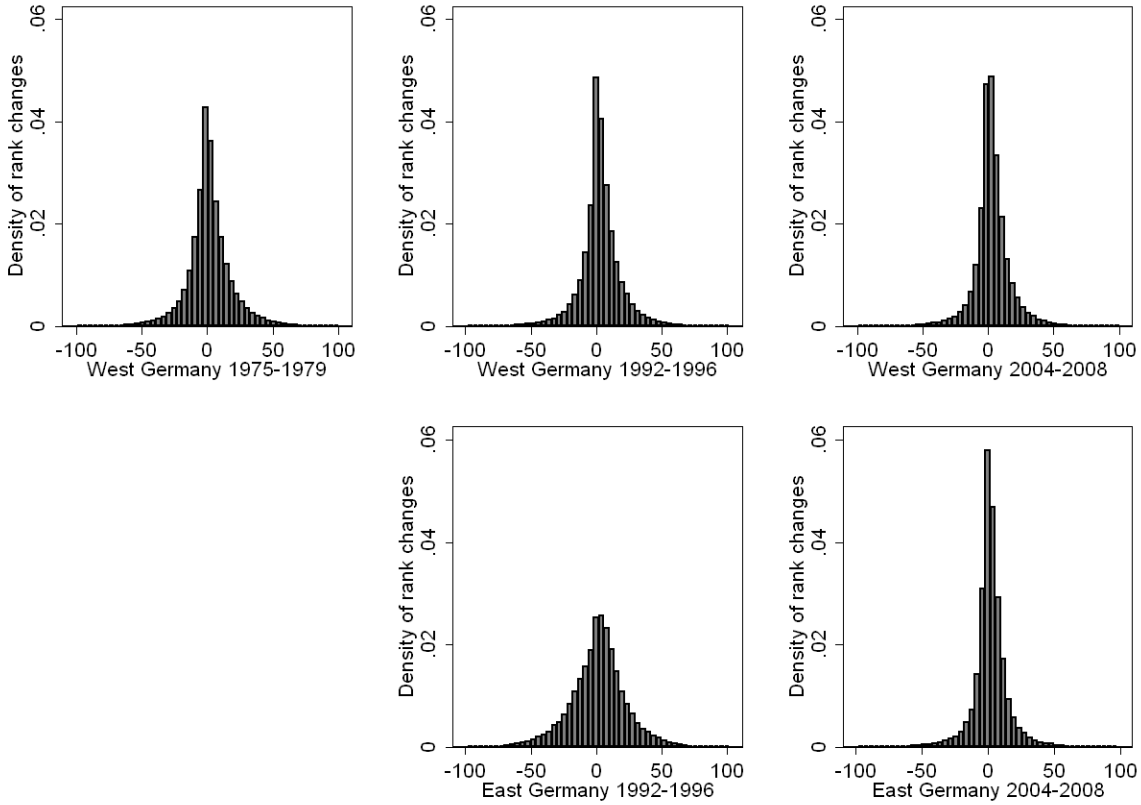
Notes: Calculated using rank distributions based only on uncensored observations because censored observations do not change their measurable rank position over time. A 'rank change by more than 10 points' indicates a change in the rank of the annual regional wage distribution by more than 10 percentiles.
Source: SIAB (1975-2008).

Figure 4 Development of Correlation Coefficients for Individuals' Percentile Ranks



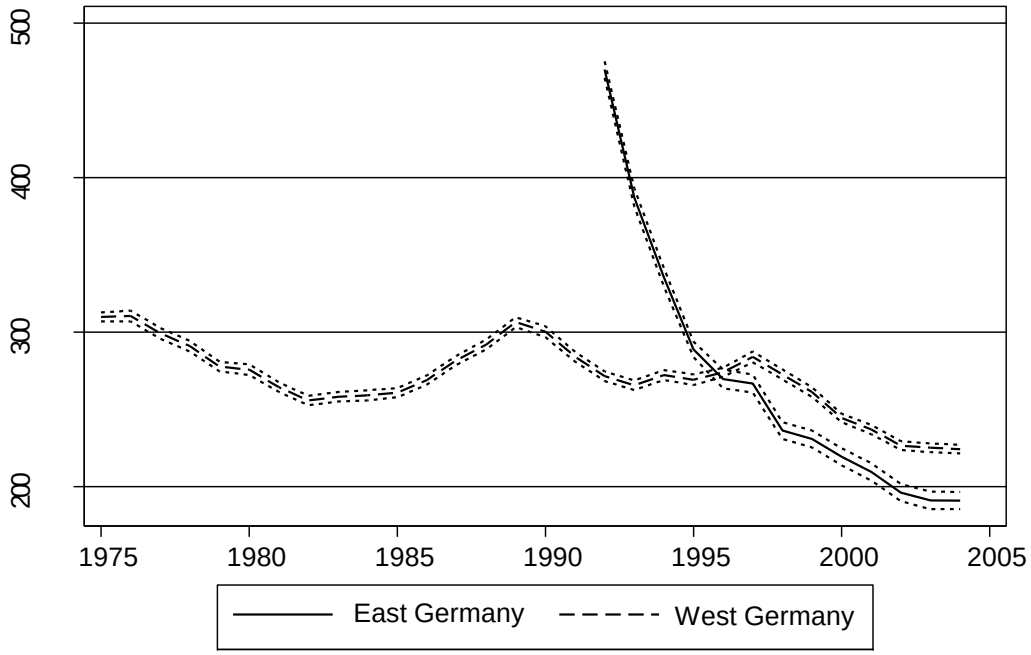
Notes: These figures describe correlation coefficients at the individual level measured based on subsequent base years (x-axis). The correlation coefficients were calculated using only uncensored observations. Since the last year of observed data is 2008 we cannot calculate more recent correlations so far.
Source: SIAB (1975-2008).

Figure 5 Distribution of Changes in Relative Rank Positions – by Period and Region



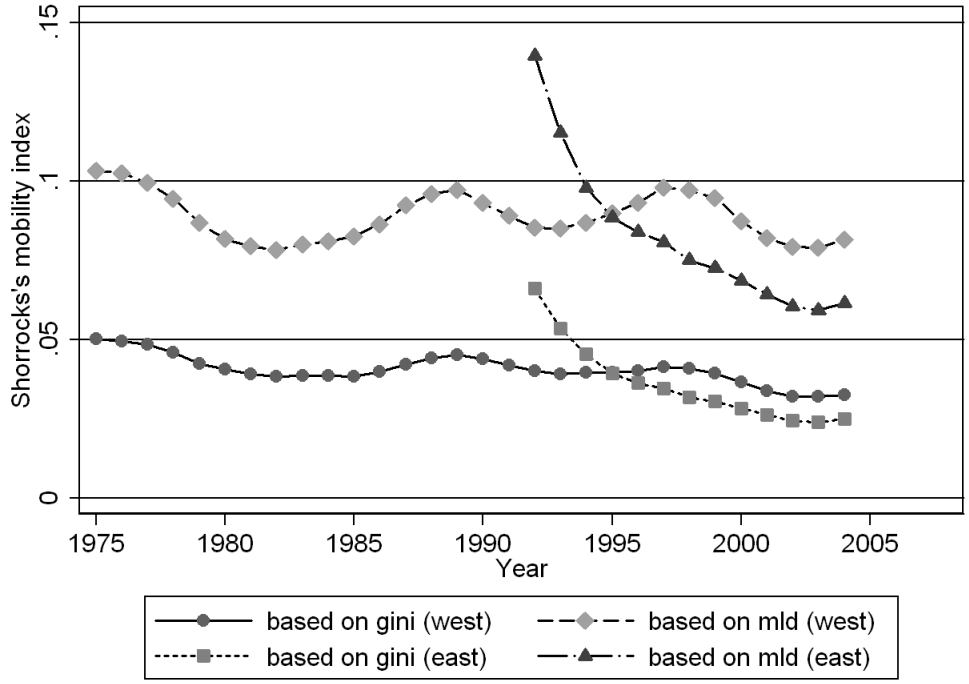
Notes: Individual rank positions are determined based on the regional wage distribution in the beginning and the end year of the considered interval. Since not all wage earners of the base year are observed four years later, and because those with stable employment situations may represent a positive selection, we obtain slightly more upward than downward mobility in rank positions. Censored wage observations are omitted: because all censored individuals occupy the same rank, their consideration would vastly increase the share of zero changes in rank position. Alternative depictions including censored wage observations are available upon request.
Source: SIAB (1975-2008).

Figure 6 Development of the Variance of the Distribution of Individual Rank Changes between Periods t and $t + 4$



Notes: Presented is the variance of the individual rank change distribution along with 95 percent confidence intervals based on bootstrapping. The variance of the rank change distribution is calculated using only uncensored observations.
Source: SIAB (1975-2008).

Figure 7 Development of Shorrocks Indices Based on Mean Log Deviation and Gini Coefficients for Regional Subsamples



Notes: All values are calculated for an accounting period of five years (i.e., years t - $t + 4$). The calculations use only the uncensored part of the wage distribution. Indicators labeled "mld" present the Shorrocks index when using a mean log deviation inequality measure. Indicators labeled "gini" are based on the gini coefficient as an inequality measure.
Source: SIAB (1975-2008).

Table 1 Decomposition Results - Full Period

period 1 / **period 0**	**1993-1997** / **2004-2008**		**1993-1997** / **2004-2008**	
	East		**West**	
A. Description				
period 1	390.19 ***		265.70 ***	
	(2.90)		(1.40)	
period 0	191.09 ***		224.39 ***	
	(2.78)		(1.46)	
total change	-199.10 ***		-41.31 ***	
	(4.09)		(2.12)	
B. Aggregate Decomposition of Total Change (=100 %)				
composition	-80.25 ***	40%	2.00	-5%
	(5.16)		(1.97)	
structure	-138.97 ***	70%	-37.62 ***	91%
	(6.27)		(2.12)	
C. Detailed Decomposition of Composition Effect (=100 %)				
Z - individual	-13.37 ***	17%	-6.03 ***	-302%
	(3.80)		(0.82)	
J - job stability	-32.55 ***	41%	2.31 ***	116%
	(2.61)		(0.78)	
E - employment	-33.08 ***	41%	5.83 ***	292%
	(3.09)		(1.10)	
R - regional	-1.25 ***	2%	-0.12	-6%
	(0.40)		(0.10)	
approximation error	0.94		-5.31 **	
	(9.20)		(2.16)	
reweighting error	19.18 ***		-0.38	
	(4.45)		(0.78)	

Notes: Z, J, E, and R represent the groups of individual, job stability, employment and regional variables, which contain different numbers of indicators as described in the text and electronic appendix. The figures present absolute values of mobility and their changes. The smaller font figures in parentheses are bootstrapped standard errors (100 replications). ***, ** and * indicate statistical significance at the 1, 5, and 10 percent level, respectively. The analysis is based on the consistently censored part of the daily wage distribution. Number of observations: East Germany 1993-1997: 60,676; East Germany 2004-2008: 46,341; West Germany 1993-1997: 189,533; West Germany 2004-2008: 184,846.
Source: SIAB (1975-2008).

Table 2 Decomposition Results - Partial Periods

period 1	**1993-1997**		**1998-2002**		**1993-1997**		**1998-2002**	
period 0	**1998-2002**		**2004-2008**		**1998-2002**		**2004-2008**	
	East				**West**			
A. Description								
period 1	390.19 ***		238.61 ***		265.70 ***		272.78 ***	
	(3.12)		(2.78)		(1.54)		(1.51)	
period 0	238.61 ***		191.09 ***		272.78 ***		224.39 ***	
	(2.90)		(2.58)		(1.71)		(1.23)	
total change	-151.58 ***		-47.52 ***		7.08 ***		-48.39 ***	
	(4.41)		(4.11)		(2.44)		(1.79)	
B. Aggregate Decomposition of Total Change (=100 %)								
composition	-36.57 ***	24%	-33.09 ***	70%	17.86 ***	252%	-19.26 ***	40%
	(2.94)		(3.66)		(1.44)		(1.81)	
structure	-113.54 ***	75%	-21.45 ***	45%	-8.57 ***	-121%	-26.21 ***	54%
	(4.48)		(4.53)		(2.29)		(2.20)	
C. Detailed Decomposition of Composition Effect (=100 %)								
Z - individual	-7.44 ***	20%	-8.71 ***	26%	-4.85 ***	-27%	-4.83 ***	25%
	(1.18)		(2.22)		(0.52)		(0.50)	
J - job stability	-17.63 ***	48%	-12.28 ***	37%	10.63 ***	60%	-7.00 ***	36%
	(1.69)		(1.61)		(0.72)		(0.90)	
E - employment	-10.82 ***	30%	-11.91 ***	36%	12.17 ***	68%	-7.37 ***	38%
	(1.80)		(2.21)		(1.07)		(1.07)	
R - regional	-0.67 *	2%	-0.19	1%	-0.09	-1%	-0.05	0%
	(0.38)		(0.24)		(0.09)		(0.09)	
approximation error	-1.85		-0.02		-4.03 *		-1.77	
	(5.17)		(5.23)		(2.28)		(1.96)	
reweighting error	0.37		7.05 ***		1.82 **		-1.16	
	(1.62)		(1.92)		(0.76)		(0.94)	

Notes: See Table 1. Number of observations: East Germany 1993-1997: 60,676; East Germany 1998-2002: 51,892; East Germany 2004-2008: 46,341; West Germany 1993-1997: 189,533; West Germany 1998-2002: 187,681; West Germany 2004-2008: 184,846. The standard errors were bootstrapped separately for each column.
Source: SIAB (1975-2008).

Table 3 Decomposition Results - Robustness Test: National Ranks and Extended Sample

period 1 **period 0**	**1993-1997** **1998-2002**	**1998-2002** **2004-2008**	**1993-1997** **2004-2008**
		East Germany	
A. Description			
period 1	340.12 ***	243.52 ***	340.12 ***
	(2.85)	(2.98)	(2.32)
period 0	243.52 ***	195.01 ***	195.01 ***
	(2.98)	(2.79)	(2.74)
total change	-96.60 ***	-48.51 ***	-145.11 ***
	(4.28)	(4.23)	(3.70)
B. Aggregate Decomposition of Total Change (=100 %)			
composition	-25.26 *** 26%	-38.38 *** 79%	-68.92 *** 47%
	(2.76)	(2.98)	(4.87)
structure	-71.28 *** 74%	-13.48 *** 28%	-82.94 *** 57%
	(4.35)	(4.31)	(5.61)
C. Detailed Decomposition of Composition Effect (=100 %)			
Z - individual	-7.07 *** 28%	-21.35 *** 56%	-30.43 *** 44%
	(1.51)	(2.04)	(2.35)
J - job stability	-13.18 *** 52%	-11.37 *** 30%	-22.37 *** 32%
	(1.34)	(1.51)	(2.34)
E - employment	-4.28 *** 17%	-5.66 *** 15%	-14.64 *** 21%
	(1.47)	(1.90)	(3.09)
R - regional	-0.73 ** 3%	0.00 0%	-1.48 *** 2%
	(0.30)	(0.27)	(0.43)
approximation error	-1.38	-0.19	-3.30
	(5.29)	(5.23)	(7.02)
reweighting error	1.32	3.53	10.04 ***
	(1.53)	(2.04)	(3.42)

Notes: See Table 1. The ranks were calculated for the pooled East and West German wage distribution. The decomposition is performed for those observations, who are employed in East Germany in the base period (t) independent of where they are employed in period $t + 4$. Number of observations 1993-1997: 65,292; 1998-2002: 54,999; 2004-2008: 49,038.
Source: SIAB (1975-2008).

Appendix

Table A.1 Number of Annual Observations in Full Sample and in Mobility Analyses

Year	West Germany			East Germany		
	t	t & t+4 abs.	t & t+4 in %	t	t & t+4 abs.	t & t+4 in %
1975	229,173	171,123	0.75			
1976	229,826	172,463	0.75			
1977	233,020	174,423	0.75			
1978	233,252	171,417	0.73			
1979	240,586	172,122	0.72			
1980	242,998	171,930	0.71			
1981	243,737	170,963	0.70			
1982	240,919	172,945	0.72			
1983	236,286	171,147	0.72			
1984	237,829	173,507	0.73			
1985	236,028	172,254	0.73			
1986	242,790	177,151	0.73			
1987	245,336	178,227	0.73			
1988	249,548	180,022	0.72			
1989	256,878	182,117	0.71			
1990	269,878	184,992	0.69			
1991	280,101	189,907	0.68			
1992	283,999	191,013	0.67	98,967	64,419	0.65
1993	281,241	189,906	0.68	94,949	62,431	0.66
1994	276,411	189,413	0.69	93,100	60,941	0.65
1995	275,693	191,082	0.69	92,450	60,548	0.65
1996	271,929	191,855	0.71	89,918	58,687	0.65
1997	268,761	189,956	0.71	85,320	55,406	0.65
1998	268,893	188,040	0.70	82,641	53,105	0.64
1999	270,074	187,241	0.69	81,224	52,033	0.64
2000	273,463	188,047	0.69	78,512	50,028	0.64
2001	272,230	187,394	0.69	75,368	47,961	0.64
2002	265,904	186,372	0.70	71,997	46,884	0.65
2003	259,578	186,538	0.72	69,426	46,934	0.68
2004	253,159	184,855	0.73	66,771	46,343	0.69

Notes: The columns entitled "t" provide the number of sample observations observed in the base period (calendar year provided in "Year" column). The columns entitled "t & $t+4$" provide the number of observations ("abs") with wage observations in periods t and $t+4$ as well as their share ("in %") in the number of observations in the base period.
Source: SIAB (1975-2008).

Table A.2 RIF Regressions for East and West Germany

	East Germany			West Germany		
	1993	**1998**	**2004**	**1993**	**1998**	**2004**
age 31-35	-28.45 ***	-69.23 ***	-48.83 ***	-60.73 ***	-92.68 ***	-71.08 ***
	(9.77)	(8.95)	(10.09)	(4.51)	(4.87)	(5.05)
age 36-40	-41.51 ***	-98.63 ***	-88.65 ***	-81.57 ***	-123.30 ***	-101.00 ***
	(10.02)	(8.87)	(9.50)	(4.83)	(5.07)	(4.87)
age 41-45	-64.79 ***	-106.80 ***	-98.68 ***	-89.33 ***	-129.80 ***	-115.10 ***
	(10.50)	(9.13)	(9.33)	(4.97)	(5.36)	(4.95)
age 46-50	-70.22 ***	-115.20 ***	-101.40 ***	-92.18 ***	-131.70 ***	-108.90 ***
	(11.55)	(9.54)	(9.63)	(5.43)	(5.59)	(5.22)
age > 50	-98.47 ***	-101.20 ***	-109.20 ***	-91.07 ***	-114.80 ***	-103.30 ***
	(11.23)	(10.56)	(9.95)	(5.30)	(6.25)	(5.50)
start pos. 11-20	26.16 *	-61.50 ***	-17.43	12.87 *	-17.31 **	-21.70 ***
	(15.51)	(13.42)	(13.11)	(7.51)	(7.80)	(7.13)
start pos. 21-30	47.57 ***	-71.53 ***	-18.31	84.59 ***	-9.13	-5.21
	(15.59)	(13.18)	(13.00)	(7.52)	(7.78)	(7.13)
start pos. 31-40	67.78 ***	-87.90 ***	-15.38	101.70 ***	2.09	20.03 ***
	(15.58)	(13.31)	(13.10)	(7.59)	(7.89)	(7.21)
start pos. 41-50	96.11 ***	-56.26 ***	3.59	129.90 ***	17.81 **	45.86 ***
	(15.78)	(13.34)	(13.26)	(7.68)	(7.99)	(7.32)
start pos. 51-60	109.70 ***	-14.41	43.75 ***	133.00 ***	19.67 **	55.61 ***
	(15.96)	(13.45)	(13.34)	(7.78)	(8.09)	(7.41)
start pos. 61-70	120.50 ***	-3.40	54.38 ***	152.90 ***	26.17 ***	72.22 ***
	(16.20)	(13.58)	(13.58)	(7.88)	(8.19)	(7.52)
start pos. 71-80	162.00 ***	10.15	51.97 ***	159.10 ***	27.36 ***	61.01 ***
	(16.61)	(13.87)	(13.88)	(7.98)	(8.32)	(7.63)
start pos. 81-90	147.70 ***	-8.27	30.12 **	173.90 ***	29.16 ***	32.95 ***
	(17.01)	(14.27)	(14.21)	(8.17)	(8.54)	(7.85)
start pos. 91-100	146.00 ***	-42.52 ***	38.32 **	203.70 ***	36.48 ***	33.52 ***
	(18.27)	(15.25)	(15.11)	(8.76)	(9.05)	(8.42)
educ mid	16.37	11.39	31.55 *	29.70 ***	35.88 ***	33.72 ***
	(14.16)	(15.04)	(16.43)	(4.63)	(5.15)	(4.96)
educ high	18.22	52.03 ***	84.23 ***	94.25 ***	162.70 ***	130.20 ***
	(18.84)	(17.99)	(18.80)	(10.00)	(9.55)	(8.08)
non german	104.00 ***	23.88	-41.85	35.30 ***	19.74 ***	-5.05
	(26.99)	(24.92)	(25.51)	(5.26)	(5.87)	(5.52)
female	-46.23 ***	-29.30 ***	-1.95	4.42	-21.07 ***	11.27 ***
	(8.56)	(7.10)	(6.66)	(4.19)	(4.28)	(3.80)
migrates west	43.56 ***	68.50 ***	30.05	-	-	-
	(11.69)	(12.07)	(27.30)			
firm change	125.70 ***	156.50 ***	133.30 ***	167.90 ***	177.80 ***	169.70 ***
	(8.24)	(7.41)	(7.28)	(4.33)	(4.53)	(4.26)
unempl. 0-0.5 yr	126.20 ***	86.04 ***	106.70 ***	113.00 ***	68.17 ***	93.95 ***
	(9.89)	(9.28)	(9.40)	(5.73)	(5.94)	(5.83)

unempl. 0.5-1 yr	217.50	***	142.80	***	153.10	***	164.30	***	72.26	***	137.80	***				
	(12.85)		(11.41)		(10.94)		(7.70)		(8.17)		(7.12)					
unempl. > 1 yr	265.30	***	149.80	***	139.60	***	240.20	***	57.93	***	90.33	***				
	(12.09)		(10.85)		(9.77)		(7.71)		(8.31)		(6.98)					
tenure 0.5-1 yr	-29.91	**	-62.01	***	-59.21	***	-93.60	***	-156.70	***	-87.10	***				
	(14.56)		(12.15)		(12.84)		(8.26)		(7.88)		(7.93)					
tenure 1-2 yr	6.03		-25.03	**	-55.41	***	-90.93	***	-174.60	***	-87.62	***				
	(14.37)		(12.67)		(12.48)		(8.23)		(8.05)		(7.61)					
tenure > 2 yrs	-24.63	*	-31.91	***	-74.56	***	-133.30	***	-209.30	***	-117.80	***				
	(14.11)		(11.54)		(11.42)		(7.42)		(7.27)		(6.94)					
firm size 11-25	-22.90	*	16.08	*	-12.14		-4.05		8.00		2.20					
	(11.77)		(9.01)		(8.77)		(5.70)		(5.81)		(5.41)					
firm size 26-50	-35.67	***	22.36	**	12.95		-0.11		9.73		19.83	***				
	(12.41)		(9.68)		(9.24)		(6.10)		(6.17)		(5.72)					
firm size 51-100	-22.59	*	34.40	***	7.45		0.58		20.83	***	13.84	**				
	(12.39)		(9.74)		(9.33)		(6.07)		(6.13)		(5.67)					
firm size 101-1000	-17.15		17.06	**	26.69	***	-13.90	***	12.84	**	20.67	***				
	(10.51)		(8.51)		(8.25)		(5.06)		(5.11)		(4.92)					
firm size > 1000	23.48	*	-41.29	***	-8.85		-37.77	***	3.86		32.44	***				
	(13.24)		(12.02)		(12.82)		(6.12)		(6.46)		(6.25)					
industry: agriculture	-97.80	***	-105.40	***	-52.76	***	-109.30	***	-138.20	***	-107.40	***				
	(29.33)		(24.26)		(16.11)		(18.01)		(18.71)		(15.01)					
ind.: energy water m.	173.10	***	-6.54		-43.44	*	-38.90	***	-45.72	***	-0.96					
	(21.49)		(21.78)		(22.49)		(12.05)		(13.24)		(12.82)					
ind.: manufacturing	156.80	***	-0.99		-1.89		17.13	***	-15.91	***	13.61	***				
	(10.77)		(8.94)		(8.48)		(5.23)		(5.31)		(4.68)					
ind.: construction	61.30	***	-5.43		-54.18	***	2.35		-18.34	**	-30.79	***				
	(12.59)		(10.78)		(10.48)		(7.20)		(7.60)		(6.71)					
ind.: retail	47.58	***	-9.32		-8.41		-20.44	***	-39.51	***	-27.56	***				
	(13.23)		(10.76)		(9.72)		(6.01)		(6.06)		(5.15)					
ind.: transp. comm.	-61.59	***	-29.13	***	-29.42	***	-38.46	***	-32.78	***	-34.78	***				
	(13.58)		(11.16)		(10.67)		(7.58)		(7.71)		(6.64)					
ind.: bank., insur.	85.56	***	15.33		16.78		-24.24	**	-44.47	***	0.30					
	(27.31)		(21.90)		(23.00)		(10.12)		(10.56)		(9.57)					
ind.: adm, non-profit	-83.84	***	-66.74	***	-76.69	***	-66.32	***	-97.64	***	-71.68	***				
	(10.90)		(9.75)		(11.22)		(6.53)		(6.83)		(6.92)					
shrinking workforce	-23.70	***	-39.87	***	-31.97	***	-19.12	***	-23.87	***	-32.43	***				
	(7.87)		(6.03)		(5.54)		(3.33)		(3.45)		(3.01)					
occup: qual. manual	-20.91	**	11.92		8.19		-17.15	***	-4.02		-9.83	**				
	(10.27)		(8.70)		(8.60)		(4.71)		(5.03)		(4.72)					
occup: tech., engineer	0.24		49.31	***	15.53		-6.59		25.27	***	18.23	**				
	(16.51)		(13.82)		(13.00)		(7.81)		(8.03)		(7.18)					
occup: simple services	54.22	***	33.53	***	0.95		18.12	***	4.53		-14.51	***				
	(12.28)		(10.74)		(10.21)		(5.69)		(6.06)		(5.55)					
occup: qualif. services	81.22	***	46.05	***	22.43		4.67		-9.00		-7.63					
	(17.60)		(14.67)		(13.81)		(9.43)		(9.72)		(8.58)					
occup: semi profession	100.00	***	58.66	***	41.57	***	24.56	***	26.44	***	28.95	***				
	(16.99)		(14.16)		(13.67)		(9.35)		(9.41)		(8.23)					
occup: profession	48.55		104.30	***	31.62		176.90	***	234.50	***	265.90	***				
	(33.70)		(28.08)		(25.35)		(18.72)		(17.87)		(14.73)					
occup: simp. sales adm.	65.36	***	51.45	***	35.05	***	36.59	***	45.47	***	21.26	***				
	(16.32)		(13.61)		(13.34)		(7.37)		(7.88)		(7.32)					

occup: qual. sales adm.	107.20	***	99.03	***	72.26	***	99.14	***	132.10	***	76.44	***
	(12.98)		(11.06)		(10.47)		(6.04)		(6.31)		(5.63)	
occup: manager	137.70	***	125.10	***	67.96	***	157.80	***	208.90	***	137.90	***
	(22.78)		(19.72)		(19.34)		(15.09)		(15.10)		(12.60)	
occup: misc.	-35.28		44.44		-13.15		20.02		117.70	***	26.05	
	(36.72)		(40.18)		(34.70)		(80.70)		(42.20)		(24.12)	
occupational change	151.50	***	153.90	***	169.60	***	169.30	***	182.30	***	170.40	***
	(8.52)		(8.24)		(8.67)		(5.13)		(5.22)		(5.10)	
industry change	180.00	***	175.70	***	177.10	***	155.60	***	168.40	***	211.00	***
	(8.92)		(8.53)		(9.25)		(5.41)		(5.59)		(5.27)	
Berlin	69.57	***	77.89	***	44.67	***	-		-		-	
	(12.16)		(10.06)		(9.53)							
Brandenburg	20.05	*	-1.35		-7.65		-		-		-	
	(11.46)		(9.55)		(9.21)							
Mecklenburg-West P.	-5.25		-32.83	***	-17.39	*	-		-		-	
	(12.64)		(10.67)		(10.27)							
Saxony	11.17		8.09		-2.35		-		-		-	
	(10.08)		(8.43)		(8.07)							
Saxony-Anhalt	-19.53	*	-8.19		-8.20		-		-		-	
	(11.18)		(9.38)		(9.12)							
Hamburg	-		-		-		11.79		34.11	***	39.41	***
							(11.55)		(12.29)		(11.23)	
Lower Saxony	-		-		-		-8.02		-3.71		-17.91	**
							(8.99)		(9.40)		(8.57)	
Bremen	-		-		-		2.47		9.73		-35.86	**
							(15.13)		(16.13)		(14.81)	
NRW	-		-		-		11.89		21.83	**	3.92	
							(8.31)		(8.71)		(7.97)	
Hesse	-		-		-		8.12		13.98		10.71	
							(9.19)		(9.68)		(8.84)	
Rhineland-Pal.	-		-		-		4.55		2.51		-6.90	
							(10.05)		(10.52)		(9.60)	
Baden-Wü.	-		-		-		10.97		21.61	**	4.95	
							(8.64)		(9.07)		(8.27)	
Bavaria	-		-		-		-4.97		5.57		-6.51	
							(8.52)		(8.93)		(8.16)	
Saarland	-		-		-		19.06		1.85		-10.75	
							(13.43)		(14.05)		(12.85)	
constant	88.09	***	200.10	***	155.70	***	172.30	***	362.10	***	216.10	***
	(3.32)		(8.24)		(6.26)		(12.44)		(25.55)		(16.24)	
N	**60,676**		**51,892**		**46,341**		**189,533**		**189,681**		**187,681**	
R-sq	**0.09**		**0.11**		**0.11**		**0.097**		**0.098**		**0.098**	

Notes: t-statistics in parentheses; *, **, and *** indicates statistical significance at the 5, 1, and .1 percent level.
Source: SIAB (1975-2008).

Table A.3 Mean J, E characteristics in East and West and their differences over time

		1993 East	1998 East	2004 East	1993 West	1998 West	2004 West	Diff 1993 W-E		Diff 1998 W-E		Diff 2004 W-E	
J - Job Stability													
firm change	yes=1	0.48	0.38	0.32	0.29	0.34	0.30	-0.19	***	-0.04	***	-0.04	***
unemployment	not unempl.	0.65	0.69	0.69	0.81	0.82	0.80	0.16	***	0.13	***	0.13	***
	0-0.5 year	0.15	0.12	0.10	0.09	0.09	0.08	-0.06	***	-0.03	***	-0.03	***
	0.5-1 year	0.08	0.07	0.08	0.05	0.04	0.05	-0.03	***	-0.03	***	-0.03	***
	>1 year	0.12	0.12	0.13	0.05	0.05	0.06	-0.07	***	-0.07	***	-0.07	***
tenure	<0.5 year	0.07	0.07	0.07	0.05	0.06	0.06	-0.02	***	-0.01	***	-0.01	***
	0.5-1 year	0.18	0.16	0.10	0.10	0.12	0.08	-0.08	***	-0.04	***	-0.04	***
	1-2 years	0.22	0.14	0.14	0.11	0.12	0.12	-0.11	***	-0.02	***	-0.02	***
	>2 years	0.53	0.63	0.70	0.74	0.69	0.74	0.21	***	0.07	***	0.07	***
E - Employer and Employment													
firm size	1-10	0.17	0.21	0.20	0.17	0.19	0.15	0.00		-0.03	***	-0.03	***
	11-25	0.13	0.15	0.15	0.12	0.13	0.13	-0.01	***	-0.03	***	-0.03	***
	26-50	0.11	0.13	0.13	0.10	0.11	0.12	-0.01	***	-0.02	***	-0.02	***
	51-100	0.12	0.13	0.14	0.11	0.11	0.13	-0.01	***	-0.01	***	-0.01	***
	101-1000	0.33	0.29	0.30	0.33	0.33	0.35	0.00		0.04	***	0.04	***
	>1000	0.14	0.09	0.07	0.16	0.14	0.13	0.02	***	0.04	***	0.04	***
industry	agriculture	0.01	0.01	0.03	0.01	0.01	0.01	-0.01	***	-0.01	***	-0.01	***
	energy, water, mining	0.03	0.02	0.01	0.02	0.02	0.01	-0.01	***	0.00		0.00	
	manufacturing	0.23	0.24	0.22	0.40	0.38	0.33	0.17	***	0.15	***	0.15	***
	construction	0.15	0.14	0.12	0.08	0.08	0.08	-0.07	***	-0.07	***	-0.07	***
	retail	0.10	0.10	0.12	0.13	0.13	0.15	0.03	***	0.03	***	0.03	***
	transport, telecommunication	0.09	0.09	0.08	0.06	0.06	0.07	-0.03	***	-0.03	***	-0.03	***
	banking and insurance	0.02	0.02	0.01	0.03	0.03	0.03	0.01	***	0.01	***	0.01	***
	services	0.21	0.25	0.33	0.19	0.22	0.27	-0.03	***	-0.04	***	-0.04	***
	adm., non-profit and p.h.	0.17	0.13	0.07	0.08	0.08	0.06	-0.08	***	-0.05	***	-0.05	***
shrinking workforce	yes=1	0.71	0.61	0.55	0.65	0.44	0.53	-0.06	***	-0.17	***	-0.17	***
occupation group	simple manual	0.18	0.18	0.19	0.23	0.22	0.21	0.05	***	0.04	***	0.04	***
	qualified manual	0.22	0.21	0.19	0.23	0.22	0.20	0.01	***	0.00	*	0.00	***
	tech. and engineers	0.05	0.06	0.06	0.05	0.06	0.06	0.00	***	0.00		0.00	***
	simple services	0.14	0.14	0.14	0.14	0.14	0.14	0.00	*	0.01	***	0.01	***
	qualified services	0.05	0.05	0.06	0.04	0.04	0.04	-0.01	***	-0.01	***	-0.01	***
	semi professions	0.07	0.07	0.07	0.04	0.05	0.06	-0.03	***	-0.02	***	-0.02	***
	professions	0.01	0.01	0.01	0.01	0.01	0.01	0.00	***	0.00	***	0.00	
	simp. sales a. adm.	0.06	0.07	0.06	0.07	0.07	0.06	0.01	***	0.00		0.00	
	qual. sales a. adm.	0.18	0.18	0.18	0.17	0.18	0.20	-0.01	***	0.00		0.00	***
	manager	0.02	0.02	0.02	0.01	0.01	0.02	-0.01	***	-0.01	***	-0.01	***
	miscellaneous	0.01	0.00	0.01	0.00	0.00	0.00	-0.01	***	0.00	***	0.00	***
occupation change	yes=1	0.23	0.17	0.13	0.13	0.14	0.12	-0.10	***	-0.03	***	-0.03	***
industry change	yes=1	0.24	0.18	0.13	0.13	0.14	0.13	-0.11	***	-0.04	***	-0.04	

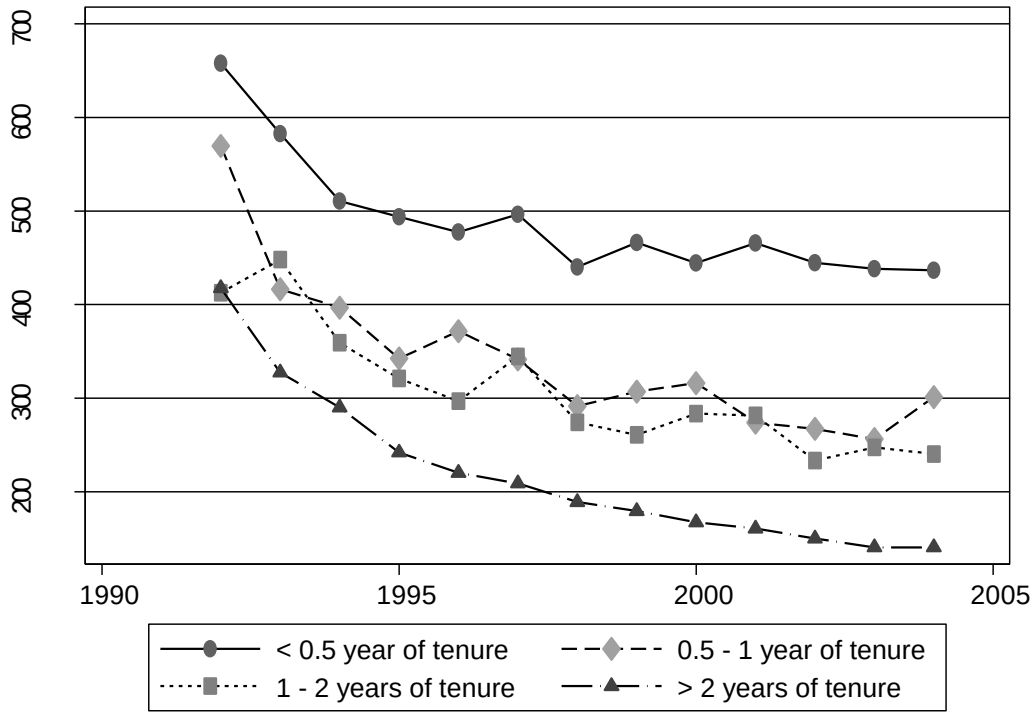
Note: Columns 1-3 present the mean observed characteristics for the East German samples, columns 4-6 for the West German samples and columns 7-9 describe the difference between East and West. *, **, and *** indicate the statistical significance of the mean difference at the 10, 5, and 1 percent level.
Source: SIAB (1975-2008).

Table A.4 Decomposition Results - Contemporaneous Comparison of East and West

West **East**	**1993-1997** **1993-1997**		**1998-2002** **1998-2002**		**2004-2008** **2004-2008**	
A. Description						
East	390.19 ***		238.61 ***		191.09 ***	
	(3.30)		(2.83)		(2.64)	
West	265.70 ***		272.78 ***		224.39 ***	
	(1.59)		(1.59)		(1.50)	
Difference	-124.49 ***		34.17 ***		33.30 ***	
	(3.64)		(3.29)		(2.93)	
B. Aggregate Decomposition of Difference (=100%)						
composition	-95.49 ***	77%	-22.91 ***	-67%	-16.27 ***	-49%
	(3.29)		(2.26)		(2.17)	
structure	-26.20 ***	21%	72.93 ***	213%	56.72 ***	170%
	(4.85)		(4.29)		(3.49)	
C. Detailed Decomposition of Composition Effect (=100%)						
Z - individual	3.42 **	-4%	0.55	-2%	-2.83 ***	17%
	(1.38)		(1.05)		(0.85)	
J - job stability	-69.80 ***	73%	-19.07 ***	83%	-18.62 ***	114%
	(1.78)		(1.45)		(1.34)	
E - employment	-29.12 ***	30%	-4.39 ***	19%	5.19 ***	-32%
	(2.02)		(1.50)		(1.11)	
approximation error	0.56		-12.32 ***		-8.86 ***	
	(4.56)		(3.69)		(3.37)	
reweighting error	-3.36 *		-3.53 ***		1.70	
	(1.89)		(1.32)		(1.13)	

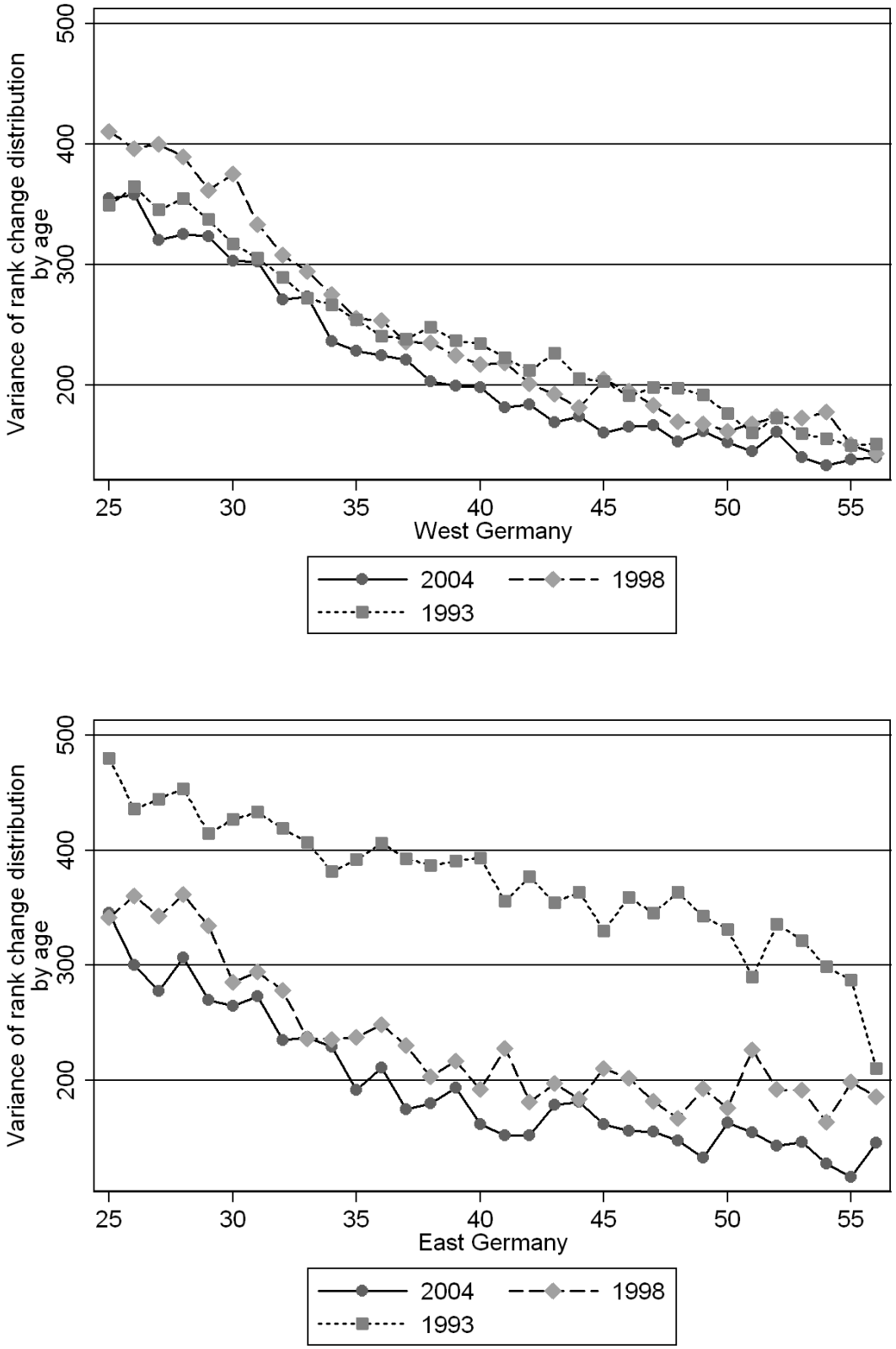
Notes: Z, J, and E represent the groups of individual, job stability, and employment variables, which contain different numbers of indicators as described in the text and electronic appendix. The figures present absolute values of mobility and their changes. ***, **, and * indicates statistical significance at the 1, 5 and 10 percent level. The analysis is based on a consistently censored part of the daily wage distribution as applied in Tables 1 and 2. The presented results were obtained reweighting the West German observations to mimic the corresponding East German observations. The results are robust to switching the base category. Number of observations: East: 1993-1997: 60,676; 1998-2002: 51,892; 2004-2008: 46,341. West: 1993-1997: 189,533; 1998-2002: 187,681; 2004-2008: 184,846.
Source: SIAB (1975-2008).

Figure A.1 Tenure-Specific Wage Mobility by Year



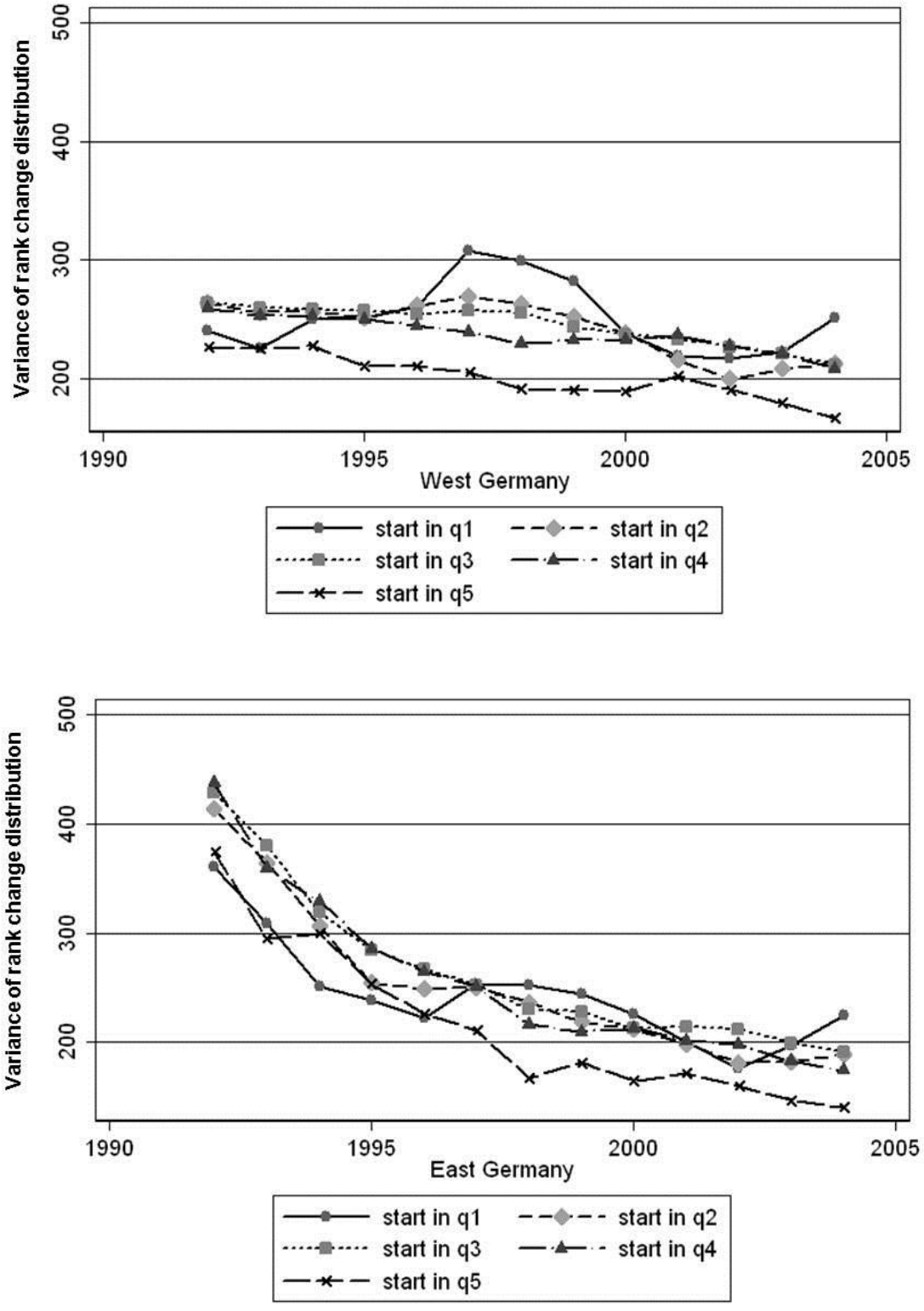
Notes: The graph is based on uncensored observations and regionally defined wage ranks. It presents average mobility at given years and levels of tenure in East Germany (see notes below Figure 6).
Source: SIAB (1975-2008).

Figure A.2 Age-Specific Wage Mobility by Year and Region



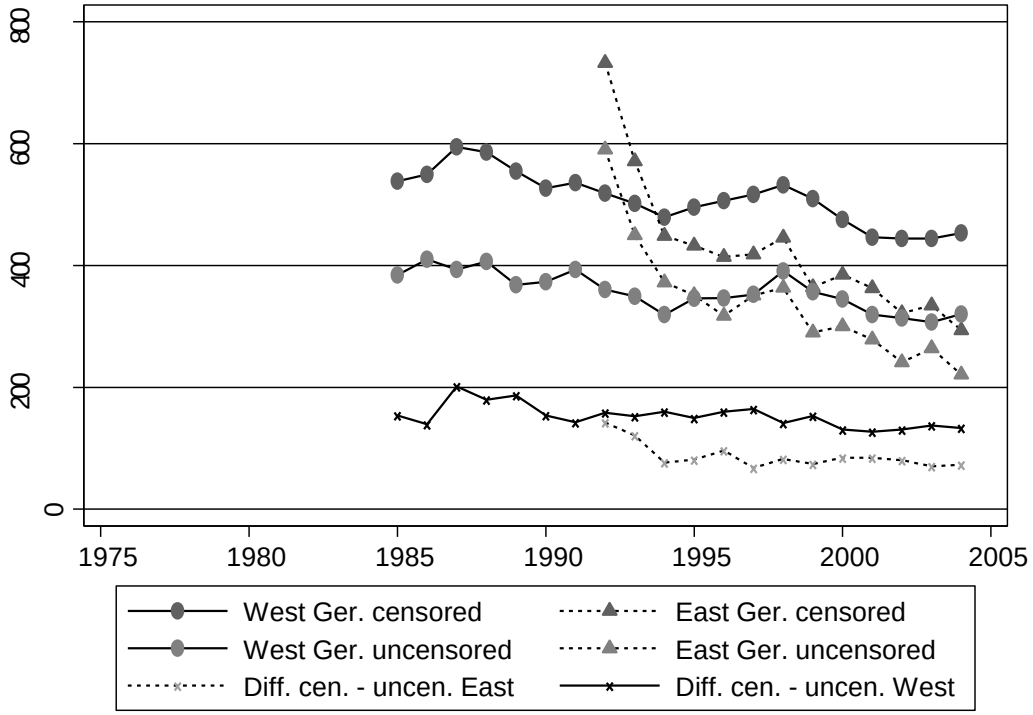
Notes: The graphs are based on uncensored observations and regionally defined wage ranks. They present average mobility at given years, regions, and ages.
Source: SIAB (1975-2008).

Figure A.3 Wage Mobility by Start Position Quintile in Base Period (t) and Region over Time



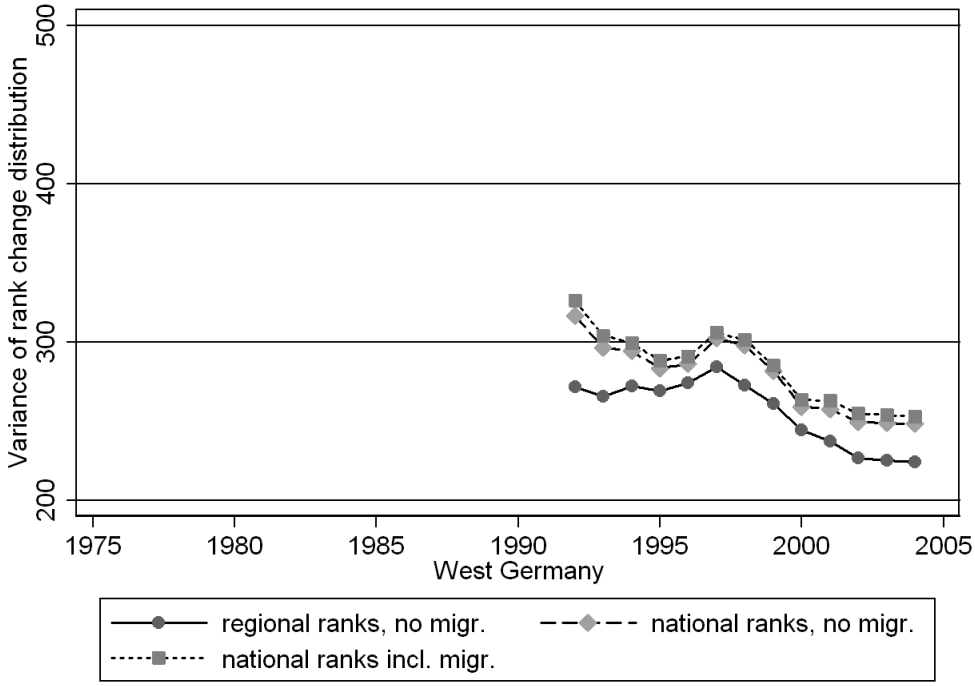
Notes: The graphs are based on uncensored observations and regionally defined wage ranks. q1-q5 represent the lowest to highest quintile in the wage distribution in period t.
Source: SIAB (1975-2008).

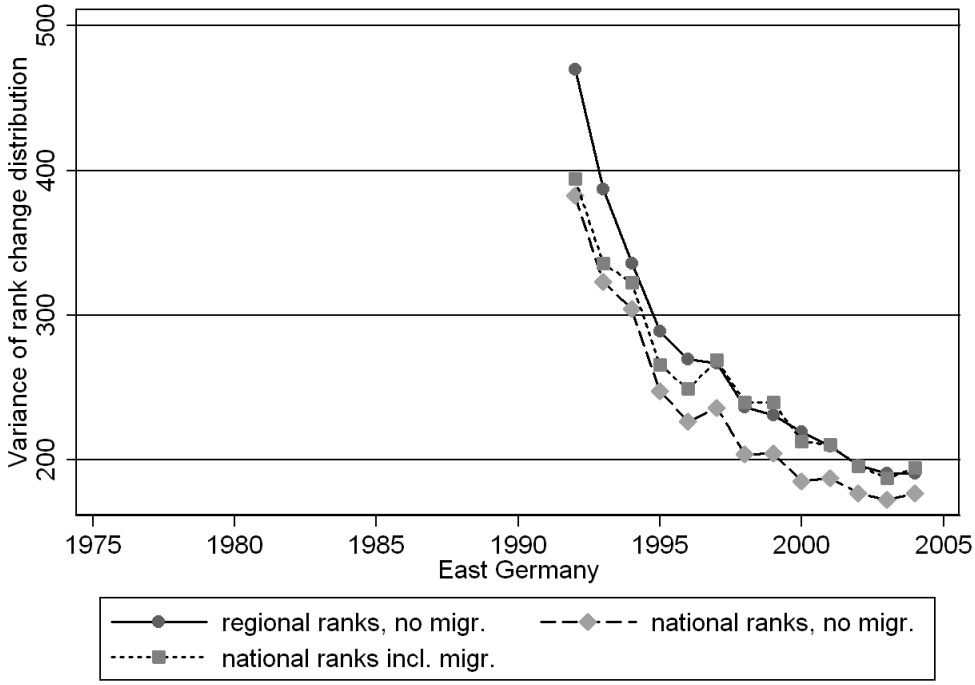
Figure A.4 Development of Variance of Individual Rank Change Distribution for Regional Subsamples with Censored and Uncensored Data from Survey Data (SOEP)



Notes: The sample is comparable to the sample from the administrative data: included are full-time workers excluding the self-employed and civil servants; individuals are between 25 and 60 years of age; region is assigned by place of residence; all values are calculated for an accounting period of five years (i.e. years t to t +4) and are based on real hourly wages. The results are not weighted. The average annual sample sizes are 1.900 and 905 for West and East Germany, of which on average 1.500 and 770 observations are uncensored.
Source: SOEPv27 (1984-2010).

Figure A.5 Variances of Rank Change Distribution Based on National Ranks and Redefined Samples





Notes: The series "regional ranks, no mig." describe the aggregate mobility patterns analyzed in Tables 1 and 2. The series "national ranks, no migr." uses the same samples but assigns wage ranks based on the national instead of the regional wage distribution. The series "national ranks, incl. migr." considers those individuals who in the based period t are observed in the assigned region independent of whether they migrate by period $t + 4$. It uses national rank assignments.
Source: SIAB (1975-2008).

Data Appendix

The SIAB data are drawn from the Integrated Employment Biographies (IEB 1975-2008) and provided by the Institute for Employment Research as the successor of the widely used IABS data. We consider observations from Berlin as part of the East German sample after unification and omit them from the sample before. Our sample considers full-time employed workers.[21] Full-time employment is coded if the person's contract runs over that number of weekly hours which is considered full-time in the employee's establishment. Depending on bilateral bargaining agreements this number may vary between 35 and 45 hours per week (see Dorner et al. 2010). As we inspect earnings of full-time workers over time it is important to note that their average annual hours worked hardly changed over the period considered for the main analysis in East and West Germany (see Wanger 2006).[22] - This data appendix describes the dependent and explanatory variables. Tables EA.1.A and EA.1.B in the electronic appendix present descriptive statistics as of the three base years (t) considered in the mobility analyses (1993, 1998, 2004).

1 Dependent Variable of the Decomposition Analyses

1.1 Wage Measure

Our data provide employment spells. We are interested in wages of full-time employment relationships, only. If several simultaneous full-time employment relationships are reported for a given person over the course of a calendar year we consider the wage of the main job. The main job is the one with the longest spell duration or, if several employment relationships have the same duration, the one with the highest daily wages.[23] Since we are interested in wage mobility in the main job we do not consider information on secondary jobs. We use the

[21] The share of part-time employed workers in the labor force slightly increased over time in both regions of the country from 13-14 percent in 1998 to 15-16 percent in 2004 (Statistik der Bundesagentur für Arbeit 2012a, 2012b).

[22] Wanger (2006, p.42) provides the subsequent figures on annual hours worked for full time employed workers:

	1991	1993	1997	2001	2004
West	1645	1625	1641	1651	1672
East	1568	1735	1703	1700	1708
All	1625	1650	1654	1661	1679

[23] On average about 15 percent of the employees in our sample experienced more than one full-time employment spell over the course of the calendar year. By considering the wage of a "main job" we differ from the procedure applied by Dustmann et al. (2009), who use the average wage of all full-time employment relationships in a given calendar year.

daily wage observation for every individual that was full-time employed for at least one day in a given year. The daily wage is measured in 2008 Euros.

Wage observations are censored at the contribution limit of the mandatory retirement insurance. This upper threshold varies by year and by region (i.e., east and west). To ensure that we observe a constant share of the wage distribution in both regions over time we apply a consistent top-coding approach (Burkhauser et al. 2009): we censor the regional wage distributions at the highest percentile that remains uncensored in all years and thus lose observations that enter, stay or leave the censored region of the wage distributions. For West Germany this is the 85th percentile and for East Germany this is the 90th percentile. Some of our mobility indicators refer to the full, uncensored and some to the censored part of the wage distributions.

The data contain two structural breaks. (a) Since 1984 one-time payments such as bonuses are added to earnings. While various authors who study wages or inequality with our data correct for this break using a method developed by Fitzenberger (1999) we omit this adjustment for two reasons: first, it is unlikely that the addition of bonuses to the upper tail of the wage distribution affects rank positions and mobility, and second the correction method does not provide imputations for individuals observed only prior to 1984. As our main analysis focuses on the period after 1992 it is not affected by this structural break. (b) Since 1999 information on minor employment is registered. However, since we condition on full-time employment this should not affect our results.

1.2 Wage Ranks

Our key variable is the change in the individual rank in the wage distribution between two years, t and $t+k$. To obtain this change, we first define the rank in an annual wage distribution. For a given year t, we divide the uncensored part of the wage distribution (up to the 85th percentile in West Germany and up to the 90th percentile in East Germany) into 100 percentiles and assign each uncensored wage observation one of these 100 rank positions for this year. We repeat the same procedure for year $t+k$ to calculate the individual wage rank in $t+k$. The difference between these two ranks is our measure of individual wage mobility.

The variance of the distribution of these individual rank changes is our main aggregate measure of wage mobility which we interpret as a characteristic of the regional labor market.

2 Explanatory Variables of the Decomposition Analyses

2.1 Individual Characteristics Z

Education: we use three categories to describe individual education. We classify individuals to be *low educated* if they have no degree at all or if they finished school (without university entrance certificate) but did not complete vocational training. An individual is *medium educated* if the person finished school and vocational training or if the person holds a university entrance degree but does not hold a university degree. Individuals holding a university degree are classified as *high educated* (for a similar classification see Dustmann et al. (2009)). As the data show many missing values for the education variable, we imputed education according to the procedure IP 1 suggested by Fitzenberger et. al (2006). Initially, education information was missing for 11.3 percent of the spells. After using information from prior and subsequent spells, we end up with 2.2 percent missings, which we had to drop.

Age: we use six age categories: (1) 25-30, (2) 31-35, (3) 36-40, (4) 41-45, (5) 46-50, and (6) >50 years. As we analyze a five year period and age is measured in the start year t, the highest age in the last category is 56. Otherwise, an individual would exceed age 60 in period $t + 4$, which violates our age restriction.

Starting position: we control for the individual's rank position in the wage distribution in the base year, i.e. the year starting from which mobility is measured. The variable considers ten categories according to the 10 deciles of the uncensored part of the wage distribution.

Citizenship: indicator variable $(= 1)$ if person is not of German citizenship.

Sex: indicator variable $(= 1)$ if person is female.

Migrates west: indicator variable $(= 1)$ if person migrates to West Germany in the future. This information is only calculated for the East German sample.

2.2 Job Stability J

Firm change: indicator variable $(= 1)$ if individual changes employers between t and $t + 4$.

Unemployment: we control for individuals' unemployment experience in the period between t and $t + 4$. We consider an individual as unemployed if the person is observed to receive unemployment benefits (this includes short term as well as long term unemployment). We consider four categories: (1) no unemployment experience, (2) up to half a year of unemployment experience, (3) more than half a year but less than 1 year of unemployment experience, (4) more than 1 year of unemployment experience.

Tenure: tenure is measured in four categories: (1) less than half a year, (2) between half a year and 1 year, (3) between 1 and 2 years, (4) more than 2 years.[24]

2.3 Employer and Employment Characteristics (E)

Firm size: we include six firm size categories: (1) up to 10 employees, (2) between 10 and 25, (3) 25 to 50, (4) 51 to 100, (5) 101 to 1000, (6) more than 1000 employees.

Industry: we control for 9 industries: (1) agriculture, (2) energy, water supply, mining, (3) manufacturing, (4) construction, (5) retail, (6) transport and telecommunication, (7) banking and insurance, (8) services, (9) administration, non-profit organizations, private households.

Decreasing workforce: indicator variable $(= 1)$ if an individual's employer reduces the number of employees between t and $t + 4$.

Occupation group: we control for 11 occupation groups (according to Blossfeld 1985): (1) simple manual occupation, (2) qualified manual occupations, (3) technicians and engineers, (4) simple services, (5) qualified services, (6) semi professions, (7) professions, (8) simple sales and administration occupations, (9) qualified sales and administration occupations, (10) manager, (11) miscellaneous.

Industry change: indicator variable $(= 1)$ if individual changes industry between t and $t + 4$.

Occupation change: indicator variable $(= 1)$ if individual changes occupational groups between t and $t + 4$.

2.4 Regional Information (R)

State indicators: indicator variables for the federal state (*Bundesland*) of the individual workplace.

[24] Note that all East German observations start with a tenure valued zero in 1992.

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