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Rising Wage Inequality in Germany

ZEW Discussion Papers, No. 06-019 [rev.2]

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Suggested Citation: Pfeiffer, Friedhelm; Gernandt, Johannes (2007) : Rising Wage Inequality in Germany, ZEW Discussion Papers, No. 06-019 [rev.2], Zentrum für Europäische Wirtschaftsforschung (ZEW), Mannheim

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Discussion Paper No. 06-019

Rising Wage Inequality in Germany

Johannes Gernandt and Friedhelm Pfeiffer

ZEW

Zentrum für Europäische
Wirtschaftsforschung GmbH

Centre for European
Economic Research

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Non technical summary

This paper contributes to the ongoing debate on rising wage inequality. Based on the GSOEP 1984 to 2005 the evolution of wage inequality is investigated separately for West Germany between 1984 and 2005, and compared to the evolution of inequality in East Germany between 1994 and 2005. Our central measure of wage inequality is the 90th to 10th percentiles of real gross hourly wages, as well as its two sub-groups, 90th to 50th, 50th to 10th. Two samples of workers, one for all workers including the self-employed and one for the group of prime age dependent male workers, have been drawn from the GSOEP. The increase in wage inequality is decomposed into a composition, a price and a residual effect. Not surprisingly, the paper confirms the well known stability of the West German wage distribution for the period 1984 to 1994. Wage inequality started to rise around 1994 in the sample for prime age dependent male workers in both parts of Germany. In the sample for all workers, including the self-employed, the trend towards rising wage inequality started around 1996. The main reason for this lag is that there is no rising inequality for the group of self-employed worker, although the level of inequality is higher compared to wage worker.

The evolution of wage inequality differs in East compared to West Germany. Rising wage inequality in West Germany primarily occurred in the lower part of the wage distribution, and wage inequality in East Germany primarily occurred in the upper part of the wage distribution. These differences presumably are due to the adjustment processes of the two parts of Germany and the induced competition for high wage workers. Surprisingly, the evolution of wage inequality in East Germany seems to have some similarities to the evolution of wage inequality in the United States in the 80s.

There are some more interesting and economically meaningful results from the decomposition analysis. For West German workers residual wage inequality “explains” roughly two thirds of rising inequality, with composition and price effects accounting for one third of the rising inequality. For East German workers residual wage inequality “explains” roughly 40 percent, whereas price effects account for roughly 50 percent of the rising inequality.

Rising wage inequality seems to be a general trend in the sense that it is not restricted to wage workers with specific characteristics, although it is quantitatively more pronounced among low skilled workers and workers with low tenure in West Germany. High rates of unemployment, presumably reinforced by non-neutral technical change, led to wage adjustment primarily through wage decreases for the low skilled and for entrants. Wages for workers with longer years of tenure are more rigid and firm’s adjustment for this group of employees takes place primarily through reduction in employment and hours of work.

Rising Wage Inequality in Germany

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This version: November 2007

Abstract:
The paper investigates the evolution of wages and wage inequality in Germany based on samples from the German Socio-Economic Panel (SOEP) 1984 to 2005. Real gross hourly wages for prime age dependent male workers increased on average by 23 percent between 1984 and 1994 in West Germany and the wage distribution was fairly stable. Between 1994 and 2005 average wages increased by 7 percent in West Germany and 18 percent in East Germany. In this period wage inequality, measured by the ratio of the ninetieth to tenth percentile of the wage distribution, increased from 2.5 to 3.1 in West Germany and from 2.4 to 3.2 in East Germany. In West Germany rising wage inequality occurred mainly in the lower part of the wage distribution, whereas in East Germany wage inequality predominantly increased in the upper part of the wage distribution. In West Germany the group of workers with low tenure experienced higher increases in wage inequality compared to the group of workers with high tenure.

Keywords: Wage Inequality, Skill Structure, Real Wages, Tenure.

JEL-classification: J21, J24, J31

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Acknowledgements:
Friedhelm Pfeiffer acknowledges financial support from the German Research Foundation under grants PF 331/2, PF 331/4 ("Microeconometric Methods to Assess Heterogeneous Returns to Education") and PF 331/3 ("Wages, Rent-Sharing and Collective Wage Bargaining"). For helpful comments we would like to thank Denis Beninger, Bernhard Boockmann, Alfred Garloff, Blaise Melly, Grit Mühler, Reinhold Schnabel, participants at AIEL, EALE, EEA, ESPE and Verein für Socialpolitik conferences as well as two anonymous referees. For competent research assistance we thank Gunhild Berg, Philipp Eisenhauer and Tim Landvoigt. Remaining errors are ours.

1 Introduction

The issue of rising wage inequality has attracted a considerable amount of research in international labour economics.[1] For a long time rising wage inequality in Great Britain and the United States has been contrasted with a stable wage distribution in Europe and especially in Germany. The issue has been highlighted by Krugman (1994) who argued that rising wage inequality and low unemployment rates in the United States and rising unemployment combined with a stable wage distribution in Europe are the two sides of the same coin. It was suggested that the stability of the German wage distribution might reflect institutional factors such as social transfers, union bargaining power in the German system of central wage bargaining or the public educational expansion of the seventies.

However, as a result of its strong trade orientation, Germany experienced an increase in the demand for high skilled workers and a decrease in the demand for the low skilled, which is a development common to most industrialized countries. Findings by Fitzenberger (1999), Franz and Steiner (2000) and Möller (2005) among others (compare the summary of studies on wage inequality in Germany in the appendix) suggest that wages in Germany have always been flexible to some degree. More specifically in the recent decades wages below the median seem to have experienced a higher dispersion and inequality increased in East Germany after unification.

In this paper we analyse the evolution of wage inequality based on the German Socio-Economic Panel (SOEP) 1984 to 2005. Our contribution to the literature on rising wage inequality is threefold: First, the paper provides evidence for the recent clear increase in wage inequality (the ratio of wages of high wage workers as measured by the ninetieth percentile of the wage distribution and low wage workers as measured by the tenth percentile of the wage distribution for all workers was 2.47 in 1994, 2.76 in 2000 and 3.08 in 2005 in West Germany) and discusses some possible explanations. Second, we separately investigate the evolution of wage inequality both for East and for West Germany in order to account for the different economic transition processes after unification. Third, based on the Juhn et al. (1993) decomposition method, the role of tenure, self-employment, education, nationality and gender for the rise in inequality in each part of Germany is analysed. To the best of our knowledge the relationship between tenure and rising inequality has not been investigated so far, although it is central from an economic point of view. Point estimates of price and composition effects are presented, together with confidence intervals.

[1] See Acemoglu (2002, 2003), Autor et al. (2005, 2008), Blau/Kahn (1996), DiNardo et al. (1996), Gottschalk/Smeeding (1997), Juhn et al. (1993), Katz/Autor (1999) and Prasad (2004), among others.

As a rule, studies on wage inequality in Germany are based on various samples taken either from the two percent sample of the social pension fund register data (so called IABS) or from the SOEP. Both data have pros and cons which shall be sketched briefly.[2] One advantage of the SOEP is that it includes all groups of workers (wage and self-employed workers as well as civil servants) and information on hours of work is available. One disadvantage is that the number of observations is low (compared to the IABS). Studies for specific groups of workers such as the top one percentile ones or physicians are not possible. Another concern is representativeness. For instance, successful or high wage worker information on hours and earnings may be missing more often (high wage workers may shrink away from specifying their earnings, successful workers may have higher opportunity costs from participation in a survey) which can result in an underestimation of wage inequality.

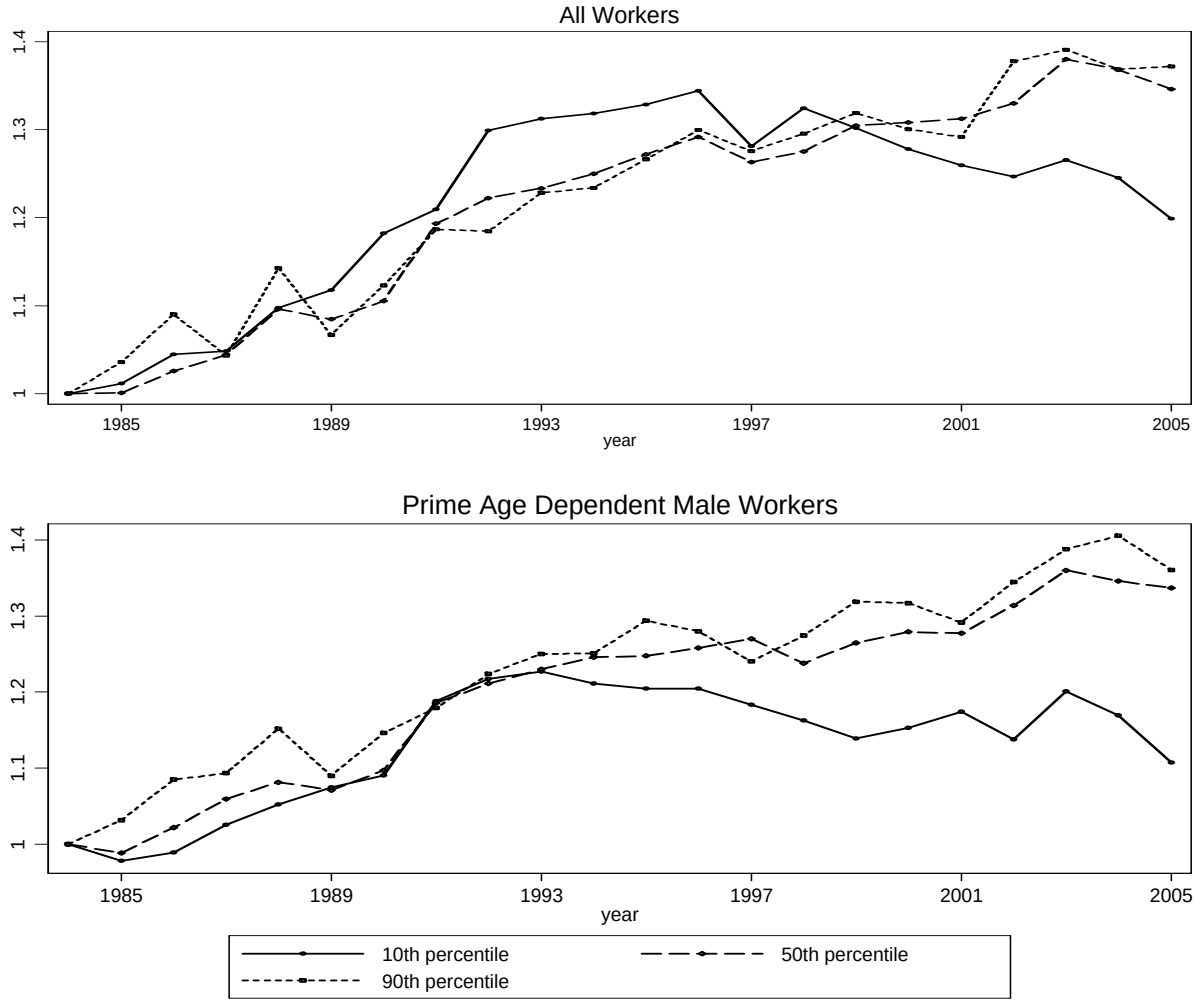
One advantage of the IABS is that it is a large representative sample of dependent wage workers starting in 1975. One disadvantage is that hours of work are not available. Therefore studies based on the IABS focus on daily instead of hourly wages. This may result in an overestimation of wage inequality if hours of work become more dispersed over time. Another limitation is that periods as a self-employed worker or a civil servant are not available in the IABS, as a rule. In Germany about 20 percent of employed workers are either self-employed or civil servants. They are not obliged to join the social pension fund and therefore are not in the IABS data. It is beyond the scope of our paper to evaluate the pros and cons of these two or other data (such as the German Mikrozensus or the German Taxpayer Panel) for the analysis of wage inequality. Nevertheless on occasion we will discuss similarities and differences taking samples from the SOEP that are alike the IABS. Keeping in mind the pros and cons mentioned above (as well as other qualifications such as data errors) is helpful for comparison reasons.[3]

Our measures of wage inequality are the ninetieth to tenth percentile of the real gross hourly wage, as well as its two sub-intervals, the ninetieth to fiftieth, and fiftieth to tenth percentile of the wage distribution (see section 2 below). Figure 1 and Figure 2 show the evolution of wages between 1984 and 2005 for West Germany and between 1994 and 2005 for East Germany, respectively.

[2] A detailed comparison is not intended here in order to save space. The interested reader may find more information on the IABS in Bender et al. (2000) and on the SOEP in Haisken-DeNew/Frick (2005). For further discussion of pros and cons compare Dustmann et al. (2007), Fitzenberger (1999) or Pfeiffer (2003), among others.

[3] Comparing results with national and international studies based on incomplete data can be exhausting. For example, in the United States wage inequality is higher (the ninetieth to tenth percentile of real gross hourly wage was 4.4 in 2004), but remained stable between 1994 and 2004 (Mishel et al. 2006). In Spain inequality is also higher (3.6 in 2002), although it has been decreasing since 1995 (Izquierdo/Lacuesta 2006). The role of data design for understanding international differences needs some more research, see also Part 4 below.

Figure 1: The Evolution of Real Wages at the 10th- 50th- and 90th-Percentile, West German Workers 1984-2005



Source: SOEP 1984-2005; own calculations based on cross-section weights; all wages for the three percentiles are normalized to 1 in 1984. Real wages at the tenth percentile increased from 5.77 € in 1984 over 7.48 € in 1994 to 6.91 € in 2005 for all workers and from 7.48 € in 1984 over 9.37 € in 1994 to 9.03 € in 2005 for prime age dependent males. At the fiftieth percentile wages grew from 9.36 € in 1984 over 11.74 € in 1994 to 12.86 € in 2005 for all workers and from 10.48 € in 1984 over 13.23 € in 1994 to 14.69 in 2005 for prime age males. At the ninetieth percentile wages increased from 14.97 € in 1984 over 18.45 € in 1994 to 21.25 € in 2005 for the full sample and from 16.04 € in 1984 over 19.77 € in 1994 to 22.67 € in 2005 for the prime age dependent males.

Two samples of workers have been drawn from the SOEP, one comprising all workers including the self-employed, and one only for the group of prime age dependent male workers (age group 25 to 55; the latter can be compared more easily with results from the IABS; for more details see section 2). The findings confirm that wage inequality in Germany started to increase after the economic downturn 1992/93.[4] The significant rise in wage inequality in Germany

[4] After the unification boom the German economy experienced a severe recession with employment losses in the private sector of 1.97 percent in 1992/93, 1.56 percent in 1993/94 and 1 percent in 1994/95 (Pfeiffer 2003 based upon "DIW Vierteljährliche Gesamtrechnung").

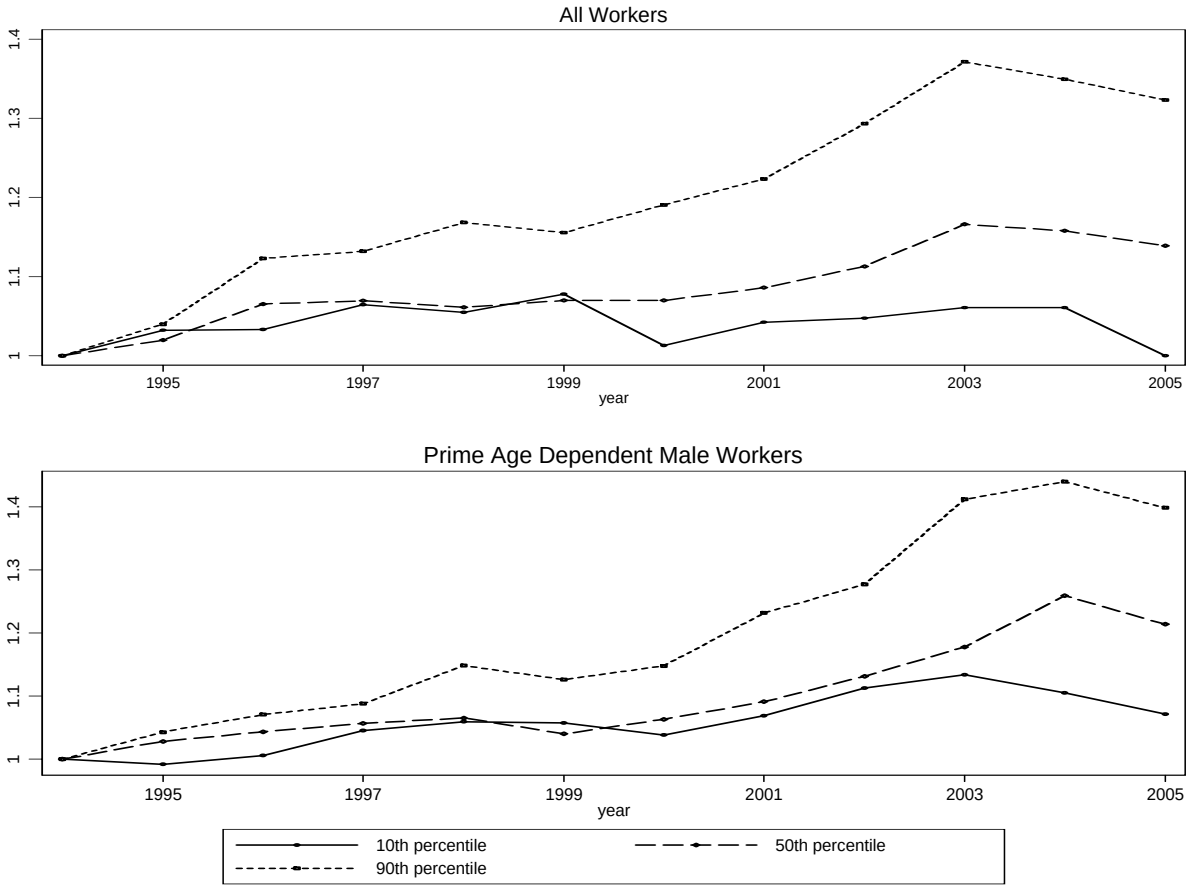
is a phenomenon that seems not to be exclusive to specific groups of workers as for example the self-employed, women or foreigners. However, the increase in wage inequality was higher for workers with lower tenure compared to workers with higher tenure. Wages therefore seem to react more flexible for entrants and workers with low tenure compared to incumbent workers, which is line with the literature on wage rigidity in Germany, see Franz and Pfeiffer (2005, 2006), among others.

Between 1994 and 2005 the average hourly wage of prime age dependent male workers increased by 23.4 percent in East Germany and by 9.8 percent in West Germany. For this group, the ratio of the ninetieth to the tenth percentile of the wage distribution increased from 2.3 to 2.9 in East Germany and from 2.1 to 2.5 in West Germany. With respect to West Germany, this implies a strong increase in inequality in a period with only very moderate average wage growth. Between 1984 and 1994 the wage distribution was stable even though average wage growth was 23.7 percent for prime age dependent males.

The evolution of wages and wage inequality in East Germany differs considerably from that in West Germany. During the transition process towards a market economy, mean wages as well as wage dispersion rose faster. In East Germany, rising inequality mainly concerns wages above the median wage, while in West Germany dispersion forces were stronger below the median. This is in line with the explanation that rising wage inequality in East Germany to a greater extent results from firm competition for (high) qualified workers who else might migrant to West Germany, while rising wage inequality in West Germany to a greater extent results from an increased supply of low-wage workers.

The rest of the paper is organized as follows: Section 2 describes the samples taken from the SOEP, undertakes some comparisons with the quarterly wage survey of the German Federal Statistical and introduces to major changes in the structure of the German workforce. Section 3 discusses the evolution of wages and wage inequality while section 4 focuses on the findings from the decomposition of wage changes. Section 5 concludes.

Figure 2: The Evolution of Real Wages at the 10th- 50th- and 90th-Percentile, East German Workers 1994-2005



Source: SOEP 1994-2005; own calculations based on cross-section weights; all wages for the three percentiles are normalized to 1 in 1994. Real wages at the tenth percentile increased from 5.31 € in 1994 to 5.31 € in 2005 for all workers and from 5.74 € in 1994 to 6.01 € in 2005 for prime age dependent males. At the fiftieth percentile wages grew from 8.38 € in 1994 to 9.56 € in 2005 for all workers and from 8.58 € in 1994 to 9.88 in 2005 for prime age males. At the ninetieth percentile wages increased from 12.75 € in 1994 to 17.00 € in 2005 for the full sample and from 12.99 € in 1994 to 17.62 € in 2005 for the prime age dependent males.

2 Data and Changes in the Structure of the German Workforce

Two samples were drawn from the 22 waves of the German Socio-Economic Panel (SOEP, see Haisken-DeNew/Frick, 2005) 1984 to 2005, both separately for West and for East Germany. First, a full sample was taken containing all workers aged 16 to 65 years including the self-employed. All observations with missing information on at least one variable of interest were dropped. The variable real gross hourly wage is obtained for all workers including the self-employed by calculating the ratio of last months' salary and hours worked. All wages are deflated with the Consumer Price Index for Germany (base year 2000, Statistisches Bundesamt 2006). Hourly wages are trimmed at the two percent highest and lowest observations to reduce the risk of measurement error from extreme values. Further issues in reported hours for measured wage inequality are discussed in section four below. With this sample the evolution of wage inequality in Germany is analysed based on all individuals

participating in the workforce, including women, part-time workers and the self-employed.

Second, a restricted sample was drawn containing only prime age dependent male workers, at the age between 25 and 55 years (about 45 percent of the full sample). Table A2 in the appendix contains detailed summary statistics on wages, hours and earnings for the chosen samples for West Germany, and Table A3 for East Germany. This restricted sample is chosen to facilitate comparisons with previous studies which concentrate on the populations of dependent workers who are part of the German system of social pension fund (for instance Dustmann et al 2007, Kohn 2006, Möller 2000, 2005). Furthermore we would like to answer the question whether rising wage inequality is also prevalent in the group of workers with the highest commitment to the labour market which are prime age dependent males. For those (see Table A2), average hourly wages in West Germany were 11.27 € in 1984 (compared to 10.00 € in sample one), 13.94 € in 1994 (12.38 € in sample one) and 15.31 € in 2005 (13.61 € in sample one). Weekly hours worked were 43.45 in 1984 (40.53 in sample one), 42.15 in 1994 (38.80 in sample one) and 43.20 in 2005 (37.41 in sample one).

A comparison of our results based on the SOEP with the quarterly wage survey of the German Federal Statistical Office (see Statistisches Bundesamt 1995, 2006) reveals similar trends in wage inequality. The quarterly wage survey contains average wages for blue collar unskilled workers and blue collar skilled workers and wages for white collar skilled and unskilled workers from manufacturing. Between 1994 and 2004 the wage gap of male blue collar skilled and unskilled workers increased from 26.5 percent in 1994 to 33.3 percent in 2004 in West Germany and from 19.5 percent to 29.4 percent in East Germany, confirming rising wage inequality. Furthermore, the wage gap of male white collar skilled and unskilled workers increased from 53.5 percent in 1994 to 62.6 percent in 2004 in West Germany and from 40.2 percent to 63.6 percent in East Germany.

In the subsequent econometric analysis (section 4 below) it is necessary to estimate wages as a function of educational qualification, tenure, potential experience, sex (female), self-employment and nationality (foreigner) of workers. The evolution of these variables reflects changes in the socio-economic composition of the German workforce. In West Germany the share of highly educated workers[5] doubled between 1984 and 2005. Prime age dependent male workers are better educated compared to workers in the full sample. In both samples, the average duration of years of schooling increased by about 1

[5] These are workers with a degree from a technical college or university.

year (to 12.30 years in sample one and to 12.35 in the sample of prime age dependent males in 2005).

Female participation increased from 37 to 47 percent, while the share of foreigners fluctuates around 8 percent. About 6 percent of the workers in the overall sample are self-employed.[6] Self-employment has been rising continously since 1994. The share of people whose tenure is seven years (the median) or longer ("high tenure") decreased in the sample of prime age dependent West German males from 64 percent in 1984 to 58 percent in 2005. In this sample the average years of tenure was 11.46 in 1984 and 11.77 in 2005. For workers with high tenure, average wages increased 42 percent between 1984 and 2005 (1984: 11.57 €, 1994: 14.61 €, 2005: 16.43 €), while for workers with low tenure, average wages increased 28 percent between 1984 and 2005 (1984: 10.73 €, 1994: 12.88 €, 2005: 13.74 €).

In East Germany average wages in 2005 amount to 77 percent (71 percent in 1994) of average wages in West Germany in sample one and to 72 percent (64 percent in 1994) in the sample of prime age dependent male workers.[7] East German prime age dependent males work on average 1.4 hours more than West Germans, while in the sample of all workers the difference is 3.8 hours in 2005. Compared to West Germany there are more workers with high education. Female participation rates are higher, although the West German ones are converging to East German levels. The share of foreigners in East Germany does not exceed one percent.

There was a continuous rise in the share of self-employed workers (3.68 percent in 1994, 7.09 percent in 2005) after the transition to a market economy and the permission of private enterprises in East Germany. The share of individuals with high tenure increased by about 50 percent in the sample of prime age dependent males (1994: 26 percent, 2005: 37 percent). Not surprisingly the average number of tenure (9.90 for the full sample in 2005) is still lower compared to West Germany. The ratio of the officially registered unemployed in the workforce[8] increased from 15.7 percent in 1994 to 20.6 percent in 2005 in East Germany and from 9.1 percent in 1984 and 1994 to 11.0 percent in 2005 in West Germany.

[6] Shares for weighted data with cross sectional weights.
[7] In sample one, average wages in East Germany (West Germany) amount to 8.82 € (12.38 €) in 1994 and to 10.52 € (13.61 €) in 2005. For prime age dependent males average wages amount to 8.96 € (13.94 €) in 1994 and to 11.06 € (15.31 €) in 2005 in East Germany (West Germany), see Table A2 and A3 in the appendix.
[8] Statistisches Bundesamt (2006), unemployment rate for dependent employed civil workers.

3 The Evolution of Wage Inequality

West Germany 1984 to 2005

This section presents the evidence on the development of wage inequality in the SOEP samples for West Germany. *Table 1* displays the central measure for wage inequality, the ratio of the ninetieth to tenth percentile in the wage distribution. In the sample of all workers the measure of inequality first decreased from 2.59 in 1984 to 2.47 in 1994, indicating a moderate wage compression, and than increased to 3.08 in 2005, indicating rising inequality. According to the 95 percent confidence interval this difference is significant (*Table 1*, in brackets).

Wage inequality is lower in the sample of prime age dependent male workers and for foreigners, although the increase in wage inequality is also present in those subgroups. The ninetieth to tenth percentile in the group of prime age dependent male workers was 2.11 in 1994 and 2.51 in 2005. To compare the basic finding of rising wage inequality in the group of dependent male workers from the SOEP with results from Kohn (2006) based on the IABS the eightieth to twentieth wage percentile was calculated. Between 1992 and 2001 this ratio increased by 5 log points, in this SOEP sample. According to Kohn (2006) in this period the eightieth to twentieth wage percentile of daily wages increased by 9 log points. As argued above (see the introduction) the comparison suggests that the finding based on the SOEP may underestimate the rise in wage inequality. The increase might have been 9 instead of 5 log points. However, one needs to keep in mind that the IABS findings refer to daily and not hourly wages. According to the SOEP data in that period the dispersion (standard deviation) of hours of work increased from 7.19 (1992) to 7.71 (2001), with a slight rise in the mean (42.58; 43.17) (see Table A2). Therefore, the IABS may overestimate the rise in (hourly) wage inequality.

Wage inequality is highest for the self-employed, but the numbers do not indicate a clear trend in the period under investigation. Wage inequality is significantly lower for workers with seven or more years of tenure (see “high tenure” in *Table 1*). For the group of workers with “low tenure” the tendency of rising wage inequality since 1994 is strongest.

Table 1: Wage Inequality in West Germany: 90th to 10th Wage Percentiles

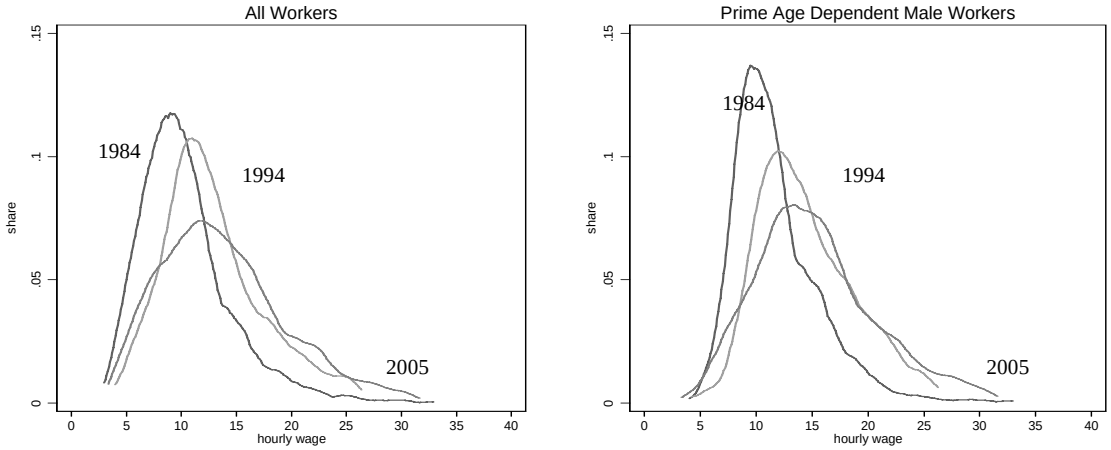
	All Worker			Prime Age Dependent Male Worker		
	1984	**1994**	**2005**	**1984**	**1994**	**2005**
All	2.59 (2.52 – 2.67) N=4,772	2.47 (2.39 – 2.54) N=3,913	3.08 (3.00 – 3.15) N=5,522	2.14 (2.07 – 2.22) N=2,322	2.11 (2.04 – 2.18) N=1,797	2.51 (2.42 – 2.60) N=2,298
Females	2.46 (2.32 – 2.60) N=1,752	2.37 (2.28 – 2.45) N=1,619	3.16 (3.03 – 3.30) N=2,576	.	.	.
Foreigners	2.13 (2.03 – 2.23) N=1,306	2.07 (1.95 – 2.19) N=860	2.92 (2.60 – 3.23) N=554	1.74 (1.64 – 1.85) N=652	1.83 (1.71 – 1.95) N=399	2.28 (2.20 – 2.95) N=253
Self-employed	5.25 (4.51 – 5.99) N=223	3.63 (3.21 – 4.06) N=182	4.28 (3.65 – 4.92) N=338	.	.	.
High tenure	2.39 (2.29 – 2.48) N=2,625	2.26 (2.16 – 2.36) N=2,051	2.60 (2.50 – 2.71) N=3,009	2.07 (2.00 – 2.14) N=1,506	1.99 (1.92 – 2.05) N=1,099	2.25 (2.15 – 2.35) N=1,344
Low tenure	2.57 (2.48 – 2.66) N=2,147	2.46 (2.33 – 2.58) N=1,862	3.32 (3.16 – 3.47) N=2,513	2.13 (2.02 – 2.25) N=816	2.18 (2.06 – 2.29) N=698	2.86 (2.69 – 3.03) N=954

Source: Samples from SOEP 1984-2005, see text; in brackets: 95% bootstrapped confidence interval with 1,000 replications, N= number of observations; own calculations.

Figure 3 illustrates the wage distributions for workers in the overall and in the restricted samples for the years 1984, 1994 and 2005. For 1984 and, to some degree, for 1994 the figures indicate the well-known compressed distribution of German wages which is skewed to the right and shaped like a log-normal distribution. The 2005 figure, however, shows more dispersion and more symmetry. Apparently, compared to 1994, more workers earn both very low and also relatively high wages.

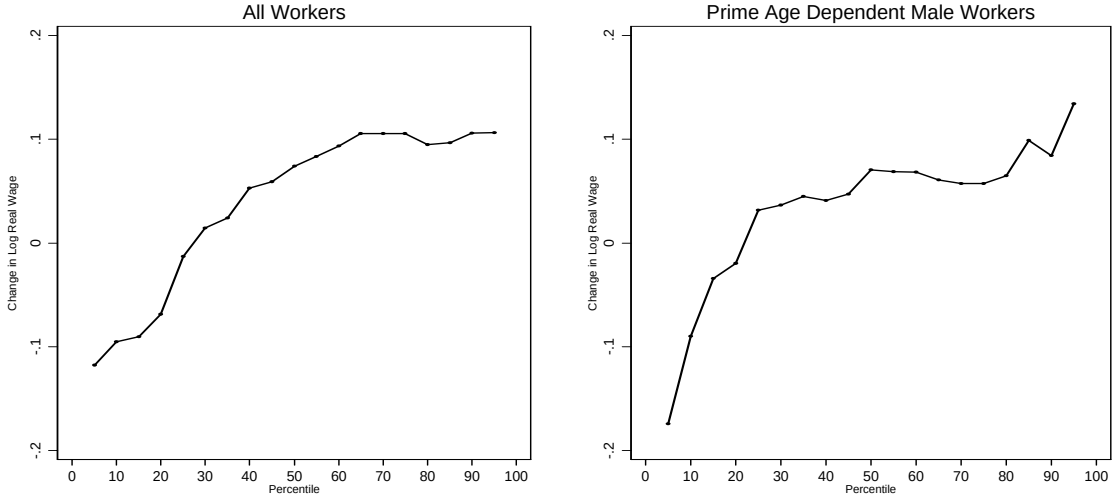
A comparison between twenty percentiles of the wage distribution for 1994 and 2005 in the full sample (*Figure 4*) reveals that real wages below the twenty-fifth percentile decreased, and that wages above the median grew at roughly similar rates. This suggests that the rise in inequality has been stronger below the median, which is in line with findings from Kohn (2006) and Möller (2005). In the group of prime age dependent male workers real wages below the twentieth percentile decreased (see *Figure 4*). For self-employed workers wage growth was more diverse at all percentiles. Foreigners experienced a significant rise in inequality which confirms the findings of Riphahn (2003).

Figure 3: The Distribution of Wages in West Germany 1984, 1994, 2005



Source: SOEP 1984-2005(for the samples see Chapter 2); weighted data; based on kernel density estimation; own calculation.

Figure 4: Wage Growth by Percentile, West Germany 1994-2005



Source: SOEP 1994-2005 (for the samples see Chapter 2); weighted data; own calculation.

Interestingly, however, wage growth for workers with low and high tenure differs to a higher degree. Between 1994 and 2005 wage growth for the "high tenure" group of workers exceeds growth rates for the "low tenure" group in all percentiles below the seventieth percentile of the wage distribution and in the subgroup for prime age dependent males in all percentiles, Figure 5.

Figure 5: Wage Growth by Percentile, West Germany 1994-2005

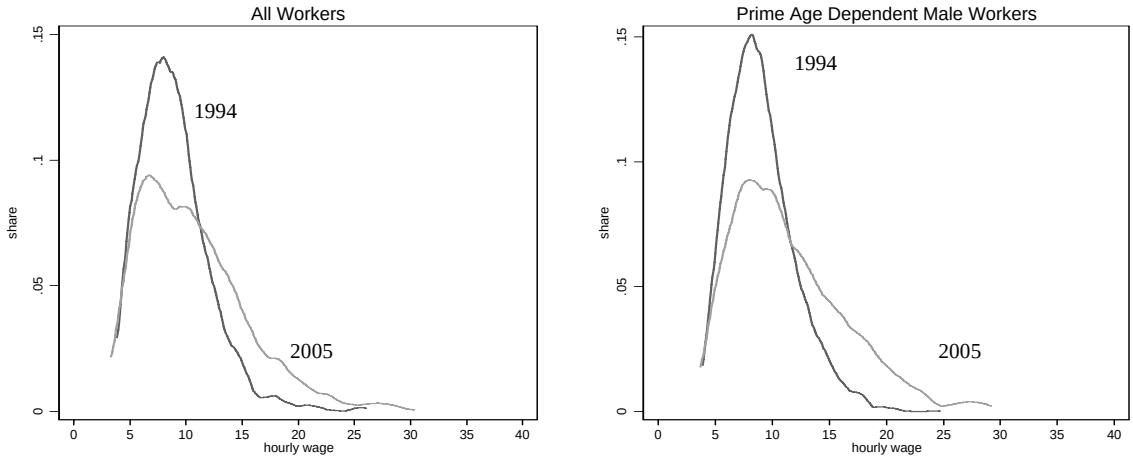
Source: SOEP 1994-2005; weighted data; own calculations.

The differences are significant. There is no percentile with a wage decrease for the high tenure group of prime age dependent males. In comparison, real wages of workers with low tenure decreased below the fortieth percentile of the wage distribution. According to these results tenure seems to be an important dimension of wage inequality and wage flexibility. Wage growth in the group of workers with low tenure shows more inequality and dispersion compared to the "high tenure" group. These results suggest that the adjustment of wages to labour market conditions primarily takes place among entrants to the labour market. In the group of workers with high tenure, adjustment to market conditions for labour mainly takes place through reduction of employment or hours of work, not primarily through wage cuts.

East Germany 1994, 2005

This section reports our results on the evolution of wages and wage inequality in East Germany. To allow a direct comparison with the findings on West Germany, the period of observation is 1994 to 2005. *Figure 6* illustrates the evolution of wages in East Germany for the whole wage distributions and *Figure 7* shows the wage growth for twenty percentiles. Rising wage inequality is present and concentrated to some extent in the upper tail of the wage distribution.

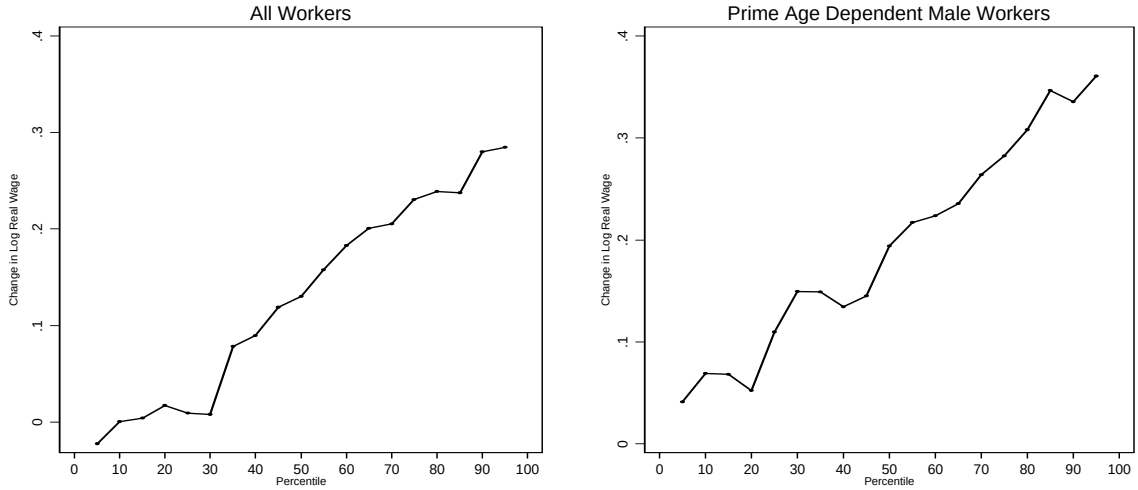
Figure 6: The Distribution of Wages in East Germany, 1994, 2005



Source: SOEP 1994-2005 (for the samples see Chapter 2); weighted data; based on kernel density estimation; own calculation.

Table 2 reports wage inequality as measured by the ninetieth to tenth percentile for the different samples and subgroups of workers (females, self-employed, low and high tenure), including 95 percent confidence intervals. In the first sample, the ninetieth to tenth percentile was 2.40 in 1994 and 3.20 in 2005. The 95 percent confidence intervals do not overlap, indicating rising wage inequality.

Figure 7: Wage Growth by Percentile, East Germany



Source: SOEP 1994-2005 (for the samples see Chapter 2); weighted data; own calculation.

Table 2: Wage Inequality in East Germany: 90th to 10th Wage Percentiles

	All Workers			Prime Age Dependent Male Workers		
	1984	**1994**	**2005**	**1984**	**1994**	**2005**
All	·	2.40 (2.32 – 2.48) N=1,710	3.20 (3.07 – 3.34) N=1,820	·	2.26 (2.15 – 2.38) N=797	2.93 (2.73 – 3.14) N=698
Females	·	2.42 (2.30 – 2.53) N=769	3.04 (2.83 – 3.26) N=886	·	·	·
Self-employed	·	4.79 (n.a.) N=63	4.42 (3.78 – 5.06) N=129	·	·	·
High tenure	·	2.24 (2.10 – 2.37) N=596	3.10 (2.90 – 3.29) N=1,025	·	2.21 (2.02 – 2.40) N=285	2.90 (2.64 – 3.16) N=386
Low tenure	·	2.40 (2.29 – 2.52) N=1,114	2.91 (2.74 – 3.08) N=795	·	2.27 (2.12 – 2.43) N=512	2.70 (2.45- 2.96) N=312

Source: Samples from SOEP 1994-2005, see text; in brackets: 95% confidence interval, calculated by bootstrapping (1,000 replications), N= number of observations, own calculations. Since the share of foreigners is very low in this sample, they are excluded in the table.

For males and females the increase in wage inequality is rather similar. As in West Germany, wage inequality is highest among the self-employed. Along the tenure dimension results differ in East and West Germany. In East Germany inequality is similar in the high and low tenure groups. Tenure is still lower in East Germany, since firm foundation emerged after unification, only 14 years ago. Firms are smaller in East Germany and smaller firms show a higher degree of employment volatility and a lower inclination in central wage bargaining (see Pfeiffer 2003). This may explain why the tenure differences found for West Germany are not yet visible in the East German samples.

4 Findings from Decomposition

This section presents the findings from a decomposition analysis based on the method introduced by Juhn et al. (1993). Changes in wage inequality are decomposed into changes in prices for observable characteristics (in our study: age, tenure, educational qualification, sex, self-employment and foreigner), changes in the composition of the workforce concerning these variables over time and unobserved or residual wage inequality. For this purpose, linear wage equations are estimated with the SOEP. The estimated coefficients are interpreted as returns to the observable variables, and changes in the observables over time are interpreted as changes in the composition of the workforce. In real data the counterfactual decomposition results do not need to add up to one. Therefore the residual component is calculated as the difference between the observed percentage change in wage inequality and the estimated price and

quantity components from the wage equation. To obtain reasonable results for this decomposition analysis the error term has to be independent and normally distributed.[9]

Growing residual wage inequality might result from increasing inequality in the distribution of unobserved skills. For instance in the United States a rise in the variances of wages occurred primarily for high educated workers (Lemieux 2006). Unlike the United States, in the West German sample from SOEP the variance of real wages increased in all education groups, from 10.15 in 1994 to 20.82 in 2004 for individuals with the lowest educational degree and from 25.92 to 35.53 for individuals with a degree from a (technical) university.

Increasing residual wage inequality might also result from growing measurement errors in the hours of work available in the data. For instance, recent studies by Autor et al. (2005) and Lemieux (2006) indicate a different quality of hours and wage information in different US surveys. The IABS contains no information on hours worked and daily earning might be an incomplete or misleading measure of wages (see section 2 above). In the SOEP data wages are calculated as the ratio of self-reported monthly earnings and hours worked. Self-reported hours of work may contain errors. The question is whether these errors changed over time. The standard deviation of hours of work in the sample of West German prime age dependent male workers increased from 7.4 in 1984 to 7.7 in 2005 (see Table A2 in the Appendix), while the standard deviation of monthly earning strongly increased. The findings from official wage statistics and from this study therefore indicate that the rise in wage inequality is not just the result of a rise in the error of reported hours of work.

We try to confirm this argument with a simulation exercise. In this exercise a normal error with a continuously rising standard deviation was added to the reported hours of work in the sample from 1984 and the corresponding wage inequality was calculated. To increase the ratio of the ninetieth to the tenth wage percentile from 2 in 1994 to 2.5 (the level in 2005) the standard deviation of the hours (actual plus simulated error) has to increase to 11. Compared to this huge increase in the variation of hours, a rise to 7.7 (the value from the sample 2005) had only a minor impact on the ratio of ninetieth to tenth wage percentile.

[9] If the location model is inappropriate the decomposition can produce misleading results. For alternatives to this approach, like the quantile decomposition methods see Dustman et al. (2007), Kohn (2006), Machado/Mata (2005), Melly (2006) or a kernel reweighting approach see DiNardo et al. (1996), among others. For quantile decomposition methods number of observations needs to be appropriate.

In order to get a reasonable empirical wage equation non-linearities are allowed for. Tenure is divided into thirteen[10], potential experience into seventeen categories[11]. All wage equations have been estimated separately for East and West Germany, for the full sample and the restricted sample of prime age dependent male workers as well as for various subgroups, for example workers with low and high tenure.[12] The following discussion of the empirical findings concentrates on the ninetieth to tenth wage differentials as well as its two sub-groups, the ninetieth to fiftieth and the fiftieth to tenth differentials.

West Germany 1984, 1994, 2005

The decomposition confirms findings on wage inequality from section 3 and may be helpful in clarifying the role of some explanatory factors for rising wage inequality. *Table 3* summarizes the findings for the full sample and the restricted sample of prime age dependent male workers. To read table 3, look, for example, at its first row: The wage dispersion between the ninetieth and the tenth percentile (column one) decreased in total (column two) by 0.050 log points or 4.88 percent ($(e^{-0.05} - 1) * 100 = -4.88$). The total wage growth is decomposed into a quantity effect (column 3), a price effect (column 4) and a residual effect (column 5).

The findings can be summarized as follows:

- Even though wage inequality increased significantly over the whole period, the increase was concentrated on the period between 1994 and 2005. For the period between 1984 and 1994 our findings confirm the stability of the German wage distribution.
- In the full sample of workers there is an asymmetry in the increase of wage inequality between 1994 and 2005: Wage inequality increased somewhat in the upper part of the wage distribution. The total increase in the ninetieth to fiftieth percentile was 0.050 log points. Compared to that the increase is quantitatively more pronounced in the lower part of the wage distribution. The total increase in the fiftieth to tenth percentile that is in the lower part of the wage distribution was 0.171 log points. These results are in line with findings by Möller (2005) for West Germany, based on the IABS 1984 to 2001.
- In the period of stability, the decade 1984 and 1994, composition effects alone would have caused increasing wage inequality while in total wage inequality decreases. So price and composition forces seem to have worked in the opposite direction. In the period of rising inequality, the decade 1994

[10] The groups range from 0-3 years over 3-6 years to 33-36 years, the group with highest duration are those employees who stayed with the same employer for more than 36 years.
[11] The groups range from 0-3 years over 3-6 years to 45-48 years, the highest group is “more than 48 years”.
[12] All wage equations are available from the authors upon request.

to 2005, the estimated composition effects have been responsible for moderate changes in the evolution of wages in the sample of prime age dependent males. Price effects dominate. Price changes for observed characteristics explain one quarter to one third of overall rising inequality.

- For prime age males with low tenure prices have the highest influence for changes between the 90th and 10th and above the median.

- Results differ between the full sample of all workers, including the self-employed and women, and the restricted sample of prime age dependent male workers. However, these differences are moderate. There was slightly less wage dispersion in the period between 1994 and 2005 in the sample of prime age dependent male workers. For woman in the overall sample composite and price effects are quantitatively similar, while price effects are more important in the sample of male dependent worker (assessed by the point estimates).

- According to Kohn (2006) the increase in wage inequality below the median (between 1992 and 2001) is predominantly concentrated among women. In our analysis this is not the case. Even if we restrict our observation period from 1992 to 2001 and estimate the wage equation separately for women and men, increasing wage inequality is concentrated below the median for males and females (results available upon request).

- The reported confidence intervals suggest that the distinction between price, composition and residual effects has a moderate degree of statistical explanation power. One reason for the moderate precision presumably is the relatively low number of observations in the SOEP.

According to the best of our knowledge confidence intervals are not reported for others decompositions exercises for Germany. A comparisons with studies based on the IABS that use quantile decomposition techniques may be helpful here. For instance, according to Dustmann et al. (2007) changes in the composition of the workforce can explain 40 percent of the increase in wage inequality in the upper part of the wage distribution (that is between the eighty-fifth percentile and the median) and 15 percent in the lower part of the wage distribution (that is between the median and fifteenth percentile).

Table 3: Decomposition Results for West Germany

All Workers				
Differential	**Total**	**Composition**	**Prices**	**Unobserved**
	1984-1994 (base year 1984)			
90-10	-0.050 (-0.093 – -0.006)	0.020 (-0.012 – 0.058)	-0.043 (-0.074 – -0.016)	-0.027 (-0.053 – -0.002)
90-50	-0.018 (-0.036 – 0.000)	0.037 (0.012 – 0.066)	-0.033 (-0.059 – -0.011)	-0.022 (-0.037 – -0.008)
50-10	-0.032 (-0.072 – 0.009)	-0.017 (-0.046 – 0.014)	-0.010 (-0.029 – 0.009)	-0.005 (-0.022 – 0.012)
	1994-2005 (base year 1994)			
90-10	0.221 (0.181 – 0.261)	0.018 (-0.009 – 0.046)	0.060 (0.032 – 0.087)	0.143 (0.115 – 0.170)
90-50	0.050 (0.027 – 0.073)	-0.025 (-0.047 – -0.003)	0.017 (-0.004 – 0.038)	0.058 (0.040 – 0.076)
50-10	0.171 (0.135 – 0.207)	0.043 (0.018 – 0.069)	0.043 (0.024 – 0.062)	0.085 (0.064 – 0.106)
	1994-2005 (base year 1994), only females			
90-10	0.286 (0.230 – 0.341)	0.053 (0.010 – 0.095)	0.066 (0.022 – 0.112)	0.167 (0.120 – 0.212)
90-50	0.098 (0.057 – 0.139)	0.014 (-0.023 – 0.051)	0.026 (-0.011 – 0.065)	0.058 (0.033 – 0.080)
50-10	0.188 (0.146 – 0.229)	0.038 (0.006 – 0.070)	0.040 (0.013 – 0.067)	0.109 (0.073 – 0.146)
	1994-2005 (base year 1994), only foreigners			
90-10	0.342 (0.221 – 0.463)	0.036 (-0.029 – 0.102)	0.150 (0.060 – 0.238)	0.156 (0.068 – 0.246)
90-50	0.132 (0.068 – 0.196)	0.030 (-0.026 – 0.086)	0.045 (-0.026 – 0.116)	0.057 (0.017 – 0.098)
50-10	0.210 (0.103 – 0.317)	0.006 (-0.058 – 0.070)	0.105 (0.039 – 0.169)	0.099 (0.024 – 0.175)

Prime Age Dependent Male Workers				
Differential	**Total**	**Composition**	**Prices**	**Unobserved**
	1984-1994 (base year 1984)			
90-10	-0.016 (-0.067 – 0.034)	0.030 (-0.007 – 0.067)	-0.022 (-0.055 – 0.014)	-0.024 (-0.054 – 0.003)
90-50	-0.025 (-0.064 – 0.013)	0.015 (-0.019 – 0.050)	-0.021 (-0.050 – 0.011)	-0.019 (-0.040 – -0.001)
50-10	0.009 (-0.026 – 0.043)	0.015 (-0.014 – 0.044)	-0.001 (-0.022 – 0.020)	-0.005 (-0.024 – 0.015)
	1994-2005 (base year 1994)			
90-10	0.173 (0.123 – 0.224)	-0.014 (-0.049 – 0.021)	0.080 (0.038 – 0.120)	0.107 (0.076 – 0.140)
90-50	0.031 (-0.010 – 0.073)	-0.016 (-0.049 – 0.017)	0.016 (-0.013 – 0.045)	0.031 (0.011 – 0.051)
50-10	0.142 (0.103 – 0.181)	0.002 (-0.024 – 0.028)	0.064 (0.035 – 0.091)	0.076 (0.048 – 0.106)
	1994-2005 (base year 1994), only "low tenure"			
90-10	0.273 (0.194 – 0.351)	0.038 (-0.015 – 0.090)	0.118 (0.048 – 0.188)	0.117 (0.060 – 0.174)
90-50	0.074 (0.016 – 0.131)	-0.003 (-0.050 – 0.048)	0.056 (-0.004 – 0.109)	0.021 (-0.008 – 0.052)
50-10	0.199 (0.141 – 0.258)	0.041 (-0.006 – 0.083)	0.063 (0.020 – 0.110)	0.095 (0.048 – 0.143)

Source: SOEP 1984-2005 (for the samples see chapter 2); Juhn et al. (1993) decomposition method; in brackets: 95% confidence interval; calculated by bootstrapping (1,000 replications); own calculations.

Based on the SOEP our study indicates strong rising wage inequality, thus adding to the evidence that the increased wage dispersion in Germany is more than a spurious empirical effect. The findings are in line with evidence from recent studies based on larger samples of German register data for dependent workers, although there are some qualifications. Increasing wage inequality in West Germany seems to be neither the result of rising participation of women or self-employment workers nor of changes in the share of foreigners. In addition we find that a larger part of the rise in inequality occurred in the group of workers with low tenure which has not been reported so far for Germany (confirming however findings from Spain, Izquierdo and Lacuesta, 2006). This result is in line with empirical research on downward wage rigidity in recessions. In Germany incumbent workers enjoy a higher degree of protection against wage competition. Adjustment takes place to a greater extent through reductions in hours and labour while wage reductions more often occur in the group of entrants and workers with low tenure (see Fehr and Götte 2005, Franz and Pfeiffer 2005, 2006, Kaiser and Pfeiffer 2001, Pfeiffer 2003, among others).

East Germany 1994, 2005

Which factors account for rising wage inequality in East Germany? Are there differences between East and West Germany? The results of the decomposition (see *Table 4*) can be summarized as follows:

- The overall measure (ninetieth to tenth differential) indicates a slightly stronger rise in wage inequality in the sample of East compared to West German workers, *Table 4*, which is in line with Kohn (2006). This is a consequence of the transition from a socialist to a market economy after unification. The process of adjustment and convergence to the West German wage distribution is still not complete, and its consequences for the evolution of wage inequality are still unfolding (see also Franz and Steiner 2000).
- In contrast to West Germany a large part of rising inequality occurred in the upper tail of the wage distribution, 54 in comparison to 23 percent in West Germany (for the full sample). The total increase in the ninetieth to fiftieth percentile of the wage distribution for prime age dependent males was 0.165 log points, the total increase in the fiftieth to tenth percentile of the wage distribution was 0.094 log points.
- Composition effects seem to be of minor importance in the East German samples with the exception of the lower part of the distribution for prime age dependent males. Price effects are significant especially in the upper part of the wage distribution (assessed by point estimates). For prime age

dependent male workers decomposition results suggest that price effects are quantitatively more important than residual effects.

Table 4: Decomposition Results East Germany 1994-2005

All Workers				
Differential	**Total**	**Composition**	**Prices**	**Unobserved**
1994-2005 (base year 1994)				
90-10	0.288 (0.236 – 0.340)	0.016 (-0.022 – 0.054)	0.105 (0.054 – 0.155)	0.167 (0.125 – 0.210)
90-50	0.155 (0.109 – 0.202)	0.006 (-0.029 – 0.043)	0.079 (0.036 – 0.120)	0.071 (0.041 – 0.100)
50-10	0.132 (0.089 – 0.176)	0.010 (-0.027 – 0.045)	0.027 (-0.007 – 0.060)	0.096 (0.068 – 0.126)
1994-2005 (base year 1994), only females				
90-10	0.230 (0.145 – 0.314)	0.017 (-0.042 – 0.087)	0.084 (0.002 – 0.159)	0.129 (0.064 – 0.189)
90-50	0.107 (0.027 – 0.187)	0.032 (-0.022 – 0.100)	0.043 (-0.030 – 0.107)	0.031 (-0.016 – 0.075)
50-10	0.123 (0.054 – 0.192)	-0.015 (-0.073 – 0.040)	0.040 (-0.016 – 0.100)	0.095 (0.052 – 0.143)

Prime Age Dependent Male Workers				
Differential	**Total**	**Composition**	**Prices**	**Unobserved**
1994-2005 (base year 1994)				
90-10	0.259 (0.175 – 0.343)	-0.010 (-0.060 – 0.038)	0.189 (0.112 – 0.265)	0.080 (0.020 – 0.144)
90-50	0.165 (0.097 – 0.233)	-0.023 (-0.073 – 0.027)	0.158 (0.095 – 0.219)	0.030 (-0.006 – 0.067)
50-10	0.094 (0.026 – 0.163)	0.014 (-0.036 – 0.060)	0.031 (-0.022 – 0.084)	0.050 (0.006 – 0.097)
1994-2005 (base year 1994), only "low tenure"				
90-10	0.174 (0.057 – 0.291)	0.004 (-0.072 – 0.081)	0.149 (0.044 – 0.254)	0.021 (-0.063 – 0.105)
90-50	0.103 (0.010 – 0.195)	-0.038 (-0.118 – 0.041)	0.136 (0.044 – 0.224)	0.005 (-0.046 – 0.059)
50-10	0.071 (-0.014 – 0.156)	0.042 (-0.028 – 0.112)	0.013 (-0.057 – 0.087)	0.016 (-0.053 – 0.081)

Source: SOEP 1994-2005 (for the selection of samples see chapter 2); since the share of foreigners is very low in this sample, they are excluded in the table; in brackets: 95% confidence interval, calculated by boots-trapping (1,000 replications); own calculations.

- The differences in wage inequality between tenure groups are less pronounced in East compared to West Germany.
- Again the reported confidence intervals suggest that the distinction between price, composition and residual effects has a moderate degree of statistical explanation power.

One economic explanation for the finding that there is no tenure difference in East and a strong tenure difference in West Germany is the competition for high wage workers between both German regions. This competition together with the well known mobility of high wage workers (especially from East to West Germany) contributed to wage dynamics and inequality in the upper part

of the wage distribution in East Germany. The relatively higher degree of rising wage inequality in East compared to West Germany is due to a higher extent of wage inequality for high wage workers in East Germany. Interestingly the pattern of wage inequality in East Germany after unification has some similarities with the period of rising wage inequality in the United States that started after the computer revolution in the seventies (see Juhn et al. 1993).

5 Conclusions

This paper contributes to the ongoing debate on international trends in wage inequality. Based on the SOEP 1984 to 2005 the evolution of wage inequality is investigated separately for East and West Germany. Despite the strong trade orientation of the German economy and rising wage inequality abroad, the German wage distribution was fairly stable for a long time. However, our findings, based on the rich SOEP data, hint at rising wage inequality which started after the economic downturn 1992/93 in both parts of Germany.

The recent significant increase in wage inequality in Germany is a robust phenomenon that seems to be unrelated to specific groups of workers, for example the self-employed, women or foreigners, although there is a need for differentiation. Our decomposition results indicate that price effects are more important for East compared to West German workers, assessed by the point estimates. Rising wage inequality in East Germany is quantitatively more pronounced among high wage workers and in West Germany among workers with low tenure. In times of high unemployment firms' adjustment takes place primarily through reductions of employment and hours of work. Competition through high unemployment in West Germany seems to have had a stronger impact on wage inequality among entrants and workers with low tenure. In East Germany rising inequality is due to a higher extent of wage inequality for high wage workers, which presumably is a result of competition for (highly) qualified workers who otherwise migrate to West Germany.

Prominent additional explanations in the literature on rising wage inequality refer to the non-neutral nature of technical change, a rising demand for cognitive, non-routine abilities, to world-wide factor competition, decreasing social transfers and union power (German unions lost 2.8 million of their members between 1994 and 2004), changes in unobserved skills and rising inequality in abilities resulting from the German educational system of early tracking. The computer revolution fostered general education and analytical and cognitive non-routine skills while vocational education and non-cognitive manual and routine skills lost ground. Yet another specific factor for Germany might be the rise in active labour market policies in the observation period that might have influenced wage setting behaviour and the inequality of wages.

Future research could be directed more specifically to these different explanations and reasons for the evolution of wages and inequality in Germany. Since residual wage changes account for two thirds of the rise in wage inequality in West Germany, future research is needed with improved information on hitherto not observed characteristics. For instance, the content of the chosen categories of education might differ over time as well as the economic value of tenure in an employee-employer relationship. Furthermore the consequences of rising wage inequality for individual well-being, for employment as well as for the evolution of unemployment need to be investigated in greater detail.

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Appendix

Table A1: Selected Studies on Wage Inequality in Germany

Study	Time	Data	Results
Bellmann and Gartner (2003)	1975-2000	IABS, BLH	Increasing wage dispersion in the 1990s in West Germany, especially within high wage sectors.
Dustmann, Ludsteck, Schönberg (2007)	1975-2004	IABS, LIAB	Increasing Wage Inequality in the 1980s, but only at the top of the wage distribution, in the early 1990s wage inequality also started to increase below the median.
Fitzenberger (1999)	1975-1990	IABS	The wage dispersion within skill groups is stable over time for low skilled workers but increases for medium and high skilled workers. After controlling for age and cohort effects there is increasing wage inequality within the group of low skilled workers.
Fitzenberger, Hujer, MaCurdy and Schnabel (2001)	1976-1984	IABS	Wage compression at the lower part of the wage distribution which seems constant over the surveyed time. The main findings are that wages of workers with intermediate education levels, among them especially those of young workers, deteriorated slightly relative to high and low education levels.
Franz and Steiner (2000)	1990-1997	SOEP	In East Germany wage distribution was compressed under socialism. After unification there is rising wage inequality in East Germany, strongest in the first years.
Kohn (2006)	1975-2001	IABS	Rising wage inequality, especially in East Germany, starting in the mid 1990s.
Möller (2005)	1975-2001	IABS	Rising wage inequality, especially below the median, starting in the mid 1990s.
Pfeiffer (2003)	1975-1995	IABS	Wage rigidity is present due to central wage bargaining; for 50 percent of workers wages would have been lower without rigidity; the wage sweep-up is higher for German workers in large firms, rises with tenure and is higher in the middle part of the wage distribution.
Prasad (2004)	1984-1997	SOEP	Relatively stable wage distribution in Germany. Returns to education and experience remained stable. Some evidence for a modest increase in wage inequality at mid 1990s.
Steiner and Hölzle (2000)	1990-1997	SOEP	Relatively stable wage distribution in Germany. Earnings and wage inequality in East Germany increased after reunification.
Steiner and Wagner (1998)	1984-1990	SOEP, IABS	Modest increase in earnings inequality when calculated on the basis of the IABS, while earnings remained constant or slightly decreased on the basis of the SOEP.

Table A2: Means of Real Wages and Hours (Std.-dev. in Brackets), West Germany

	All Workers				Prime Age Dependent Male Workers			
	Obser-vations	**Real gross monthly salary**	**Weekly hours worked**	**Real gross hourly wage**	**Obser-vations**	**Real gross monthly salary**	**Weekly hours worked**	**Real gross hourly wage**
2005	5,522	2,285.65	37.41	13.61	2,298	2,867.47	43.20	15.31
		(1,275.54)	(12.77)	(5.56)		(1,107.58)	(7.71)	(5.32)
2004	5,799	2,337.45	37.55	13.88	2,467	2,926.00	43.09	15.66
		(1,309.48)	(12.65)	(5.64)		(1,136.93)	(7.64)	(5.40)
2003	5,994	2,346.46	37.49	13.93	2,560	2,945.67	42.89	15.80
		(1,312.35)	(12.64)	(5.61)		(1,134.20)	(7.75)	(5.30)
2002	6,266	2,301.85	37.83	13.58	2,698	2,861.53	43.16	15.27
		(1,269.00)	(12.65)	(5.42)		(1,088.89)	(7.42)	(5.12)
2001	6,773	2,244.55	38.08	13.19	2,981	2,774.87	43.17	14.83
		(1,196.82)	(12.57)	(5.03)		(1,023.93)	(7.71)	(4.76)
2000	7,490	2,257.83	38.31	13.22	3,333	2,765.09	43.24	14.75
		(1,194.23)	(12.44)	(5.06)		(1,031.04)	(7.55)	(4.79)
1999	4,123	2,239.72	38.52	13.08	1,857	2,683.38	42.69	14,49
		(1,138.00)	(11.79)	(4.94)		(986.05)	(7.32)	(4.74)
1998	3,946	2,237.40	38.97	12.99	1,814	2,674.92	42.97	14.39
		(1,089.29)	(11.42)	(4.75)		(966.30)	(7.65)	(4.59)
1997	3,732	2,187.06	38.95	12.71	1,686	2,626.61	42.74	14.22
		(1,046.01)	(11.41)	(4.54)		(899.89)	(7.51)	(4.25)
1996	3,801	2,197.03	38.68	12.85	1,720	2,626.61	42.36	14.33
		(1,054.24)	(10.99)	(4.63)		(930.44)	(7.52)	(4.45)
1995	3,880	2,179.26	39.03	12.68	1,790	2,606.06	42.57	14.17
		(1,024.08)	(10.98)	(4.67)		(919.42)	(7.54)	(4.45)
1994	3,913	2,120.33	38.80	12.38	1,797	2,540.88	42.15	13.94
		(983.24)	(10.71)	(4.27)		(829.60)	(7.00)	(4.07)
1993	4,017	2,107.15	38.82	12.33	1,810	2,549.52	42.22	13.97
		(982.96)	(10.71)	(4.39)		(858.18)	(7.20)	(4.16)
1992	4,002	2,094.90	39.01	12.22	1,825	2,546.29	42.58	13.85
		(954.47)	(10.58)	(4.35)		(813.98)	(7.19)	(4.02)
1991	4,124	2,048.40	39.21	11.88	1,892	2,493.01	42.65	13.55
		(941.38)	(10.78)	(4.26)		(800.44)	(7.33)	(3.97)
1990	4,072	1,955.06	39.47	11.27	1,943	2,345.79	42.60	12.72
		(911.89)	(10.00)	(4.14)		(818.53)	(6.94)	(4.00)
1989	4,160	1,920,93	40.20	10.88	1,956	2,312.31	43.36	12.33
		(884.29)	(10.11)	(3.95)		(794.47)	(6.95)	(3.78)
1988	4,147	1,938.64	39.86	11.19	1,947	2,332.27	43.08	12.60
		(995.41)	(10.67)	(4.92)		(883.92)	(7.01)	(4.66)
1987	4,371	1,854.53	40.04	10.54	2,011	2,242.45	43.27	11.98
		(897.42)	(10.44)	(3.98)		(811.94)	(6.98)	(3.86)
1986	4,240	1,854.13	40.55	10.58	2,004	2,222.76	43.60	11.91
		(929.45)	(10.58)	(4.81)		(850.81)	(7.47)	(4.60)
1985	4,347	1,800.09	40.61	10.32	2,061	2,139.69	43.59	11.58
		(912.00)	(10.97)	(5.02)		(808.08)	(7.71)	(4.89)
1984	4,772	1,766.44	40.53	10.00	2,322	2,109.10	43.45	11.27
		(846.17)	(10.55)	(3.96)		(726.22)	(7.35)	(3.65)

Source: Samples from SOEP 1984-2005, see text; own calculations.

Table A3: Means of Real Wages and Hours (Std.-dev. in Brackets), East Germany

	All Workers				Prime Age Dependent Male Workers			
	Obser-vations	**Real gross monthly salary**	**Weekly hours worked**	**Real gross hourly wage**	**Obser-vations**	**Real gross monthly salary**	**Weekly hours worked**	**Real gross hourly wage**
2005	1,820	1,878.80	41.25	10.52	698	2,124.25	44.58	11.06
		(961.29)	(10.09)	(4.78)		(925.17)	(7.39)	(4.63)
2004	1,923	1,930.98	41.54	10.70	739	2,174.55	44.54	11.30
		(979.70)	(10.16)	(4.72)		(981.13)	(7.68)	(4.68)
2003	1,967	1,931.36	41.81	10.64	761	2,167.30	44.78	11.23
		(947.14)	(9.79)	(4.57)		(928.19)	(7.15)	(4.56)
2002	2,050	1,882.83	42.15	10.30	802	2,084.13	44.97	10.73
		(890.51)	(9.81)	(4.29)		(876.38)	(7.71)	(4.20)
2001	2,220	1,831.92	42.33	10.04	882	2,016.24	45.31	10.38
		(856.01)	(10.12)	(4.16)		(806.59)	(7.57)	(4.02)
2000	2,336	1,812.73	42.46	9.90	931	1,984.44	45.43	10.14
		(830.79)	(10.11)	(4.01)		(804.70)	(7.88)	(3.80)
1999	1,668	1,792.09	42.80	9.71	691	1,919.96	45.56	9.83
		(762.24)	(9.52)	(3.78)		(715.47)	(8.16)	(3.58)
1998	1,632	1,785.58	43.02	9.67	694	1,937.78	45.62	9.93
		(738.21)	(9.38)	(3.77)		(693.97)	(8.04)	(3.55)
1997	1,610	1,793.09	43.62	9.56	690	1,922.98	46.15	9.73
		(739.08)	(9.32)	(3.61)		(683.73)	(7.92)	(3.32)
1996	1,673	1,762.72	43.16	9.50	728	1,893.92	46.00	9.63
		(720.55)	(9.31)	(3.53)		(648.47)	(7.72)	(3.27)
1995	1,749	1,697.36	43.36	9.12	770	1,831.71	46.23	9.24
		(699.52)	(9.63)	(3.45)		(659.33)	(7.96)	(3.13)
1994	1,710	1,653.03	43.45	8.82	797	1,762.10	45.71	8.96
		(647.18)	(8.63)	(3.12)		(592.33)	(7.21)	(2.85)

Source: Samples from SOEP 1994-2005, see text; own calculations.