

## **Wages and Labor Market**

### **The Changing Wage Distribution in Germany between 1985 and 2006**

By Johannes Giesecke and Roland Verwiebe

#### **Abstract**

In this paper the changes in the wage distribution in (West-)Germany between 1985 and 2006 are analysed. The theoretical framework is based on the literature on skill-biased technological change (SBTC) and on structural theory. Analyses draw on descriptive measures of the development of wage inequality among blue- and white-collar workers as well as on regression analyses of individual and structural determinants of wages for the years 1985 to 2006. The results show that wage inequality remained fairly constant until the early 1990s, but started to increase from the mid-1990s onwards. Moreover, regression analyses reveal that this increase was paralleled by rising inter-class wage differentials, while returns to (higher) education decreased.

*JEL Classifications: J21, J24, J31*

#### **1. Introduction**

In sharp contrast to developments in most other western societies (e.g. U.S.A., Great Britain, Italy, Sweden), wage inequality in Germany remained fairly stable throughout the 1970s and the 1980s. Many authors have attributed these differences to the high degree of labour market regulation found in Germany, which is believed to result in an inflexible wage structure (Atkinson, 2000; Katz/Autor, 1999; Prasad, 2004). However, as shown by previous research, wage inequality has increased substantially from the mid-1990s onwards (Gerndt/Pfeiffer, 2007; Giesecke/Verwiebe, 2008a; Giesecke/Verwiebe, 2008b; Kohn, 2006; Möller, 2005; Schettkat, 2006). One can assume that labour market groups are differently affected by this development. In particular, the wages of social groups with a weak labour market position (e.g. low-qualified workers or workers in lower occupational classes) can be expected to have worsened, while wages of groups with a strong labour market position might have improved both in absolute and relative terms. Empirically, we test these assumptions on the growing inequality of wages using SOEP data

for the years 1985–2006, focussing – for the sake of brevity – on changes in the education-based and class-based wage differentials of male workers. The theoretical framework of our analysis is based on economic as well as sociological literature on wage inequality.

## 2. Theoretical Framework

On a theoretical level, there are both economic and sociological explanations for an increase in wage inequality during the last decade(s). Based on recent findings of labour economists, one could postulate that market forces driven by technological changes (especially new computer technology) and the corresponding growth in the relative demand for highly-skilled labour have led to an increase in wage inequality. In this process, highly-qualified workers are assumed to be in a position to increase their wages, whereas low-qualified workers have to accept a worsening of their earnings. This explanation, known as the skill-biased technological change (SBTC) thesis, currently dominates the economic research on wage inequality (for the contours of the debate see Acemoglu, 2002; Card/DiNardo, 2002; Katz/Autor, 1999; Machin, 2008). Empirically, SBTC-based assumptions are supported by a large number of studies (particularly for the United States) documenting a wage structure that has become substantially wider since the late 1970s, largely driven by increases in educational wage differentials and residual (within-group) wage inequality (Autor et al., 2006; Juhn et al., 1993).

While the increase in wage inequality is a major concern in economics, surprisingly little attention has been given to this issue within sociology. As Morris/Western (1999) put it: Since sociologists have “continued to focus on the question of how people are allocated to positions in the earnings distribution, rather than on the structure of those positions”, sociology has remained “remarkably silent” on the issue of rising wage inequality (Morris/Western, 1999, 624). We understand this critique of Morris/Western (1999), which was recently echoed by a number of other researchers (e.g. DiPrete, 2007; Esping-Andersen, 2007; Weeden et al., 2007), as a call for sociologists to confront the established economic approaches with alternative sociological concepts.

Following this call, we suggest a structural explanation for the changes in the wage distribution in Germany that draws in particular on the work of Sørensen (1983; 2000) and Weeden (2002). Based on Max Weber’s notion of social closure, Sørensen (1983; 2000) emphasizes the importance of labour market structures for socio-economic outcomes. Although explicitly acknowledging the relevance of demand and supply mechanisms, he argues that institutional and structural factors are strongly influencing the distribution of wages, at least much more strongly than economic theory is able to imagine (Sørensen, 1983). According to this argument, certain labour market groups

are able to generate rents, i.e. they are able to receive wages that are above their productivity equivalent. Such rents may arise when employees as the incumbents of labour market positions are able to restrict access to these positions (through closure). The closure potentials of different occupational groups are particularly based on devices such as licensing, credentialing through the education system, representation by occupational associations (e.g. for lawyers/notaries, doctors, architects, tax consultants, certified accountants), and unionisation (Weeden, 2002). From a theoretical point of view, concepts of occupational class are very helpful in bundling these divergent closure potentials and inequality structures.

According to such a structural theory-based explanation of wage differentials, the recent increase in wage inequality might reflect changes in the potential of occupational groups to generate or to maintain rents. Individuals in higher class positions are expected to be able to preserve or even to expand their chances to create rents,<sup>1</sup> whereas processes of rent destruction are more likely to have affected lower occupational classes (DiPrete et al., 2002; Esping-Andersen, 1993; Morgan/Cha, 2007; Weeden, 2002). This is in line with the predictions of Breen (1997), who argues that, while corporations increasingly transfer market risks to the work force, this transfer of risks is not equally distributed across occupational classes. It is particularly the lower classes that are affected by the transfer of uncertainties, resulting in relative wage losses or higher unemployment risks for workers in those positions. One example of this transfer of market risks is the increasing number of flexible employment relations (fixed-term contracts or temporary help agency work) for newly-hired workers, which presumably also affects working conditions and wage levels of workers holding standard contracts. Moreover, given a decrease in unions' power (mainly due to the decrease in jobs regulated by collective agreement practices), a rather high level of unemployment and the recent changes in labour market policies, it seems reasonable to assume that employers have become more and more able to shift market uncertainties to the workforce, while at the same time workers increasingly have to accept these kinds of changes. Thus, in this perspective, the increase in wage inequality is not seen as solely resulting from a growing demand for highly-qualified labour, but rather as reflecting rising wage differentials between occupational classes that are due to shifts in the rent-generating potential of those classes.

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<sup>1</sup> An illustrative example is the decoupling of the salaries of the CEOs of large German firms from the general wage dynamic. On average, those CEOs doubled their salaries (excluding bonuses) between 1997 and 2005, while average real wages for non-self-employed workers fell by approximately one percent during that time period (Schulten, 2006).

### 3. Data and Methods

The analyses are based on data from the German Socio-Economic Panel (SOEP), waves 1985–2006. In this paper, we use all existing SOEP sub-samples, except for the sub-sample G (high income earners).<sup>2</sup> There are several restrictions that we have applied to the data. First, the results are based on information obtained from blue- and white-collar workers, which excludes self-employed persons. Second, in accordance with common practice in labour market research, we have confined the sample to workers aged 16 to 65. Third, in order to minimize the impact of outliers we have excluded observations of persons who reported (real) gross hourly wages of less than 2.50 € or more than 200 € (in constant prices). Fourth, persons in full-time education are not included. Finally, for sake of brevity we restrict the analysis to male workers in the West German labour market.

The dependent variable *hourly wage* is computed by relating an individual's *monthly gross labour income* (in €) to his *actual working time*. Additionally, yearly inflation rates have been used to create real wages in constant prices (base year: 2000).

With regard to the explanatory variables – in line with the theoretical part of the paper – we focus on wage differentials between educational groups and between occupational classes. *Education* is measured by eight educational categories (based on CASMIN): ranging from inadequately completed education/general elementary school (CASMIN 1a, b) to higher tertiary education (CASMIN 3b). Information on *occupational class* is based on the EGP class-concept (Erikson/Goldthorpe, 1992). Given the restrictions applied to the data, a total of eight classes can be distinguished: the higher and the lower service class, routine non-manual workers, routine service-sales workers, supervisor manual and skilled manual workers, farm labourers, and semi-/unskilled manual workers.

Besides education and class, the models contain various individual as well as job-related control variables that are known to be important wage determinants: age, nationality, number of children in the household, family status, unemployment experience during the previous 12 months, tenure, type of contract (fixed-term, part-time), civil servant status, industry, public sector, and firm-size.

The analyses of this paper are based on OLS-regressions that were estimated for each wave of the SOEP using cross-sectional weights. The underlying model, regressing (log) wages for workers  $i$  at time  $t$  on observed individual and job-related characteristics and on an idiosyncratic error term, can be written as:  $\log(wage_{it}) = \beta_{0t} + \beta_{1t} x_{1t} + \beta_{2t} x_{2t} + \dots + \beta_{kt} x_{kt} + \varepsilon_{it}$ . Because of the logged dependent variable, the estimated  $\beta$ -coefficients can be recalculated as

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<sup>2</sup> Since sample G is drawn from a very special population, we decided to exclude this sample from our analyses in order to minimise breaks in the time series.

representing the average percentage change of wages for a unit-change in variable  $m$  by transforming them as  $[\exp(\beta_{mt}) - 1] * 100$ .

## 4. Results

### 4.1 Descriptive Analysis of Wage Inequality

Table 1 displays basic information about the wage distribution of male blue- and white-collar workers in West Germany between 1985 and 2006. To measure the amount of inequality in the wage distribution we used three different decile ratios that allow us to analyse the overall changes in the wage distribution ( $d9/d1$ ) as well as in the upper ( $d9/d5$ ) and the lower ( $d5/d1$ ) half of the distribution. Three major aspects will be emphasized here:

1. Wage distribution in Germany remained fairly stable until the mid-1990s, which is in line with results from previous research (Prasad, 2004; Steiner/Hölzle, 2000). There had even been a slight decrease in wage inequality up to the early 1990s due to a relative increase in wages at the d1-level.
2. Wage inequality started to rise from the mid-1990s onwards. While wages at the d9-level were 139 per cent higher than wages at the d1-level in 1995, this gap increased to 173 per cent in 2006. In terms of real wages, this corresponds with an increase in higher wages (d9-level from 21.3 € in 1995 to 22.5 € in 2006) and a decrease in lower wages (d1-level from 9.0 € in 1995 to 8.3 € in 2006).
3. The rise in overall wage inequality is caused by a growing polarization in the lower half of the wage distribution ( $d5/d1$ -ratio). The  $d9/d5$ -ratio remains almost unchanged over the whole observational period as median wages (d5-level) increased approximately by the same relative amount as did higher wages (d9-level).

Table 1

#### Changes in wage inequality

	1985	1990	1995	2000	2006		1985	1990	1995	2000	2006
<b>d9/d1</b>	2.39	2.29	2.37	2.64	2.73	<b>d9 in €</b>	17.32	19.59	21.29	22.61	22.53
<b>d9/d5</b>	1.61	1.61	1.66	1.69	1.62	<b>d5 in €</b>	10.76	12.14	12.84	13.40	13.88
<b>d5/d1</b>	1.48	1.42	1.43	1.56	1.68	<b>d1 in €</b>	7.26	8.54	8.98	8.57	8.26

Source: Authors' calculation based on SOEP 1985–2006 data.

On the whole, the descriptive findings show an increase in wage inequality in West Germany between 1995 and 2006. These results are in line with those from recent research on the German labour market (Gernandt/Pfeiffer, 2007; Kohn, 2006). Moreover, the findings indicate that this increase in inequality was due to a decline in wages in the lower parts of the wage distribution and,

simultaneously, an increase in wages in the upper parts of the wage distribution. As discussed in the theoretical part of this paper, there are different arguments with regard to the processes underlying these changes. While the dominant approach in the economic literature tries to relate these changes to an increasing demand for highly-educated people due to a pervasive technological change, sociological views focus on occupational classes and on shifts in the potential of occupational groups to extract rents from their labour market positions. In the next section we turn to a more in-depth analysis in order to understand the processes underlying the recent wage dynamics in the German labour market.

## 4.2 Regression Analysis

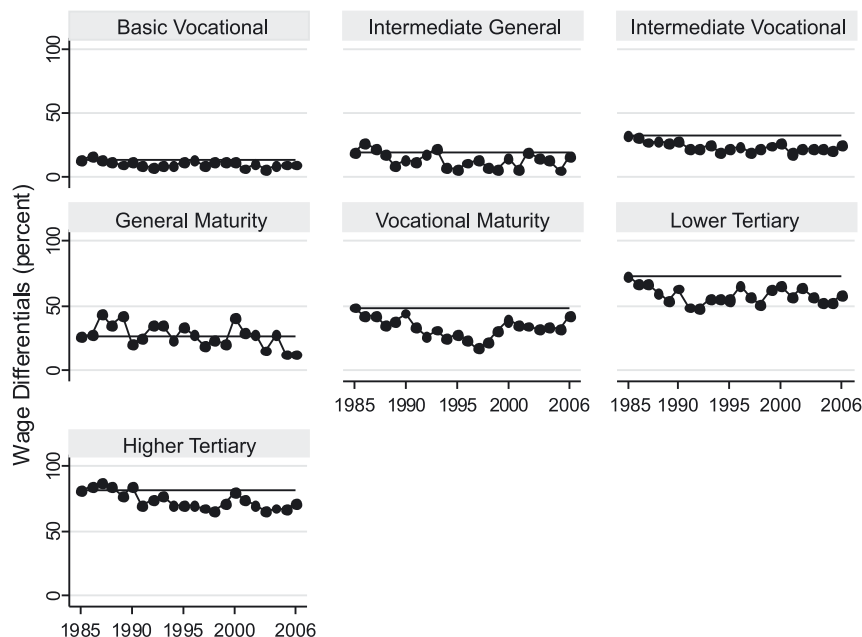
Based on the model described in subsection 3, we ran regression analyses, which provided estimates of the variables' impact on wages for a given year. However, in line with the theoretical discussion, we focus on the impact of education and occupational class. Starting with education-based wage differentials, Figure 1 displays the transformed coefficients for the seven education categories, the reference category being "inadequately completed education / general elementary school".<sup>3</sup> As can be seen, there are considerable wage differentials between educational groups, reflecting the well-known relation between the amount of general human capital and wage levels (e.g. Becker, 1964; OECD, 2006). In particular, workers holding tertiary degrees earn wages that are on average substantially higher than wages for workers with a minimum level of education (for example, in 1985 this "wage premium" for a higher tertiary degree was about 81 per cent). With respect to changing wage differentials between educational groups the findings show that, in contrast to the assumptions of the literature on skill-biased technological change, returns to education did *not* increase for highly-educated workers.<sup>4</sup> As indicated by the results, employees holding tertiary degrees actually experienced a relative *decrease* in their wages between 1985 and 2006 (e.g., the "wage premium" for a higher tertiary degree decreased from 81 to 71 per cent between 1985 and 2006).<sup>5</sup> In the light of stagnating levels of educational expansion since the

<sup>3</sup> While the reported coefficients are estimated net of the impact of various individual and job-related characteristics, it is important to note that the models do not control for occupational class. Since highly-educated persons are more likely than persons with a low level of education to work in higher class positions, controlling for class substantially reduces the effect of (higher) education on wages.

<sup>4</sup> Here, a more detailed analysis of changes in the returns to specific skills (computer skills, non-cognitive skills etc.) would be a valuable additional test of the SBTC-thesis. However, due to limitations in the data such an analysis cannot be done using the SOEP.

<sup>5</sup> These findings are in line with those of Boockmann / Steiner (2006), but contradict the results of Bellmann / Gartner (2003) or OECD (2006), who report increasing returns to education for the highly skilled. The decrease in the returns to education is even more pronounced if occupational class is also controlled for (results not shown).

mid-1990s and corresponding small changes in the supply of highly-educated persons (OECD, 2008), the data do not support the notion of a sharp increase in demand for highly-qualified workers. Moreover, relating these findings to the observation of an increase in overall wage inequality, it becomes obvious that decreasing wage differentials between educational groups cannot account for a rise in overall wage inequality. Thus, these results are clearly in contrast to the results found for other western countries, especially the U.S. and the U.K. (e.g. Autor et al., 2006; Goos / Manning, 2007).



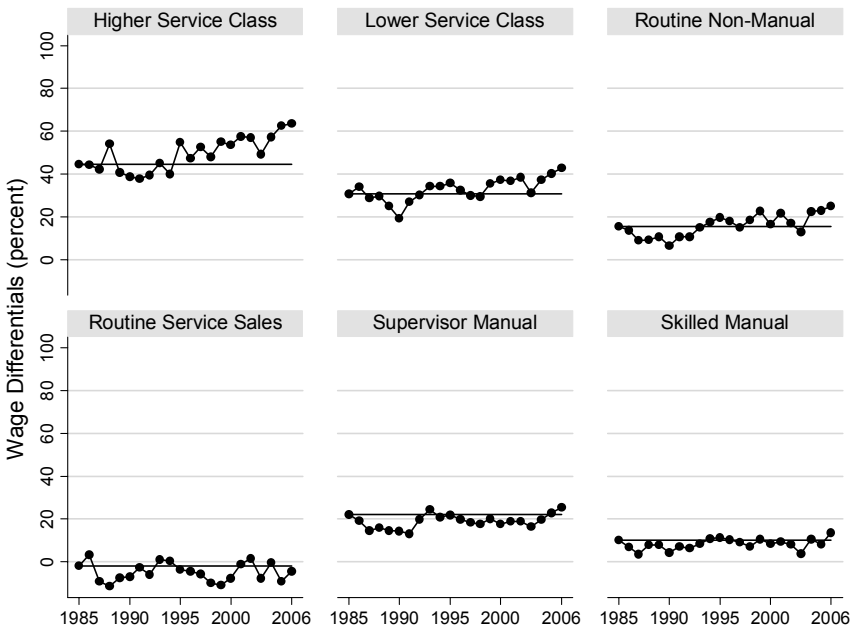
*Source:* Authors' calculation based on SOEP 1985–2006 data; reference category: inadequately completed education / general elementary school; model controls for age, nationality, number of children in the household, family status, unemployment experience during the previous 12 months, tenure, type of contract (fixed-term, part-time), civil servant status, industry, public sector, and firm-size.

Figure 1: Changes in wage differentials – education

In a second step, we investigated the development of wage differentials between occupational classes over the observational period. The estimated and transformed coefficients for six classes are displayed in Figure 2, the reference category being “semi-/unskilled workers”.<sup>6</sup> The findings underline the importance of an individual's class position for his earnings opportunities (e.g.

<sup>6</sup> Since in our data the class of “farm labourers” consists of only a few observations, we do not show results for this occupational class.

DiPrete et al., 2002; Esping-Andersen, 1993). There are substantial wage differentials between classes that cannot be explained by differences in the average level of education, age, firm-size etc., as these characteristics are controlled for in the models. High wages are particularly found among the service classes and the routine non-manual occupations. For example, in 1985 men in the higher service class earned wages that were on average about 45 per cent higher than wages of semi- and unskilled workers. Moreover, with respect to changes in the wage distribution, the results show that wage differences between classes have substantially increased over time. The findings suggest that especially the wage advantages for higher occupational classes have increased. For example, the 45 per cent wage premium for members of the higher service class in 1985 increased to about 64 per cent in 2006. On the whole, the results clearly indicate an increase in wage inequality between classes, mainly between the upper (non-manual) and the lower (manual) classes. Since this pattern resembles the trends in overall wage inequality, class can be inferred to be an important source of the increase in wage inequality starting from the mid-1990s.



Source: Authors' calculation based on SOEP 1985–2006 data; reference category: semi-/unskilled manual workers; results for farm labourers not shown; model controls for educational level, age, nationality, number of children in the household, family status, unemployment experience during the previous 12 months, tenure, type of contract (fixed-term, part-time), civil servant status, industry, public sector, and firm-size.

Figure 2: Changes in wage differentials – occupational class



It is important to note that these results are “net of” individual and job-related variables *and* “net of” educational effects, which are controlled for in the models.<sup>7</sup> Thus, the increasing wage inequality between classes cannot be attributed to factors such as education, age, industry or firm-size. Furthermore, to the extent that education is understood as a proxy for skills, our findings thus suggest that the increase in wage inequality is driven by class effects that are not attributable to the underlying nexus of skills and positioning in the labour market. Therefore, skill-biased technological change does not seem to be the major explanation for the increase in wage inequality in Germany. There are good reasons to believe that other mechanisms have driven this increase. As shown by Weeden et al. (2007) for the U.S., higher occupational classes appear to have been especially successful in securing social closure, thereby raising their already high wage levels even further. Our results for the German case point to similar conclusions.

## 5. Conclusion

For a long time, the German wage structure was believed to be highly stable, especially when compared to the developments in other western societies like the U.S. or Great Britain. However, the results of this paper as well as those of other recent research show that wage inequality in Germany has substantially increased since the mid-1990s. This increase is characterised by a negative growth in lower-level wages and a corresponding increase in median and higher-level wages.

Based on SOEP data for the male labour force of West Germany between 1985 and 2006, the goal of this contribution was to discuss to what extent this process has been driven by growing wage differentials between educational groups and/or between occupational classes. Theoretically, as suggested by the debates on skill-biased technological change and structural theory, we expected that both education and occupational class have been major sources of the increase in wage inequality. Empirically, the results of wage regressions estimated on a yearly basis reveal that wage differentials between highly-educated and workers with a low level of education have actually decreased over the observational period. At the same time, wage differentials between occupational classes have increased, meaning that wages of lower classes have decreased relative to those of higher occupational classes. These findings suggest that a structural explanation of the rise in wage inequality turns out to be more appropriate than a SBTC-based explanation of recent wage dynamics. It remains an open question as to what extent this can be shown for other countries as well.

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<sup>7</sup> Since returns to (higher) education have been decreasing, the estimated wage differentials between occupational classes turn out to be smaller than those displayed in Figure 2 if educational level is *not* controlled for in the model (results are not shown).

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