Pay Inequalities and Economic Performance

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Pay Inequalities in Germany
A Review of the Literature

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1. Introduction

Due to a lack of individual and firm level data, wage structures in Germany were “terra incognita” until the mid 1980s, when the “German Socio-Economic Panel” was made available to the scientific community. The GSOEP is a longitudinal micro-database containing socio-economic information on more than 6,000 private households in East and West Germany. In addition to standard demographic information the GSOEP questionnaire also contains a number of objective measures (education, wages, incomes, transfer payments, weekly working hours, tenure, firm size and industry, etc.) and subjective measures (levels of satisfaction with various aspects of life, political involvement, etc.) of the German population (Burkhauser, Kreyenfeld and Wagner 1997, Wagner, Burkhauser and Behringer 1993).

The first wave of GSOEP data was collected in 1984 in the old Federal Republic of Germany and included 12,245 respondents in 5,921 households. All persons in a household aged 16 and over were interviewed. Each year since 1984, the GSOEP has attempted to reinterview original sample members who have not left the country. A new generation of panel children is brought into the panel as they reach the age of 16 and are interviewed. Moreover, new people are surveyed when they join one of the original panel households. A major expansion of the GSOEP was necessitated by the re-unification of Germany. In June 1990, one month before the official July 1, 1990 date for monetary, economic and social union, the GSOEP fielded a first wave of a new sample of the German Democratic Republic to parallel the West German sample. The new sample originally included 4,453 adult respondents in 2,179 households.

The attrition rate has been relatively low in the GSOEP. Through eight waves (1984-1991) 68% of the original West German panel respondents have longitudinal records without missing years. By wave 16 (1999) 51% of the original panel members still continued to have longitudinal records with no missing years. The 1995 version of the East German SOEP (wave 6) still contains 78% of the original panel members with complete longitudinal records while in wave 10 (1999) the respective share was 66%.

The so-called “ALLBUS” (German General Social Survey; part of the “International Social Survey Program” (ISSP)) was started in 1980 with the goal of collecting and distributing data on attitudes and behavior, as well as on the social structure of the German population (Terwey 2000). The ALLBUS surveys have been conducted bi-annually with the exception of an additional baseline survey in 1991 shortly after the re-unification of Germany. The individual data sets consist of independent random samples drawn from respondents living in private households who are at least 18 years old, i.e. the series of ALLBUS-surveys does not constitute a panel. The number of respondents varies between 3,000 and 3,500 per survey. Apart from a number of questions on subjective attitudes, opinions, values and specific activities (for a detailed list see Terwey 2000), the questionnaires ask for demographic information on age, gender, education and income. Moreover, education and occupation of the respondents parents is also asked for. A cumulative file comprises all ten ALLBUS-surveys from 1980-1998. It has a total of nearly 35,000 respondents and more than 800 different variables. Unfortunately, the data set has major shortcomings that limit its use for empirical studies of pay inequalities: First, a high percentage of respondents do not report their earnings (see De New and Schmidt 1994). Second, only net earnings are available. This, in turn, causes serious problems because the “tax wedge” (the difference between gross and net monthly wages) is influenced by marital status, spouse’s income and the number of de-
pendent children. Finally, the sampling scheme is not known and, consequently, weighting factors are not available.

Finally, in the mid 1990s a further data set has been released that is based on a 1% random sample of all social security records that are archived by the Federal Labor Office in Nürnberg (“IABS”, for a description see Bender et al. 1996). The data set covers a period of 16 years (1.1.1975-31.12.1990) and contains annual information on about 200,000 individuals (420,000 individuals altogether) that can be used as a panel. Contrary to survey data like the GSOEP or the ALLBUS, where inconsistencies are likely to occur and sometimes difficult to correct, these process produced administrative records are highly reliable: On the one hand, the information provided constitutes financial obligations to employers (i.e. in the form of contributions to old age, health and unemployment insurance) and legally enforceable claims to employees. Therefore, it is very likely that the information given to the Federal Labor Office has been checked carefully by more than just one party. Irrespective of these advantages, the data set has certain shortcomings that may limit its use for studies of income inequality. On the one hand, contributions to social security depend on the amount of money earned. Therefore, the data set does not include low wage earners (i.e. persons who earned less than 470 DM per month in 1990). Moreover, persons receiving an income above a certain threshold (6,300 DM per month in 1990) are included in the data set only with that maximum amount. This, in turn, reduces the variance in observed earnings to an unknown extent: While the truncation to the left of the distribution is known (wages below the social security minimum, that is increased annually, are excluded), the extent of the truncation to the right can only be estimated. On the other hand, the information that is available on individual wage earners is rather limited. The data set includes gender, age, nationality, education, occupation, beginning and end of an employment spell, working time (dummy for full- vs. part-time), firm size and sector (3-digit-code). A final caveat of the sample is that it does not include civil servants and unpaid family members working in small family businesses (overall, the register – and, therefore, also the sample covers almost 80% of total employment in West Germany).

In terms of sample representativeness, the quality of earnings data, and the availability of other relevant information, the GSOEP and the IABS are clearly the most appropriate data sources for the analysis of (changes in) earnings inequality. While the GSOEP has been widely used since it became available in 1986, the IABS has not yet attracted as much attention in the scientific community. Since sampling schemes and the way earnings information is collected differ substantially between the GSOEP and the IABS, they should be used as complements rather than substitutes1.

Aside from the very large sample size the main advantage of the IABS is its supposedly reliable earnings data. Employers are legally requested to report earnings of their employees covered by the social security system. This information, in turn, is used for the calculation of old age pensions. In contrast, earnings information in the GSOEP is voluntarily provided by the respondents. This implies substantial non-response and frequent “rounding” of earnings at particular amounts (i.e. monthly earnings of 3,000 DM,

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1 Alternative data sources used in some of the more recent empirical studies have major shortcomings: In the “micro census” (Mikrozensus) earnings are coded in rather broad categories and income from sources other than income cannot be identified. The “income and consumption survey” (Einkommens- und Verbrauchsstichprobe) is very expensive to obtain, has very limited information on human capital variables, excludes foreigners living in Germany and is not up to date (the latest year available is 1988).
3.500 DM, 4.000 DM an so on). On the other hand, the IABS has certain disadvantages compared to the GSOEP: First, there is no information on working hours, only a full-time/ part-time distinction is available. Second, reported earnings include fringe benefits, and there is no way to distinguish them from “normal” earnings. Third, as mentioned above, earnings in the IABS are right censored at the social security threshold, i.e. the amount of earnings up to which social security contributions have to be paid. Earnings exceeding this threshold are only included with the threshold level, i.e. it is not known to what extent they exceed the social security maximum. In general, the proportion of right censored cases is about 10%. However, in some skill groups, such as university graduates, the percentage share comes close to 60%. This poses a serious problem for the interpretation of standard inequality measures. These problems notwithstanding, the development of median earnings in the two data sets is remarkably similar (see Steiner and Wagner 1996: 7).

In 1993 the “IAB-Establishment Panel” was started in West Germany; in 1996 the survey was extended to firms in East Germany. The basis for the panel is the employment statistics register (see above) of the Federal Labor Office, which is collected via the social insurance procedure introduced in 1973. Every year all employers have to report changes in the number of their employees who are subject to compulsory social security (there are legal sanctions for misreporting).

The unit of the survey is the establishment, not the company as a legal and commercial aggregate (Kölling 2000). By “establishment” the researchers mean the local unit in which the activities of a company (production of goods and/or services) are carried out. The establishment is considered the adequate level of analysis because personnel decisions are usually made here. At the same time, most of the data to be collected (turnover, wages and salaries, working hours, further training, etc.) are immediately available to the respondents.

From those establishments included in the employment statistics register a stratified random sample is drawn using selection probabilities which depend on the variation of the number of employees in the respective stratum (16 industries and 10 firm size classes are considered). Since the size classification leads to more heterogeneous establishments with respect to the number of employees, the selection probabilities increase with the size of establishments. The overall and most of the size-specific response rates in 1993 were above 70% (with the exception of very small firms with 1-4 and 5-9 employees respectively, where the response rates were 67% and 64%). The response rate of repeatedly interviewed establishments always exceeded 80% - a value that is considered quite high compared to other establishment surveys. During the first years, the number of participating units developed as follows: 4,265 (1993), 4,139 (1994) and 4,096 (1995). The East German establishment panel started with 4,313 units in 1996. Since sample sizes have been increased in subsequent years, the number of establishments in 1999 was 4,427 (West) and 5,335 (East; 9,762 overall). It is expected that the number of establishments surveyed will have increased to approximately 13,000 in the year 2000.

The panel’s goal is to provide detailed information on the “demand side” of the labor market. Therefore, the questionnaires ask for the size and the structure of a firm’s staff, for changes in employment, initial and further training, working time arrangements, wage and salary bills, fringe benefits, establishment structures and policies (change management etc.), business development and investments. Other topics (i.e. contacts
with the Federal Labor Services, use of public employment subsidies, ec). Are being asked every second or third year only.

Contrary to the individual data sets mentioned above that are accessible to academic researchers, the IAB-panel is not accessible due to German data protection legislation. It is, however, possible to approach the “IAB-Establishment Panel Data Service (IPDS)” asking for specific analyses of the data. The codebook and the questionnaires are available upon request, as is test data that mimics the structure of the original survey and enables the researcher to create a syntax file that fits his/her individual wishes. This syntax file can be send to the IPDS, where it will be run on the original data. Afterwards, the standard data protection rules are employed to control the outcome. If the results to not violate the data confidentiality laws, they are conveyed to the researcher outside the IAB.

Currently, the IAB tries to link its panel data with information from the employment statistics register. This will give the first linked employer-employee data set in Germany that has the quality of panel data which, in turn, will enable researchers to study labor supply and labor demand factors simultaneously.2

2. The Development of Earnings Inequality since the 1980s

International comparisons usually portray Germany as one of the few developed market economies where earnings inequality has not increased in the 1980s and 1990s. This development is often cited as an explanation for the poor employment performance of the German as compared to the US- or the UK-labor market (in the latter two countries, earnings inequality has markedly increased during this period). Most often, changes in the demographic structure of the labor force, international trade with low-wage countries and the introduction of labor-saving technologies are used as alternative explanations in the literature. Since these factors have affected all economies with similar demographic developments and exposure to international competition in more or less the same way, one would have expected to observe their labor market effects in Germany as well.

Conventional wisdom holds that these factors have been accommodated by different price and quantity adjustments in the three countries: While they have changed the wage structure in the US and the UK, they have led to employment adjustment in Germany. These differences, in turn, are usually explained by a greater importance of institutional rigidities, such as restrictive labor law regulations, strong industry unions and generous income support schemes in the latter country.

2 A second firm panel - the “Hannover Panel” - is not accessible to researchers outside the University of Hannover. It has four waves (1994-1997) and has been financed by the Volkswagen Foundation. The survey population is all manufacturing establishments with at least five employees in Lower Saxony. Sampling is stratified by firm size and industry with a response rate of 51%. In the first wave, 1,025 firms participated, in the last wave, this figure had dropped to slightly more than 600 (for a description see Brandt et al. 1998).

A third firm panel (the “NIFA-Panel”) is confined to the German machine tools industry. During the years 1991-1998 about 1,700 firms were interviewed annually (giving a response rate of 25-30%, because the industry consists of about 6,000 firms). Since the panel has been financed by the “German Science Foundation”, the data is available to academic researchers at a very low cost. However, the questionnaires never asked for wages and salaries (see Widmaier and Hauptmanns 1996). It merely concentrated on the organization of work and production, on change management, personnel training and turnover, and technical equipment and its change. Frick (2001) used the panel to study the influence of some “high performance work practices” on (changes in) firm performance.
A number of papers have recently been published that seek to analyse the development of earnings income inequality in East and West Germany since the mid 1980s. It appears that earnings inequality has indeed remained more or less constant. Since this finding has been produced in studies based on different data sources and employing different strategies to define the groups of employees under consideration, it became virtually a “stylized fact” in the meantime (for a comparison with the US see also Burkhauser, Holtz-Eakin and Rhody 1997).

Table 1
The Development of Earnings Inequality in Germany (Gini Coefficients, 1984-1996)

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>West Germany*</td>
<td>West Germany**</td>
<td>East Germany**</td>
</tr>
<tr>
<td>1984</td>
<td>0.2049</td>
<td>0.2774</td>
<td>-</td>
</tr>
<tr>
<td>1985</td>
<td>0.2109</td>
<td>0.2642</td>
<td>-</td>
</tr>
<tr>
<td>1986</td>
<td>0.2065</td>
<td>0.2667</td>
<td>-</td>
</tr>
<tr>
<td>1987</td>
<td>0.2057</td>
<td>0.2625</td>
<td>-</td>
</tr>
<tr>
<td>1988</td>
<td>0.2033</td>
<td>0.2617</td>
<td>-</td>
</tr>
<tr>
<td>1989</td>
<td>0.2040</td>
<td>0.2571</td>
<td>-</td>
</tr>
<tr>
<td>1990</td>
<td>0.2048</td>
<td>0.2572</td>
<td>0.1828</td>
</tr>
<tr>
<td>1991</td>
<td>0.2035</td>
<td>0.2523</td>
<td>0.1971</td>
</tr>
<tr>
<td>1992</td>
<td>0.1999</td>
<td>0.2538</td>
<td>0.1974</td>
</tr>
<tr>
<td>1993</td>
<td>0.2032</td>
<td>0.2613</td>
<td>0.2088</td>
</tr>
<tr>
<td>1994</td>
<td>0.2054</td>
<td>0.2664</td>
<td>0.2112</td>
</tr>
<tr>
<td>1995</td>
<td>0.2033</td>
<td>0.2762</td>
<td>0.2146</td>
</tr>
<tr>
<td>1996</td>
<td>-</td>
<td>0.2577</td>
<td>0.2020</td>
</tr>
</tbody>
</table>

* Full-time employees (men and women, no apprentices) only (sample sizes: 2.929 - 4.375 persons (source: GSOEP)).
** Total population (residents of East and West Germany respectively, no information on sample sizes (source: GSOEP)). Steiner and Puhani (1996) also document a rapid increase in earnings inequality in East Germany immediately after unification.
*** Full-time male employees (no apprentices) under 66 years of age (sample sizes: 101.013 - 106.806 (IABS) and 2.239 - 2.486 (GSOEP)). Since the IABS-data is right censored, the same truncation has been applied to the GSOEP-data. Using the data without that truncation, Steiner and Wagner (1996) calculate figures that are virtually identical to the the ones reported by Grund (1998a).

There are, of course, various measures to describe the development of earnings inequality over time. Summary measures, like the Gini coefficient, can detect overall changes in the distribution of earnings. For a given change in inequality, the various measures do not necessarily give identical results, because they depend on the part of the distribution where the change occurs. Inequality measures that explicitly take into account changes in different parts of the earnings distribution are percentile ratios. These ratios, however, corroborate the Gini coefficients, i.e. they too have remained more or less constant during the 1980s and 1990s (see also Abraham and Houseman 1995). The only exception is a study by Hamermesh (2001) who documents little change in the left tail of the earn-
ings distribution while simultaneously the right tail stretched out rapidly during the 1990s.

One important aspect of the earnings distribution that has been neglected in recent research is whether monetary fringe benefits lead to a more unequal distribution (i.e. because they are positively correlated with gross monthly wages) or whether low paid workers are compensated by disproportionately generous fringe benefits (i.e. pay and benefits are negatively correlated). Using data from waves 11-12 (1994-1995) of the GSOEP, Frick, Frick and Schwarze (1999) and Frick, Bellmann and Frick (2000) show that fringe benefits increase disproportionately with gross hourly wages.\(^3\)

### Table 2
Hourly Wages and Fringe Benefits in Germany 1995

<table>
<thead>
<tr>
<th>Earnings Quintile</th>
<th>Gross Hourly Wage DM</th>
<th>Gross Fringe Benefits per Hour DM</th>
<th>Gross Fringe Benefits per Hour in %*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>14,76</td>
<td>0,76</td>
<td>100</td>
</tr>
<tr>
<td>II</td>
<td>19,84</td>
<td>1,17</td>
<td>154</td>
</tr>
<tr>
<td>III</td>
<td>23,22</td>
<td>1,78</td>
<td>234</td>
</tr>
<tr>
<td>IV</td>
<td>27,83</td>
<td>2,32</td>
<td>305</td>
</tr>
<tr>
<td>V</td>
<td>41,85</td>
<td>4,37</td>
<td>575</td>
</tr>
</tbody>
</table>

* gross hourly wage (gross hourly benefits) in % of average wage (average benefits) in lowest quintile
** gross fringe benefits per hour in % of wage per hour

Moreover, the percentage of workers eligible for fringe benefits increases from 82% in the lowest quintile to 91% in the highest quintile. The percentage of workers legally entitled to benefits from a pension plan operated by their current employer increases from 5% in the lowest quintile to 54% in the highest one (quintile II: 16%; quintile III: 25%; quintile IV: 42%). Thus, if one looks at gross earnings only, a significant part of earnings inequality does not show up (the coefficient of variation of gross hourly wages is 45% in the sample under consideration, but 117% in the case of fringe benefits). Therefore, one of the next steps to be taken is to calculate inequality measures for wages including fringe benefits. It is very likely that such an exercise reveals an increase in inequality, because fringe benefits have grown faster than gross wages during the last 10-20 years.

The argument that wage compression has cut off low skill jobs, particularly in the German service sector, has recently been challenged by Freeman and Schettkat (2000a, 2000b, 2000c). They argue that a plausible explanation for the difference between the US and the German wage structure is that the distribution of skills may be more compressed in Germany than in the US: If less skilled workers were more skilled in Germany than in the US while German and American skilled workers were similarly qualified, some of the narrow dispersion of wages in Germany could be attributed to the compression of skills. Using a large data set (the “Comparable German American Sectoral Database” (GCAS)) with data not only on employment and wages of workers in comparable industry and occupation cells for the period 1970-1995, but also with information on literacy skills from the OECD’s “Adult Literacy Survey” they reach the

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3 The figures in Table 2 have been calculated for male and female employees aged 20-55 years working full-time in the private sector (n=2,225).
following conclusions⁴: First, measured in equivalent skill units or literacy scores, Germany has a more skilled workforce than the US, with a more compressed distribution of skills. This is a somewhat surprising finding, because the “traditional” view (supported by data on average school attendance) suggests that German workers have fewer years of (formal) education. Second, the principal difference in skills between American and German workers occurs in the bottom rungs of the skill distribution, where Americans have much lower literacy skills than Germans (this is even true when one looks only at native-born Americans and excludes the immigrant population). Third, jobless Germans have comparable skills to employed Germans and to Americans in the middle of the skill distribution, while jobless Americans have lower skills than employed Americans. Fourth, these findings notwithstanding, the narrower distribution of skills in Germany – as compared to the US – explains only a modest proportion of the lower dispersion of wage, leaving a considerable role for institutional factors in compressing the German wage structure⁵.

3. The Determinants of Pay Structures and Pay Inequality

3.1. Individual Characteristics

Following Mincer’s (1974) seminal publication on the estimation of “earnings functions” (which has been termed “…one of the great success stories of modern labor economics” (Willis 1986: 526)), a still increasing number of studies using different data sets and employing different methodologies tries to isolate the impact of schooling and (further) training (i.e. of “general” and “specific” human capital) on the level as well as the development of individual earnings (for a summary of the evidence see Psacharopoulos 1985; Wagner and Lorenz 1992; Lorenz and Wagner 1993; Blanchflower and Oswald 1990a and – most recently – Card 1999 and Becker 2000). As for Germany, all data sets described above have already been used; the results of the studies quoted in Table 2 indicate the range in which the estimated rates of return vary (due to differences in the period under investigation, the population of wage and salary earners; the age and sex composition, etc.).⁶

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⁴ The underlying sources of the data in the CGAS database are the US Census of Population and the Current Population Survey on the one hand and the German “Mikrozensus” and the IABS described above. The CGAS classifies workers in the two countries in into comparable occupations (n=95) and industries (n=65). Within industry and occupation it contains cells based on wages, age, sex, education, and nationality rather than observations on individuals (information that is not accessible for Germany due to data protection legislation). Thus, the final data set consists of hundreds of thousands of cells which allow for detailed empirical analyses of wage and employment growth differentials.

⁵ Moreover, Freeman and Schettkat (2000c) find that the job deficit in the (low wage) German service sector is neither due to high reservation wages nor to high labor costs. Surprisingly, low wage service industries are further below the national average in Germany than in the US and low wage service industries employ proportionately more skilled workers in Germany than in the US. Perhaps most surprising is the finding that the differing dispersion of wages between the US and Germany can not explain the observable differences in unemployment (Freeman and Schettkat 2000a).

⁶ Moreover, a number of studies use dummy variables for different educational levels. Since the estimated coefficients cannot be interpreted as rates of return (for an interpretation of dummy variables in semi-logarithmic wage equations see Halvorsen and Palmquist 1981), and since their findings are not very much different from the ones presented here, they will not be discussed in detail (see Licht and Steiner 1992; Grund 2000; Georgellis and Lange 1997; Dustmann and van Soest 1997; Lauer 2000; Beblo and Wolf 2000).
Table 3
The Impact of Schooling, Experience and Tenure on Earnings in Germany*

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Data</th>
<th>Rate of Return</th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bellmann and Möller (1995)</td>
<td>IABS 1974, 1979, and 1984; n &gt; 100,000</td>
<td>7.3% - 7.7%</td>
<td>3.5% - 5.1%</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Lorenz and Wagner (1993)</td>
<td>Luxemburg Income Study 1981, n=1,359</td>
<td>6.2%</td>
<td>2.8%</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Knoll and Störk (1993)</td>
<td>GSOEP 1984, 1988, and 1991; n &gt; 3.600</td>
<td>3.8% - 6.2%</td>
<td>2.9% - 3.1%</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Blanchflower and Oswald (1990)</td>
<td>ALLBUS 1986, n=1,855</td>
<td>3.1%</td>
<td>7.7%</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Gerlach and HübLer (1998)</td>
<td>GSOEP 1984 - 1993, n &gt; 2,150</td>
<td>3.6% - 4.4%</td>
<td>1.9% - 2.5%</td>
<td>0.04% - 0.06%</td>
<td></td>
</tr>
<tr>
<td>Winkelmann (1996)</td>
<td>GSOEP 1984 – 1990, n &gt; 1,600</td>
<td>4.2% - 5.6%</td>
<td>3.6% - 4.3%</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Wagner (1991a)</td>
<td>BIBB 1979 and 1985, n &gt; 11,000</td>
<td>5.6% - 7.0%</td>
<td>2.6% - 3.0%</td>
<td>0.005% - 0.007%</td>
<td></td>
</tr>
<tr>
<td>Gerlach and Schmidt (1989)</td>
<td>GSOEP 1984 - 1987, n = 604 – 2,252</td>
<td>6.7% - 7.6%</td>
<td>1.4% - 2.4%</td>
<td>0.002 – 0.01%</td>
<td></td>
</tr>
</tbody>
</table>

* Schooling measured in years necessary to obtain given degree.

As Table 3 shows, rates of return to schooling vary considerably from a low 3.1% to a high 7.7%. The variance in the rates of return for experience is even higher (they range from 1.9% - 7.7%). The returns to tenure, although always statistically significant, are much lower.

Practically all of the studies that estimate Mincer-type earnings functions do so by using the OLS-method. This, however, may cause specific problems: First, a bias may occur when unobserved individual heterogeneity is not accounted for. If individual effects do

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7 Boockmann and Steiner (2000) and Lauer and Steiner (2000) show that for females the returns to schooling have significantly declined (from 12% for an additional year of schooling for the cohort born 1945-1949 as compared to women born between 1970 and 1974) while such a decline cannot be observed for males. Nevertheless, the observable reduction in the male-female wage differential between 1984 and 1997 is mostly due to the fact that women have increased their endowment of human capital (see Lauer 2000).

8 Beblo and Wolf (2000: 14, 25) show that earnings functions that do not control for the depreciation of human capital while not working underestimate the returns to effective (instead of potential) experience. This finding occurs irrespective of how the dependent variable is defined (gross hourly wage including or excluding fringe benefits per hour).

9 Schmidt (1995) finds that refined measures of an individual’s human capital, such as the grades obtained in mathematics and German during the last year at school, also have a significant influence on individual earnings (without, however, reducing the influence of the more “traditional” human capital variables).

10 Experience and tenure also explain much of the observed variation in hourly fringe benefits (see Frick, Frick and Schwarze 1999: 20-21). Comparing the standardized regression coefficients of a standard wage equation and a benefit equation, it appears that their influence on benefits is considerably stronger than their impact on wages (see also the comparable findings reported by Jirjahn and Stephan 1999, who used data from administrative records on some 40,000 employees working in about 1,300 firms in Lower Saxony in 1990 and 1995).
exist and if they are correlated with the observed control variables, then the effects of heterogeneity may be falsely attributed to the control variables, leading to biased coefficient estimates. A usual practice to circumvent this problem is to allow the individual effects to be correlated with the explanatory variables in the wage function. However, estimating “fixed effects models” does not really solve this problem, because endogenous variables that do not change over time disappear from the regression. Since schooling is a constant in most cases and (potential) experience is incremented each year by one, fixed effects panel estimation does not seem to be an appropriate way to deal with the problem of unobserved heterogeneity. It is, therefore, advisable to use the OLS estimator and to reduce unobserved individual heterogeneity by including a large number of control variables.

Second, estimation by OLS assumes that the explanatory variables are all exogenous. If this is not the case, then again the estimates may be biased. One way to correct for this bias is to apply a two-stage instrumental variables procedure, where the instrumental variable is first regressed on a set of explanatory variables and then instrumented by its predicted value in the second-stage earnings function. This procedure requires variables that affect the endogenous variables without directly affecting earnings. Given the number of potentially endogenous variables, correcting for endogeneity would complicate the estimates considerably. Moreover, the lack of convincing instruments renders the results rather sensitive to the choice of variables and casts serious doubts on the usefulness of such an approach.

Third, a further type of bias may arise if the sample used is not representative of the population the researcher is interested in, i.e. if only individuals with some specific characteristics enter the sample. In the context of earnings inequality, an individual’s decision to work determines whether wages are observed in the data or not. If the factors determining this decision were random and uncorrelated with the factors that determine wages, the fact that wages are not observed for all individuals could simply be ignored. However, such an assumption would be rather heroic: Individuals working full-time are most likely a self-selected group whose wages are representative of all individuals with observable characteristics. In order to test for sample selectivity, the usual Heckman procedure may be applied. A selectivity correction term, the inverse Mill’s ratio, is computed from a reduced form probit equation of labor force participation which is then included as an additional regressor in the earnings equation. If this correction term is statistically significant and alters some or all of the other coefficients, this indicates that omitting to correct for selectivity would bias the estimates. This, however, again requires the availability of convincing instruments that determine the propensity to work but do not have a direct impact on earnings. Using the GSOEP 1984-1997, Lauer and Steiner (2000) show, that although the inverse Mill’s ratio is likely to be statistically significant, it usually leaves the other coefficients unchanged. Moreover, since most of the available studies estimate earnings equations only for men, the selectivity problem is less likely to occur due to the high participation rate especially of prime age males.

Summarizing then, the importance of the potential biases should not be exaggerated. Especially in longitudinal studies the biases should be of minor importance because they are likely to be rather constant over time.
3.2. Firm Characteristics

There is much evidence from various countries that large firms pay more than small firms, that the size-wage effect is substantial and that it has increased in recent years (for an overview see Brown and Medoff 1989 and – more recently – Oi and Idson 1999). Apart from a few notable exceptions, research in Germany has only recently addressed the firm size-wage relationship. Brüderl and Preisendörfer (1986) use individual cross-sectional data from the so-called “Worker Income Survey” 1980/81 (“Arbeitseinkommensumfrage”) and run income regressions with a set of traditional human capital variables and a firm-size dummy (less than 49 employees vs. 50 and more employees). Controlling for sex, education, experience and weekly working hours, plant size has a positive and significant impact on wages, with the female coefficient being twice the size of the male coefficient$^{11}$.

In a series of papers, Gerlach and Schmidt (1989, 1990), Gerlach and Hübler (1995, 1998) and Schmidt (1995) analyze whether the well documented firm-size wage differentials have changed over time. Moreover, they elaborate on the earnings effects resulting from the mobility of labor between firms of different size classes. Using the first ten waves of the GSOEP (1984-1993) Gerlach and Hübler (1998) show that – after controlling for schooling, experience, tenure and sex – firm size wage differentials have significantly increased over the period under investigation. According to their estimates, observationally identical workers who are employed in small firms (less than 20 employees) earned 9% less in 1984 and 13% less in 1993 than workers in the reference group (firms with 20-199 employees). On the other hand, workers in firms with more than 2,000 employees enjoyed 8% higher wages in 1984 and 14% in 1993$^{12}$. Furthermore, the analysis shows that in large firms the rate of return to schooling was higher in 1993 than in 1984 while in the other size classes the opposite development can be observed. At the same time, the average level of schooling has increased in large firms while no similar trend is discernible for small and medium-sized firms, i.e. it is only the largest firms that attract increasingly more qualified workers. Both findings together suggest that working in an environment with high qualification and long tenure is beneficial even to those who are themselves less qualified. Controlling for voluntary and involuntary job mobility (number of previous employers and number of previous unemployment spells) it appears that employees originating in small firms and moving into larger ones do not attain the same wage level as persons with comparable attributes who have a longer employment record in large firms. On the other hand, movers from large to smaller firms retain, at least to some degree, the wage advantage of employees in the larger firms of origin. These latter findings are certainly incompatible with the “gift-exchange variant” of efficiency wage theory, which stresses the importance of “fairness”.

Since unobserved characteristics which are relevant for productivity could vary systematically across firm sizes and conduce to the observed firm size-wage differential, it is necessary to control for this possible heterogeneity by estimating fixed- and/or random-effects models. The findings of such an exercise (see Gerlach and Schmidt 1989, 1990) show that unobserved individual characteristics do indeed play a role (the fixed effects

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$^{11}$ Using a different data set Schmidt and Zimmermann (1991) reach a similar conclusion. However, their estimates are problematic insofar as they use net (and not gross) monthly wages.

$^{12}$ In the third size class (200-1,999 employees) wages are not significantly different from those earned by workers in the reference group.
model is to be preferred while the random effects model proved to be inappropriate). Nevertheless, the coefficients of the firm-size dummies remain significant and their magnitude is not decreased.

Since gross monthly wages constitute only part of the total remuneration of workers, it is possible that including payments for vacation, Christmas bonus, social security contributions, workers’ profit share, etc. reduces the firm size wage differential. This will be the case when monetary fringe benefits are negatively correlated with firm size. Using (the natural log) of total remuneration as their endogenous variable, Gerlach and Schmidt (1989, 1990), show that the firm size coefficients not only remain significant, but that the size-wage differential increase. On average, the difference between workers’ earnings in very small (1-19 employees) and very large (2,000 and more employees) firms amounts to 17-20 percentage points for men and 29-32 percentage points for women.

Moreover, the size-wage differential may serve as a compensating differential, i.e. workers in large firms may earn more than observationally similar workers in small and medium-sized firms because of their more unpleasant working conditions. This hypothesis too has been tested by Gerlach and Schmidt (1989, 1990) as well as by Grund (2000). While the former papers test the influence of a series of dummy variables describing conditions and characteristics of work and of the job (i.e. physical hard work, nervous tension, noise, unpleasant working times, etc.) the latter uses the individuals’ answers to the question whether they “are exposed to an increased risk of work related accidents” (with the three possible categories “fully applies”, “partly applies”, “does not at all apply”)\(^\text{13}\). Using data from the 12\(^{\text{th}}\) wave of the GSOEP (1995, \(n=2,460\)), Grund (2000) estimates a standard earnings function showing that other things equal male full-time employees are indeed compensated for their readiness to work in dangerous jobs\(^\text{14}\).

Controlling for job hazards, however, does not at all reduce the firm size-wage differential: Irrespective of the specification of the equation, employees in small firms (1-5 employees) earn about 20% less than those working in large firms (2,000 employees and more). Using data from a different time period (1985 and 1987) as well as a different set of variables representing an individual’s working conditions Gerlach and Schmid (1989, 1990) conclude that incorporating dummy variables for work characteristics into wage equations does not at all influence the firm size-wage differential neither for men nor for women. Entering three “synthetic variables” extracted from a factor analysis performed on the variables describing conditions and characteristics of work produces some interesting findings: Workers who have a high degree of job autonomy, earn c.p. more than those with a lesser degree while people working in an unpleasant environment earn c.p. less. A last factor, working time, does not influence wages (the results are identical for men and women). With regard to the firm size-wage differential it appears that although work conditions contribute to the explanation in the variation of earnings, they have no noticeable impact on the size-wage relationship\(^\text{15}\).

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\(^{13}\) The studies by Bellmann (1994) and Lorenz and Wagner (1988, 1989) use industry or occupational averages for work related health risks instead of individual perceptions. Due to this methodological problems, these studies will not be discussed here.

\(^{14}\) Not surprisingly, only blue-collar workers and workers in West Germany receive compensating differentials while no such differentials are paid to white-collar workers (who have less risky jobs) and to workers in East Germany (where due to the higher unemployment rate firms can usually fill their vacancies without having to pay a compensating differential).

\(^{15}\) Nearly identical findings are documented by Schmidt and Zimmermann (1989) and Wagner (1991a). The latter study for example reports a significantly negative influence of physically demanding work-
Another reason why large firms pay more to observationally similar workers than small firms may be self-selection of employees: If more productive workers have a preference for working in large firms, estimates that include a number of firm size dummies may be biased. Wolf (1999) using GSOEP-data from East Germany and Schmidt (1995) using the “Qualification and Career Paths” data sets collected in 1979 and 1985 find that adjusted firm size differentials that take into account self selection of workers are much higher than the usual estimates. This implies that on average the more productive employees choose to work in small firms instead of large ones. Thus, if large firms wanted to hire the more productive workers, they would have to pay them significantly more than they pay to their actual workforces16.

4. The Relationship Between Pay and Performance

4.1. Individual Level: Pay, Satisfaction, Job Changes, and Absenteeism

Using data from the GSOEP over the period 1985-1988 (waves 2-5) Winkelmann (1999) matches retrospective information on the number of absent days in the previous year with information on current workplace and individual characteristics in the current year (hourly wage, employment status (blue- vs. white-collar), public or private sector, contract type (fixed term or unlimited), firm size, age, sex, tenure, health and family status). The final unbalanced panel (male workers aged 18-64 years only) has 7,373 observations with 1,217 workers present in all four years. The dependent variable – absence from work – is defined as any non-attendance for reasons other than hospitalization. In the final sample, 54% of all workers report no absence days. The average number of working days lost due to absenteeism is 8 with a standard deviation of 16 (the largest number on absence days is 180). Hence, absence rates vary substantially across individuals, and therefore Winkelmann asks whether absence is systematically related to wages as predicted by the shirking- as well as the “adjustment-to-equilibrium” hypothesis.

Applying multivariate count data regression models (in particular a random effects negative binomial model) he finds that both, job satisfaction and (log) hourly wage reduces absenteeism in a statistically significant and economically relevant way. Apart from that, blue-collar worker, public sector employees, married men, workers in medium-sized and large firms (with more than 200 employees), persons with chronic health problems and workers with unlimited contracts have – other things equal – significantly higher absence rates than those with the opposite individual and/or job characteristics.

Gerlach and Stephan (1996) also use the GSOEP (1984-1993; waves 1-10) to answer the question whether and to what extent wages (household income) influence satisfaction. They restrict their sample to German women and men aged 16-65 who are full-time employees, an unpleasant work environment, shift and night work and a high degree of monotony and a significantly positive influence of a high degree of responsibility on gross monthly earnings. Including these work characteristics into the estimates (male blue- and white-collar workers in 1979 and 1985) does not at all influence the coefficients of the firm size dummies, which are all statistically significant (he distinguishes between seven firm size classes). Schettkat (1993) shows that other things equal job instability is not rewarded by higher wages, but instead goes hand in hand with lower wages.

16 Contrary to the situation in the US and the UK, individual union membership does not have an influence on wages (see Wagner 1991b, Schmidt 1991, Blanchflower and Freeman 1992).
time or regular part-time employees, are unemployed or do not belong to the labor force (therefore one of the endogenous variables is household income instead of individual earnings). The dependent variable – “happiness” or “overall satisfaction with life” is a scale ranging from 0-10 with 0 as completely dissatisfied and 10 as completely satisfied.

Estimating fixed effects models (with individual and time effects) for different age groups (younger than 30, 30-49, 50 and older) separately for men and women, they find that in four out of six regressions, net household income has a statistically significant impact on satisfaction (the exceptions being men and women aged 50 years and more). Moreover, an individual’s satisfaction with his/her health has a strong positive influence on overall satisfaction while unemployed individuals report a statistically significant lower degree of satisfaction (the latter does not hold for women aged 50 years and more)\(^\text{17}\).

Clark, Georgellis and Sanfey (1998) argue that workers, who are more satisfied in their jobs will be more likely to behave in a way that will enable them to keep it, that is work harder or shirk less. Using information on 2,459 male and 2,051 female West German workers (with 10,750 and 7,858 observations respectively) from the first ten waves of the GSOEP they estimate different random effects probit models and show that male as well as female workers who report satisfaction with their jobs are statistically less likely to quit than those who report dissatisfaction (the number of quits was 523 for males and 473 for females)\(^\text{18}\). More surprising, however, is the finding that in the case of men the natural logarithm of real hourly wages in the year preceding the survey has a significantly positive influence on the individual’s probability to quit – a finding that is clearly contrary to the turnover hypothesis in efficiency wage theory (The authors argue that if workers with higher levels of human capital are more mobile, lagged wages may be proxying the part of human capital which is not measured by years of education). This effect disappears if the change in wages between \(t-1\) and \(t-2\) is entered as an additional regressor: Holding the level of pay at \(t-1\) constant, men are significantly more likely to quit out of jobs where the change in wage was low in the most recent past (the coefficient of the lagged wage then becomes insignificant). Clark et al. (1998) argue that standard efficiency wage theory may be missing an important part of worker utility in its concentration on the level of wages, because the rate of change appears to play an important role in both worker satisfaction and subsequent quitting behavior\(^\text{19}\).

Gerlach and Stephan (1994) derive a measure of wage premiums by first estimating a standard wage equation with the usual controls for demographic and human capital variables (such as education, work experience and tenure). They then interpret the residuals of that equation as (positive or negative) wage premiums. The basic idea of their test is that workers with large premiums should be less likely to quit, should be more

\(^{17}\) In a similar analysis, Winkelmann and Winkelmann (1995, 1998) estimate fixed effects logit models using the GSOEP 1984-1989 (n=20,944 in the pooled sample). Aside from the statistically significant negative influence of unemployment and bad health they too find a statistically significant positive impact of (log) net household income on overall life satisfaction (see also Winkelmann and Winkelmann 1995). Hoewever, their analysis is different from the one performed by Gerlach and Stephan (1996) in that they do not use the full information from the satisfaction variable (they rescale it to different dummy variables).

\(^{18}\) In order to examine a fairly homogeneous sample, the authors exclude the self-employed and civil servants as well as persons aged 55 years and above.

\(^{19}\) Although in the case of women the estimated wage coefficients have the correct sign (as opposed to the ones estimated for men), none of them proved to be statistically significant.
satisfied with their jobs, should be less likely to be closely monitored and should have a higher probability to work in jobs that are not monotonous and require their participation in decision-making. They use data from three waves of the GSOEP (1985, 1987 and 1989) with the relevant information on job and workplace characteristics (males outside the public service and agriculture, n > 1,600 in every single year) and interpret the residuals they obtain as a measure of a worker’s cost of losing his job (the latter interpretation is problematic insofar as the procedure is subject to an omitted variable bias, because a number of variables not taken into account may have an impact on wages). The main findings are: First, the residuals are significantly correlated with gross monthly incomes which implies that workers with high wages are more likely to obtain high wage premiums. Second, the vast majority of the coefficients have the negative signs predicted by efficiency wage theory and are statistically significant at conventional levels. Third, the coefficients estimated with the 1985 data are less supportive of efficiency wage theory than the ones estimated using 1987 and 1989 data. This suggests that in a period of high unemployment firms are more reluctant to pay efficiency wages – a finding that is certainly in line with the arguments developed by Shapiro and Stiglitz (1984).

Finally, Frick, Frick and Schwarze (1999) in a study already quoted above show that job satisfaction increases both with hourly wages and with gross fringe benefits. Moreover, fringe benefits reduce personnel turnover while at the same time they increase absenteeism (according to their estimates, hourly wages have no impact on absenteeism or on he quit probability). Surprisingly, a legal entitlement to benefits from a pension plan run by the current employer does not influence job satisfaction, turnover probability or the number of absence days.

4.2. Firm Level: Wages, Pay Systems and Performance

4.2.1. Determinants of Wage Levels and Wage Gaps

Since the two main establishment panels became available, the number of empirical studies trying to identify the determinants of per-capita-wages and salaries has increased rapidly. Since the mid 1980s, when Parsons (1986: 796) criticized the “supply-bias” of empirical labor economics, the situation has changed quite a lot: “… empirical work has lagged behind theoretical developments. Unfortunately, given the scarcity and relative primitiveness of existing employer data sets and the relative subtlety of many of the theoretical implications, this imbalance is likely to remain for some time”.

In a series of papers, Bellmann and Kohaut (1995a, 1995b, 1997, 1999) not only try to isolate the factors influencing per-capita wages, but also try to answer the question, which firms paid higher wages than those agreed upon in collective agreements and how much more these firms usually pay. In 1992, about 72% of all firms in West Germany had to obey to collective agreements stipulating the wage rates for workers of different qualification. Of these, 57% paid higher wages than they had to. The wage gap (i.e. the difference between collectively agreed and effective wages) in that year was 7.6% (basis for calculation: all firms) or 13.4% (basis: only firms paying more than the going rate). In 1997, the percentage of firms that had to obey to collective agreements had dropped to 59% (West Germany) and was even lower in East Germany (41%).

20 Using the IAB-panel and the Hannover panel respectively, Kohaut and Bellmann (1997), Schnabel and Wagner (1996) and Bellmann, Kohaut and Schnabel (1999) try to identify – with practically iden-
The wage gap had dropped to 5.5% (all firms) and 11.4% (firms paying more than the going rate) in West Germany. The respective figures for East German firms are 1.9% and 11.4% (Bellmann, Kohaut and Schnabel 1998). The percentage of firms paying more than the going rate varies considerably between sectors and size classes. In 1997, between 21% of the firms in mining and energy, but 61% of all construction firms in West Germany paid more than they would have obliged to do. The wage gap varied between 8.1% (agriculture) and 11.5% (trade). Looking at different size classes, it appears that only 43% of all small firms (less than 10 employees), but 63% of all medium-sized firms (50-199 employees) and 50% of the largest enterprises (500 employees and more) pay above the going rate (see also Meyer and Swieter 1997).

In a multivariate analysis, none of the firm size dummies, but most of the sector dummies (ten out of thirteen) proved to be significant predictors of the wage gap. Moreover, the percentage of vacancies induces firms to extend the wage gap, while the percentage of part-time employees and the presence of a works council have – other things equal – a negative impact on the wage gap (data base: first wave 1993, n=4,300 firms).

With regard to the average wage (total wage bill divided by number of employees) the findings are rather different: The percentage of qualified employees, the presence of a works council, the existence of a firm operated pension plan, overtime hours (a dummy-variable) and the age of the technical equipment (as a proxy for capital intensity) have a significantly positive impact on per-capita-wages while the percentage of women and part-time employees and the percentage of trainees have a significantly negative influence (separate estimates for private sector firms in East and West Germany show that the magnitude of the coefficients is quite similar).

Surprisingly, only a small number of the industry dummies proved to be significant (6 out of 26 in the estimate for West Germany and 7 out of 26 in the estimate for East Germany). Of the firm-size dummies (n=5; less than 20 employees as reference category) all were significant in the West German estimate, but only two in the East German context (with the coefficients for the two upper size classes (1,000-1,999 and 2,000 and more employees) being insignificant).

Addison, Schnabel and Wagner (1998) as well as Jirjahn and Klodt (1998, 1999) use one or more waves of the Hannover firm panel (see Brandt et al. 1998 for a description) to isolate the determinants of per-capita-wages in manufacturing firms located in Lower Saxony. Based on an unbalanced panel of 861 firms (n=1,888, 1993-1995) and estimating random effects models, the latter two authors find that firms that invest in further training, have a high percentage of workers doing shift work, employ new production technologies, have a works council, have introduced profit sharing for its management (as opposed to its workforce) and export a high share of their production pay – other
things equal – higher wages than otherwise similar firms. On the other hand, a high percentage of part-time and female employees, of apprentices and blue-collar workers and firms that have been founded recently c.p. pay lower wages. In a second estimate based on a smaller sample of firms (n=604 instead of n=861) they can also show that – other things equal – market competition tends to reduce wages while membership in an employers’ association (with the resulting obligation to pay wage rates that employers and union(s) have agreed upon) does not influence per-capita-wages.

Using data from the fourth wave of the Hannover panel (1997; n=711 participating firms) Hübler and Meyer (2000) analyze the determinants of wage differentials between skilled and unskilled blue-collar workers. To measure wage differentials within firms, the respondents were asked the following question: “Can you approximately tell us the difference between the highest effective hourly wage rate of a skilled blue-collar worker and the lowest effective hourly wage rate of an unskilled blue-collar worker in your establishment? Temporary workers should not be taken into consideration”. 617 firms (87%) answered the question, the average wage differential is 38%. Controlling for a number of potential determinants of wage differentials (globalization of the establishment, technical progress, restructuring of the enterprise23, percentage of female employees, employer financed training-on-the-job) they find that, first, union density has no influence on the internal wage structure. Given the institutional setting (especially the “division of labor” between unions and works councils) this may be reasonable, because union representation at the establishment level is rather weak. Second, the presence of a works councils leads c.p. to a lower wage differential and, finally, coverage by collective bargaining leads to a widening of the wage structure between skilled and unskilled workers. This latter finding is the most surprising one and certainly defies the demand for a more decentralized bargaining system.

Summarizing it appears that a large part of the variation of per-capita-wages can be explained by firm characteristics on the one hand (structure of the workforce, industrial relations) and, on the other hand, characteristics of the relevant product market (competitive pressures) and the technology employed. Unfortunately, however, none of the establishment panel data sets available has detailed information on wages paid to workers of different skill and/or gender, tenure, or some other individual characteristics (the percentage differential reported by Hübler and Meyer (2000) is not accompanied by information on how many workers are in the highest and lowest wage group). Due to these limitations, only the average wage can be calculated which, in turn, does not say anything about wage differentials within firms24.

4.2.2. Worker Remuneration and Firm Performance

Until recently very few papers have been published that try to analyze the influence of pay systems, fringe benefits and/or profit sharing on the performance of firms. Papers analyzing the influence of wage dispersion on firm performance (like the ones published by Pfeffer and Langton 1993 or Cowherd and Levine 1992) do not exist.

23 These are the headings for three “synthetic” variables derived from a rotated factor matrix of 15 different variables (see Hübler and Meyer 2000:15).
24 A number of studies look at the (possible) determinants of pay systems (Heywood, Hübler and Jirjahn 1998, Jirjahn 1998, Hübler and Jirjahn 1998, Carstensen, Gerlach and Hübler 1995a, 1995b). Although pay systems are likely to influence pay levels (see Lazear 2000), these studies will not be discussed here.
Using administrative data from 1.973 manufacturing firms from Lower Saxony for the year 1988, Stephan (1994) shows that wages have – other things equal – a negative influence on absenteeism (controlling inter alia for firm size, industry affiliation, percentage of white collar-workers, part-time employees, women, and investments in further training). Separate estimates reveal that the reduction in absenteeism occurs only in medium-sized and large firms (more than 200 employees) while in small firms wages have no impact on sickness rates.

Using the first two waves of the Hannover Panel (1994-1995; n=797), Schnabel and Wagner (1999) not only isolate the determinants of the existence of a firm operated pension plan, but also look at the impact of such a plan on personnel turnover (percentage of voluntary quits per year). They find that a pension plan reduces the turnover rate by almost 20% (from 4.7% per year to 3.8%). Moreover, the presence of a works council and the existence of a profit sharing plan influence personnel turnover in the same direction. These findings are supported by a those of second estimate that uses the percentage of long-term employment relationships (ten years and longer) as the dependent variable.

Using data from the first wave of the Hannover panel (n=686 and n=953) Jirjahn (1998) finds a positive influence of profit sharing for management and for the remaining workforce on profitability as well as on labor productivity. The presence of a works council is found to have a positive impact on productivity, but a negative one on profitability (according to his estimates, piece rate remuneration surprisingly reduces labor productivity; with similar results Addison, Schnabel and Wagner 1998)

Möller (2000) uses data from the sixth wave of the IAB panel for West Germany (n=1.800) and the third wave for East Germany (n=2.500; both collected in 1998) to estimate augmented Cobb-Douglas-, CES- and translog-production functions with a dummy variable “presence (or otherwise) of profit sharing” as one of the main explanatory variables. Her most conservative estimates reveal that (controlling for labor and capital inputs, product and process innovations, qualification and training of the workforce and export share) the introduction of profit sharing increases labor productivity by about 15% in West German and 11% in East German firms. Moreover, the estimates show that the translog-production function is to be preferred, i.e. that the interaction of labor and capital inputs has an independent effect on labor productivity.

The final study to be mentioned in this context comes from Frick (2000) and Bellmann and Frick (1999) who analyze the influence of fringe benefits on firm performance. They assume that workers pay for receiving fringe benefits by renouncing to portions of their direct pay, i.e. that workers earn less than their marginal product and that they receive the difference between pay and productivity in the form of (deferred) monetary as well as non-monetary benefits. Using data from the first wave of the IAB panel as well as the 1990 British and Australian “Workplace Industrial Relations Survey” they find that neither the existence of a firm operated pension plan nor the presence of a “cafeteria system” (a “bundle” of benefits out of which utility-maximizing employees can choose up to a certain cash equivalent) has any detectable influence on firm performance.

Although much progress has been made since the time when the different establishment panels became available, much remains to be done. While a number of papers analyze the impact of pay systems and specific forms of workers’ compensation on firm performance, virtually nothing exists with regard to the impact of pay differentials on the performance of firms. Moreover, none of the of the studies cited above can answer the
ambitious question asked (and answered in the affirmative) by Levine (1992) nearly ten years ago: “can wage increases pay for themselves?”

5. **Unemployment and Earnings Inequality**

5.1. **Wage Curve and Inequality**

Following Blanchflower and Oswald (1990b, 1994a, 1994b, 1995) a number of studies have attempted to replicate what has come to be known as the “wage curve”, i.e. a negative relationship between the local unemployment rate and the level of wages. Blanchflower and Oswald find that the wages of workers in labor market with high unemployment are lower than the wages of observationally identical workers in labor markets with lower unemployment. They show that the unemployment elasticity of wages is rather stable and lies in a range of -0.08 to -0.11 for a number of countries, including the USA, the UK and Australia. This means that doubling the local unemployment rate in some regions implies a 10% drop in the level of wages – holding everything else constant.

The wage curve is a standard wage equation normally used to estimate the returns to schooling and/or seniority but with the addition of the local unemployment rate to the set of regressors. As Card (1995) has shown in his insightful review of these studies, the local unemployment rate does not vary with individuals and the actual degrees of freedom involved in the estimation of the wage curve is very often rather low.

Wagner (1994) uses data from two different surveys to estimate wage curves for Germany: One data set that has been collected by the BIBB (Bundesinstitut für Berufsbildung) in 1979 and 1985 and the SOEP, covering the years 1984-1990. The number of individual observations is 20,565 and 7,429 respectively (German men working full-time as blue- or white-collar workers outside non-profit organizations and the public sector). Unfortunately, Wagner could distinguish only between ten (BIBB) and nine regions (SOEP) which reduces the degrees of freedom to 20 and 63 respectively. Notwithstanding these methodological problems, the estimates seem to confirm the findings of Blanchflower and Oswald: Using the BIBB-data the log specification yields an unemployment elasticity of -0.13 that is statistically significant while the SOEP-data yields an insignificant elasticity of -0.06 only (with similar findings Gerlach and Wagner 1995).

Baltagi and Blien (1998), on the other hand, use a random sample of 6,590 employees drawn from administrative records that are kept by the Federal Labor Office. These records include information on 80% of all employees in Germany (only civil servants and persons with an income below the annually changing threshold that stipulates a requirement to report to the social insurance system are excluded). The total number of observations in the sample is 40,852 from 142 different labor market regions over the period 1981-1990 (these regions are the administrative districts of the Federal Employment Service in Western Germany; they are the smallest regions for which official unemployment figures are available). Controlling for marital status, citizenship, employ-

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25 Using data from the GSOEP for the years 1985, 1989 and 1993 and unemployment figures for the 75 regional districts (“Raumordnungsregionen”) in West Germany, Renttel and Schwarze (1995) do not find convincing evidence supporting the idea of the wage curve: The coefficient of the local unemployment rate proved to be significant only in a pooled estimate without fixed effects. In a fixed effects-estimate and an error component model, the respective coefficient lost its statistical significance.
ment status, qualification, occupation, industry, and establishment size, and applying a number of different estimation procedures, the authors find that when unemployment is treated as predetermined, support for the wage curve is found only for younger and less qualified workers (findings that corroborate the ones reported by Blanchflower and Oswald). If, however, unemployment is treated as endogeneous, support for the wage curve can be demonstrated for all groups of workers26.

Baltagi, Blen and Wolf (2000) use information from more than 32.000.000 employment spells (an unbalanced panel of the entire population of people gainfully employed and included in the social security system in East Germany during the period 1993-1998) that have been classified into 114 administrative districts (“Landkreise” and “kreisfreie Städte”) to allow the most comprehensive analysis of the wage curve for Germany. Taking into account the endogeneity of unemployment and controlling for time and region effects, the authors find an overall unemployment elasticity of wages of –0.15 (in separate estimates the coefficient proved to be higher for female than for male workers).

Pannenberg and Schwarz (1998) argue that although participants in active labor market programs have to be considered as a part of the regional labor force, they are not included in the regional unemployment rates that are published on a regular basis. Omitting these persons, however, has serious consequences when estimating wage curves for regions where local governments spend considerable amounts of money on job creation schemes and labor market training programs. They prove their hypothesis by merging data from the East German SOEP with information on the 35 labor market areas that are distinguished in administrative records and official statistics. Their data covers the years 1992-1994. They use the log of hourly wages as their dependent variable and include the usual rights hand side variables in their equation (gender, schooling, experience, tenure, firm size, industry and year dummies). Estimating a “standard” wage curve reveals an insignificant coefficient for the local unemployment. If, however, the “regional search rate” (unemployed persons plus persons in active labor market programs) is included instead of the unemployment rate, the coefficient has the expected negative signs and is statistically significant from zero. Moreover, the coefficient has about the size of the ones estimated by Blanchflower and Oswald in their studies for the US, the UK and Canada.

5.2. Wage Losses upon Reemployment

Following a large number of studies from the USA that report severe and lasting earnings losses for displaced workers on the order of 10-25% compared with continuously employed workers (for an overview Burda and Mertens 2001), a limited number of studies have been recently conducted in Germany that also looked at reemployment.

26 In a companion paper, Blen (1995) estimates a multilevel model and shows that on the level of West German districts (n=328 “Landkreise” and “kreisfreie Städte” and 55.265 individuals randomly selected from the social security files stored at the IAB) the elasticity for 1989 is –0.043. Thus, the wage curve is similar to that of other countries, but it is flatter. Moreover, Bellmann and Blen (1997) document the existence of a wage curve using data from the first three waves (1993-1995) of the IAB-panel (n > 12.000 firms). See also Wagner (1996) and Gerlach and Klotz (1997) who – using the Hannover Panel – do not find evidence in support of the wage curve. Since their panel does not include the smallest firms (1-4 employees) which are most likely to react to regional unemployment by lowering wages, their findings can probably be reconciled with those from other studies.
wages of displaced workers. Contrary to the findings from the US, none of the studies revealed economically significant income losses.\textsuperscript{27}

Using data from the first wave of the SOEP, Klein and Hocke (1991) show, that unemployment spells do not change the slope of the income trend compared to the development of wages of those who were continuously employed. However, the income of the formerly unemployed prior to the unemployment spell was considerably lower than the income of those not affected by unemployment (2.185 DM gross monthly income vs. 2.777 DM). Persons with a University degree, those who were in high-skilled jobs before unemployment and “prime age” persons (31-50 years) can increase their incomes significantly upon re-employment while persons earning especially high incomes prior to their unemployment spell cannot – other things equal – reach their former income level (further individual characteristics proved to be insignificant).

Van Santen and Ziegler (1994) also use the SOEP (waves 1-6, 1984-1989) and concentrate on the financial consequences of recurrent unemployment. They identify 1.007 spells that can be attributed to people who were repeatedly unemployed between January 1983 and December 1988. According to their calculations, 54\% of these spells ended with a wage gain of at least 5\% (on average, they lasted for 4.7 months). The remaining 46\% (average duration: 4.3 months) ended with a smaller gain or even a loss. Especially older workers (45-64 years) were found to have a high probability of experiencing losses as were former “high wage earners” (all other individual characteristics proved – as in the study by Klein and Hocke (1991) – to be insignificant).

Using waves 1-5 of the SOEP (1984-1988) Gerlach and Schasse (1991) not only compare the rates of return to professional experience for people that had been unemployed but also distinguish between employees who had been laid off and those who voluntarily quit their last job. Their sample consists of all 16-59 year old employees (no apprentices and civil servants) whose last employment spell was terminated between 1984 and 1988. Two months after the termination, 11\% of those who quit voluntarily were still unemployed, while 52\% of those who had been laid off were still searching for a new job. 64\% of those who quit voluntarily reported a higher income than before, while 13\% experienced a loss of income. Among those who had been laid off, the respective percentage shares were 35\% (increase) and 25\% (decrease). While the rate of return on experience was quite similar in both groups while they were in their “old” job (4.3\% per year for those who quit and 3.5\% for those who had been laid off later), the situation changed quite dramatically upon reemployment. While the rate of return increased for those who quit voluntarily (to 5.5\%), it decreased to 2.1\% for those who had been laid off, i.e. the members of the latter group obviously suffered from a significant depreciation of large parts of their human capital.\textsuperscript{28}

Licht and Steiner (1992), using the first six waves of the SOEP, analyze the influence of career interruptions (be it due to voluntary “home time” or (in-)voluntary unemployment). They find that interruptions hurt men and women to more or less the same extent. While men suffer a wage loss of about 4.8\% upon reemployment, the respective figure for women is −3.0\%. This disadvantage for men is compensated by a higher rate

\textsuperscript{27} Two older studies (Brinkmann (1977) and Büchel and Weißhuhn (1990) only report the percentage shares of persons with and without income losses upon re-employment: In the former sample, 39\% of the formerly unemployed report income losses, while 31\% report an increase. In the latter sample, the percentage shares were 14\% (loss of more than 5\%) and 25\% (increase of more than 5\%).

\textsuperscript{28} In a further study, Hübler (1989) shows that every additional employer a person has been working for during his career reduces his monthly gross income significantly (he uses data from the first wave of the SOEP, 1984).
of return on experience (2.6% for men and 1.9% for women). Since unemployment benefits amounted to about 68% of last month’s net income before unemployment in the period under investigation (1984-1989), re-employed persons incur income losses – given the duration of the average unemployment spell – of about 10% compared to a situation without unemployment.

Buttler and Bellmann (1991) use a sample male full-time employees from the IABs social security files for the years 1979-1983 (n=70,039) to investigate whether involuntary separations have an impact on future wages. Controlling for schooling and experience they find that a change of the job (three-digit code) reduces wages upon reemployment by slightly more than 3% while a change of industry (three-digit code) leads to a reduction of 5%. Contrary to these findings, a change of employer (usually following a voluntary quit) leads to a wage increase of about 12% (with similar findings albeit using different data sources Blien and Löwenbein 1991).

Based on a signalling and adverse selection model developed and empirically tested by Gibbons and Katz (1991), Grund (1998b, 1999) asks whether the development of wages of workers who had been laid off is different if they lost their job due to an individual dismissal or due to a plant shutdown. He uses data from waves 8-13 of the SOEP (1991-1996) with information on men aged 20-60 that had been reemployed at the latest one year after they had been laid off (n=204 individual dismissals and 164 workers whose plant was shut down). If the type of termination serves a signal to potential employers about the likely productivity of the employee, then persons who had been dismissed should have lower wages upon reemployment than those who lost their job because of a plant closure. The evidence for Germany is strikingly clear: No such stigma effects exist. Those who had been dismissed earned 3,079 DM per month in their old and 3,101 DM in their new job (+0.7%) while those who experienced a plant closure had gross monthly incomes of 3,238 DM in their old and 3,259 DM in their new jobs (+0.6%)29. Moreover, individual job satisfaction is not affected by the type of termination and job characteristics (promotion probability, work load, travel-to-work-distance, working hours, fringe benefits and job security) do not differ either between the two groups of dismissed workers.

6. Inter-Industry Wage Differentials

In a competitive labor market, relative wages should not be affected by industry affiliation, once the distribution of workers’ skills and non-wage components of jobs have been taken into account. Nevertheless, there exists a large international literature on the existence of large and persistent wage disparities between observationally equivalent workers in different industries. Generally, it has been argued that the persistence of these effects contradicts explanations that advocate temporal shifts in industry labor demand. In their seminal study, Krueger and Summers (1986, 1988) for example propose to use efficiency wage ideas as an explanation for the observed patterns. Thus, persistent inter-industry wage differentials can be compatible with several arguments:

• Some industries pay high wages in order to reduce the number of voluntary quits (turnover version).
• Due to high profits, firms in some industries are able to pay high wages to their workers, i.e. rents are shared between employer and employees (fairness version).

29 Those who were continuously employed increased their monthly incomes during the period under investigation from 3,748 DM to 3,863 DM (+3.1%).
• The higher the capital intensity of an industry and the more complicated the implementation of supervision methods, the higher the expected losses from shirking. Thus positive wage differentials are paid to prevent shirking (shirking version).

The standard approach to quantify these patterns (thereby implicitly testing the above mentioned hypotheses) has been described by Thaler (1989: 182):

“There is a simple way to demonstrate the existence and measure the importance of interindustry wage differentials. Take a large data set with decent information about worker characteristics and income. … First run a regression with the (log of the) wage rate for each individual on the left hand side and a host of individual characteristics on the right hand side such as age, education, occupation, gender, race, union status, marital status, region, and so on. Now, add industry dummy variables to the regression and see what happens”.

Schmidt and Zimmermann (1991) use a random survey of employed male individuals aged 18-65 years and working full-time (n=891, collected in 1978) to analyze the influence of industry affiliation on the natural logarithm of net monthly earnings. Controlling for family status, number of children, education, experience, tenure, number of jobs held in the past, firms size, innovative activities of current employer and working conditions (eight dummies), they find no statistically significant influence: As a group, the industry variables (n=17) do not add anything to the explanation of wages.

Hübler and Gerlach (1990) use the first wave of the SOEP (1984, n=1.810) and a 10% random sample of all employed blue and white collar workers in the federal state of Bremen (1981, n=4.999). Controlling for a large number of (possible) determinants of individual pay, they find that average sectoral wages (23 sectors in the Bremen survey and 22 in the SOEP) have a statistically significant influence on individual wages. They conclude that “some sectors pay high wages and offer good working conditions in order to avoid shirking, reduce the quit rate, induce applications of qualified workers while other sectors do not have to rely on this strategy as they are able to utilize less expensive control mechanisms, have lower turnover costs or the productivity gain stemming from qualified workers compared to unqualified workers is lower” (Hübler and Gerlach 1990: 113). Moreover, they can show that high wage sectors pay high wages over all hierarchy levels and firm sizes and that these sectoral effects are more important for white collar employees than for blue collar workers.

Schmidt (1992) uses the first four waves of the SOEP (1984-1987, male and female full- and part-time employees, n=4.333 (1984), n=3.779 (1985), n=3.377 (1986) and n=3.073 (1987), pooled sample with information on 3.966 individuals with 13.236 observations) and finds that the sectoral wage structure (n=33 different sectors) is remarkably stable (the correlation between the sector effects in the different years is in the range between +.84 and +.93)\(^{30}\). Moreover, about half of the industry dummies are significantly different from zero in every single specification. If sector wage differences reflect unobserved differences in productivity among workers, then estimating fixed- and random effects models should lead to much lower wage differentials. This, however, is not the case: the correlation of sectoral wages patterns (the coefficients of the

\(^{30}\) Using highly aggregated data from the Federal Statistical Office covering the years 1960, 1970, 1975, 1980, 1982, and 1986 effective hourly wages for three different qualification groups of blue collar workers and effective monthly earnings for four different qualification groups of white collar workers) Fels and Gundlach (1990a, 1990b) calculate correlation coefficients higher than +.75 when comparing wages across time and across different qualification groups. Similar findings are reported by Englberger (1987).
estimated industry dummies) in a simple OLS- and a fixed effects model are in a range between +.34 and +.45). Schmidt concludes that intersectoral wage differentials cannot be explained by unobservable worker heterogeneity.

Burda (1991) uses the 1985 wave of the SOEP (n=4,599 full- and part-time employees, n=8 and 36 sectors respectively) to analyze the influence of industry affiliation on individual gross hourly earnings. He finds that earnings functions are statistically different across sex, firm size, full- versus part-time, and especially job tenure groupings. Tests for homogeneity of earnings equations across these groups are decisively rejected. When the sample is reduced to full-time workers with less than five years experience in their current job, industry wage differentials vanish, whereas they remain economically and statistically significant for workers with more than five years of tenure. Burda suggests that his findings are consistent with workers and firms’ sharing rents of industry or firm-specific human capital, which accumulates only over time.

Wagner (1991a) uses two large samples (n=11,764 male blue and white collar workers in 1979 and 11,075 in 1985, data collected by the “Bundesinstitut für Berufsbildungsforschung”) and distinguishes between 25 different sectors (reference category: construction). Controlling not only for education, experience, tenure, firm size, working hours and working conditions, but also for health status and region, he finds that 8 (1979) and 11 (1985) respectively of the industry dummies were significantly different from zero (p < .05). The sector wage effects that can be calculated from the coefficients of the dummy variables range between −11.6% (agriculture and forestry) to +11.5 (paper and printing) in 1979 and between −17.7 (leather production) and +7.9 (banks and insurances) in 1985. The correlation between the sector wage effects in 1979 and 1985 is +.73, corroborating the findings from the studies quoted above. Additional tests show that the wage effects are not at all affected by short-term changes in labor demand, that they are not a compensating differential for sectoral differences in the probability of unemployment and that sector wage effects are not correlated with industry profitability. It appears, however, that a higher capital intensity leads to a lower sector wage differential and that labor turnover is negatively related to sector wage differentials (the latter two findings can be interpreted as being supportive of the “shirking” and the “turnover”-versions of the efficiency wage theory 31.

A further sample that has recently been used to analyze sector wage differentials is the “Allgemeine Bevölkerungsumfrage der Sozialwissenschaften (ALLBUS)” whose six consecutive bi-annual cross sections of 1980-1990 (De New and Schmidt 1994). Concentrating on male full-time blue- and white-collar workers aged 18-65 who report at least 300 DM and at most 9,500 DM average net monthly earnings (in constant prices of 1980) and excluding self-employed persons and civil servants, their sample consists of 2,371 individuals (almost half of the cases are lost due to the non-reporting of income; a further 5% of the workers do not report their industry). De New and Schmidt document substantial raw differences in mean earnings between sectors, with negative disadvantages for workers in agriculture, textiles and clothes, construction and trade. Tangible advantages can be found for workers in energy and mining, chemicals, banking and insurance, services and non-profit organizations. Much of these raw differences across industries, however, can be explained by the composition of industry employment with respect to the most basic worker characteristics (schooling, age, experience, skill level). De New and Schmidt (1994) conclude that while the German wage structure is rela-

31 Similar findings are presented in Helberger, Stobernack and Vorholt (1994) who also test the influence of union density (insignificant) and of subsidies (positive) on sector wage differentials.
tively tight – a finding they cannot confirm in later research – industry affiliation seems to be of minor importance only (another finding that is generally disputed by authors using gross income instead of net earnings, but in line with Schmidt and Zimmermann (1991) who also used the log of net income as their dependent variable).

The most recent paper analyzing industry wage effects comes again from Haisken-De New and Schmidt (1999). Using the SOEP and the German Mikrozensus, they compare the German inter-industry wage structure to the one from the US (as it can be calculated from the Panel Study of Income Dynamics and the Current Population Survey). They restrict their samples to prime age (25-60 year old) males working full-time outside agriculture and the public sector. For the US, they only use whites and for Germany only German nationals. Their dependent variable is gross hourly wages. The SOEP-samples for the years 1984-1996 have between 700 and more than 1,000 observations and the panel analysis is based on 11,000 person-year observations from about 2,300 persons. The final yearly sample sizes of the Mikrozensus are between 51,000 and 56,000. Their findings can be summarized as follows: First, the correlation between the American and the German inter-industry wage structure is rather high. Depending on the data sources used, the correlation coefficients lie in a range between +.70 and +.89. Second, controlling for unobserved individual heterogeneity, it appears that – compared to the pooled data model – the overall dispersion of wages is significantly reduced (by about 50%) in Germany as well as in the US. Third, and possibly most important, the overall dispersion of wages seems to be growing in Germany over time (from 6.4 percentage points in 1984 to 9.5 percentage points in 1996). In the US, on the other hand, the dispersion was slightly reduced during the period under investigation (from 10.9 percentage points in 1984 to 7.6 percentage points in 1996).

The most comprehensive studies on inter-industry wage structures have been published by Bellmann and Möller (1995), Möller and Bellmann (1995, 1996) and Möller (1999). Using three large cross-section data sets from German social security files (1979, 1984 and 1989; n > 100,000, full-time males only) Bellmann and Möller (1995) find that the amount of wage dispersion among industries being not explained by (observed) human capital variables has been considerably growing over time. Especially the period between 1979 and 1984 witnessed a strong extension of inter-industry wage differentials in Germany, i.e. the “flexibility” of the wage structure seems to have increased rapidly. According to their estimates the magnitude of inter-industry differentials in 1989 ranges from −45% (restaurants) to +36% (petroleum industry). In 1974, the spread was significantly lower, ranging from −32% (again restaurants) to +20% (again petroleum industry). Moreover, Bellmann and Möller (1995) study the wage changes experienced by industry switchers (their subsamples of industry switchers consist of more than 10,000 cases for every year under consideration). They show that industry effects are weaker for switchers, but also present and they are highly correlated with the overall differentials (the correlation coefficients being +.79, +.87 and +.82 for 1979, 1984 and 1989 respectively). In their second study, covering the years 1979-1989, Möller and Bellmann (1995) not only show an increase in inter-industry wage differentials over the years, but also a high degree of persistence. Even the differentials found for 1979 and

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1989 are strongly correlated ($r=+.93, n=31$ different industry sectors, service industries excluded)\textsuperscript{33}.

Comparing the development of wage structures in the private and public sectors in Germany during the period 1984-1993\textsuperscript{34}, Dustmann and van Soest (1997) find that unconditional wages in the public sector are significantly higher for males and females. Moreover, wages developed almost in parallel in the two sectors, and this was the case for all age cohorts and education groups. Wage dispersion was remarkably stable in both sectors and more or less identical for men and women. Conditional on education, age, and marital status wages, wages are about 6% lower for men in the public sector, but substantially higher for women (about 10%). When interpreting these findings, one should take into account that the wage measure used by Dustmann and van Soest (gross hourly remuneration, deflated to 1984 values) included monetary fringe benefits, while neglecting non-monetary benefits, such as job security and access to special insurance and pension contracts for public sector employees. These non-monetary fringe benefits may well compensate males for their wage disadvantage while widening the gap between females working in the private and public sectors.

7. Implications for Further Research

Although the availability of large and representative data sets on individuals and firms has clearly spurred empirical research, a number of most important questions remain open:

- The available studies neither agree on the extent nor on the development of earnings inequality during the 1980s and 1990s.
- The extent and the development of inter-industry wage differentials is still highly disputed.
- The firm-size wage differentials documented so far in the literature have been calculated on the basis of the GSOEP only.
- The impact of regional unemployment on individual wages has been studied in detail only for East, but not for West Germany.
- Finally, the question that is at the heart of our research project (do wage differentials influence the level and/or the growth rate of (labor) productivity) has not been tackled at all.

The question, whether the observable differences in many of the empirical findings are due to differences in the data used or in the methodology applied, can not be answered yet. Thus, it is advisable to study the extent and the determinants of wage differentials using a fifth large data set that has been assembled independently from the IABS, the GSOEP, the ALLBUS and the survey on “Qualification and Career Paths” (the latter data set has not attracted as much attention from the scientific community as the former three)\textsuperscript{35}.

\textsuperscript{33} The assumption that these inter-industry differentials reflect unmeasured ability differences among workers (Gibbons and Katz 1992, Blackburn and Neumark 1992, Murphy and Topel 1990) has not been tested with German data.

\textsuperscript{34} The authors use the first ten waves of the GSOEP. Their sample sizes range from 400 (women employed in the public sector in 1984 and 1993) to 1,500 (men working in the private sector in 1984).

\textsuperscript{35} This latter data set was collected three times (in 1979, in 1985 and in 1991/92) by the “Bundesinstitut für Berufsbildung” and consists of more than 25,000 individuals each. The data can be obtained from the “Zentralarchiv für Empirische Sozialforschung” at the University of Cologne.
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