Higher and Higher? Performance Pay and Wage Inequality in Germany

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– Preliminary, do not quote! –

Abstract: Performance pay is of growing importance as it applies to a rising share of employees. A parallel trend has been that of growing wage dispersion. From this the question evolves of how is the growing use of performance pay schemes related to the increase in wage inequality? German SOEP data for the years 1984 to 2009 confirm the large increase in the application of performance pay schemes. There are large wage differences between variable and fix remuneration schemes, but little of this difference is causally due to performance pay. Rather, selection on observables and unobservables explains a large share of the wage difference, leaving little room for incentive effects. Reweighting methods in a quantile regression framework show that performance pay schemes have contributed to the rise in wage dispersion. On average, 15% of the growth in wage inequality over time are explained by performance pay, even more at the top of the distribution.

Keywords: Performance Pay, Wage Structure, Quantile Regression, Reweighting
JEL-Classification: J31, J33, C21

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1 Introduction

Classical labor market theory assumes that wages equal the marginal product of labor, that is: productivity. One mechanism to align wages with productivity is performance pay in which remuneration depends on some measure of performance. This payment scheme has recently gained attention as it applies to more and more employees. A parallel trend has been that of growing wage inequality. From this the following research question evolves: How is the rise in wage inequality related to the growing use of performance pay schemes?

In theory, employers have a choice between paying fixed or variable wages. Variable pay schemes are advantageous in that they induce effort and attract highly productive workers. However, it is costly to monitor effort so that for some employers or certain jobs a fixed wage scheme is more profitable. Lemieux, MacLeod, Parent (2009) argue that due to technical progress, monitoring costs have declined so that more employers now find it profitable to pay wages according to workers' performance. This could explain why the use of performance pay schemes is growing.

The introduction of performance pay schemes could affect wages through different channels (see e.g. Heywood and Parent, 2009; Booth and Frank, 1999). Above all, it is expected to induce higher effort which would in turn generate higher wages. At the same time, performance pay leads to sorting of workers: As employees know about their own productivity and about their willingness to provide effort, they select themselves into the preferred pay

scheme. In consequence, the researcher would observe higher wages within the group of performance pay workers as opposed to the non-performance pay job matches. Moreover, wage insecurity is higher in variable pay schemes which could be compensated by higher wages (Amuedo-Dorantes and Mach, 2003).

In addition to the level effect, performance pay is expected to go along with rising wage inequality. First, wage level differences *between* the two remuneration schemes generate between-variation. Second, also *within* performance pay jobs, wage inequality is higher almost by definition. This is because effort is more variable than wages in a fixed wage scheme. To see this, consider a fixed wage scheme in which wages are determined by e.g. educational level and tenure. Under a variable pay scheme the performance depends on many more factors such as career-orientation, ability, health etc. thus generating higher variability in productivity and thus in wages. Additional variation could be caused through the monitoring mechanism. From all this, one would expect that the rising incidence of variable pay schemes brings about higher wage inequality. In addition, performance pay could serve as a channel to translate changes in returns to skills as induced by skill-biased technological change (SBTC) into wage differences (Lemieux et al., 2009; Heywood and Parent, 2009). Put differently, if SBTC requires larger wage differentiation, then PP could be a mechanism to implement this. Lemieux et al. (2009) conclude that this applies to the case of the US in the last quarter of the past century.

For Germany, this relation has not been studied, yet. Performance pay plays

a special role in Germany in the particular context of the German industrial relations system. As performance pay is more flexible compared to collective bargaining, it was seen as a way to increase the competitiveness of German firms and thus to reduce unemployment (Jirjahn, 2002, p. 163). The incidence of performance pay has been increasing in Germany like in other industrialized countries (Pannenberg and Spiess, 2009). One viable data source to analyze this question is the German SOEP which among other things asks explicitly for performance evaluations by the supervisor. According to this, the share of employees whose performance is evaluated ranges between 25% (Cornelißen et al., 2008) and 31% (Grund and Sliwka, 2010) in the year 2004, depending on the exact specification of the data set. The long-term rising trend for the incidence of performance pay in Germany is described in Pannenberg and Spiess (2009) for the period from 1991 to 2000. This study aims at providing a detailed description of the empirical trends for an even longer time period, i.e. from 1984 to 2009.

Wage inequality has been rising in Germany during the last 30 years (Kohn, 2006; Gernandt and Pfeiffer, 2007; Dustmann et al., 2009; Antonczyk et al., 2009). Recently, the growth in wage dispersion was dramatic (more than 10 log percentage points at the 90-10-differential from 2001 to 2006, see Antonczyk et al., 2010). Growing wage inequality has been found to affect the top as well as the bottom of the wage distribution (ibid.) which makes it an important component in the debate on poverty and the low wage sector. Several explanations are possible, such as skill-biased technological change (SBTC). However, Antonczyk et al. (2009) find changes in the tasks can-

not explain growing wage dispersion in Germany. Also, deunionization can explain only a small part of the growing wage inequality (Antonczyk et al., 2010). Can performance pay explain it?

Answering this question requires two things: First, in order to capture the entire distribution of wages, quantile regression methods will be used. Second, this analysis requires a long panel data set with information on performance pay.

The empirical analyses in this paper are based on data from the German Socio-Economic Panel (SOEP). Performance pay-jobs ('PP-jobs') are defined as those job matches which have paid profit sharing, premiums or similar bonuses at least once in the past (similar to Lemieux, MacLeod, Parent, 2009 and Heywood, Parent, 2009). The particularity of this data set is that it includes the level of this type of variable pay which allows going beyond the analysis of the incidence of performance pay.

The empirical evidence suggests that there are large wage differences between both types of remuneration schemes, but little of this difference is causally due to performance pay. Rather, selection on observables and unobservables explains a large share of the wage difference. The results leave a wage gain in performance pay jobs of less than 2 percentage points after controlling for individual unobserved heterogeneity. One of the most important trends in the wage structure over the past few decades is growing wage inequality. Several factors contribute to this trend such as globalization, deunionization and variable pay. The contribution of the latter channel is analyzed in this study by means of quantile regression and reweighting methods. Preliminary

results show that the growing use of performance pay did contribute to the growth in wage dispersion - but only at the top of the wage distribution. This is the part of the wage distribution where wage inequality has grown most (Autor et al., 2008). This growth in wage inequality at the top would have been considerably lower in the absence of performance pay.

The paper proceeds as follows: The next section explains the data, specific data problems and their solution, and descriptive statistics. Then, section 3 describes wage differences between performance pay and non-performance pay jobs at the mean and over the wage distribution. Section 4 studies in depth the empirical correlation between performance pay and wage inequality by means of reweighting. The final section discusses the results.

2 Data

The empirical analyses in this paper are based on data from the German Socio-Economic Panel (SOEP), a large household survey for the years 1984 to 2009.[1] This study is limited to full-time employees in West Germany aged 25 to 65 and excludes self-employed and public-sector employees, as for these groups the meaning of pay for performance is not clear. The survey asks for several additional pay components from the employer of which one category is "profit-sharing, premiums and bonuses". It also asks for the gross amount. I will refer to this pay component as "performance pay" in this study.

[1]The most recent available wave is from 2010 which refers to pay components in the year 2009.

Given that this variable pay component depends on performance, some employees may not receive a bonus because their performance hast not been satisfactory. For this reason, it is not sufficient to measure performance pay in the given year, but rather "performance pay jobs" are defined (á la Lemieux, MacLeod, Parent, 2009; Heywood, Parent, 2009). This is to capture those jobs with a variable pay scheme – regardless of whether a bonus was paid this year or not. Thus performance pay-jobs ("PP jobs" in the following) are defined as those jobs which have paid for performance at least once in the past. This definition differs from the one of Lemieux, MacLeod, Parent (2009) and Heywood, Parent (2009) in that only bonus payments in the past or present define a PP job – not those in the future. This allows observing the new introduction of pay for performance in a job match.

This definition would distort the observed share of employees in performance pay jobs at the beginning of the observation period, because pay for performance that was awarded in a given job match before 1984 is not observed in the data. In order to present descriptive statistics that are comparable over time, an end-point correction is applied á la Lemieux et al. (2009) which is described in the appendix.

Figure 5 and table 2 show how the incidence of performance pay jobs has increased over time in Germany over the past 25 years (both correct for the end-point problem discussed above). The share of employees working in PP jobs has increase continuously from 15.4% in 1984 to 39.6% in 2009. The steepest increase is observed in the late 1990s, from 25.9% in 1994 to 35.5% in 1999. This period is followed by stagnation and a sharp decline in the

year 2002. From then on, the incidence of PP jobs is rising again. In times of the current financial crisis, the use of performance pay has declined mildly in 2007, peaked in 2008 and receded in 2009. Overall, the general trend has been to grow higher and higher.

The same data set has been used by Pannenberg and Spiess (2009) for the period 1991 to 2000, but they do not define "performance pay jobs", so that the exact numbers are not comparable. Still, their study also documents an increase in the incidence of performance pay over the 1990s. An alternative question in the SOEP data asks explicitly for performance evaluations by the supervisor. According to this, the share of employees whose performance is evaluated ranges between 25% (Cornelißen et al., 2008) and 31% (Grund and Sliwka, 2010) in the year 2004, depending on the exact specification of the data set. Unfortunately, this survey question is only available for the years 2004 and 2008. In addition it is asked whether bonuses depend on this performance evaluation. The share of employees whose performance evaluation by the supervisor determines their bonus payments is 15% in 2004 and 16% in 2008 in the current data set (not displayed). In addition, the literature has pointed to considerable gender differences in the incidence of performance pay (Jirjahn, 2002; Grund and Sliwka, 2010; de la Rica et al., 2010). On the firm level, Berger et al. (2011) report that 37% of firms use performance-related pay.

Who receives performance pay? Or: How are PP jobs characterized? To answer this, table 3 in the appendix shows probit regression results for the probability of working in a PP job. It can be seen that older and more

experienced workers are more likely to receive pay for performance. Also, employees with higher education and higher occupational category are more likely to hold a PP job. These results are in line with Grund and Sliwka (2010) who find that performance pay is found more often with increasing tenure and hirarchical level. All this means strong positive selection.

3 Wage differences

3.1 Wage difference at the mean

The unconditional wage difference between PP and non-PP jobs is 36% (i.e. 32 log points). This wage difference is driven by differences in worker, job and firm characteristics where PP jobs are the 'better' job matches with more highly educated and experienced employees, longer tenure and larger firms.

Table 1: Effect of performance pay on log hourly wages

	Estimation method					
	OLS			Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
PP Job	0.073		0.056	0.018	0.016	
	(0.006)		(0.007)	(0.005)	(0.006)	
PP this year		0.077	0.033		0.004	0.006
		(0.006)	(0.007)		(0.004)	(0.004)
Person Fixed Effect	No	No	No	Yes	Yes	Yes
Job-Match Fixed Effect	No	No	No	No	No	Yes

Controlling for personal and job characteristics, industry, occupation and year dummies.

Table 1 shows the wage difference that remains after controlling for individual characteristics (education, gender, age and age^2, experience in full-time and part-time work and in unemployment and their second polynomials), job match characteristics (tenure, occupational category, and an indicator for temporary contracts), and firm characteristics (firm size, industry, and federal state), as well as year-dummies. The first three columns refer to least squares estimations with standard errors clustered on the individual level. According to this, PP jobs show 7% higher wages (column (1)). If a performance pay bonus was paid this year, the wage difference increases slightly to nearly 8% (column (2)). Interestingly, when both explanatory variables are included in the regression, the effect of working in a PP job is larger than that of receiving a bonus this year (column (3)). Results of similar magnitude are found by Booth and Frank (1999) who report a wage gain of 9% for men and 6% for women.

These results could be driven by unobserved differences between employees in the fix and the variable pay scheme. Therefore, the fixed effects estimation analyses those employees who switch between the regimes in order to control for individual unobserved heterogeneity. The share of switchers is 5.8% in the sample, which corresponds to 750 individuals. Controlling for unobserved heterogeneity reduces the wage difference between PP and non-PP jobs to less than 2% (column (4)). Again, working in a PP job has a larger effect on wages than receiving a bonus this year (column (5)).

Finally, one can control for unobserved heterogeneity between job matches. Doing so suggests that the wage gain of receiving a bonus this year while

working in a PP job is only 0.6% (column (6)).[2]

This analysis hast shown that the large wage difference between PP and non-PP jobs is driven to a very large extent by observed and unobserved differences in employees and in job matches. This is synonymous to a strong positive selection of employees into PP jobs. For workers who switch between the two job types, the wage difference amounts to less than 2%. Parent (2009) interprets fixed effects estimations as a lower bound to the incentive effect induced by performance pay. For comparison, Gielen et al. (2010) find an incentive effect from performance related pay on productivity of 9%. It is an important estimate because the introduction of performance pay schemes often has the goal of increasing productivity.

So far, the results only considered the mean of the wage distribution. The next section extends this analysis to the entire distribution of wages.

3.2 Wage difference over the entire distribution

Different types of variable pay components affect differnt types of workers and thus different parts of the wage distribution. For example, piece rates or overtime premia can be found mainly in production and for low to middle qualified employees (Jirjahn, 2002). In contrast, pay for performance in this study refers to profit-sharing, premia and bonuses other than Christmas or

[2]A discussion of how the covariates contribute to wages in omitted here for brevity. From theory it is expected that personal characteristics yield higher returns in PP jobs compared to non-PP jobs (de la Rica et al., 2010; Lemieux et al., 2009). Likewise, job characteristics are expected to pay off more in non-PP than in PP jobs. An additional empirical analysis (not displayed) weakly confirms this hypothesis.

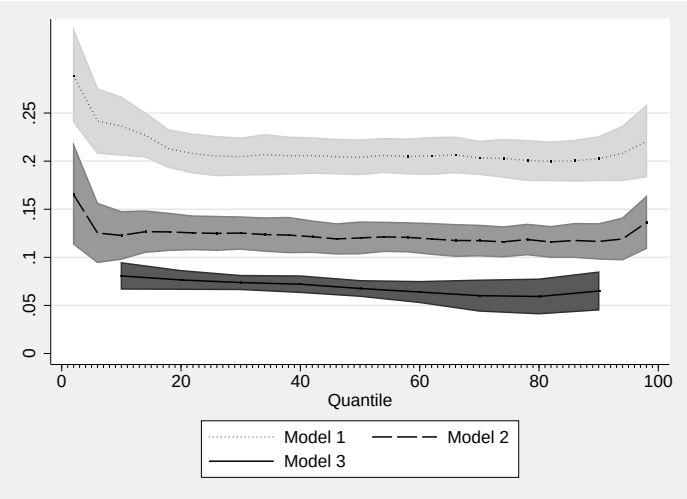
vacation pay and also excluding overtime premia (see section 2). This pay component could be used for all those employees whose performance can be measured. In particular, the survey question does not differentiate between individual and group incentives and workers could potentially benefit from profit-sharing regardless of ther individual effort. From this point, performance pay could potentially affect all workers and thus the entire wage distribution. However, it is also plausible that performance pay affects mainly high-wage earners such as managers. The reason is that their effort is hard to monitor but decisive for the firm's success which is a classical situation to implement an incentive pay system. So, from this point, performance pay would be expected to affect mainly the top of the wage distribution. As the question is undecided from theory, the following analysis tries to shed light on it from an empirical perspective.

Looking at the entire distribution of wages, the unconditional wage difference between PP and non-PP jobs ranges between 30 and 40 log points, i.e. 35 to 52% (not displayed). Over the distribution, this wage difference is rather constant with only moderate increases at the top.

Next, the conditional wage difference is estimated by quantile regressions (Koenker, 2005). In quantile regression, the results are displayed according to the conditional wage distribution. Intuitively, this is the wage residual that remains after conditioning on the means of all the covariates. Hence, individuals at the bottom display more disadvantageous characteristics compared to the mean. Analogously, individuals at the top deviate positively from the average, in both observed and unobserved characteristics. Roughly

speaking, individuals in right part of figure 1 are high wage earners while individuals on the left side are low-wage earners.

Figure 1: Effect of PP job on log hourly wages at each percentile



Model 1: Controls for personal characteristics and year dummies

Model 2: Adds job characteristics

Model 3: Adds firm characteristics

Figure 1 shows the results of quantile regressions. It shows the conditional wage difference between PP and non-PP jobs in consecutive models which add ever more covariates succesively. The more characteristics are controlled, the lower the wage difference. This reconfirms positive sorting of workers into PP jobs. Model 3 which corresponds to the specification in table 1, shows a wage difference of 6 to 8%. It can be seen that the wage difference is rather constant over the wage distribution with increases only at the very bottom and the very top.

Let us now turn to the central question of how performance pay is related to rising wage dispersion.

4 Wage inequality and performance pay

Rising wage inequality is the major empirical trend in labor economics in recent decades. The strong rise in wage dispersion in the US and the UK since the 1980s affected the entire distribution (see summary in Antonczyk et al., 2010). In contrast, in West Germany wage inequality began rising first at the top of the distribution in the 1980s, and only started to grow at the bottom since the 1990s (Dustmann et al., 2009; Fitzenberger, 1999). The early period includes the start of the observation period in this analysis, which may affect the results.

Different explanations have been offered for rising wage dispersion, still parts of the trend remain unexplained. One prominent explanation is skill-biased technical change (SBTC) which is consistent with the German development under the presumption that that labor market institutions such as collective bargaining prevented wage inequality at the bottom from growing (Fitzenberger, 1999; Dustmann et al., 2009; Antonczyk et al., 2010). However, Antonczyk et al. (2009) conclude that the recent rise in wage inequality cannot be traced back to tasks performed at the workplace. Another possible explanation for rising wage dispersion is deunionization where the idea is that unions intend to foster wage equality. However, Antonczyk et al. (2010) conclude that deunionization can only explain a small share of increasing wage inequality in Germany while a large share remains in different remuneration schemes between different industries and firms. As the increasing trend of wage inequality runs parallel to the trend in performance pay, the question arises, whether these two trends are correlated?

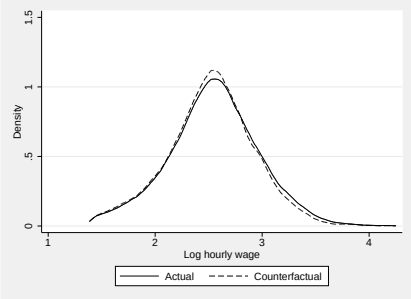
The development of wage inequality over time in the present German data set can be found in figure 5. It depicts the standard deviation of hourly wages in PP and non-PP jobs, smoothed over three-year-intervals. From 1985 to 2000, overall wage inequality has increased, stabilizing thereafter. For PP jobs, wage dispersion decreases until 1991 and then evolves parallely to non-PP jobs and the overall trend. As expected, wage inequality is larger within PP jobs as compared to non-PP jobs. The same trends are found by Pannenberg and Spiess (2009) based on the same data set, but limited to the period of 1991 to 2000.

In order to answer the question of how the wage structure is related to the growing use of performance pay, one way to go is to ask how the wage structure would have developed in the absence of performance pay. This unobserved counterfactual wage distribution can be estimated in analogy to Lemieux, MaxLeod, Parent (2009) by means of the reweighting method from DiNardo, Lemieux, Fortin (1996). Intuitively, the non-PP observations are reweighted as they are underrepresented in the total wage distribution if the non-PP-wage distribution is of interest. Therefore, the reweighting factor $\Psi(X) = \frac{Pr(PP=0)}{Pr(PP=0|X)}$ is applied to all inviduals in non-PP jobs. Here $Pr(PP = 0)$ denotes the unconditional probability of working in a PP job and $Pr(PP = 0|X)$ is the conditional propensity of working in a PP job. It is estimated based on table 3. This procedure generates a hypothetical counterfactual wage distribution in the absence of performance pay schemes.

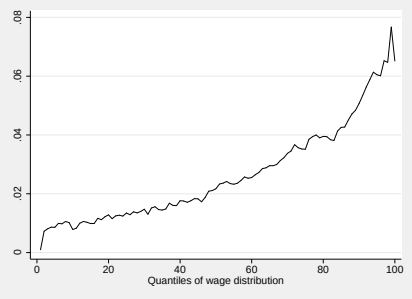
Figure 2 shows the result. The left hand panel shows the actual and the counterfactual wage distribution and the right hand panel shows the differ-

Figure 2: Result of reweighting

Density of actual and counterfactual log wages.



Difference between actual and counterfactual wage distribution

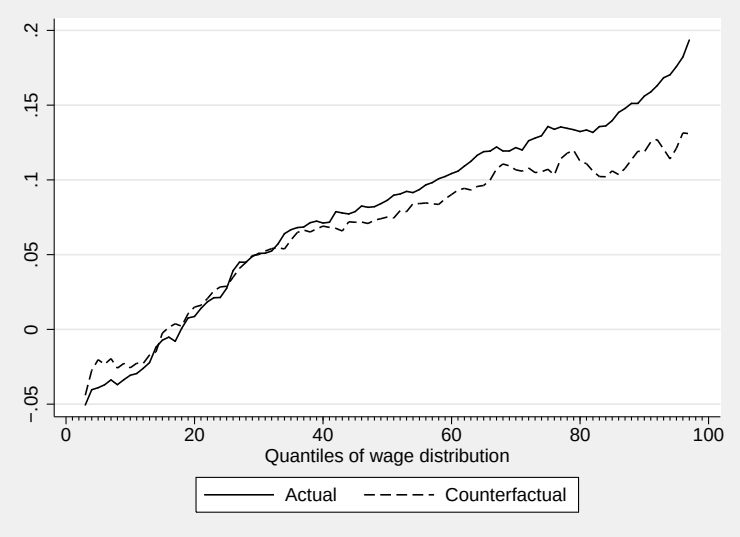


ence between the two. On average, the difference is 2% meaning that in a hypothetical world without pay for performance, wages would on average be 2% lower. It is interesting to consider this effect over the wage distribution. Here, the x-axis displays quantiles of the unconditional wage distribution. Put differently, low wage earners are found on the left, and high wage earners on the right side. The increasing effect over the distribution means that the wage loss in a world without performance pay would affect high-wage earners disproportionally. The top 20% of earners (i.e. above the 80^{th} quantile would experience wage losses of more than 4%. This is confirmation of the hypothesis that high wage earners benefit most from pay for performance. On the other side of the distribution, low wage earners have gained least from performance pay, as we see a wage gain of only about 1% here.

The same estimation method can be applied to describe the development of the wage structure over time. In order to do so, the hypothetical wage distribution in the absence of performance pay is estimated for the years 1989

and 2004.[3] Then, the difference between both years is estimated for both, the actual and the counterfactual wage distribution. These two differences are displayed in figure 3. It shows how the actual wage distribution has developed over time ("actual") and how it would have developed over time in the absence of performance pay ("counterfactual"). Again, the quantiles of the unconditional wage distribution on the x-axis indicate high-wage and low-wage earners.

Figure 3: Wage change from 1989 to 2004: Actual and counterfactual



The results in figure 3 show that performance pay did not affect the bottom half of the wage distribution. In the top half, the curves start diverging meaning that performance pay affects wages of high wage earners.[4] The wages of top earners would have been considerably lower in the absence of

[3]The years are chosen so as to lie at the beginning and at the end of the observation period without being to close to the edges.

[4]On average, 15% of the change are explained by PP.

performance pay. This means that in the counterfactual world, wage inequality would have been lower. Put differently, the observed increase in wage inequality over time is indeed correlated with the increasing use of performance pay schemes. This holds particularly at the top of the distribution.

Recall that wage inequality was growing in West Germany at the top and the bottom of the wage distribution since the 1990s. This study finds that pay for performance contributed to growing wage inequality only in the top half of the distribution. This is plausible if performance is paid mainly for high wage earners.

This finding is consistent with the view that performance pay provides a channel or a mechanism through which firms implement the need to differentiate wages (as described in Lemieux et al., 2009). As a next step, a variance decomposition should shed light on whether it is wage inequality *within* or *between* the fix and the variable pay sector that drives wage dispersion up.

5 Discussion

This study provides a detailed description of the contribution of performance pay to the German wage structure. The growing incidence of variable pay schemes affects ever more employees and their productivity and wages. The share of employees working in a performance pay job (defined as a job that has paid for performance at least once in the past) in Germany increased steadily from 15% in 1984 to 40% in 2009. The steepest increase took place in the late 1990s. The empirical evidence presented here suggests that there

are large wage differences between fix and variable remuneration schemes, but little of this difference is causally due to performance pay. Rather, selection on observables and unobservables explain a large share of the wage difference. The preliminary results leave a wage gain in performance pay jobs of less than 2 percentage points after controlling for individual unobserved heterogeneity. This implies that the productivity gain associated with the introduction of performance pay is on the order of 2%.

One of the most important trends in empirical labor economics over the past few decades is growing wage inequality. Several factors contribute to this trend such as globalization, skill-biased technological change and de-unionization. As the increasing use of pay for performance runs parallel to the growth in wage inequality, it constitutes another potential contributing factor. So the question analyzed in this study is whether performance pay correlates with growing wage dispersion. This question is analyzed using quantile regressions and reweighting methods á la DiNardo et al. (1996).

The results show that the growing use of performance pay did indeed contribute to the growth in wage dispersion - but only at the top of the wage distribution. This is the part of the wage distribution where wage inequality has grown most (Autor, Katz, Kearney, 2008). The results mean that this growth in wage inequality at the top would have been considerably lower in the absence of performance pay. On the other end of the distribution, performance pay plays hardly any role and is thus unrelated to the debate about low-wage earners and poverty. Rather, it affects the part of the wage distribution which is relevant for the discussion about managerial pay. Here,

performance pay could gain even more importance in the future.

References

Amuedo-Dorantes, C. and Mach, T. (2003). Performance pay and fringe benefits. work incentives or compensating wage differentials? *International Journal of Manpower*, 24(6):672–698.

Antonczyk, D., Fitzenberger, B., and Sommerfeld, K. (2010). Rising wage inequality, the decline of collective bargaining, and the gender wage gap. *Labour Economics*, 17(5):835–847.

Antonczyk, D., Fitzenberger, F., and Leuschner, U. (2009). Can a Task-Based Approach Explain the Recent Changes in the German Wage Structure? *Journal of Economics and Statistics (Jahrbücher für Nationalökonomie und Statistik)*, 229(2+3):214–238.

Autor, D., Katz, L., and Kearney, M. (2008). Trends in U.S. Wage Inequality: Revising the Revisionists. *The Review of Economics and Statistics*, 90(2):300–323.

Berger, J., Herbertz, C., and Sliwka, D. (2011). Managerial Incentives and Favoritism in Promotion Decisions: Theory and Field Evidence. *IZA Discussion Paper*, 5543.

Booth, A. L. and Frank, J. (1999). Earnings, Productivity, and Performance-Related Pay. *Journal of Labor Economics*, 17(3):pp. 447–463.

Cornelißen, T., Heywood, J. S., and Jirjahn, U. (2008). Performance pay, risk attitudes and job satisfaction. *SOEPpapers on Multidisciplinary Panel Data Research*, 136.

de la Rica, S., Dolado, J. J., and Vegas, R. (2010). Gender Gaps in Performance Pay: Evidence from Spain. *IZA Discussion Papers*, 5032.

DiNardo, J., Fortin, N. M., and Lemieux, T. (1996). Labor market institutions and the distribution of wages, 1973-1992: A semiparametric approach. *Econometrica*, 64(5):1001–1044.

Dustmann, C., Ludsteck, J., and Schönberg, U. (2009). Revisiting the German Wage Structure. *The Quarterly Journal of Economics*, 124(2):843–881.

Fitzenberger, B. (1999). *Wages and Employment Across Skill Groups: An Analysis for West Germany*. Physica, Heidelberg.

Gernandt, J. and Pfeiffer, F. (2007). Rising Wage Inequality in Germany. *Journal of Economics and Statistics*, 227(4):358–380.

Gielen, A. C., Kerkhofs, M. J. M., and Van Ours, J. C. (2010). How performance related pay affects productivity and employment. *Journal of Population Economics*, 23(1):291 – 301.

Grund, C. and Sliwka, D. (2010). Evidence on performance pay and risk aversion. *Economics Letters*, 102:8–11.

Heywood, J. S. and Parent, D. (2009). Performance Pay and the White-

Black Wage Gap. *Canadian Labour Market and Skills Researcher Network (CLMSR) Working Paper*, 34.

Jirjahn, U. (2002). *The German Experience with Performance Pay*, chapter 6, pages 148–178. S. E. Sharpe.

Koenker, R. (2005). *Quantile Regression*. Econometric Society Monographs no. 38. Cambridge University Press.

Kohn, K. (2006). Rising Wage Dispersion, After All! The German Wage Structure at the Turn of the Century. *ZEW Discussion Paper*, 06-031.

Lemieux, T., MacLeod, W. B., and Parent, D. (2009). Performance pay and wage inequality. *The Quarterly Journal of Economics*, 124(1):1–49.

Pannenberg, M. and Spiess, M. (2009). GEE estimation of the covariance structure of a bivariate panel data model with an application to wage dynamics and the incidence of profit-sharing in West Germany. *AStA Advances in Statistical Analysis*, 93(4):427–447.

Parent, D. (2009). The effect of pay-for-performance contracts on wages. *Empirical Economics*, 36:269–295.

Appendix

End-point correction

"Performance pay jobs" are defined as jobs which have paid for performance at least once in the past. Thus, job matches that are observed over a longer period are more likely to be observed as PP jobs. For this reason, job matches that are observed at the beginning of the observation period in 1984 may be misclassified as non-PP jobs if they paid for performance before 1984. In order to correct for this, an end-point correction is applied in analogy to Lemieux et al. (2009). It proceeds in three steps: First, PP jobs are estimated as a function of calender year and the number of years an individuals job-match is observed in the sample. Second, the distribution of years that the job-matches are observed in the sample is held constant at a time in the middle of the observation period. Third, the share of PP jobs is predicted based on this hypothetical distribution of observation years. These shares deviate from the uncorrected shares at the beginning of the observation period. The corrected shares are depicted int he following figure and table.

Figure 4: Development the incidence of performance pay jobs (with end-point correction)

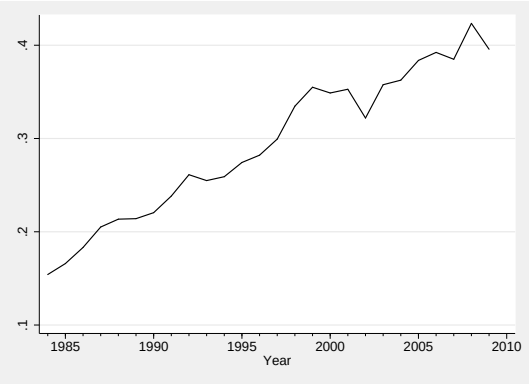


Table 2: Share of PP-jobs in percent (with end-point correction)

Year:	1984	1989	1994	1999	2004	2009
1984-Sample	15.4	21.4	25.9	35.5	36.3	39.6

Table 3: Probit estimation results for the probability of working in a PP job

Variable	**Coefficient**	**(Std. Err.)**
No training degree	-0.250***	(0.075)
University degree	0.008	(0.057)
Training degree missing	-0.214	(0.227)
Female	-0.081*	(0.049)
Age	0.061***	(0.013)
Age^2	-0.001***	(0.000)
Tenure	0.041***	(0.006)
$Tenure^2$	-0.001***	(0.000)
Temporary contract	-0.114**	(0.056)
Occupation: Reference are trained workers		
Untrained Worker	-0.211**	(0.101)
Semi-trained worker	-0.119**	(0.057)
Foreman	0.393***	(0.077)
Simple tasks	0.082	(0.074)
Qualified professional	0.372***	(0.056)
Highly qualified profe.	0.711***	(0.063)
Managerial	1.021***	(0.101)
Others	-0.303**	(0.131)
Firm size in categories is highly significant***		

Figure 5: Development of wage inequality