DISCUSSION PAPER SERIES

IZA DP No. 5538

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Patrick Kampkötter
Dirk Sliwka

February 2011

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

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Patrick Kampkötter
University of Cologne

Dirk Sliwka
University of Cologne
and IZA

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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

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ABSTRACT

Wage Premia for Newly Hired Employees: Theory and Evidence*

We investigate wage differences between newly hired and incumbent employees. We show in a formal model that when employees care for wages as well as match-specific utility, incumbents earn less than new recruits if and only if firm-specific human capital is not too important. The existence and structure of these wage premia is then investigated empirically using detailed personnel data from a large number of banks. We find that, on average, new hires earn more than comparable incumbent colleagues on the same job. But the size of the wage premia varies between jobs and indeed strongly depends on a measure of human capital specificity.

JEL Classification: J31, J44, J62

Keywords: wages, job mobility, wage premia, human capital, new hires

Corresponding author:

Patrick Kampkötter
University of Cologne
Albertus-Magnus-Platz
50923 Köln
Germany
E-mail: patrick.kampkoetter@uni-koeln.de

* We are very grateful to Martin Emmerich, Andreas Enneking, Katharina Hessenauer and Michael Kramarsch from TowersWatson for their support. We also thank seminar and conference participants in Amsterdam, Berlin, Budapest, Cologne, Munich, and Tübingen for valuable comments.

1 Introduction

Dating back to the seminal work by Doeringer and Piore (1985) it has often been claimed that firms can partially shield their employees from external market forces and, hence, it is important to study internal labor markets. Starting with the important contributions of Baker et al. (1994a) and Baker et al. (1994b), a large number of empirical studies have so far explored the structure of internal labor markets. However, surprisingly little work has been done in this literature on the wage differential between incumbent employees and new recruits on the same job. But this variable yields substantial information on the extent to which external market forces indeed determine the wage formation within firms as in perfectly competitive labor markets there should be no difference between wages of new hires and incumbents with identical characteristics.

The key reason for this lack of evidence is that the typically used data sets often have only rather crude information on job characteristics. Even the matched employer-employee data sets that came available in the last few years[1] often contain only proxies for the hierarchical level of the employees and typically lack detailed information on the departments and functional areas in which they are working. More specific details on the jobs studied are known in the empirical literature on internal labor markets when single-firm case studies are investigated.[2] However, the existing papers do not systematically compare wages of incumbents and new recruits[3] and as these studies work with personnel data from single firms the evidence may be idiosyncratic to the specific firm studied.

We now can make use of a unique data set spanning a whole sector and providing detailed information on the jobs, hierarchical levels, company, region as well as information on the individual employees such as wages, bonus

[1] See, for instance, Lima and Pereira (2003), Lazear and Oyer (2004a), Lazear and Oyer (2004b), and von Wachter and Bender (2006).

[2] See, for instance, Treble et al. (2001), Gibbs and Hendricks (2004), Dohmen et al. (2004), and Lin (2005) for single-firm studies.

[3] Differences in promotion probabilities between new hires and incumbents have been analyzed with quite mixed results so far (see e.g. Baker et al. (1994a), Treble et al. (2001), and, more recently, Acosta (2010)).

payments, age, and firm tenure.

We use this data set to study determinants of wage differentials between newly hired and incumbent employees. To fix ideas, we first analyze a simple model to develop hypotheses on the sign and size of these wage differentials. Firms in an industry compete against each other for the service of employees who can fill a certain position and are already employed in one of the firms. An employee's utility is affected by his wage as well as by the personal well-being in his current job (for instance his fit to the corporate culture, his satisfaction with the work environment, supervisor or colleagues). The risk averse employee has private information about these personal preferences. However, while she receives wage offers from other firms, she is uncertain about her personal well-being at a potential new employer. We show that the current employer will always offer a lower wage to the employee than competing firms when the employee's human capital is not too firm-specific. The reason is that risk averse agents are reluctant to move to new employers even when wages are higher. Hence, firms earn rents in a competitive labor market even when human capital is mainly general. Nonetheless, turnover occurs as employees move to different firms when they are less satisfied with the work environment. When comparing the wages of employees staying with their firm with those who have been newly recruited by their employer we should therefore indeed observe that wages are higher for the new recruits. However, when human capital is very firm-specific current employers may outbid potential rivals to ascertain that the employee stays with the firm with a sufficiently high probability and these specific skills are not lost.

We then analyze the wage premia paid to newly hired employees empirically by investigating a large data set on compensation in the German banking and financial services sector provided by the management consultancy Towers Watson[4]. In the years 2004-2008, around 50 banks and financial service companies of every size participated in the survey covering a vast majority of all relevant job positions in this industry. Including all of the largest banks in Germany, the survey covers between 95,000 and 120,000

[4]Towers Watson (formerly Towers Perrin) data sets have in economics also been used for instance by Abowd and Kaplan (1999), Murphy (1999), and Murphy (2001).

employees each year from 2004 to 2008.

We find that, on average, newly hired employees earn significantly higher wages than incumbents on the same job. We then study the influence of the hierarchical level and functional area on these wage premia. The results show that wage premia are *negative* for lower levels but are *positive* and *very substantial* at higher levels where general managerial skills are of increasing importance. Moreover, wage premia differ significantly between functional areas. Wage premia are highest in investment banking and corporate banking where client-specific human capital is of high importance which is general human capital in the sense that it is very valuable for other firms.

But to provide a more direct test of the theory, namely that the (un)importance of firm-specific human capital is a key determinant of the size of wage premia for new recruits, we implement a two-step procedure: Our data set has the useful feature that most of the employees receive a bonus payment in each year. We use this to construct a measure of the importance of firm-specific human capital by investigating the impact of firm tenure on bonus payments. We estimate this measure separately for about 380 to 440 separate "departments", i.e. unique combinations of the specific function, hierarchical level, and career ladder. In the second step, we estimate the association between this specificity measure and the size of the wage premia for newly hired employees. We find that wage premia are substantial for employees in areas where specific human capital is not very important and for those at the median in terms of specificity. But the wage premia vanish in areas in which specific human capital is very important.

We also check whether the results may be driven by unobserved heterogeneity in abilities between incumbents and new hires (i.e. for instance when new hires are more able on average). To do this we make use of the possibility to track the later career for a part of the employees in our data. Using this panel data set we estimate fixed effects regressions with the bonus as dependent variable. The predictions for the indivdiual components in the data set, i.e. the estimated fixed effects, are then used as a straightforward measure of individual ability of each employee. We re-estimate our previous regression models controlling for this measure of individual ability and find

that the results are robust. Newly hired employees, on average, earn more than incumbents on the same job, even when they show the same future performance.

The focus of our empirical study is a within-firm comparison of the wages of employees doing the same job. But earnings differentials between employees have also been investigated in the theoretical and empirical literature on job search (see for instance Mortensen and Pissarides (1999), Rogerson et al. (2005), Eckstein and van den Berg (2007), or Yashiv (2007) for a recent overview). Postel-Vinay and Robin (2002), for instance, show that earnings differentials can arise across identical workers employed at identical firms. In their paper this is due to sequential sampling of alternative random job offers.[5] In our simple model, differentials occur due to a combination of differences in match-specific utility driving employee turnover and differences in the importance of firm-specific human capital on the job under consideration. Hassink and Russo (2008) investigated the wage difference between incumbents and externally hired workers with matched employer-employee data of Dutch firms. They find no wage difference between incumbent workers and employees hired from other firms but do not distinguish between hierarchical levels or job characteristics.[6]

Our paper is also related to recent research showing that wages of newly hired employees are more procyclical and less rigid than those of incumbent employees (see e.g. Barlevy (2001), Devereux and Hart (2006), Hart (2006), Martins (2007), Haefke et al. (2008), Carneiro et al. (2009), Pissarides (2009), or Martins et al. (2010)).[7] Indeed, we find some variations in the wage premia over the years of our study. However, even in 2008 when banks were severely hit by the recent financial crisis we still observe, on average, positive wage premia for new hires and the impact of firm-specific human capital is very stable across the different years considered.

[5] See also Greenwald (1986), Lazear (1986), Golan (2005), or Barron et al. (2006) for models investigating the importance of adverse selection in the process of offers and counteroffers.

[6] Note that this is not inconsistent with our results as they only consider average wage premia. In our data, wage premia are negative for lower hierarchical levels but positive for higher levels.

[7] For the role of compositional effects see e.g. Gertler and Trigari (2009).

Finally, the paper also contributes to the literature on human capital and labor market frictions (see Acemoglu and Pischke (1998), Acemoglu and Pischke (1999b), or Kessler and Lülfesmann (2006)). As has been pointed out for instance in Acemoglu and Pischke (1999a), labor market frictions lead to a compressed wage structure as outside firms competing for the service of an employee cannot capture the full value of this employee. In turn, current employers should earn rents from incumbent employees which makes even investments in general human capital attractive. As our empirical results show that firms (have to) pay more for outside employees at identical jobs and with the same future performance, they indeed must earn positive rents from incumbents.

The paper proceeds as follows. We first investigate a simple model to illustrate a key mechanism leading to wage differentials between incumbents and new hires in section 2. Section 3 then presents the empirical investigation, in particular an analysis of organizational determinants of wage premia as well as a direct test of the importance of firm-specific human capital. Finally, section 4 concludes.

2 A Simple Model

2.1 Description of the Model

We first analyze a very simple model of an industry consisting of n firms indexed by k with $n \geq 3$ and a number of employees indexed by i. We consider only employees who gained some labor market experience and therefore are already employed in one of the firms.[8] Each employee is qualified for exactly one type of job J. Initially being employed in one of the firms, an employee can in principle fill the same job in all firms in the industry. Hence, for each job all firms in the industry compete for the service of all employees who are qualified for the job. Consider a certain employee i working at a firm

[8] The unemployment rate in the German banking sector is 2.8% (2004 and 2005), 1.7% (2006), 1.5% (2007), and 1.3% (2008). This is far below the national average of 8% to 11.7% in this period. Therefore, our assumption of job-to-job transitions is quite plausible.

k. When staying with firm k the employee generates revenue $s_J \cdot a_i$ for his current employer. When moving to the same job in another firm in the industry, the new employer earns revenues of a_i. Hence, a_i can be interpreted as the employee's job-specific ability and human capital and $s_J \geq 1$ measures the importance of firm-specific human capital for the considered job J. For instance, when the job mainly consists of managerial tasks and managerial competencies are rather general, s_J will be relatively small. But when it is for instance important for the job to know firm-specific software or specific procedures, s_J will be large. We assume that the job-specific ability a_i is measurable by all potential employers.[9] We further assume that a firm always benefits from employing an employee when the revenue generated by the employee exceeds the wage costs.

An employee i's utility does not only depend on the wage she earns but also on other aspects of the job. We denote this match-specific utility when staying with firm k by u_{ik}. Of course, the employee knows this match-specific utility when staying with the firm but we assume that u_{ik} is private information of the employee and is unknown to the current employer as well as to other employers on the labor market. When she moves to a different firm $l \neq k$ it is drawn from a normal distribution with mean 0 and variance σ_u^2 and is unknown by the employee before his decision on whether to accept an external offer.[10] The employee's utility is additively separable in the wage and the match-specific utility and she is risk averse with constant absolute risk aversion. Her Arrow-Pratt measure of absolute risk aversion is r.

The timing is as follows: First the current employer makes a wage offer to the employee, then other firms in the industry simultaneously make wage offers to the same employee. Finally, the employee decides on whether to stay with the initial employer or to move to a competing firm.

[9] Adverse selection issues arising from an initial employers superior knowledge about an employees talent are e.g. analyzed by Waldman (1984), Greenwald (1986), Gibbons and Katz (1991), or Acemoglu and Pischke (1998).

[10] Hence, the match-specific utility is an experience good such as for instance in Jovanovic (1979).

2.2 Equilibrium Analysis

Due to the competitive labor market, in equilibrium each employer makes a wage offer of $w_i^E = a_i$ to each external employee i. We now investigate the optimal wage offer made to an employee by his initial employer. Note that the certainty equivalent of the employee's utility when moving to a new employer is $a_i - \frac{1}{2}r\sigma_u^2$. Employee i stays with his current employer k at a wage w_{ik} whenever

$$u_{ik} + w_{ik} \geq a_i - \frac{1}{2}r\sigma_u^2.$$

Hence, the employee stays with probability

$$P(w_{ik}) = 1 - F\left(a_i - \frac{1}{2}r\sigma_u^2 - w_{ik}\right).$$

Note that there always will be employee turnover between the firms in the industry. When considering the optimal wage paid to an incumbent employee firms now trade-off wage costs against the risk to lose the employee to a competitor. Although moving to a different firm is risky, employees will do so when they are very dissatisfied with the current working conditions, i.e. u_{ik} is relatively small. The firm maximizes

$$\max_{w_{ik}} (s_J \cdot a_i - w_{ik}) \left(1 - F\left(a_i - w_{ik} - \frac{1}{2}r\sigma_u^2\right)\right). \tag{1}$$

The first order condition is equivalent to

$$(-1)\left(1 - F\left(a_i - w_{ik} - \frac{1}{2}r\sigma_u^2\right)\right) + (s_J \cdot a_i - w_{ik})\, f\left(a_i - w_{ik} - \frac{1}{2}r\sigma_u^2\right) = 0. \tag{2}$$

From this condition we can derive the following result:

Proposition 1 *The wage w_i^I offered to an employee by his current employer is characterized by*

$$w_i^I + \frac{1 - F\left(a_i - w_i^I - \frac{1}{2}r\sigma_u^2\right)}{f\left(a_i - w_i^I - \frac{1}{2}r\sigma_u^2\right)} = s_J \cdot a_i. \tag{3}$$

The wage paid to an incumbent employee w_i^I will be lower than that paid to a new hire of the same ability $w_i^E = a_i$ if and only if human capital is not too firm-specific, i.e. when

$$s_J \leq 1 + \frac{1 - F\left(-\frac{1}{2}r\sigma_u^2\right)}{a_i f\left(-\frac{1}{2}r\sigma_u^2\right)}.$$

Proof:

Condition (2) can be directly rearranged to obtain (3). The normal distribution satisfies the monotone hazard rate condition, hence, $\frac{d}{dx}\left(\frac{f(x)}{1-F(x)}\right) > 0$ which implies that

$$\frac{1 - F\left(a_i - w_{ik} - \frac{1}{2}r\sigma_u^2\right)}{f\left(a_i - w_{ik} - \frac{1}{2}r\sigma_u^2\right)}$$

is strictly increasing in w_{ik}. Therefore, (3) has a unique solution w_i^I. Moreover, the first derivative of (1) is strictly positive for $w_{ik} < w_i^I$ and strictly negative for $w_{ik} > w_i^I$. Hence, a necessary and sufficient condition for a positive wage premium paid to newly hired employees is that the first derivative of the objective function (1) with respect to w_{ik} is negative at $w_{ik} = a_i$. This is the case when

$$\begin{gathered}
-1 + F\left(-\frac{1}{2}r\sigma_u^2\right) + (s_J \cdot a_i - a_i) f\left(-\frac{1}{2}r\sigma_u^2\right) < 0 \Leftrightarrow \\
(s_J - 1) a_i f\left(-\frac{1}{2}r\sigma_u^2\right) \leq 1 - F\left(-\frac{1}{2}r\sigma_u^2\right) \Leftrightarrow \\
s_J \leq 1 + \frac{1 - F\left(-\frac{1}{2}r\sigma_u^2\right)}{a_i f\left(-\frac{1}{2}r\sigma_u^2\right)}.
\end{gathered}$$

■

Hence, when the competencies relevant for a certain job type are purely general human capital, i.e. employee's can switch between firms without productivity losses, incumbents always earn less in equilibrium than newly hired employees. The reason is the following: In the competitive labor market employees who leave their employer will be paid according to their productivity.

When the current employer matches this outside offer he makes zero profits. A lower wage of course increases the probability that the incumbent leaves the firm. But if she stays, profits will be strictly positive. Hence, expected profits are only positive when incumbents are paid at a wage below the market level. It is interesting to note that this effect even arises when agents are risk neutral. However, the more risk averse the employee the lower can be the incumbent's wage as the switching costs due to the uncertainty about the new job are higher.

But when firm-specific human capital is more important, market wages will be below the productivity of the employee in the current firm. Hence, the firm makes positive profits even at market wages. When firm-specific skills are very important, paying less than market wages becomes too risky as agents with below-average levels of job satisfaction will be tempted to leave the firm. In equilibrium, the firm will then pay wages that exceed the market level to assure the employee's retention.

It is interesting to note that firms always earn rents from incumbent employees and they do so even if human capital is entirely general. Ex-ante (i.e. before an employee has become an incumbent) firms should therefore be willing to bid a wage which is higher than an employees' current productivity as they anticipate future rents. Note that this idea reinforces our key hypothesis: firms not only should bid more for new entrants as they have to convince workers to switch employers but also as new entrants promise future rents.

3 Empirical Investigation

3.1 The Data

We investigate a large data set on compensation in the German banking and financial services sector[11] for the years 2004-2008 owned by the international management consultancy Towers Watson. In 2004, we have informa-

[11] Sparkassen (publicly-owned savings banks), Volks- and Raiffeisenbanken (cooperative banks) and the Deutsche Bundesbank (German central bank) are not part of the sample.

tion about 43 firms and more than 95,000 employees, in the years 2005 to 2008, more than 50 banks and financial service companies of every size located in Germany participated in the compensation survey covering around 120,000 employees each year. The survey participants report information for a variety of job positions in all relevant functional areas of the financial services sector.[12]

We have individual information on base salary, age, firm tenure with the current employer, hierarchical level (6 levels), functional area (8 areas), and region (15 regions) for the majority of employees of each participating company. The functional areas represent a broad classification of the main sectors in the banking and financial services industry: Retail banking (RB), asset management (AM), corporate banking (CB), investment banking (IB), private banking (PB), treasury and capital markets (TCM), the typically lower-skilled service functions (corporate services (CS)) as well as the cross-divisional functions (corporate production (CP)). A unique feature of the data set is that information on the functional area[13] and hierarchical level is quite precisely comparable across firms in the sample as Towers Watson uses a standardized method to define specific functions in detail as well as so-called "career levels" that are described through detailed job descriptions and profiles of competencies, skills and knowledge required for the relevant job position in an employee's career path.[14] These career levels reflect typical career steps for individuals from entry levels to senior expert positions for each function and job family, i.e. employees are typically promoted to the next career level. In a next step these career levels are matched to the huge number of functions and disciplines that can be identified in the financial services sector resulting in four different career ladders: one for management positions and three for individual expert positions (professional, sales and support).

[12]Executive and senior management positions are excluded. Also trainees and apprentices are not part of the sample.

[13]A functional area comprises a large number of specific functions.

[14]For expert positions, typical dimensions that are applied comprise professional skills, customer and process/business strategy orientation, problem-solving and communication skills, and teamwork and networking skills.

We can distinguish six hierarchical levels in the data set, where level 1 denotes the lowest level, typically the entry positions of university graduates, and level 6 the highest level, typically divisional heads. Most of the employees belong to levels 2, 3, and 4. Only 2.5% hold the highest positions in the data set. The average proportion of newly hired employees ranges from 1.5% in 2004 to 2.4% in 2008 (see table A1 in the appendix for . The mean age of incumbents (new hires) in the sample is about 40 years (33 years). About 34% of all employees work in the retail banking area, followed by about 25% in both the cross-divisional support functions like e.g. HR, legal, finance and accounting (corporate production) and the lower-skilled service functions including mostly back-office positions (corporate services). About 2% can be assigned to asset management and investment banking positions.[15]

3.2 Wage Premia

As a starting point consider the OLS baseline regression results reported in table 1. The dependent variable is the logarithm of wage (base salary) and the dummy variable *Newly hired* indicates that an employee has been hired in the relevant year. We control for age, age squared, hierarchical level, functional area, geographic region and company and run separate regressions for the years 2004 to 2008. Recall that our model made a prediction on the difference between the wages of new recruits and incumbents with a *similar previous experience* on the labor market. Hence, we restrict the data set to levels 3 to 6 as we can rule out that there are new recruits without prior professional experience on these levels.[16] The employees' age then serves as a proxy for labor market experience.[17] Further, heteroskedasticity-robust

[15] As we exclude levels 1 and 2 (entry levels) in the following regressions, descriptive statistics for levels 3 to 6 are provided in table A2 in the appendix.

[16] Levels 1 and 2 are typical entry levels, so there is a large proportion of young graduates among the newly hired employees. In that case we should expect lower wages for new recruits as a new recruit should not only have less firm-specific human capital but also less general human capital. This is indeed confirmed by table A3 in the appendix showing regression results for the two lowest levels.

[17] We cannot track employees before entering and after leaving a firm and therefore cannot measure job mobility. But Marshall and Zarkin (1987), for instance, have shown that prior mobility has neither a significantly positive nor a significantly negative impact

standard errors are reported in each regression.

Dep. variable:	Logarithm of Base Salary				
	2008	2007	2006	2005	2004
Newly hired	0.0130**	0.0491***	0.0165***	0.0298***	0.0282***
	(0.0058)	(0.0062)	(0.0055)	(0.0065)	(0.0082)
Age	0.0173***	0.0258***	0.0273***	0.0279***	0.0202***
	(0.0007)	(0.0009)	(0.0007)	(0.0007)	(0.0007)
Age^2*100	-0.0156***	-0.0241***	-0.0256***	-0.0259***	-0.0173***
	(0.0008)	(0.0010)	(0.0009)	(0.0009)	(0.0008)
Level 6[a]	0.667***	0.654***	0.690***	0.670***	0.673***
	(0.0039)	(0.0052)	(0.0041)	(0.0045)	(0.0043)
Level 5	0.378***	0.338***	0.374***	0.364***	0.395***
	(0.0018)	(0.0024)	(0.0021)	(0.0021)	(0.0021)
Level 4	0.189***	0.160***	0.184***	0.171***	0.179***
	(0.0013)	(0.0015)	(0.0013)	(0.0012)	(0.0012)
Observations	61694	40248	57021	59724	54147
R-squared	0.72	0.71	0.74	0.70	0.73

Additional control variables include functional area, region and company

[a] Reference category: Level 3

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table 1: Baseline regressions

On average, newly hired employees earn between 1.3% and 4.9% more than incumbents and these wage premia are highly significant. The results also show the typical inversely U-shaped age-earnings profile as well as a wage structure which is convex in the hierarchical level.

The results show some variation in the magnitude of wage premia during the period 2004-2008. As previous research has shown, wages of newly hired employees are more procyclical and less rigid than those of incumbent employees.[18] Note that this seems to hold also for our data: The spearman correlation coefficient between average wage premia (i.e. the coefficients for "newly hired" for each of the five years) and the average return on equity (return on assets) for German banks is 0.43 (0.44).[19] But it is notable that

on wage offers for newly hired employees.

[18] See e.g. Devereux and Hart (2006), Haefke et al. (2008), and Pissarides (2009).

[19] Average return on equity (return on assets) in German banks was 4.2% (0.14%) in

even in 2008, when banks were severely hit by the financial crisis, positive wage premia are paid to newly hired employees.

It is also interesting to investigate the size of wage premia of new recruits in comparison with employees on the same job with different levels of seniority. Therefore we classify firm tenure into four groups: The first includes only newly hired employees, the second includes incumbents with firm tenure from 1 to 5 years, the third employees with 6 to 10 years of firm tenure and the last group comprises employees who work more than 10 years for their current firm. The results of the regressions including variables for different tenure classes are shown in table 2, with newly hired employees as reference category. It can be seen that employees with the longest firm tenure face the strongest disadvantage relative to the new recruits in the same job. In 2007 for example, a newly hired employee earns on average 4% more than an incumbent with 1 to 5 years of tenure. This premia increases up to 5.7% when comparing to incumbents with more than 10 years of firm tenure.[20] Note that we control for age, job, and firm characteristics. Accordingly, each job move leads to a wage premium for the mover providing him with a persistent advantage relative to his colleagues on the same job who have stayed with the firm for longer periods of time. Hence, in particular the very "loyal" employees seem to have the strongest disadvantage relative to new hires. These results are robust over the years.

3.3 The Impact of Organizational Characteristics

Before proceeding to a direct test of our theory it is instructive to conduct an explorative analysis of organizational determinants of wage premia which is guided by the key ideas of the model. Given the predictions, the above results seem to indicate that firm-specific human capital is on average not too important in the banking industry. However, we might expect differ-

2004, 13% (0.44%) in 2005, 9.4% (0.36%) in 2006, 6.6% (0.25%) in 2007, and -7.7% (-0.3%) in 2008 (see monthly reports for September 2008 and 2009 of the German Central Bank).

[20] Note that the weak benefits of tenure are in line with the well-known results by Altonji and Shakotko (1987) and Abraham and Farber (1987) showing that the effects of tenure are rather weak as compared to general labor market experience.

Dep. variable:	Logarithm of Base Salary				
	2008	2007	2006	2005	2004
Tenure 1-5[a]	-0.0053	-0.0400***	-0.0053	-0.0246***	-0.0186***
	(0.0061)	(0.0064)	(0.0056)	(0.0066)	(0.0083)
Tenure 6-10	-0.0189***	-0.0524***	-0.0210***	-0.0313***	-0.0275***
	(0.0059)	(0.0063)	(0.0056)	(0.0066)	(0.0083)
Tenure $\geq$=11	-0.0345***	-0.0572***	-0.0308***	-0.0370***	-0.0415***
	(0.0059)	(0.0063)	(0.0056)	(0.0066)	(0.0083)
Observations	61694	40248	57019	59526	54147
R^2	0.72	0.71	0.74	0.71	0.74

Additional control variables include age, hierarchical level, functional area, region and company. [a] Reference category: Newly hired employees
*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table 2: OLS wage regressions with tenure classes

ences between the hierarchical levels and functional areas. We can use these expected differences as a first test of the theoretical predictions concerning the impact of specificity.

First of all, managerial skills and talent will become more important the higher the hierarchical level. But managerial talent is mostly general human capital.[21] As qualifications for managerial positions become more and more similar between firms when an employee climbs up the hierarchy, our simple model therefore suggests that wage premia for new recruits should be increasing in the hierarchical level. To test this, we add interaction terms between each hierarchical level and the *Newly hired* dummy to the baseline regression model.

As level 3 is the reference category, the coefficients for the interaction terms measure the difference in the new recruits' wage premia relative to that premium at level 3. Our hypothesis concerning the effect of the hierarchical level on the wage premia is indeed confirmed by the results reported in table

[21] Murphy and Zábojník (2004), for instance, have argued that "*general managerial skills [..] became relatively more important for the CEO job, perhaps as a result of the steady progress in economics, management science, accounting, finance, and other disciplines which, if mastered by a CEO, can substantially improve his ability to manage any company. At the same time, certain types of knowledge specific to one particular firm [..] is nowadays available in computerized form at the tip of the CEO's (or his secretary's) fingers.*"

Dep. variable:	Logarithm of Base Salary				
	2008	2007	2006	2005	2004
Newly hired	-0.0159**	0.0010	-0.0337***	-0.0535***	-0.0064
	(0.0079)	(0.0091)	(0.0075)	(0.0100)	(0.011)
× Level 4	0.0468***	0.0486***	0.0775***	0.110***	0.0138
	(0.0118)	(0.0122)	(0.0110)	(0.013)	(0.015)
× Level 5	0.0285	0.122***	0.115***	0.171***	0.131***
	(0.0194)	(0.0197)	(0.0178)	(0.020)	(0.027)
× Level 6	0.143***	0.147***	0.157***	0.193***	0.187***
	(0.0326)	(0.0407)	(0.0425)	(0.034)	(0.061)
Age	0.0171***	0.0255***	0.0271***	0.0275***	0.0201***
	(0.0007)	(0.0009)	(0.0007)	(0.0007)	(0.0007)
Age^2∗100	-0.0154***	-0.0238***	-0.0253***	-0.0254***	-0.0171***
	(0.0008)	(0.0010)	(0.0009)	(0.0009)	(0.0008)
Level 6[a]	0.664***	0.651***	0.687***	0.666***	0.671***
	(0.0040)	(0.0053)	(0.0041)	(0.0046)	(0.0043)
Level 5	0.378***	0.336***	0.372***	0.361***	0.394***
	(0.0018)	(0.0024)	(0.0021)	(0.0021)	(0.0021)
Level 4	0.188***	0.160***	0.183***	0.169***	0.179***
	(0.0013)	(0.0015)	(0.0013)	(0.0012)	(0.0012)
Observations	61694	40248	57021	59724	54147
R-squared	0.72	0.71	0.74	0.71	0.73

Additional control variables include functional area, region and company

[a] Reference category: Level 3

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table 3: Interaction with hierarchical level

3: First note that the coefficient for *Newly hired* is negative and statistically significant in 2005, 2006 and 2008 when the interaction terms are included. That is on level 3, the lowest level in the data set, newly hired employees earn less than their incumbent counterparts. This difference is sizeable at about -1.6% in 2008, -3.4% in 2006 and -5.4% in 2005, but not significantly different from zero in 2004 and 2007. However, already on level 4 new recruits receive a positive wage premium relative to incumbents in all years except 2004. This premium increases up to 13% at level 5 and further up to 13%-21% at the highest level.[22] For divisional heads, this average premium amounts to

[22]Recall that the wage increases by $\left(e^{\beta}-1\right)*100$ percent in case of dummy variables

18,000 Euros.

A potential explanation for this pattern is that at the lowest level considered firm-specific human capital such as the knowledge of firm-specific software systems, specific banking products and administrative processes is important such that firms pay less to employees hired from the outside. But firm-specific human capital becomes less important at upper levels in the hierarchy where general managerial skills are more important. Of course, there are other explanations for the pattern as well. For instance, workers at higher hierarchical levels may become more visible to the outside market and, as in turn adverse selection problems may be smaller, this increases the willingness to pay for external hires. But in the next section we will provide strong direct evidence that the importance of specific human capital is a key driving force.

As in German banks many employees at lower levels are covered by collective wage agreements, which impose restrictions on market wages, it is important to check whether some of the observed effects are due to such agreements. In the regressions reported in table A4 in the appendix we therefore exclude all employees covered by a collective wage agreement from the data set. It is interesting to note that, at the lowest level, the wage discount for new hires even becomes more negative, indicating that the minimum wage character of a collective wage agreement seems to favor new recruits relative to the outcomes of a market-based wage-setting process as analyzed in our model. At higher levels the results remain unchanged.[23]

Labor market and job characteristics of course should also differ between the various functions. Table 4 shows the results of a wage regression where we explore differences among the functional areas by interacting the *Newly hired* dummy with the different functional areas. As reference group we have chosen retail banking as this is the largest functional area covering more than 30% of all employees. It is quite interesting to note that there are substantial differences between the functional areas.

Wage premia are negative and significant in retail banking in four of the

in semilogarithmic equations (see e.g. Halvorsen and Palmquist (1980)).

[23] At more senior levels, almost all employees are exempt ones.

Dependent variable:	Logarithm of Base Salary				
	2008	2007	2006	2005	2004
Asset Management[a]	0.159***	0.158***	0.141***	0.143***	0.138***
	(0.0056)	(0.0072)	(0.0064)	(0.0071)	(0.0078)
Corporate Banking	0.111***	0.0689***	0.0565***	0.0589***	0.0342***
	(0.0036)	(0.0030)	(0.0023)	(0.0023)	(0.0023)
Corp. Production	0.0442***	0.0418***	0.0200***	0.0214***	0.0181***
	(0.0018)	(0.0020)	(0.0017)	(0.0016)	(0.0014)
Corporate Services	-0.0209***	-0.0148***	-0.0452***	-0.0236***	-0.0274***
	(0.0022)	(0.0025)	(0.0021)	(0.0020)	(0.0019)
Investment Banking	0.168***	0.130***	0.141***	0.142***	0.118***
	(0.0058)	(0.0073)	(0.0057)	(0.0066)	(0.0067)
Private Banking	0.0886***	0.0694***	0.0424***	0.0226***	0.0103***
	(0.0041)	(0.0041)	(0.0030)	(0.0020)	(0.0018)
Treas. & Cap. Mark.	0.176***	0.210***	0.206***	0.143***	0.179***
	(0.0047)	(0.0052)	(0.0048)	(0.0046)	(0.005)
Newly hired	-0.0052	-0.0254***	-0.0346***	-0.0528***	-0.0448**
	(0.0137)	(0.0097)	(0.013)	(0.0177)	(0.0161)
× Asset Man.	-0.0053	0.0105	0.0777***	0.0438	0.0564
	(0.0244)	(0.0238)	(0.0276)	(0.0346)	(0.0429)
× Corp. Bank.	0.0389	0.0387	0.0979***	0.158***	0.222***
	(0.0286)	(0.0311)	(0.0250)	(0.0295)	(0.0552)
× Corp. Prod.	0.0064	0.0058	0.0690***	0.0991***	0.0707***
	(0.0161)	(0.0130)	(0.0145)	(0.0195)	(0.0193)
× Corp. Serv.	-0.0456**	-0.0461**	0.0019	0.0619**	0.0470
	(0.0217)	(0.0230)	(0.0220)	(0.0300)	(0.0313)
× Inv. Bank.	0.108***	0.0779**	-0.0008	0.169***	0.207***
	(0.0330)	(0.0342)	(0.0315)	(0.0401)	(0.0493)
× Priv. Bank.	0.0540**	0.129***	0.0173	0.0853***	0.0282
	(0.0256)	(0.0242)	(0.0265)	(0.0297)	(0.0326)
× TCM	0.141***	0.0543**	0.148***	0.111***	0.162***
	(0.0322)	(0.0265)	(0.0301)	(0.0294)	(0.0384)
Observations	61694	40248	57021	59724	54147
R^2	0.72	0.71	0.74	0.71	0.73

Additional control variables include hierarchical level, region, company, age and age^2

[a] Reference category: Retail Banking

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table 4: Interaction with functional area

five years (up to -5.3%). Positive and economically significant wage premia can be found in treasury and capital markets in all years, with average premia that are up to 16% higher than in retail banking. We also find large and economically significant wage premia in the majority of years in corporate banking and investment banking. Of course, the data must be interpreted carefully in this respect, but it seems as if the observations may quite well be understood by the reasoning suggested in our model. In capital market-based functions employees mainly deal with trading in debt, equity, foreign exchange, derivative and money market products that are highly standardized and therefore very similar or even identical across banks. Hence, acquired human capital should be mostly general rather than firm-specific. Jobs in investment banking and corporate banking are often characterized by human capital that is much more *client-specific* than firm-specific. But client-specific human capital is general human capital in the sense that it is very valuable for a competitor. Hence, firms will be willing to pay high wages to lure investment and corporate bankers away from their competitors.[24] However, retail banking is concerned with the day-to-day business with less wealthy private customers where it is important for an employee to be more familiar with firm-specific products, software and procedures.[25]

Our data set offers an additional feature that allows to distinguish between managers and functional experts. The consultancy Towers Watson distinguishes between different career ladders. The "managerial ladder" includes employees in supervisory roles with mainly managerial tasks whereas the "professional ladder" encompasses functional experts. As argued already in the above, managerial skills should mostly be general human capital. On the other hand, among the functional experts, firm-specific knowledge should be on average more important for individual productivity. Hence, we expect

[24]Examples are UBS recruiting two teams of financial advisors from Merrill Lynch in 2009, both managing in total around $500 million of client assets (Reuters, November 19, 2010) or Deutsche Bank which lured away a group of more than 10 investment bankers from Merrill Lynch (Financial Times, April 7 2009).

[25]Note that new recruits earn relatively more in private banking than in retail banking. Private banking deals with wealthy private clients. In this case hiring employees from competitors should be more attractive as they bring more valuable client relations with them.

that wage premia for external recruits are higher when we consider jobs in the managerial ladder as compared to the professional ladder. This is confirmed in the regressions reported in table A5 in the Appendix. An employee in the managerial ladder receives a 3.6% to 6.9% higher premium than a comparable employee in the professional ladder.

3.4 The Importance of Firm-Specific Human Capital

So far we found some evidence for our key hypothesis and argued that firm-specific human capital should be less important at higher levels, for certain functional areas and less important for managerial as compared to expert positions. In this section we develop a procedure to provide a more direct test for the hypothesis. To do that we follow a two-step approach: In a first step, we generate a measure for the importance of firm-specific human capital. In a second step we then investigate whether the size of this measure in fact determines the difference between the wages of incumbents and newly hired employees.

The specificity measure is defined as follows. We first generate cells as unique combinations of the specific function[26], hierarchical level and career ladder for each year in the data set. This reflects the idea that the importance of human capital is rather function- and job-specific than company-specific, i.e. in many areas firm-specific human capital is of the same importance across different companies. As a result, we obtain between 380 and 435 unique cells per year. In a next step we conduct separate regressions for the years 2004 to 2008 for each of these cells with the individual performance measure (logarithm of bonus payments) as dependent variable and firm tenure and age as explanatory variables.[27] The coefficient s_j of firm tenure in each regression now gives a measure for the importance of firm-specific human capital in a cell j: The more important firm-specific human capital in a certain area the more the performance of an employee should depend upon his tenure at the firm controlling for overall experience (proxied

[26] The data set distinguishes depending on the year between 60 and 80 specific functions.

[27] In line with our previous analyses we do not make use of entry levels 1 and 2. We also exclude cells with insufficient observations.

by age).

We then standardize this measure by generating a variable equal to the cumulative distribution function $F(s_j)$ of this measure for each cell, i.e. the fraction of all cells in which the impact of tenure on performance is smaller. Hence, for the cell with the lowest tenure coefficient this specificity measure $F(s_j)$ takes on the value 0, for that with the highest coefficient it is close to 1 and for the median cell it is 0.5. For each year we separately estimate the following specification with again the wage of individual i who belongs to cell $j(i)$ as dependent variable

$$w_i = \gamma_1 \cdot NewHire_i + \gamma_2 \cdot F\left(s_{j(i)}\right) \cdot NewHire_i + \gamma_3 \cdot X_i + \varepsilon_i,$$

with X_i being a vector of independent variables, i.e. age and dummies for the hierarchical level, functional area, region, and company. We estimate this model separately for each cross section.

According to our theoretical model we expect γ_1 to be positive and the sign of the interaction term γ_2 to be negative, because wage premia should be lower in areas where human capital is more firm-specific. Table 5 shows the estimation results. We indeed find a significant negative interaction effect for all years, i.e. the wage premium for newly hired employees is economically as well as statistically significant when firm-specific human capital is not important. In these areas, new hires receive an average premium between 8% and 12%, all other factors constant. But this premium decreases in those areas where specific human capital is of high importance. At the median of specificity the wage premia are about half the size. Interestingly, while in three of the five years we observe negative premia for new hires in areas with the highest degree of specificity (i.e. $\gamma_1 + \gamma_2 < 0$) these premia are very close to zero. It is notable that the results are remarkably similar in the considered years (with the slight exception of 2005, in which the estimated specificity effect is weaker).

As a further robustness check we compare the wage premia for newly hired employees between areas with above- and below-median values for the specificity of human capital. To test the differences between these groups,

Dep. variable:	Logarithm of Base Salary				
	2008	2007	2006	2005	2004
New hire	0.0793***	0.0851***	0.0816***	0.1141***	0.0913***
	(0.0191)	(0.0231)	(0.0277)	(0.0211)	(0.0145)
New hire ×	-0.0988***	-0.0815**	-0.0990**	-0.0642*	-0.1191***
HC Specificity[a]	(0.0376)	(0.0395)	(0.0478)	(0.0370)	(0.0271)
Human Capital	-0.0097***	-0.0154***	-0.0248***	-0.0498***	-0.0188***
Specificity[a]	(0.0028)	(0.0033)	(0.0031)	(0.0027)	(0.0028)
Observations	58931	35718	49486	51683	50542
R-squared	0.72	0.72	0.74	0.72	0.73

[a] Standardized measure (distribution function). Additional control variables include hierarchical level, age, region, functional area and company

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table 5: Interaction with measure for specificity of human capital

we use a dummy variable equal to one if $F\left(s_{j(i)}\right) > 0.5$. As expected, in all years average wage premia for the below-median group are highly significant and larger than those for the above-median group. The wage premia range from 7% to 9% in areas with below-median specificity, and from 1% to 6% otherwise.

3.5 Differences in Ability?

In the regressions presented in the above we compared newly hired employees with incumbents of the same age, hierarchical level, functional area, region and company. But there might be further and unobservable differences in individual characteristics. For instance, if firms would systematically recruit employees from the outside that are of higher ability than incumbent employees in the same jobs, wage premia may to a certain extent reflect productivity premia.[28] Hence it is important to rule out that wage premia are mainly driven by a potential omitted variable bias as individual ability is unobserved.

Note that it is not appropriate to estimate a fixed effects model with

[28] Still note that it seems hard to come up with a compelling theoretical argument why this should be the case in equilibrium. It should not be possible for all firms in a market to hire employees that are of higher ability than the incumbents.

a dummy for newly hired employees as independent variable. Given the structure of our data, a fixed effects model would identify the effects of a *within* employee variation in wages between year 1 in the firm as compared to later years in the firm. But we want to investigate the difference in wages *between* newly hired employees and employees doing exactly the same job.

Dep. variable:	Logarithm of Base Salary			
	2007	2006	2005	2004
Newly hired	0.0467***	0.0132	0.0374***	0.0464***
	(0.0098)	(0.0087)	(0.0102)	(0.0143)
Ability measure	0.0321***	0.0315***	0.0182***	0.0165***
	(0.0027)	(0.0018)	(0.0014)	(0.0009)
Level 6[a]	0.661***	0.574***	0.666***	0.611***
	(0.0104)	(0.0066)	(0.0069)	(0.0088)
Level 5	0.385***	0.290***	0.348***	0.355***
	(0.0047)	(0.0037)	(0.0033)	(0.0046)
Level 4	0.188***	0.150***	0.159***	0.150***
	(0.0031)	(0.0028)	(0.0021)	(0.0030)
Observations	10420	15251	19109	12857
R-squared	0.76	0.72	0.75	0.70

Additional control variables include age, functional area, region and company. [a] Reference category: Level 3

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table 6: Baseline regressions with individual ability measure

But our data set still provides us with the possibility to control for heterogeneity in abilities, as we can (i) observe individual annual bonus payments and (ii) can construct a panel data set by matching individuals in the cross sections for about one third of all employees in our sample.[29] This panel data set contains identical information to that used in the cross sections and the distribution of employees across hierarchical levels and functional areas is very similar. We construct our measure for individual, time-constant ability as follows: First we estimate the following fixed effects regression with the

[29] The reason is that some but not all companies in the data set reported a *time-invariant* unique (anonymous) personal ID number for each employee in each year.

logarithm of bonus payments as dependent variable:

$$\ln b_{it} = \beta \cdot X_{it} + a_i + \varepsilon_{it},$$

with X_{it} being a vector of the independent variables, i.e. the logarithm of base salary, a dummy for newly hired employees[30], tenure, age, as well as dummies for the hierarchical level, functional area, region, company, and year and a_i the individual fixed effects. Note that we only include employees with information from at least two subsequent years in the regressions. We then use the individual predictions for the estimated fixed effects a_i as measure of ability for individual i and replicate the baseline regressions additionally controlling for a_i. The results are given in table 6. Note that the coefficients are very close to those reported in table 1 even though we now have a much lower number of observations.[31] Hence, the wage premia seem not to be driven by systematic differences in ability between incumbents and new recruits.

Dep. variable:	Logarithm of Base Salary			
	2007	2006	2005	2004
New hire	0.0794***	0.1104***	0.0733***	0.0841***
	(0.0252)	(0.0333)	(0.0211)	(0.0241)
New hire	-0.0753*	-0.1291**	-0.0070	-0.0963**
× HC Spec.[a]	(0.0434)	(0.0573)	(0.0385)	(0.0420)
HC Spec.[a]	-0.0110	-0.0300***	-0.0378***	-0.0435***
	(0.0067)	(0.0051)	(0.0040)	(0.0056)
Ability measure	0.0456***	0.0687***	0.0558***	0.0542***
	(0.0033)	(0.0030)	(0.0024)	(0.0027)
Observations	10115	14509	19117	11874
R-squared	0.77	0.72	0.76	0.71

[a] Standardized measure (distribution function). Additional control variables include hierarchical level, age, region, functional area and company

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table 7: Specificity of human capital and individual ability

[30] The results are even stronger when we omit this dummy.

[31] We also use future individual wage increases as further productivity measure, which confirms the results presented here.

We also replicate the results for the measure of the specificity of human capital, additionally controlling for individual ability. Even though we can again only use a subsample of observations, the results in table 7 are mainly robust compared to the estimates in table 5.

4 Conclusion

The key purpose of the paper was to explore wage differences between incumbents and newly hired employees on the same job. We started by analyzing a model in which firms compete for the service of employees and an employee's decision to stay with his current employer depends on the wages offered as well as his personal current job satisfaction. Uncertainty about job satisfaction in a new firm leads to switching costs. In turn, firms will offer higher wages to new recruits than they pay to comparable incumbents when firm-specific human capital is mainly general. If, however, firm-specific human capital is more important a competitor's willingness to pay is lower than the value of the employee for the current employer and the wage premia for new recruits should be smaller. If specific human capital is very important incumbent employees may even earn more than new recruits on the same position.

We then examined these predictions empirically using a large data set on wages in German banks and financial services companies which contains much more detailed information on the type of the jobs as compared to typical linked employer-employee data sets. We found that newly hired employees earn substantially more than incumbents in the same position at higher levels of the hierarchy. Moreover, these hiring premia are larger in functional areas where human capital is apparently often client-specific rather than firm-specific as well as in managerial positions. Indeed, we were able to show that a measure for the importance of specific human capital substantially affects the size of the wage premia. Moreover, wage premia are not driven by systematic differences in individual abilities between incumbents and newly hired employees.

Our study thus shows that firms typically (have to) pay more when poach-

ing employees from competitors. In turn, new hires on average earn more than equally able incumbents on the same job. An important implication of the result is that firms must earn rents from working with incumbents. This supports the claim put forward in the literature on internal labor markets that companies are indeed able to shield their incumbent employees from external market forces. But the extent to which this happens differs strongly between different types of jobs. A key determinant we investigated in this paper is the specificity of human capital. But other job characteristics such as the external visibility of talent should matter as well. It is an interesting task for future research to explore the importance and interplay of these different driving forces.

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5 Appendix

Level	2007				2006				2005				2004			
	Employees[a]		Age[b]		Employees[a]		Age[b]		Employees[a]		Age[b]		Employees[a]		Age[b]	
	Inc.	New	Inc.	New	Inc.	New	Inc.	New	Inc.	New	Inc.	New	Inc.	New	Inc.	New
6	2583	54	46.8	41.8	2594	29	46.1	41.1	2640	63	46.0	40.9	2261	24	46.5	40.0
	(97.95%)	(2.05%)			(98.89%)	(1.11%)			(97.67%)	(2.33%)			(98.95%)	(1.05%)		
5	12146	187	44.2	39.4	11896	151	43.5	38.9	11432	203	43.3	38.0	9283	99	43.7	39.0
	(98.48%)	(1.52%)			(98.75%)	(1.25%)			(98.26%)	(1.74%)			(98.94%)	(1.06%)		
4	25248	430	42.1	37.5	26308	431	41.7	36.4	26511	440	41.5	35.3	24392	256	41.1	36.1
	(98.33%)	(1.67%)			(98.39%)	(1.61%)			(98.37%)	(1.63%)			(98.96%)	(1.04%)		
3	24648	373	40.2	34.6	26069	500	39.4	33.5	25114	446	38.8	33.3	21706	233	38.5	32.7
	(98.51%)	(1.49%)			(98.12%)	(1.88%)			(98.26%)	(1.74%)			(98.94%)	(1.06%)		
2	26321	503	38.6	30.0	27404	525	38.0	30.0	27534	381	38.3	30.4	26763	368	37.5	30.6
	(98.12%)	(1.88%)			(98.12%)	(1.88%)			(98.64%)	(1.36%)			(98.64%)	(1.36%)		
1	9670	571	38.0	28.7	11221	417	36.7	27.1	10080	360	36.1	25.8	10345	479	36.7	25.9
	(94.42%)	(5.58%)			(96.42%)	(3.58%)			(96.55%)	(3.45%)			(95.57%)	(4.43%)		
Total	100616	2118	40.7	33.1	105492	2053	40.0	32.8	103311	1893	39.7	32.5	94750	1459	39.4	31.1
	(97.94%)	(2.06%)			(98.09%)	(1.91%)			(98.20%)	(1.80%)			(98.48%)	(1.52%)		

[a] Absolute and in % of respective level (in brackets); [b] Mean

Table A1: Proportion of newly hired and incumbent employees and distribution of age over hierarchical level (all levels)

	2007		2006		2005		2004	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Ln Base Salary	11.025	0.261	10.948	0.264	10.980	0.254	10.966	0.248
Age	41.88	7.94	41.21	7.95	40.82	8.03	40.66	8.21
Age squared	1816.72	681.92	1761.40	677.13	1730.39	680.27	1721.22	698.75
Newly Hired	0.016	0.125	0.016	0.127	0.017	0.130	0.015	0.122
Hierarchical level:								
Level 6 (highest)	0.040	0.195	0.039	0.193	0.040	0.197	0.040	0.197
Level 5	0.187	0.390	0.177	0.382	0.174	0.379	0.161	0.368
Level 4	0.389	0.488	0.393	0.489	0.403	0.491	0.421	0.494
Level 3	0.384	0.486	0.391	0.488	0.382	0.486	0.377	0.485
Functional area:								
Asset Management	0.024	0.152	0.018	0.131	0.017	0.131	0.019	0.137
Corporate Banking	0.075	0.264	0.085	0.279	0.082	0.275	0.096	0.295
Corp. Production	0.370	0.483	0.366	0.482	0.362	0.481	0.353	0.478
Corporate Services	0.146	0.353	0.150	0.357	0.139	0.346	0.138	0.345
Investment Banking	0.019	0.136	0.021	0.145	0.019	0.135	0.016	0.124
Private Banking	0.032	0.174	0.037	0.188	0.061	0.239	0.093	0.291
Retail Banking	0.299	0.458	0.285	0.451	0.283	0.450	0.246	0.431
Tr. & Cap. Mkts.	0.036	0.185	0.039	0.193	0.037	0.189	0.039	0.193

Table A2: Descriptive statistics (levels 3 to 6)

Dep. variable:	Logarithm of Base Salary				
	2008	2007	2006	2005	2004
Newly hired	-0.0604***	-0.0469***	-0.0394***	-0.0243***	-0.0235***
	(0.0051)	(0.0059)	(0.0051)	(0.0066)	(0.0053)
Age	0.0321***	0.0319***	0.0427***	0.0412***	0.0405***
	(0.0005)	(0.0006)	(0.00043)	(0.00046)	(0.00047)
$\text{Age}^2 * 100$	-0.0344***	-0.0341***	-0.0470***	-0.0452***	-0.0443***
	(0.0006)	(0.0008)	(0.00056)	(0.00059)	(0.00061)
Level 2[a]	0.173***	0.198***	0.141***	0.163***	0.178***
	(0.0016)	(0.0019)	(0.0013)	(0.0015)	(0.0015)
Observations	34874	25187	33938	34588	33738
R^2	0.63	0.70	0.70	0.69	0.67

Additional control variables include functional area, region and company

[a] Reference category Level 1

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table A3: OLS wage regressions regarding only entry levels 1 and 2

Dep. variable:	Logarithm of Base Salary				
	2008	2007	2006	2005	2004
Newly hired	-0.0208	0.0081	-0.0558***	-0.0854***	-0.0234
	(0.0153)	(0.0133)	(0.0125)	(0.019)	(0.018)
× Level 4	0.0537*	0.0571***	0.0963***	0.143***	0.0400*
	(0.0304)	(0.0201)	(0.0145)	(0.020)	(0.021)
× Level 5	0.0069	0.155***	0.140***	0.194***	0.133***
	(0.0413)	(0.0324)	(0.0203)	(0.026)	(0.031)
× Level 6	0.295***	0.115**	0.190***	0.230***	0.210***
	(0.0638)	(0.0576)	(0.0457)	(0.037)	(0.067)
Age	0.0270***	0.0330***	0.0204***	0.0234***	0.0164***
	(0.0001)	(0.0016)	(0.0010)	(0.0012)	(0.00078)
$Age^2 * 100$	-0.0260***	-0.0316***	-0.0066***	-0.0195***	-0.0128***
	(0.0017)	(0.0019)	(0.0012)	(0.0013)	(0.00091)
Level 6[a]	0.608***	0.635***	0.603***	0.624***	0.634***
	(0.0112)	(0.0089)	(0.0045)	(0.0051)	(0.0043)
Level 5	0.363***	0.305***	0.297***	0.331***	0.360***
	(0.0036)	(0.0042)	(0.0028)	(0.0031)	(0.0022)
Level 4	0.187***	0.136***	0.127***	0.158***	0.146***
	(0.0026)	(0.0032)	(0.0024)	(0.0026)	(0.0015)
Observations	16553	13933	37715	38851	44172
R-squared	0.69	0.72	0.68	0.65	0.74

Additional control variables include functional area, region and company in all specifications

[a] Reference category: Level 3

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table A4: OLS wage regressions excluding employees covered by a collective wage agreement

Dep. variable:	Logarithm of Base Salary				
	2008	2007	2006	2005	2004
Newly hired	0.0122*	0.0469***	0.0322***	0.0357***	0.0353***
	(0.0065)	(0.0068)	(0.0062)	(0.0071)	(0.0094)
Newly hired ×	0.0349**	0.0568***	0.0413**	0.0666***	0.0499*
Management	(0.0166)	(0.0213)	(0.0181)	(0.0207)	(0.030)
Management	0.1078***	0.1402***	0.1353***	0.1341***	0.1109***
	(0.0020)	(0.0033)	(0.0027)	(0.0032)	(0.0033)
Age	0.0183***	0.0228***	0.0227***	0.0244***	0.0216***
	(0.0009)	(0.0012)	(0.0009)	(0.0009)	(0.0009)
Age^2*100	-0.0162***	-0.0202***	-0.0197***	-0.0214***	-0.0183***
	(0.0010)	(0.0014)	(0.0011)	(0.0011)	(0.0010)
Level 6[a]	0.619***	0.573***	0.601***	0.598***	0.609***
	(0.0040)	(0.0056)	(0.0045)	(0.0049)	(0.0047)
Level 5	0.357***	0.317***	0.346***	0.340***	0.369***
	(0.0023)	(0.0027)	(0.0023)	(0.0025)	(0.0026)
Level 4	0.184***	0.159***	0.183***	0.170***	0.178***
	(0.0017)	(0.0020)	(0.0016)	(0.0016)	(0.0018)
Observations	45242	28098	39962	41776	37782
R-squared	0.71	0.72	0.74	0.71	0.73

Additional control variables include functional area, region and company

[a] Reference category: Level 3

*** p<0.01, ** p<0.05, * p<0.1, Robust standard errors in parentheses

Table A5: Interaction with career ladder