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Management Quality, Firm Size, and Managerial Compensation: A Comparison between Germany and the UK**

Abstract

This paper considers the relation between management quality, firm size, and managerial compensation. Exploring a German (SOEP) and a British (BHPS) data set we show that the impact of firm size on pay, which is consistently found in the management literature, vanishes (to a large extent) if it is controlled for manager quality. For the UK, we even find negative firm size elasticities. Different corporate governance systems may explain that in Germany the pay/firm size relation can only be partially explained by management quality measures. The impact of manager quality on firm size appears predominantly in the stochastic individual effects. Only for the German sample is the education/firm size-relation significant. Whether this surprising result is due to measurement problems deserves further attention.

JEL-Classification: I20, J31, D82.

Keywords: Firm Size; Manager Compensation; Returns to Education; Unobserved Ability.

1 Introduction

Microeconomic theory suggests that the marginal product of managers is larger at higher levels of the firm hierarchy (see *Rosen* (1992)). Thus, in competitive markets for managers, the most capable managers should be allocated to higher-level positions within the firm. In addition, managerial ability and the scale of resources under his control are complementary, the most talented managers should be found in larger firms with more demanding tasks. The inter-firm mobility of managers is driven by a matching process in which firms employ managers who can make the best use of their talent (see *Lazear* (1986)). Since a manager's ability is uncertain at the time of initial contracting and the manager is risk-averse, the firm offers a partial-insurance contract under which the firm insures the manager against adverse realizations of ability, but raises his compensation to retain him if he shows high ability (see *Harris/Holmström* (1982)). Therefore, we expect that managerial ability, firm size, and managerial compensation are complements.

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The management literature concentrates on the values and cognitive bases of managers. *Hambrick/Mason* (1984)) propose that firm outcomes are partially predicted by managerial background characteristics. 'Upper echelons' research indicates that the demographic characteristics of managers are related to a range of important firm outcomes such as strategic choice (*Finkelstein/Hambrick* (1990)), strategic change (*Wiersema/Bantel* (1992)), competitive behavior (*Hambrick/Cho/Chen* (1996)), market entry/exit behavior (*Boeker* (1997); *Hambrick/D'Aveni* (1992)), and firm performance (*Simons/Pelled/Smith* (1999)). There is less evidence on whether demographic characteristics are related to managerial compensation. *Finkelstein/Hambrick* (1996) report about positive impacts of managerial experience on CEO pay. *Schwalbach/Brenner* (2001) find that managers' level of education and experience has a positive effect on compensation.

In this paper we focus on the relation between managers' ability, firm size and managerial compensation. Our analysis is conducted with comparable data from Germany and the United Kingdom. Both countries are very different in terms of their corporate governance structure. Therefore, the two-country comparison allows a rigorous test of our hypothesis.

We define corporate governance as the way in which firms are directed and controlled (*Schwalbach* (2003)). Shareholders are the ultimate owners of the firm who typically delegate decision-making authority to a management team. The fundamental question arises: Are the interests of the management team aligned with those of the ultimate owners? If there are incentives for the interests of each group to diverge, then we must examine those forces that provide potential realignment. We suspect that the potential for realignment differs between Germany and the UK, and that this difference might affect the relation between managers' ability, firm size, and compensation.

The difference in the potential of realignment might be due to different mechanisms used to resolve the owner/manager issues. In the UK, there is a well-developed equity market where the equity in each company is controlled by shareholders. These are institutions or private investors who are not closely involved with the firm. The company board in the UK is made up of executive and non-executive directors. Although the share of outside directors is usually between 0.5 and 0.6 but has been increasing lately. UK companies have also been adopting key board committees. In contrast, the German corporate governance is characterized by dual boards where a substantial amount of equity in each company is controlled by a few large shareholders and/or representatives of shareholders such as financial institutions. These shareholders have a long-term commitment to the company. Large German firms are known for their close ties to banks, insurance companies, dual shareholdings, and interlocking directorates. The representatives of the shareholders in the supervisory board are often drawn from the executive ranks of other large corporations in which some of them have major stakes in the corporation.

In both the UK and Germany, the influence of the boards in attracting talented managers, monitoring their efforts, and setting performance incentives might be determined by the different corporate governance systems. Since the information

asymmetry between the two-board system in German firms is larger than in the British one-board system, we might expect that effective monitoring and evaluating managers' efforts and performance is more difficult across boards than within boards, particularly with increasing firm and board size. Therefore, we expect different outcomes in our empirical analysis of the relation among management quality, firm size, and managerial pay between Germany and the UK.

Our approach to testing *Rosen*'s model is similar to that of *Ángel/Fumás* (1997). It differs mainly in the data sets. First, we use data from two countries with different corporate governance systems. This approach allows us to determine if our results are robust. Further, we use a panel of individual observations that let us take into account the unobserved ability of managers. Since there may be problems measuring the true ability of a manager, being able to control for unobserved ability is a way to overcome some of these difficulties. Third, both studies complement each other because our sample consists of managers from the middle and lower levels of the firm hierarchy, while *Ángel/Fumás* consider top and middle level managers. Finally, we have obtained more detailed information on the managers' education.

The paper is organized as follows. In the next section we present the model. Section 3 describes the data set. Section 4 explains the estimation procedure and Section 5 reports the results. Section 6 concludes.

2 Model specification

To analyze the relation between manager quality, firm size, and compensation, we use the following structural model:

$$\ln S_{i,j,t} = \alpha_1 + \alpha_2 EXP_{i,t} + \alpha_3 EXP_{i,t}^2 + \alpha_4 TEN_{i,t} + \alpha_5 TEN_{i,t}^2 + \alpha_6 EDU_i + \lambda_{1,i} + \gamma_{1,j} + \delta_{1,t} + \in_{1,i,j,t} \quad (1)$$

$$\ln C_{i,j,t} = \beta_1 + \beta_2 \ln S_{i,t} + \beta_3 EXP_{i,t} + \beta_4 EXP_{i,t}^2 + \beta_5 TEN_{i,t} + \beta_6 TEN_{i,t}^2 + \beta_7 EDU_i + \lambda_{2,i} + \gamma_{2,t} + \delta_{2,i} + \in_{2,i,j,t} \quad (2)$$

for managers $i = 1,\ldots,N$ from industry $j = 1,\ldots,J$ observed at time $t = 1,\ldots, T$. $S_{i,j,t}$ is a measure of firm size and $C_{i,j,t}$ is the manager's pay. The right-hand-side variables comprise tenure (*TEN*), labor market experience (*EXP*), and the level of education (*EDU*). The coefficients we estimate are labeled α_l ($l = 1,\ldots,6$) and β_m ($m = 1,\ldots,7$).

Individual effects and industry effects are represented by λ_i and γ_j. Time effects are accounted for by δ_t. We assume that individual effects are random and time effects are fixed. Disturbances $\in_{1,i,j,t}$ and $\in_{2,i,j,t}$ are homoskedastic and stochastically independent of each other. We also assume that the random effects in (1) and (2) are independent.

To measure management quality, we use labor market experience, tenure, and the level of education, all measured in years[1]. The use of these variables as proxies for managerial talent receives support from both the management literature (among others, *Finkelstein/Hambrick* (1990); *Wiersema/Bantel* (1992); *Simons/Pelled/Smith* (1999)) and the human capital theory (*Card* (1999)). We hypothesize that management quality has a positive impact on pay because of the higher marginal productivity of better-qualified managers. Equation (2) corresponds to the standard human capital earnings function developed by *Mincer* (1974), which is also extensively used in the literature on manager compensation (*Murphy* (1999); *Schwalbach/Grasshoff* (1997)).

According to *Rosen*'s (1982) theory, the firm size is also related to management quality. Better-qualified managers are assigned to higher positions in the firm's hierarchy. *Rosen* does not explicitly consider the firm size/manager pay relation, but focuses instead on the resources under the manager's control. For top managers, the control over resources and the firm size are, of course, identical. Since we do not focus on the top managers, to test *Rosen*'s model we must assume that firm size and the resources under the manager's control are positively correlated. That is, we assume that managers control corporate resources that are a constant share of the firm size.

We estimate equations (1) and (2) with firm size and manager pay as the endogenous variables[2]. The compensation numbers are deflated, using the OECD consumer price index (2000). Further, we use logarithms to remove heteroskedasticity in the data and to facilitate the interpretation of the estimated coefficients. The firm size variable is available only in grouped form. Instead of using the group number, we choose the logarithm of the median of each respective group. In equations (1) and (2), we also control for the effects of the manager's sex and the firm's industry.

3 Data description

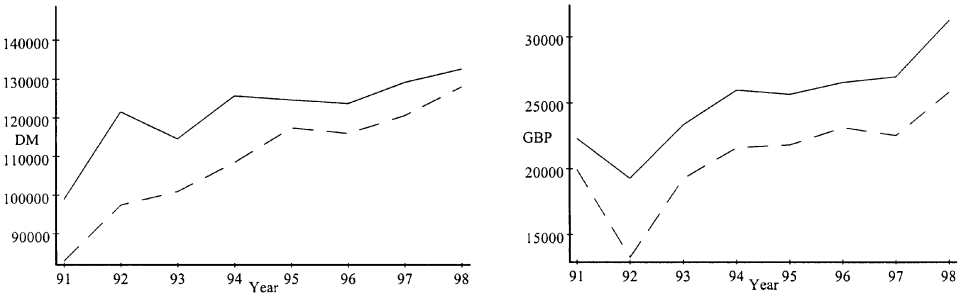
We obtain our data sets from the SOEP (German Socio-Economic Panel, 1998) and the BHPS (British Household Panel Study, 1998). These data sets cover managers of private sector companies selected by the same classification system (International Standard Classification of Occupations). We also require that individuals state in the questionnaires that they are "loaded with managerial duties".

To avoid temporal bias we consider only those observations made between 1991 and 1998. The panel is unbalanced with at least three observations in each time series. The German data set consists of 459 observations from 102 individuals. The British panel includes 234 managers observed in 1,020 cases.

1 We define labor market experience as age minus years of schooling minus pre-schooling period.

2 In contrast to *Ángel/Fumás* (1997), we include firm size in (2) to account for the part of the pay/size relationship which is not explained by our quality variables.

Figure 1: Mean and median (dashed line) of the yearly gross income of German managers in DM (left) and British managers in UK Pounds Sterling (right)



The samples supply different compensation numbers (before/after tax, supplementary payments, bonuses, etc.). We choose yearly gross labor income which includes extra payments such as bonuses. The data set does not include non-pecuniary compensation. *Figure 1* shows the time series of the (undeflated) mean and median of gross labor income for both countries. The mean values constantly lie above the median, which indicates a skewed distribution of pay. The average wages of managers in this panel are low in both countries (*Conyon/Schwalbach* (1999; 2000a,b)). Low wages may be due to the fact that the panel includes very few top level, but many middle and lower level managers. Further, average compensation is much higher in Germany. This finding is consistent with *Conyon/Schwalbach* (1999; 2000a, b), but inconsistent with *Murphy* (1999).

There are some considerable differences in the demographic structure of the managers in both countries (see *Table 1*). The share of women managers is much higher in the UK. In Germany, the mobility barriers for talented women managers are much higher. Furthermore, the average tenure of managers of both sexes is significantly higher in Germany. Higher tenures can be attributed to the fact that the German labor market is more strongly regulated, so firing managers may impose higher costs on the employers. Finally, differences in the education systems are evident in the different average number of years of schooling. On average, years of schooling are higher in Germany, which is known for the length of time needed to acquire the A-levels and more advanced degrees.

Unfortunately, besides size and industry, there is no information about the companies available. Therefore, we measure firm size as the number of employees, available only in grouped form in both panels[3]. The German data set is dominated by larger firms. Over the entire period of time, the yearly median corresponds to companies from the group with 200 to 2,000 employees. In the UK, this number varies in the early 1990s. Since 1995 the number has stabilized at the size band of 25 to 49 employees.

3 The boundaries between the size groups are 5, 20, 200, and 2,000 employees for the German data set and 3, 10, 25, 50, 100, 200, 500, and 1,000 employees for the British data set.

*Table 1: Descriptive statistics of some demographic variables, standard deviations in parantheses, + in percent of all observations, * in years*

	Female+		Tenure*		Age*		Schooling*	
	UK	GER	UK	GER	UK	GER	UK	GER
91	22.2	12.0	5.7(3.8)	8.7(8.5)	39.6(8.9)	42.0(7.1)	12.7(3.4)	13.1(2.8)
92	20.0	11.0	4.4(2.1)	8.4(8.3)	38.8(11.1)	42.5(8.0)	13.8(1.8)	13.3(2.9)
93	24.2	7.0	7.0(5.4)	11.6(11.1)	41.3(9.1)	42.3(9.0)	12.3(3.3)	13.9(2.9)
94	21.2	7.9	7.2(5.7)	10.9(10.3)	40.6(8.9)	43.1(9.3)	12.5(3.9)	14.3(2.9)
95	23.6	9.0	6.8(5.2)	11.7(11.4)	41.7(9.6)	42.3(9.1)	12.5(3.2)	14.2(2.9)
96	23.5	9.0	7.2(5.7)	10.3(10.5)	42.3(9.3)	42.6(9.2)	12.2(3.1)	14.4(2.9)
97	23.5	13.0	8.2(6.2)	12.2(9.6)	43.6(9.5)	44.1(9.1)	12.5(3.3)	14.6(2.9)
98	20.7	13.0	8.2(5.9)	12.2(8.6)	43.7(8.8)	44.8(7.9)	12.4(3.3)	14.7(2.9)

4 Estimation procedure

Estimation of (1) and (2) presents a number of problems. First, simultaneous equation systems are usually estimated based on their reduced form rather than their structural form. By doing so, researchers can circumvent the problem of correlation between the coefficients of endogenous variables and the residuals (see, for example, *Judge/Hill/Griths/Lütkepohl/Lee* (1988)). Equation (1) corresponds to the reduced form. It can be estimated separately from (2) because we assume that the residuals are stochastically independent. However, the reduced form of (2) does not provide enough parameters to identify the structural coefficients.

Second, estimation problems for (1) and (2) arise because of possible correlations between the education variable and the individual effects ("ability bias", see *Card* (1999) and between the tenure and the individual effects (*Kletzer* (1989) and *Ruhm* (1990))[4]. Hence, both estimation problems are related to correlations between variance components and model variables. Since we expect the individual effects to represent the largest portion of the variance components, we focus on possible correlations between individual effects and the model variables.

Correlations between individual effects and model variables may be accounted for by the use of an instrumental variables estimation (IV). For example, for the ability bias, variables in the individual's biography serve as proxies for completed schooling. *Card* (1999) shows that this estimator is unbiased only under very strong and unrealistic assumptions. However, the longitudinal structure of the data set allows for alternative estimation procedures.

One approach would be to apply the *Within-Group-Estimator*. This method delivers consistent estimators but no parameter estimates for the time-invariant vari-

4 The literature indicates that there may be correlations between the period of education and the slope of the wage equation. The resulting bias can be ignored if the returns on schooling are homogeneous within the group (*Card* (1999)). We can make this assumption, since in this paper we restrict attention to a specific group of managers.

ables are available[5]. *Hausman/Taylor* (1981) propose another method, which produces consistent estimators. Here, those variables that are correlated with the individual effects are separated from the uncorrelated variables. The uncorrelated variables and the time-invariant fraction of the correlated variables are used as instruments for the variables that are assumed to be correlated with the individual effects[6].

We apply the Generalized Instrument Variables Estimation (GIV) procedure described by *Härdle/Klinke/Müller* (2000). GIV is a simplified version of the *Hausman/Taylor* method. The main difference lies in the fact that in *Härdle/Klinke/Müller* instruments are not divided into a time-variant and time-invariant components, because the resulting gain in efficiency is so often low. Hence, only those variables are used as instruments (and not some transformations of them), that are not correlated with the individual effects.

Crucial for this estimator to be consistent is the correct division of the model variables in subsets of correlated and uncorrelated variables. Since the observed ability measures of tenure, labor market experience, and education may be correlated with the individual effects that are sometimes interpreted as unobserved ability, they are potential candidates for correlated variables. Further, in equation (2), we consider firm size, because in *Rosen*'s model it reflects manager quality.

The correlation between model variables and the individual effects can be tested by a Hausman-test (*Hausman/Taylor* (1981)). Under the null hypothesis, the set of variables is uncorrelated with the individual effects. For both countries, this hypothesis cannot be rejected in equation (1). However, in equation (2), for both the German and the British data sets, we reject the null hypothesis for firm size and labor market experience. Thus, we use a simple Random Effects Model in case of no correlation, and otherwise apply the GIV method.

We also test if individual effects are significant in (1) and (2). We find that such effects are true at conventional significance levels. We consider fixed-time effects by subtracting the time mean of each variable and adding its overall mean.

We note that the assumption of no correlation between individual effects in equations (1) and (2) might be too restrictive. The same unobserved characteristics that affect the compensation may also influence the firm size. Taking this correlation into account may increase the efficiency of the estimation. However, it would also make the estimation problem more difficult. Besides, we had to make restrictive assumptions about the variance-covariance matrix (*Hsiao* (1986)). Thus, we decided to neglect this possible relation.

5 This estimator is based on transformations of the data into deviations from individual means. Thus, it eliminates individual effects. Clearly, time-invariant variables are eliminated by calculating the deviation from the time average. In our specification, we could obtain estimates for the experience variables, but not for the schooling coefficient or for other time-invariant variables.

6 *Amemiya/MacCurdy* (1986) and *Breusch/Mizon/Schmidt* (1986), developed similar estimators that are more efficient under certain conditions (see *Cornwell/Rupert* (1988)).

5 Empirical results

Table 2 shows the estimated parameters of equation (1) for the UK and Germany, respectively. We can see considerable differences between both countries in the years of schooling coefficient (*EDU*). Although in Germany the relation between education and firm size is strongly positive and significant, the British parameter is negative, small, and insignificant. The coefficients can be interpreted as semi-elasticities. Hence, German managers with one more year of education are on average employed by firms whose size is 21 percent larger.

The firm-unrelated labor experience parameters show a consistent concave pattern across both countries. On average, more experienced managers work at larger companies, and the intensity of this relation decreases with the level of experience. The coefficients are strongly significant. In contrast, for the firm-specific experience, the estimated coefficients for the British data set are both negative, while the German coefficients are both positive. However, the parameters are not statistically different from zero, thus interpretation of the signs is not reasonable.

We note that an irregular pattern can be observed for women managers. British women tend to manage small companies, but German women managers are more frequently employed by larger companies. The majority of the industry dummies (not reported here) are significantly different from zero.

*Table 2: GLS estimation, dependent variable firm size, standard deviations reported below coefficient estimates, significance levels: *p < 10%, ***p < 1%*

	ln(Firm size)	
	UK	GER
Labor market experience (EXP)	0,1060*	0,0254
	(0,0768)	(0,0733)
Labor market experience ($EXP^2/100$)	-0,1044*	-0,0278
	(0,0893)	(0,1389)
Firm tenure (TEN)	-0,0214	0,0247
	(0,0434)	(0,0354)
Firm tenure ($TEN^2/100$)	-0,0111	$7{,}730*10^{-3}$
	(0,1699)	(0,1013)
Education (EDU)	$-8{,}942*10^{-3}$	0,2121***
	(0,0259)	(0,0623)
Female (SEX)	-0,4504***	0,4220
	(0,2440)	(0,6007)
Constant	0,000	3,053***
	(0,8085)	(1,465)
R^2	0,3012	0,3596
number of observations	1020	459

Equation (2) was estimated by the GIV method described in the previous section. Estimation results are shown in *Table 3*. We note that most of the coefficients are highly significant across countries and specifications, reflecting the high efficiency of the estimation procedure.

*Table 3: GIV estimation, dependent variable manager compensation, robust standard deviations reported below coefficient estimates, last row indicates which variables are assumed to be correlated with the individual effects, significance levels: * p < 10%, *** p < 1%*

	ln(Manager compensation)	
	UK	GER
Firm size (S)	-1,274*10^{-3}	0,0153*
	(8,79*10^{-3})	(0,013)
Labor market experience (EXP)	0,0838***	0,0995***
	(0,0193)	(0,0138)
Labor market experience (EXP^2/100)	-0,0634***	-0,1636***
	(0,0205)	(0,0280)
Firm tenure (TEN)	-1,908*10^{-3}	-0,0111***
	(6,32*10^{-3})	(0,0048)
Firm tenure (TEN^2/100)	-0,0180	0,0251
	(0,0247)	(0,0147)
Education (EDU)	0,02907***	0,0675***
	(7,88*10^{-3})	(0,013)
Female (SEX)	-0,361***	-0,2291***
	(0,0633)	(0,1152)
Constant	-2,026*10^{-3}	1,258*10^{-3}
	(0,0252)	(0,0335)
R^2	0,225	0,322
number of observations	1020	459
λ_i corr. with	first 3 var.	first 3 var.

The firm size elasticity of pay differs strongly between the two countries. The coefficient takes a high value for Germany, but a negative value for the British data set[7]. At first sight, the negative coefficients may be surprising. However, since we control for manager quality, this is exactly the result we could expect. Manager quality is represented by observed variables of education and experience and the individual effects that correspond to the unobserved manager ability. If we estimate (2) without controlling for those variables, the size parameter changes dramatically. Estimating pay by OLS on firm size, manager's sex, and industry dummies leads to significant size elasticities of 2,2% to 7,6% for the UK and 5,2% to 5,7% for Germany. This result indicates that the relation between manager pay and firm size can be at least partly traced back to uncontrolled manager quality. Moreover, the negative size-pay relationship in the UK is plausible, since it is consistent with the view that small firms are forced to compensate their

7 Other studies find size elasticities of manager pay of about 0,3% (*Murphy* (1999)).

(risk-averse) employees for larger failure rates. Different firm size elasticities of pay in both countries may reflect different corporate risk profiles.

But different corporate governance systems may also be responsible for the fact that in contrast to the UK, in Germany only part of the pay/size relation can be explained by manager quality measures. In Germany, the close interweaving of large companies' supervisory and executive boards may make a weakening of the quality of management one of the main determinants of firm size. For example, supervisory boards may not change the management in response to corporate failure as fast as in the UK, where the market for management personnel is better developed. However, because we are not provided with perfect quality measures, we cannot give a definitive answer to this question. However, we do provide another explanation in the following section.

The return to the schooling coefficient is higher for German managers, who obtain a premium for each year of further schooling. This premium is four percent higher than that for their British colleagues. Moreover, the returns to schooling are generally lower compared to samples that include both white- and blue-collar workers (for Germany see *Lauer/Steiner* (2000), for the UK see *Harmon/Walker* (1995). There may be at least two reasons for this difference. First, in the manager sample, the education level is higher than in samples comprising a wider range of the work force. If marginal returns fall with the number of schooling years, the marginal returns to schooling are on average lower for this group. Second, by using the GIV method, we partially control for an upward ability bias of the schooling parameter[8].

Figure 2 shows the returns to firm and labor market experience for certain periods of time[9]. Clearly, the returns for experience vary with the level of experience. The concave log earnings-experience profile, which is a very stable pattern in empirical labor economics, also appears in our estimation results for labor market experience[10]. When we compare the results for both countries, we find lower returns to experience for young British managers. Because of faster decreasing returns in Germany, the experience-earning paths of both countries intersect after a level of about seven years of experience. Thereafter, German managers are worse off in the marginal return.

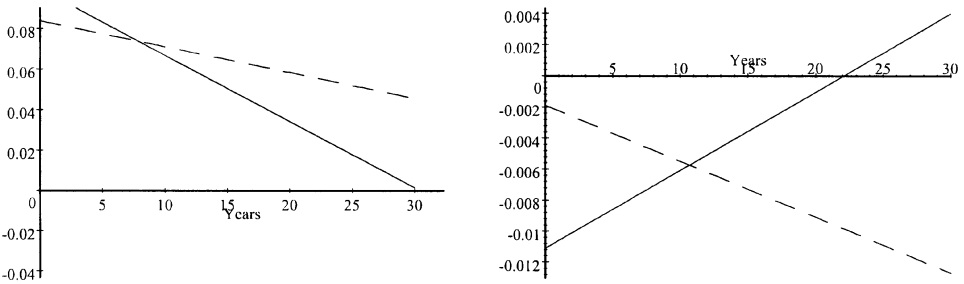
Theory predicts a concave relation between tenure and manager pay, since the marginal rate of compensation decreases with the marginal productivity of the manager. However, *Harris/Holmström* (1982) argue that more-experienced managers possess a greater bargaining power than do their younger colleagues, resulting in an entrenchment effect. Indeed, for Germany the estimated relation shows a convex pattern. Moreover, the reverse signs of the tenure parameters seem to be robust, since *Schwalbach/Brenner* (2001) find the same result for a similar German sample compounding additional seven years of observations. For the UK, the

8 This possible bias is reflected in higher OLS estimates for the returns to schooling (not reported).

9 The effect of experience on the log wages can be calculated by $\beta_3 + 2\beta_4 EXP$, where β_3 and β_4 are the estimated coefficients of the linear and quadratic experience terms in (2).

10 We note that in our specification the concave relation results in linearly decreasing returns to experience.

Figure 2: Returns to labor market experience (left) and tenure (right) at different experience levels (UK dashed)



marginal effect of tenure on pay is even negative throughout the whole period of time, but statistically not significant (see *Figure 2*). These results could be due to group effects. Because only truncated time series are available, we do not observe whole lifetime earning paths. Thus, the estimated quadratic tenure function aggregates data from individuals of different ages who may have completely different tenure profiles. Even if the true single-tenure functions were concave, the estimated (pooled) function could exhibit convex behavior. Further, the observed tenures are small. Thus, the range supporting the estimation may not justify statements about managers' longer periods of firm membership. Another reason could be that the entrenchment effect is stronger in Germany and thus dominates the wage-tenure relation. Different labor market systems (with less flexibility in Germany) could be the reason.

The effect of the manager's sex and the industry effects are considered. The estimates of the sex dummy indicate a strong tendency towards discrimination against women managers[11]. After controlling for several variables of education, experience, and industry, we find that women managers' average pay is lower by 30 percent in the UK and by 20 percent in Germany[12]. Most of the industry dummy parameters are either not at all, or only weakly, significant.

6 Conclusion

This paper examines the relation between firm size, manager quality, and manager compensation. The empirical analysis reveals the strong impact of manager quality on pay in both Germany and the UK, as measured by variables of education and experience. This result is in line with *Ángel/Fumás* (1997), who find a strong relation between firm size and manager pay mediated by manager quality. However, we also find that a considerable share of management quality has an

11 However, conclusions should be made cautiously since our estimation methods do not aim at uncovering wage discrimination (*Oaxaca* (1973)).

12 Coefficients in a semi-log-linear specification are usually interpreted as the relative change of the dependent variable induced by a unit change of the independent variable. Because dummy variables are discontinuous, this interpretation does not hold (e.g. *Giles* (1982)). Thus, dummy coefficients d were transformed by $(\exp(d) - 1) \cdot 100\%$.

impact on size and pay "hidden" in the individual effects, which are often interpreted as unobserved ability. In their analysis, *Ángel/Fumás* could not control for unobserved characteristics of managers.

Our estimation results for the impact on managerial pay are remarkable. The coefficients of the years of schooling and the firm nonspecific experience are among the most significant parameters. Firm-specific experience is only significant for the German sample. This result may be due to differences of the corporate governance systems. The German system, with its very close interweaving of supervisory and executive boards across industries, may favor managers with long tenure in large companies who might be more independent in setting their own salary than are their British counterparts. We are particularly interested to note that there is strong discrimination against women managers in both countries.

There is a considerable difference between the size elasticity of pay which is much larger for Germany. However, we find to a large extent, that the impact of firm size on manager compensation vanishes if it is controlled by manager quality. This finding supports our hypothesis that firm size is a proxy for managerial talent. After controlling for manager quality, we find a negative pay-size relation in the UK. One explanation may be related to the risk of being employed by a smaller, and hence riskier, company. Since we cannot obtain risk measures, this question remains to be examined by future research. There is another explanation, one which does not rely on the assumption of risk averse managers. When the ability of the manager is known only to the manager himself, a more able manager might accept a lower payment from the larger firms because he has a greater incentive to reveal his own quality. For example, through diversification larger firms may show more stable performance and thus, there is a higher chance that the type of this manager will be revealed in a stochastic environment. In smaller firms with a higher idiosyncratic risk, even good managers may fail and their ability will remain undiscovered by the owners of the firms. However, this argument needs further theoretical investigation[13].

The impact of manager experience on pay remains unclear. Like *Ángel/Fumás* (1997), we find a positive (concave) relation between labor market experience and pay, as predicted by human capital theory. However, the German data set exhibits a convex relation between pay and tenure while the British data show a negative relation. Similarly, *Ángel/Fumás* established a negative impact of tenure on pay for Spanish top-level managers. Since the Spanish corporate governance system is similar to the German one, this heterogeneity within the data appear to be the result of other sources of influence. However, this is a subject for future research.

We estimate the direct impact of manager quality on firm size. Here, the education parameter is significant for Germany but not for the UK. Further, surprisingly, in the UK women managers are on average employed by smaller companies, but in Germany the opposite is true. Our results leave us wondering why manager quality has a strong impact on pay, but has only a partial influence on firm size. This

13 A recent paper by *Ortega* (2003) elaborates on a similar idea.

pattern contrasts with *Ángel/Fumás'* estimates of the tenure parameters that show a positive and concave impact and which are significantly different from zero. We suspect that this difference is attributable to problems in measuring manager quality. The large stochastic individual effects of the firm-size equation suggest that individual ability may be "hidden" in the individual effects. Through stricter measures of education, intelligence, etc., the corresponding parameters may become significant. Furthermore, the estimation could be enriched by complementing the demographic variables by psychological measures of managerial talent.

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